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Amateur Radio

CQ

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur radio

NEW!

"DX-cellence!"

TS-940S

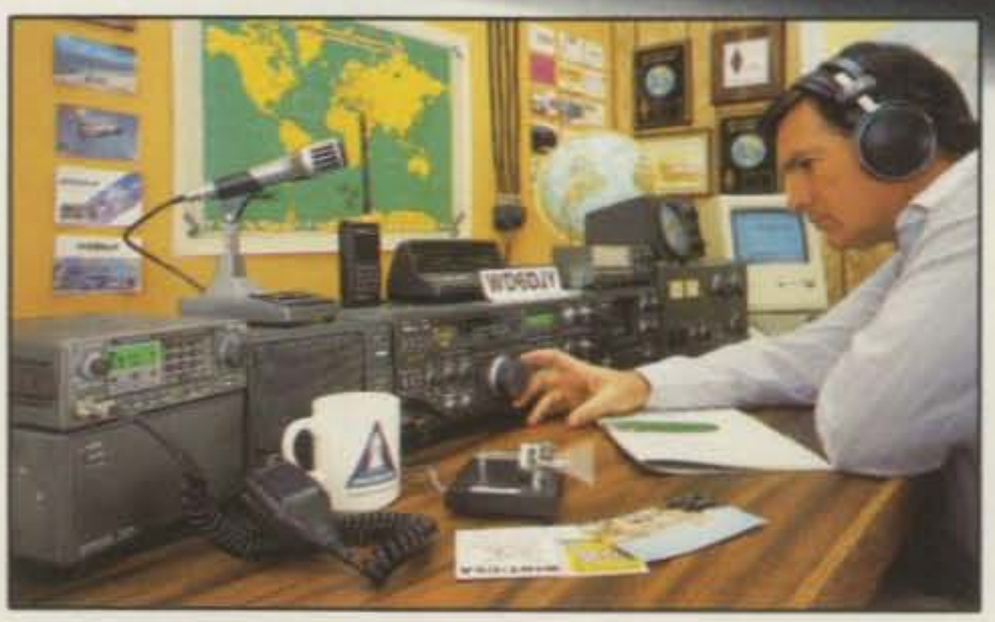
The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **Programmable scanning.**
- **Semi or full break-in (QSK) CW.**
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**

Optional accessories:

• AT-940 full range (160-10 m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First.



More TS-940S information is available from authorized Kenwood dealers.

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

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

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Matching Pair

TS-711A/811A VHF/UHF all-mode base stations.

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.**
  The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.**
  Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.**
  Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.

- **Versatile scanning functions.**
  Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.**
  Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.**
  You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.**
  For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.**
  Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.**
  Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **Optional voice synthesizer.**

More TS-711A/811A information is available from authorized Kenwood dealers.

Optional accessories.

- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- PG-2J DC power cable
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner

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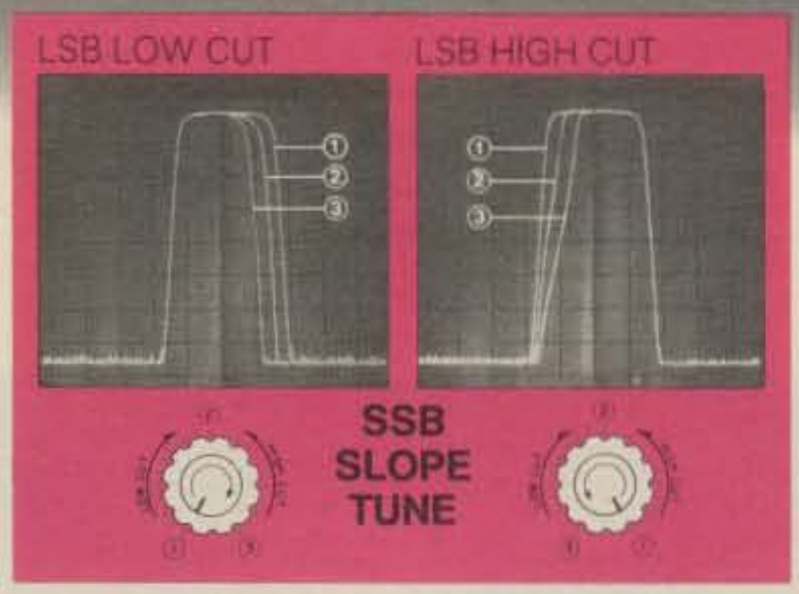
"DX-traordinary"

TS-930S

All band HF transceiver/ general coverage receiver.

The TS-930S (with or without automatic antenna tuner) is a high performance DX and contest transceiver delivering superior features and field-proven performance. Compare the TS-930S with other HF rigs in its price class and see why no other rig comes close!

- **160-10 meters, with 150 kHz-30 MHz general coverage receiver.**
  An innovative, quadruple "UP" conversion digital PLL synthesized circuit provides superior frequency accuracy, stability, plus greatly enhanced selectivity.
- **Non-volatile operating system.**
  Kenwood transceivers retain all micro-coded operating functions even when the lithium memory back-up batteries fail.
- **Easily modified for HF MARS and CAP operation.**
- **All solid-state, 28 volt final amplifier for lowest intermodulation distortion.**
- **Power input rated at 250 watts on SSB, CW, FSK, and 80 watts on AM.**
- **Full break-in or semi-break-in CW.**
- **CW VBT and pitch controls.**
  CW Variable Bandwidth Tuning control tunes out interfering signals. The CW pitch control shifts the IF passband and simultaneously changes the beat frequency pitch.



- **SSB slope tuning—Another Kenwood First!**
  Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection.
- **IF notch filter.**
- **Tunable audio filter built-in.**
- **RF speech processor.**
- **Dual mode noise blanker.**
- **Dual digital VFOs.**
- **Eight memory channels.**
- **AC power supply built-in.**
- **Built-in automatic antenna tuner (optional).**
  Covers 80-10 m. *Another industry first by Kenwood!*
- **Fluorescent tube digital display.**
- **Excellent receiver dynamic range.**
- **One year limited warranty.**

Optional accessories:

- AT-930 automatic antenna tuner
- SP-930 external speaker, with selectable audio filters
- YG-455C-1 (500 Hz) CW filter
- YG-455CN-1 (250 Hz) CW filter
- YK-88C-1 (500 Hz) CW filter
- YK-88A-1 (6 kHz) AM filter (all plug-in type)
- SO-1 commercial stability TCXO
- MC-60A, MC-80, MC-85 desk microphones
- TL-922A linear amplifier (not for CW QSK)
- SM-220 station monitor
- PC-1A phone patch
- SW-2000, SW-200, SW-100 SWR meters
- HS-4, HS-5, HS-6, and HS-7 headphones.
- LF-30A low-pass filter

More TS-930S information is available from authorized Kenwood dealers

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The Radio Amateur's Journal

JANUARY 1986 VOL. 42, NO. 1

ON THE COVER: Obviously this shot could be called "Ham and Eggs." The kitchen and cupboard in particular is the site for the station and repeater of Bob Hassler, WB2AAO, and his wife Brigitte, N2ETC. Photo by Larry Mulvehill, WB2ZPI.

FEATURES

DEPARTMENTS

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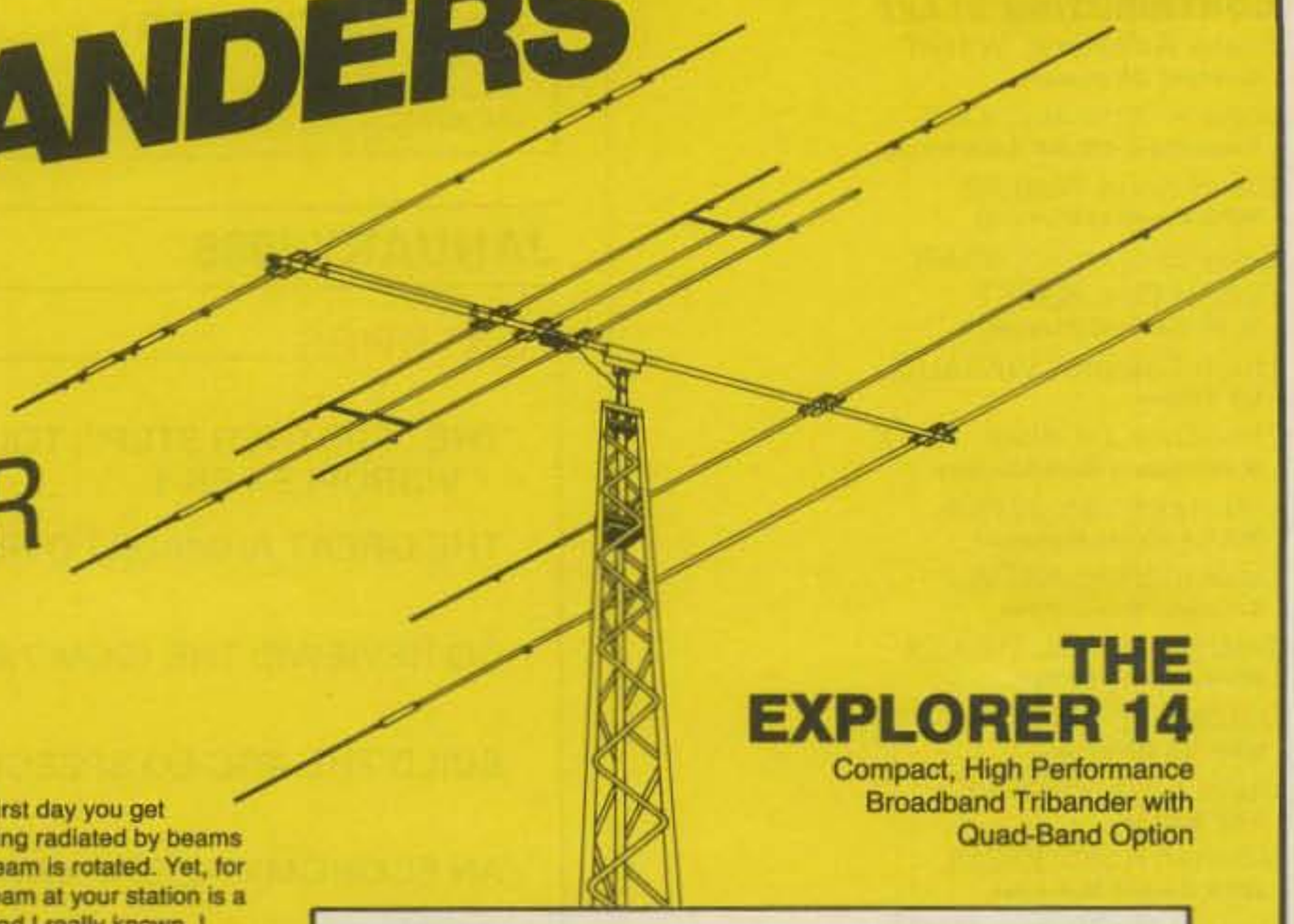
hy-gain®

BROADBANDERS

MAXIMIZE THE POTENTIAL OF YOUR HAM GEAR



There is nothing like a beam!

You hear about the importance of the antenna system from the first day you get involved in amateur radio. You hear the big signals on the air being radiated by beams and you hear those same signals virtually disappear when the beam is rotated. Yet, for whatever the reason, getting on the air for the first time with a beam at your station is a down-right exhilarating experience. The universal reaction is "Had I really known, I would have installed a beam years ago".

The gain of a beam multiplies the effective radiated power of your transmitter just like an amplifier. More importantly, it amplifies the signal from the station being beamed. Off the sides and back of the antenna, the effective radiated power of those kilowatts on/near your frequency are reduced to manageable QRP levels.

A well-designed beam is by far the best performance buy you can make and it doesn't use any electricity. Further, if you buy a good one, it will last longer than some of the electronics gear in your shack. In terms of cost per hour of enjoyment, a beam antenna is among the least expensive major station components.

As sunspot cycle 21 winds down over the next few years the priority for a good beam shifts from "great to have" to "essential!" To maximize your station capability on the high bands choose one of these super broadband arrays.

THE EXPLORER 14

The same compact size as the well-known TH3Mk3 it replaces. The driven element uses an open sleeve dipole which is a concept that we call PARA-SLEEVE (Patent Pending). The para-sleeve design achieves the broadband performance objective. The forward gain and front to back ratio is very impressive, especially when compared with other antenna designs in the same size class. 43 lbs. (19.5 kg) of superb performance on a 14 ft. (4.3 m) boom. Turning radius 17 ft. (5.3 m) and 7.5 sq. ft. (.69 m²) of surface area. The EX 14 is the ideal choice where space is limited. Great for roof mount or on smaller towers. Optional QK7-10 kit adds your choice of either 30 or 40 meters to the driven element.

FIVE ELEMENT THUNDERBIRD TH5Mk2

Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. 72 lbs. (32 kg) of rugged antenna with 7.4 sq. ft. (.68 m²) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).

SEVEN ELEMENT THUNDERBIRD TH7DX

This is a broadband successor to the legendary TH6DXX. Five active elements on 10 meters and four elements on both 15-20 meters. The TH7DX represents the ultimate in high-performance arrays whether you're comparing other large tribander's or stacked monobander's. 76 lbs. (35 kg) with a surface area of 9.4 sq. ft. (.87 m), a 24 ft. (7.3 m) boom and a turning radius of 20 ft. (6.1 m). If you own a TH6DXX, a conversion kit is available which includes the second driven element, the completely new matching system, a full set of stainless steel hardware, and of course, step by step instructions. After conversion, your TH6DXX is a TH7DX, exactly.

FEATURES COMMON TO EX 14, TH5Mk2, and TH7DX:

- Separate Hy-Q traps for each frequency. Factory assembled and individually resonated to insure uniform performance.
- Handles maximum legal power with a respectable margin of safety.
- Unique broadband beta match assures efficient energy transfer and places the entire antenna structure at dc ground.
- BN 86 balun supplied as standard.
- Top quality stainless steel hardware supplied at no added cost.
- Super strong, taper swaged 6063-T832 thick-wall aluminum tubing used throughout.
- Unique Hy-Gain die cast aluminum boom to mast bracket. Accepts mast diameters up to 2½" (63 mm).
- Twist and slip proof die formed heavy gauge aluminum element to boom brackets.
- All tubing deburred and cleaned for ease of assembly.
- Only one set of dimensions for complete coverage of all three bands below 2:1 SWR.
- Designed to survive winds of 100 mph (160 km/hr).

THE EXPLORER 14

Compact, High Performance Broadband Tribander with Quad-Band Option

The value of a Directional Antenna was one of my early "discoveries". Over the years, I have built or bought numerous Quads and Yagis. I have never been so impressed as I am with my TH7DX. I enjoy QRP but now have a problem convincing folks that I am only running 5 watts! The TH7DX is a superb antenna, both from a performance and a structural point of view.

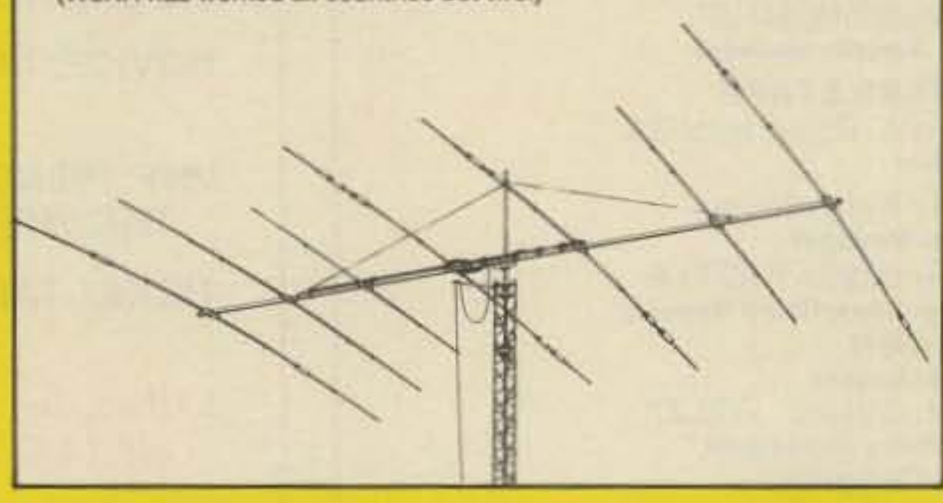
Congratulations!

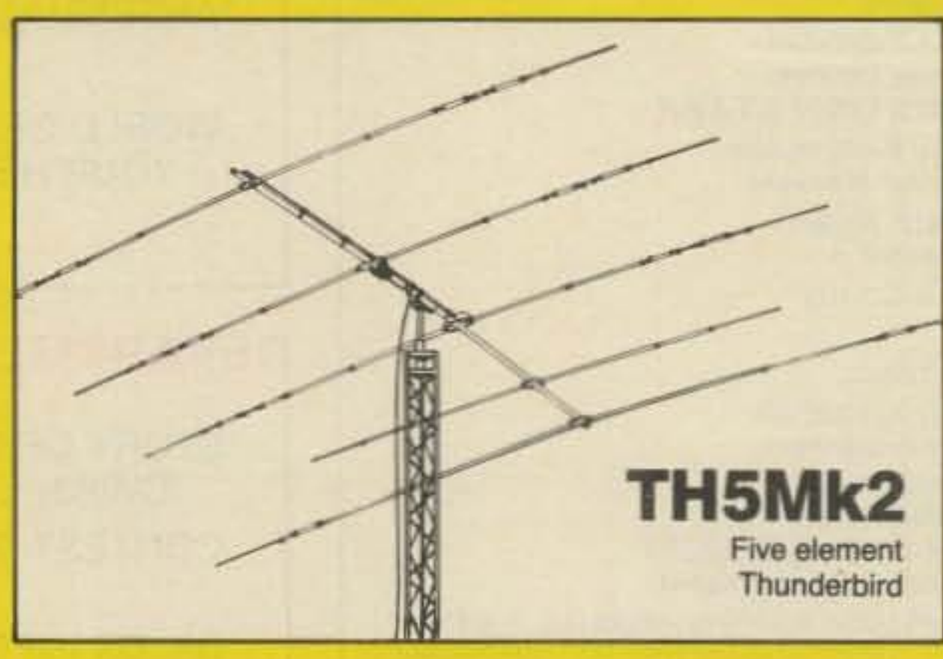
Jack Falker
W8KR

(W8KR has worked all countries but two!)

TH7DX

Seven element Thunderbird





TH5Mk2

Five element Thunderbird

TELEX® hy-gain®

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.

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SWR/Power Meters

SW-200A/SW-200B/SW-2000

Base station SWR/power meters

SW-200A supplied with SWC-1, SW-200B supplied with SWC-2, SW-2000 supplied with SWC-3

Selectable Peak-reading/RMS, SWR/POWER meters cover 1.8–150 MHz (SW-200A), 140–450 MHz (SW-200B), 1.8–54 MHz (SW-2000) in range of 0–20/200 W (SW-200A/B), 0–200/2000 W (SW-2000) full scale for base station use.

SPECIFICATIONS

• Impedance: 50–52 Ω • Frequency range: 1.8–150 MHz (SW-200A), 140–450 MHz (SW-200B), 1.8–54 MHz (SW-2000) • Power measuring range: 0–20/200 W (SW-200A/B), 0–200/2000 W (SW-2000) • Accuracy: Less than ± 10% of full scale • Sensitivity: Less than 2 W (SW-200A/B), 20 W (SW-2000) • Power supply: 12 VDC 100 mA • Dimensions: 193 (7.6) W x 62 (2.4) H x 79 (3.1) D mm (inch).

SW-100A/SW-100B

Compact SWR/power/volt meters

1.8–150 MHz (SW-100A), 140–450 MHz (SW-100B) in range of 150 W full scale for mobile use.

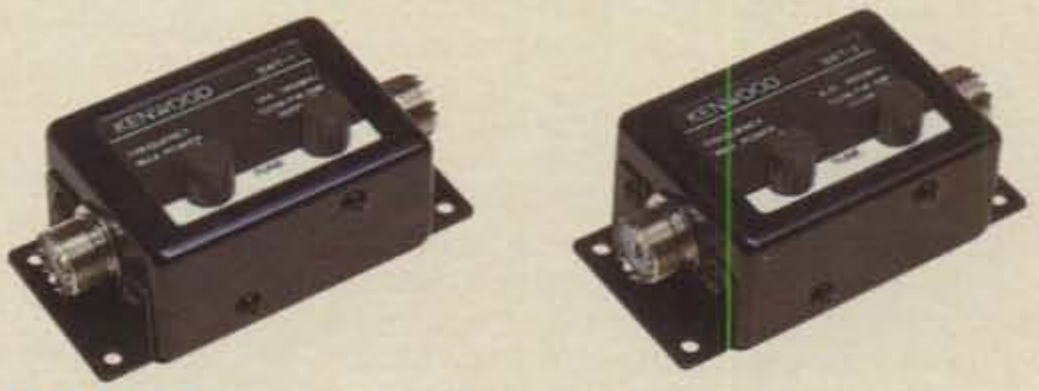
SPECIFICATIONS

• Impedance: 50–52 Ω • Frequency range: 1.8–150 MHz (SW-100A), 140–450 MHz (SW-100B) • Power measuring range: 0–150 W • DC VOLT meter: 0–20 V • Accuracy: Less than ± 10% of full scale • Meter illumination: 12 V 50 mA • Dimensions: display 92 (3.6) W x 64 (2.5) H x 36 (1.4) D mm (inch), coupler 62 (2.4) W x 50 (2.0) H x 30 (1.2) D mm (inch).

SWC-1/SWC-2/SWC-3/SWC-4

Optional couplers

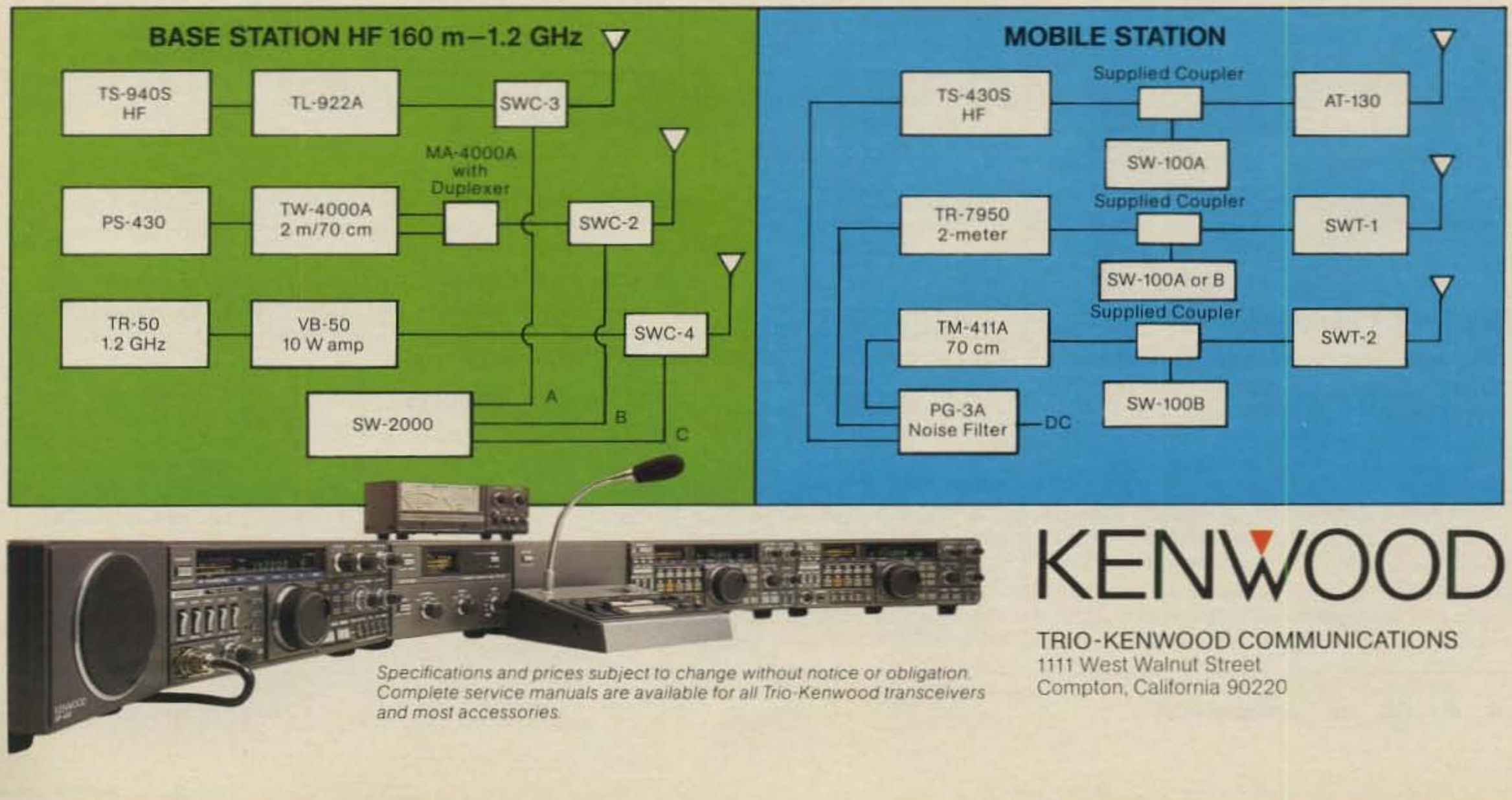
SWC-1 (1.8–150 MHz): Coupler for SW-200A/B, SW-2000
SWC-2 (140–450 MHz): Coupler for SW-200A/B, SW-2000 } SO-239 connectors
SWC-3 (1.8–54 MHz): Coupler for SW-2000
SWC-4 (1200–1300 MHz): Coupler for SW-200A/B, SW-2000 –Type N connectors



SWT-1/SWT-2

Compact antenna tuners

• Frequency Range: SWT-1 (144–148 MHz), SWT-2 (430–450 MHz) • Input Impedance: 50 Ω (unbalanced) • Output Impedance (Matching range): 25–100 Ω (unbalanced) • Insertion Loss: Less than 0.3 dB • Max. Input Power: FM/AM 100 W, SSB 200 W (PEP) • Connector: SO-239 • Dimensions: 68 (2.68) W x 32 (1.26) H x 50 (1.97) D mm (inch) (Projections not included).



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Zero Bias

AN EDITORIAL

January is the traditional time for new beginnings. However, new beginnings somehow infer a giving up of the old. Perhaps 1986 will see amateur radio experiencing a bright, positive resurgence, but we will also be losing a fine old tradition at the same time. One of the old things that will pass by the wayside this year is GMT.

I know there were those who made a smooth transition from spark and those who'll never miss burning their fingers on a metal 6L6, while others elect to remain loyal to AM and carry on. The computer explosion did manage to slip a tremendous volume of new terms into our lexicon, and somehow without realizing it UTC did manage a foothold. Such is progress.

For the stalwarts among us, though, GMT really means tradition. Back in 1675, long before Samuel F.B. Morse was a glimmer in anyone's eye, the Royal Greenwich Observatory began providing standard timekeeping services for seamen. Now, in anyone's book, 311 years is really tradition. Imagine an accurate timekeeping system set up over 200 years before it was needed to arrange DX skeds and QSOs.

Of course, the purists among us also refused to acknowledge the change in the 1950s when the Observatory was moved from the London suburb of Greenwich to Herstmonceux, close to England's south coast. Herstmonceux Mean Time (HMT) didn't sound right even then. So, along about the time when SSB started making inroads into amateur radio and giving the AM gang something to think about, cesium atomic clocks began creeping up on the big mechanical clocks. Over the last 20 or so years a network of 150 atomic clocks has been set up throughout the world to coordinate time and timekeeping, hence UTC.

The prognosis for GMT is poor. The British government feels that the annual cost of $100,000 can best be spent elsewhere, and the clocks will simply be allowed to run down over this coming year or so. The site at Herstmonceux will probably be sold, and at that point GMT will be a fading memory. I'm glad I was around to enjoy it.

New Year's Resolutions

January is also the time for making or breaking those New Year's resolutions. Why not try to make a few that you can keep and that will help out everyone? Why not resolve to introduce one new person to amateur radio in 1986? How about helping one new amateur get on the air? Can you reintroduce to amateur radio an old timer who has been off the air? Could you resolve to have more fun with amateur radio? Is it possible you could resolve to leave the main console at "Mission Control" even for a little while to help out with a club committee or go to a few hamfests? You can also add whatever you want to the above.

Last year I received several letters concerned with my appeal to youth while apparently ignoring our senior citizens. Amateur radio is for anyone of any age at any time. Senior citizens, young people, handicapped people, and the ever-popular median-age people all need the same exact thing. They all need all of us to resolve to do something to help them. Remember that old doesn't necessarily mean infirm, infirm doesn't necessarily mean helpless, and helpless doesn't necessarily mean incapable. A lot of these people are doing other things—things that promote fun, enjoyment, and a sense of accomplishment. The first thing is to make someone aware of amateur radio, its possibilities, and the things that can be done. Above all, the person describing amateur radio must sound like (and really mean it) they are having fun and a good time. Isn't that why we all do it? If so, it should be fairly easy to share your enthusiasm.

Travels With CQ

Since our last report, the *CQ* gang attended three hamfests and missed a fourth. Dick and his wife, Cathy, did the honors at the Virginia Beach Hamfest, while Arnie and I waved the flag at the Houston Hamfest. The Virginia Beach event is always a good one, with large and spacious facilities. Dick reported on several goodies found at the fleamarket. The Houston show this year was held at a new location, one more centrally located. The Mexico earthquake happened that weekend, and it was reported that a few buildings in Houston moved from the tremors.

Dick and I manned the *CQ* booth at the National in Louisville, Kentucky. The facilities at this one could house at least 1½ Daytons. For fellow hamfest gourmets, there was an extraordinary treat at this one. Along with the ever-popular grease-dog concession, the Kentucky Pork Association set up an outdoor barbecue featuring pork chop sandwiches, pork burgers, and, of course, barbecued pork. All items were served with a bag of chips and sold at cost (better than reasonable). This was done as a PR event to familiarize people with what they call "white beef." It was one of the best and tastiest hamfest meals.

I guess that these food reviews must be catching on. We received a call from Evelyn Gauzens, W4WYR, the chairperson of the Tropical Hamboree in Miami (coming up in February), letting us know that although there would be a new location for this event, the people who ran the Greek food concession (also very good) would be catering this one, too. So if you're in the Miami area and want to attend a really good hamfest and treat yourself to some Greek delicasies while strolling through the fleamarket, then put this one on your list.

The fourth event we were supposed to be at had to be scrubbed on account of Hurricane Gloria. It hit the New York area just about the time we were to board the flight to Chicago (Radio-Expo). All flights, and just about everything else, were cancelled that day. Power was out for several days on Long Island (Dick's was out for almost four days). The guys on the local repeaters (where there was power) did a great job of keeping people informed as to what was happening and standing by to handle emergencies. Needless to say, there wasn't a generator available at any price after a few hours. So we missed Chicago and Radio-Expo this year, and if everything goes right we'll be there in '86.

We hope to see a lot of you this year as we begin the hamfest season. These events are really held just for you and your friends, so why not take advantage of your neighbor's hospitality and treat yourself to a good time. If you're reading this and you're not yet an amateur or would like to find out more about amateur radio, then check our Announcements column. This lists most events throughout the country on a monthly basis. A hamfest is a good place to meet amateurs, find out about clubs, and get the latest information on amateur radio licensing classes. It's a chance to see and touch most of the equipment advertised within these pages and to meet the people who represent these companies. If you want to buy any of the equipment or need any help with a selection, there will be plenty of dealers and distributors there to help you. There will be talks, lectures, and forums at which you can pick up on some exciting aspects of amateur radio. There will probably be a fleamarket where with a bit of careful shopping you can pick up a treasure or two to start off your station. If you're lucky, you might even have something good to eat, but that's the only thing I won't guarantee. I *will* guarantee that you'll have a good time.

So whether you're male or female, young or old (or median age), physically able or handicapped, you are cordially invited to attend any or all of these events. At most of these events there will be an entrance fee, but this usually is offset by the chance of winning one of the many door prizes. If you're an old timer who's getting back into amateur radio after many years, you'll be amazed how far we've come since the Sky Buddy. Whoever you are, we would like to see you, tell you about amateur radio, and show you how much fun there is to have.

Correction

I goofed in the photo credit for our October 1985 issue. The cover shot of Neal McEwen, K5RW, and his antique key collection was taken by Joe Veras, N4QB. Joe has taken a number of cover shots for *CQ* over the years.

January

Remember, January is traditionally antenna month, so dress warm. If you were lucky, you got a scarf or two plus some warm socks for the holidays. Use them. Also use a safety belt. It's a very good investment. No antenna worthy of DX was ever put up in warm weather, or repaired in good weather. I don't know why. It's just tradition.

73, Alan, K2EEK

PACKET EVOLUTION

From $219.95 Suggested amateur net price.

ANOTHER BREAKTHROUGH FROM AEA

Packet + RTTY= Pakratt™ PK-64.

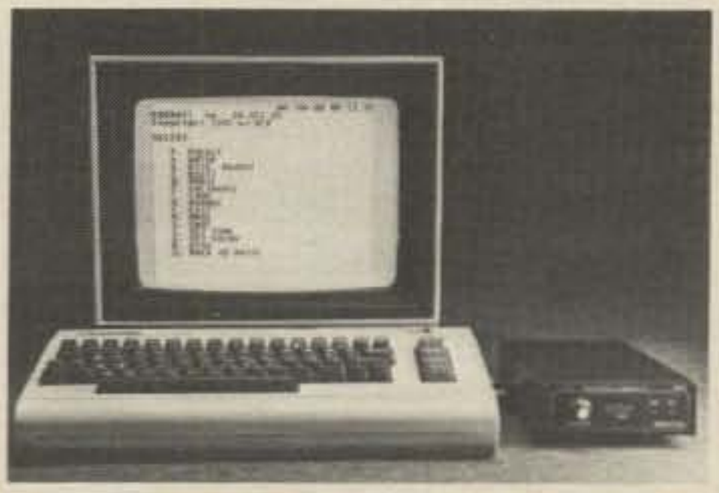
If you 've read about packet, or are already into it, you know how exciting it is. With the hot new Pakratt PK-64 we've just brought a new dimension to packet. The Pakratt PK-64 is a complete, fully assembled and tested packet radio controller which, together with a Commodore 64 or 128 computer, can convert your shack into a packet operations center.
And we've included a new version of our advanced MBA-TOR™ software to make it the first packet controller with AMTOR, Baudot, ASCII and Morse. But an even more exciting part of the Pakratt controller is its great price.

Incredibly Simple To Set Up

Just plug the Pakratt controller into the C-64's game cartridge slot, add a mic connector for connecting to your particular transceiver, and you're set.
If you're anxious to try it out, our new "quickstart" manual section can get you on the air in under ½ hour.

Simply Powerful

The versatile Pakratt controller shows messages and connect status simultaneously on your Commodore with a unique split-screen display. And it lets you



PK-64 shown with HF modem option.
Computer not included.

send letter-perfect text from the text editor software while monitoring incoming messages. The 20K byte QSO buffer stores more than 20 video screens of text! Disk commands let you save specific operating parameters for quick set-up for emergency services, clubs, and multiple frequency use. And the Pakratt controller's standard, TAPR style modem gives you 300 and 1200 baud operation with great HF/VHF performance.

We can't possibly list all of the important features of Pakratt here. But the absolutely best part of the Pakratt PK-64 is that it's at your dealer now. So stop reading, run down to your local dealer, and check Pakratt out. Because the real challenge will be to find one after the other hams see it.

Pakratt PK-64. Packet Power from AEA. At amateur radio dealers everywhere.

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Our Readers Say:

Conversion Article Caution

Editor, *CQ:*

In reading your October 1985 issue I noted a potentially *very dangerous* arrangement of parts in the Warren article ("A Quick Conversion of the Drake L4B For Use With a 3CX1200A7," p. 33). As shown, it is possible to place the full high voltage onto the Jones plug by connecting the HV part of the amplifier but not connecting the Jones plug. It is also worth cautioning the reader that if the +HV is connected between the power supply but the Jones plug is *not* plugged in, the chassis of the L4B amplifier will be sitting at *−3000 volts.* There should always be *multiple permanent grounds* between the chassis and these should be in place before the +HV is connected.

Bob Larkin, W7PUA
Corvallis, OR

Keyer Article Reaches Out

Editor, *CQ:*

It is always with great interest that I read your excellent magazine every month. There is always something of interest for everyone who is in love with radio. It has a big variety of articles, covering all aspects in the radio amateur world.

As an old CW Dog I have always read the nostalgic articles written by Dave Ingram, K4TWJ, with great interest, but the May and June issues, with old Morse keys was wonderful, and very interesting. It is good to know there are people like K5RW around, in this plastic age, who have a feeling and veneration for the past.

I was so delighted by it all that I sent the two magazines right away to my friend in Australia, VK6WT, David. He has the biggest collection of Morse keys in Australia, and I have been corresponding with him about this item for several years. Beside that, he has a collection of stamps with Morse keys pictured on them, from the whole world, so I know David will be glad to read these two issues.

I just wanted to thank you for it all, and hope you will keep up the good work.

Martin Haasen, OY7ML
Torshavn, Foroyar
Faeroe Islands

Lost and Found Department

Editor, *CQ:*

I received QSL cards from the 6 land buro today. Two cards that do not belong to me also showed up. Both were for CW contacts with DL8GAD in Sverdlovsk, Russia. The QSO's took place on March 25, 1984 at 15:45. Anyone out there claiming these QSL's please get in touch with me via Callbook. (P.S. Send me an SASE!)

Craig Williams, KB6DRW
Idaho Fall, ID

Live Help Needed

Editor, *CQ:*

I am not an amateur radio operator. However, I would love to become one. In fact, I am the kind of person your editorials and letters to the editor are discussing.

I am about to drive over three hours to see if the ARRL convention can help me. The only other help I own besides a few copies of *CQ* is a copy of *Tune in the World with Ham Radio.* I have read it through, and it is exciting to consider the possibilites open to a new ham. I am going back to study through it for my ticket.

My point is this: I do not believe I will make it as a ham unless I find real live operators to help me through the areas I do not really understand. I need the friendship and guidance of others. I wonder if I will find help in Louisville. Will someone show me a good, inexpensive receiver with which I could begin listening? Could I even get it set up correctly without help? The point is made plain when you realize that I have never seen a shack, heard a contact, or talked to an operator.

Learn how to link up with folks like me, and you are well on your way to finding the new Novices you care so much about entering the ranks of amateur operators.

Steve Baker
Kuttawa, KY

Editorial Adds To New Book

Editor, *CQ:*

I received today my September issue of *CQ* magazine, and have just finished my first read through it. I particularly wanted to compliment you on your timely, thoughtful, and outstanding editorial referencing getting the Novice licensee on the air. Your comments should be required reading for all amateurs. The points that you make have to be immediately obvious to all who are concerned with the health of our hobby, and you are certainly to be congratulated on your insights.

I have been working on a book for the new Novice, a book designed to get the new amateur on the air in the easiest practical terms, and it is about one third complete. Hopefully, it will offer to some the help that you speak of. And you brought up several points of potential problems for the new Novice that were not in my book outline. Believe me, they are now! Keep up the good work!

Bob Locher, W9KNI
Deerfield, IL

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Temp. Range	– 10 deg. C to 60 deg. C.
Dimensions	40H × 140W × 170D mm (Body only)
Weight	1.0Kg (Body only)
Transmitter	
Freq. Range	FM-240 142.000 - 150.00 MHz (FM-740 440.00 - 449.975 MHz)
Output	High = 25 watts, Low = 5 watts (High = low, (Low = 1W) (FM-740 High = Low)
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Sensitivity	Better than 12dB SINAD @ .2uV
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• **Special-Event Station KDØZK** - Special-event station KDØZK will operate all General and Novice bands during January 86. An 8½" × 11" certificate is available for contact. Send QSL and large SASE to KDØZK, Barry Horowitz, 715 West 5th St., Junction City, KS 66441. This event is in celebration of Kansas's 125th birthday.

• **Philadelphia Micro Show and Fleamarket** - This event will be held on Saturday, January 11th at the George Washington Conference Center, Willow Grove, PA. Over 175 vendors will sell new, used, surplus, and closeout computer merchandise of all kinds. Show hours are 10 a.m. to 5 p.m. and admission is $5.00 for adults and $3.00 for children ages 5–12. Vendor spaces are $25–$70 each. For additional information call Ken Gordon Productions Inc. at (201) 297-2526 or outside NJ call (800) 631-0062.

• **Midwinter Swapfest** - The annual Midwinter Swapfest will be held on Saturday, January 11 at the Waukesha Co. Expo Center Forum at 8:00 a.m. Admission: $2.00 in advance, $3.00 at door. Tables (4 ft.): $3.00 in advance, $4.00 at door. Dealers welcome. Sponsored by the West Allis Radio Amateur Club. For tickets or information write: WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201 (SASE).

• **Richmond, VA Frostfest** - The Ninth Annual Richmond Frostfest will be held on Sunday, January 12 at the Virginia State Fairgrounds, 8:30 a.m. to 3:30 p.m. General admission $4.00. Fleamarket spaces $4.00 without, $8.00 with 8 foot table. Booths available to dealers and exhibitors. No outside tailgating. Deadline for booths and reserved fleamarket spaces is December 31. VEC Exam on Saturday. Sponsored by Richmond Amateur Telecommunications Society. Write Richmond Frostfest, P.O. Box 1070, Richmond, VA 23208, or call Bill Scruggs, N4DDM, 804-272-8206.

• **Amateur Radio Social, Philadelphia, PA** - The Chaverim of Delaware Valley, Inc., an organization formed to promote a closer association between Jewish Amateur Radio operators and their friends throughout the world, will be holding their 6th midwinter annual social in downtown Philadelphia on Sunday, January 12th at 10:00 a.m. Buffet brunch, brief installation of new officers, entertainment, and lots of eye-balling. Everyone is invited to participate. Contact Bill Soble, W3QXT, at 215-676-6769, or write to 9357 Hoff Street, Philadelphia, PA 19115, for information. Reservations are necessary.

• **Oak Park ARC Swapfest** - The Oak Park ARC annual radio swapfest will be held on Sunday, January 12th at the Oak Park High School, 14300 Oak Park Blvd., Oak Park, Michigan. Hours will be from 7:30 a.m. to 4 p.m.

• **Courage HANDI-HAM System QSO Party** - This event will be held from January 12 through January 16 from 2200Z to 0400Z. Recommended operating frequencies are 14.307, 7.260, and 3.925. ALL HANDI-HAM members are invited to participate by calling CQ HANDI-HAMS. HANDI-HAMS will operate radio camp station WØEQO/6 from camp at Malibu, California.

• **EXPO/64 Computer Fleamarket** - This fleamarket will be held on Sunday, January 19th at the Meadowlands Hilton Hotel, Secaucus, NJ. The show is exclusively for owners of Commodore 64/128/20 (and Amiga) computer systems. Over 150 vendors will sell new, used, surplus, and closeout computer merchandise of all kinds. Show hours are 10 a.m. to 5 p.m. and admission is $7.00 for adults and $4.00 for children ages 5–12. For additional information call Ken Gordon Productions Inc. at (201) 297-2526 or outside NJ call (800) 631-0062.

• **HOSARC Lucky 13** - The Hall of Science ARC will issue a commemorative certificate to anyone working a HOSARC station on January 19th in celebration of their 13th anniversary. HOSARC stations using the call WB2JSM will operate SSB in the first 25 kHz of the General phone bands of 40, 20, 15, and 10 meters, CW in the first 25 kHz of the Novice bands of 80, 40, 15, and 10 meters, and in the first 5 kHz of the 30 meter band, from 1500–2100 UTC. QSL with a large SASE (44 cents or 1 IRC) to: HOSARC QSL Manager Arnie Schiffman, WB2YXB, 81-22 250th St., Bellrose, NY 11426.

• **Concord Brasspounders Special Event** - The Concord Brasspounders ARC will operate W1OC to commemorate Christa McCauliffe's first teacher in space flight. Operation will be from 1300Z Saturday to 1259Z Sunday during the first weekend following the launch of the Space Shuttle with Christa aboard. Anticipated launch date is January 22. Suggested frequencies: CW 7050, 14050, 21050 and 7105 Novice frequency. Phone 7285, 14285, 21385. For an 8½" × 11" certificate send an SASE to W1OC, P.O. Box 2214, Concord, NH 03301.

• **19th Annual Winterfest of Hams** - This event will be on Friday, January 24 at the Diamond Club, Met Park, Norfolk, VA. There will be cocktails at 6:30 p.m. (cash bar) and dinner at 7:30 p.m. Cost is $12.50 per person. For tickets contact Gus Brewer, W4FPW, 1359 Eagle Ave., Norfolk, VA 23518 (SASE). Respond by 1/20/86.

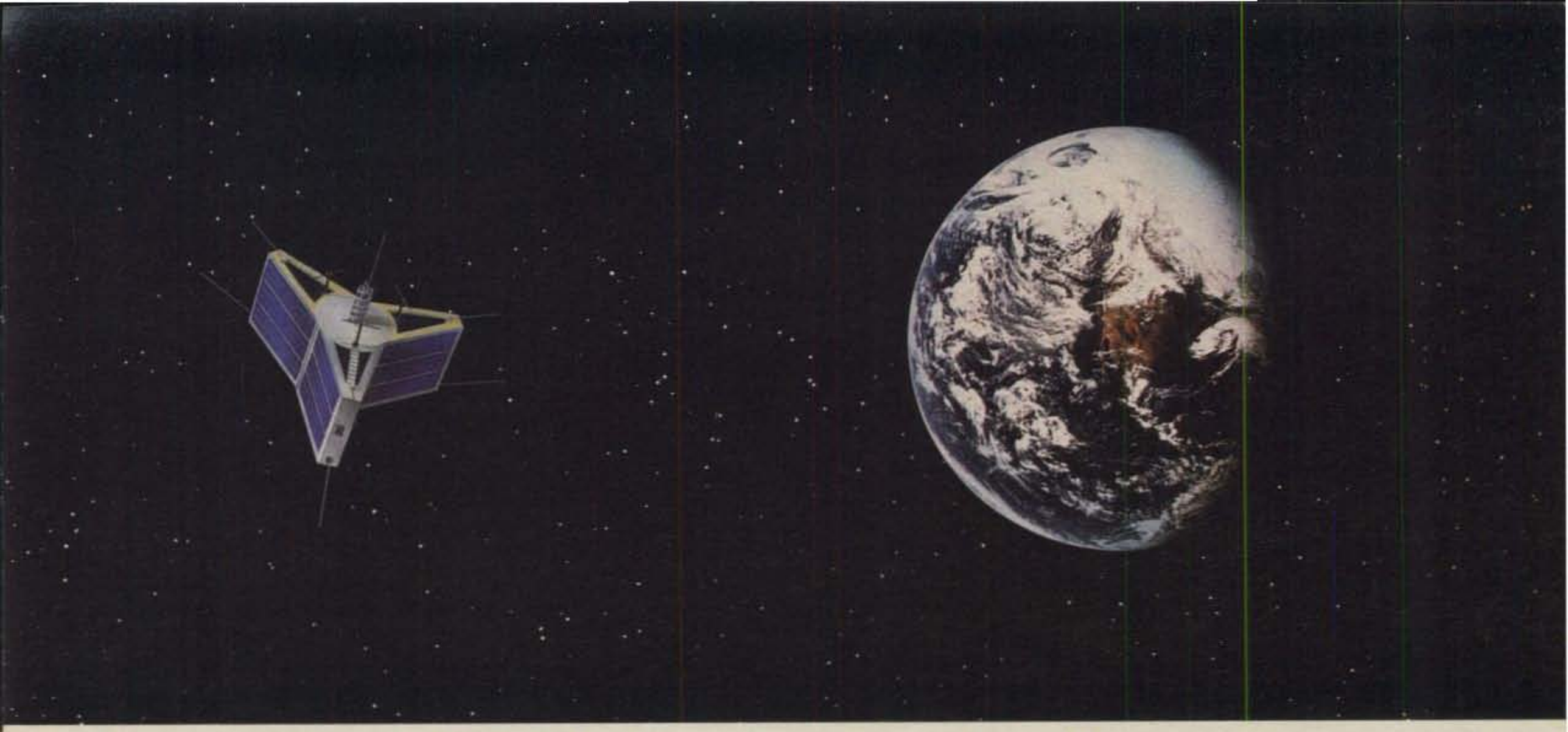
• **Boston Micro Show and Fleamarket** - This event will be held on Saturday, January 25th at the Northeast Trade Center, Woburn, MA. Over 200 vendors will sell new, used, surplus, and closeout computer merchandise of all kinds. Show hours are 10 a.m. to 5 p.m. and admission is $5.00 for adults and $3.00 for children ages 5–12. Vendor spaces are $25–$70 each. For additional information call Ken Gordon Productions Inc. at (201) 297-2526 or Outside NJ call (800) 631-0062.

• **Southfield, MI Swap & Shop** - The Southfield High School ARC will sponsor their 20th Annual Swap & Shop on January 26 at Southfield High School, 24675 Lahser, Southfield, MI. Doors open at 6:00 a.m. for exhibitors. Open to the public at 8:00 a.m. to 3:00 p.m. Admission is $2.50. Reserved tables are $20.00 for two 8 ft. tables (paid in advance). Additional reserved tables $10.00 each. Tables will also be available at the door. For more information write to Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034.

• **Yonkers, NY Electronics Auction** - The Yonkers ARC will sponsor its Electronics Auction on January 26 at Lemko Hall, 556 Yonkers Ave., Yonkers, New York from 9 a.m. to 3 p.m. Admission is $3.00 (buyers and sellers); children under 8 free. Bring equipment (new or used) you want to auction off.

• **Wheaton Hamfest**, Arlington Heights, IL, January 20, 1986. For more information, call 312-231-7497.

• **Tropical Hamboree**, Miami, FL, February 8–9, 1986. For more information, call 305-642-4139.



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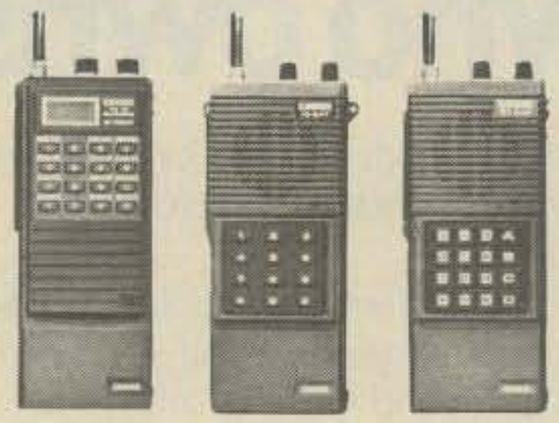

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VE3QQ comes through again with another of his great keyer projects. This one describes adding touch control to the EK-1 keyer.

The "Further Step": Touch Control For Your Vibroplex EK-1

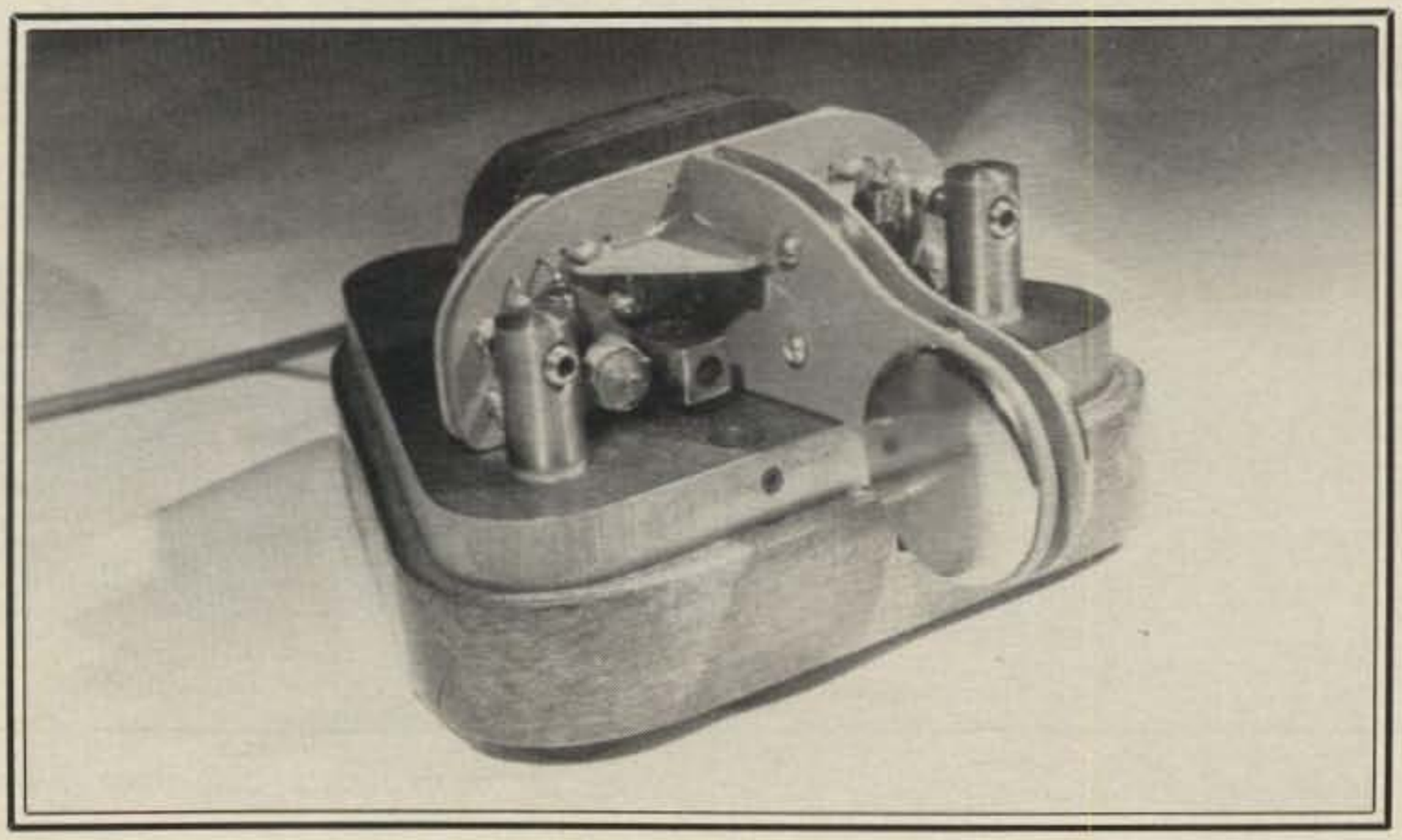
BY ALBERT H. JACKSON*, VE3QQ

An earlier article[1] covered some improvements to the Vibroplex EK-1 "Brass Racer" keyer and included a grounding modification for its metal base. If you've made the necessary paddle polarity changes and installed the two switching transistors required for direct base grounding, it's easy to go the rest of the way to capacitive touch control. Since no serious thought was previously given to adding a touch section, you will, however, have to change the associated resistors if you intend to incorporate the conversion unit described here. Move the 10K ohm ones to replace the 47K values, and substitute 2.2K resistors in the former 10K emitter-base positions on each side. Then just lift out your old-fashioned mechanical paddles and come up to date with the new.

The circuit board mounts on the same four pivot points (holes W, fig. 1) and the key-post contacts screw forward to meet a couple of silver-tipped terminals near the edges. No other connection is needed, and the magnets align with hardware on the board to help pull things together. For permanent installation, center drill the EK-1 brass back-plate in line with the other holes and insert a 6-32 × 1¼" retaining screw through hole Z into the paddle mounting stud. Adjust the nylon backscrews to support the board at the rear.

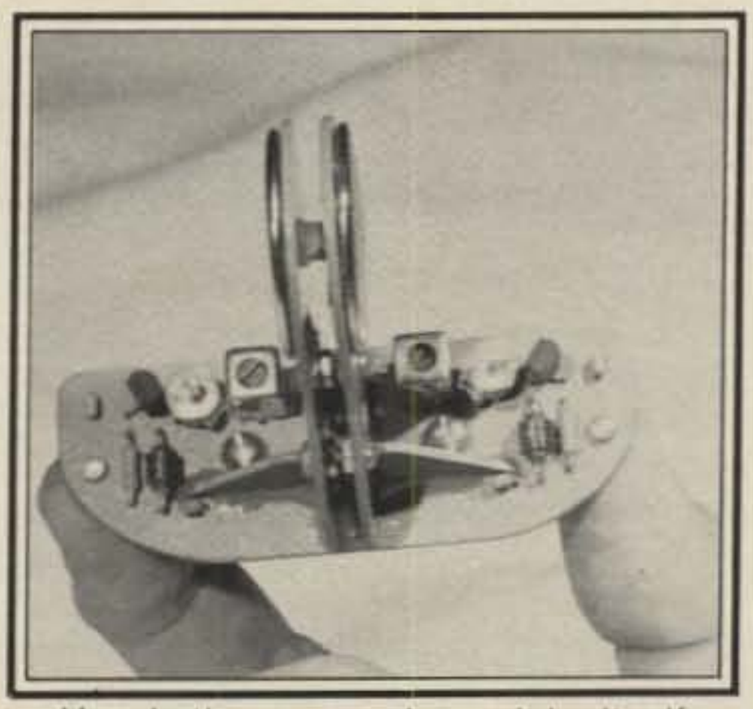
If you haven't yet done the EK-1 grounding alterations, you'll need to complete them, with the resistor changes, before proceeding. And should you decide after a good operating workout that the sensitive precision and effortless action of touch keying are not for you, simply disengage the unit and reinstall your make-and-break levers as before. At least you'll have gained the safety-first advantages of a properly grounded keyer frame, and you may be able to interest a friend in trying this add-on touch accessory.

Though touch unit current is small (less than half a milliampere idling), you'll need to provide some kind of keyer non-operational cut-off if your supply is a battery. There's room on either side of the hardwood base to set in a small ON/OFF



The new look in "Brass Racers."

Note the back-plate center retaining screw between the magnet turrets at the rear.



Here's the conversion unit by itself.

*215 Brock Street, Box 994, Stayner, Ontario, Canada L0M 1S0

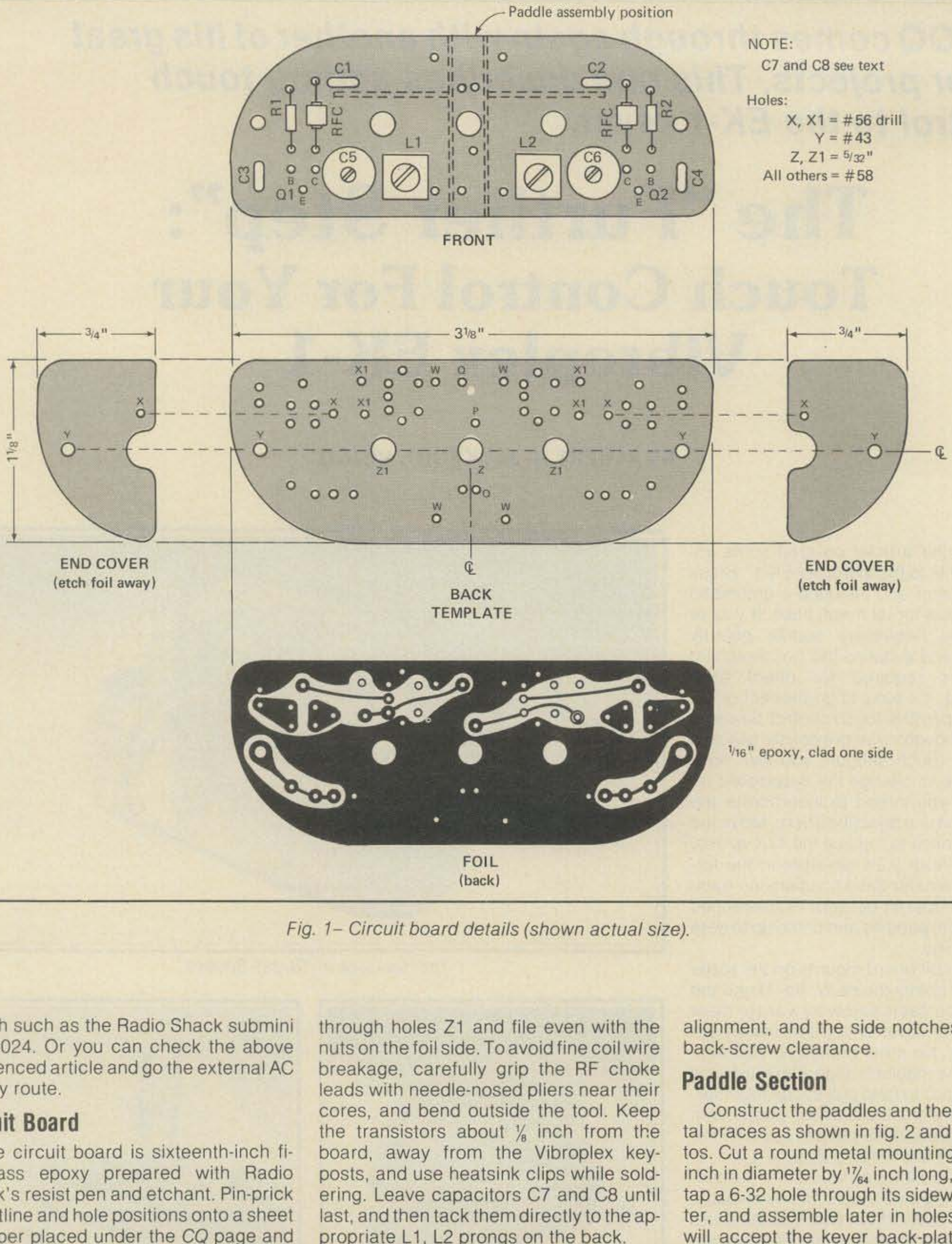


Fig. 1– Circuit board details (shown actual size).

switch such as the Radio Shack submini 275-8024. Or you can check the above referenced article and go the external AC supply route.

Circuit Board

The circuit board is sixteenth-inch fiberglass epoxy prepared with Radio Shack's resist pen and etchant. Pin-prick its outline and hole positions onto a sheet of paper placed under the *CQ* page and same-size drawing fig. 1. Cut the paper as indicated and check mounting dimensions for fit in your particular keyer; then tape it to the foil side of the board material. Mark the edges, center-punch the holes, saw and file to shape. Pilot drill (#58) all holes after circuit drawing and etching, and then follow with the larger diameters where needed. For accuracy, clamp the end covers to the circuit board and drill through holes X and Y.

Install two steel 6-32 machine screws through holes Z1 and file even with the nuts on the foil side. To avoid fine coil wire breakage, carefully grip the RF choke leads with needle-nosed pliers near their cores, and bend outside the tool. Keep the transistors about ⅛ inch from the board, away from the Vibroplex keyposts, and use heatsink clips while soldering. Leave capacitors C7 and C8 until last, and then tack them directly to the appropriate L1, L2 prongs on the back.

Make the output terminals from two 2-56 × ¼" round head screws. File their heads flat and tip each with a small silver slug (cut from surplus relay contacts) soldered in place. Round to shape and install with a nut at board holes Y. When you've completed construction, gently file down protruding wire ends and mount the circuit-protecting end covers with extra nuts on the same screws. Holes X should accept C5 and C6 lugs at positions X on the circuit board to maintain cover alignment, and the side notches are for back-screw clearance.

Paddle Section

Construct the paddles and the horizontal braces as shown in fig. 2 and the photos. Cut a round metal mounting stud ¼ inch in diameter by 17/64 inch long, drill and tap a 6-32 hole through its sideways center, and assemble later in holes U. This will accept the keyer back-plate screw when inserted between the sides.

Make the touch-plates from 1 inch ID hole plug buttons (Cinch-Jones 41-G). Break off all but a single finger on each and solder-tin this as a connecting lug. Use a little acid paste on the nickel plating if necessary, but be sure to remove the residue with a solvent such as lacquer thinner. File the remaining stubs almost, but not quite, flush with the button edges.

Sandpaper roughen the outer paddle

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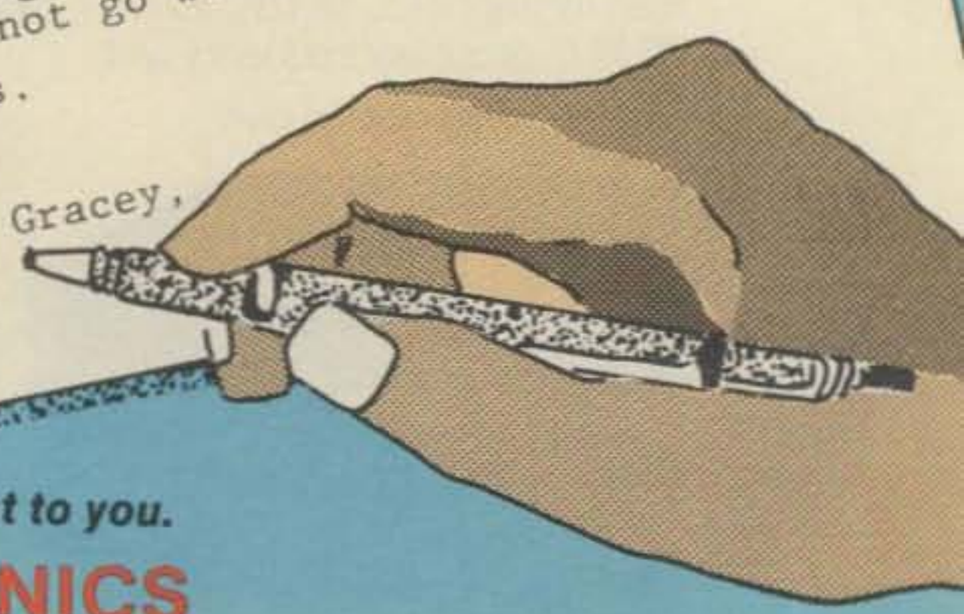

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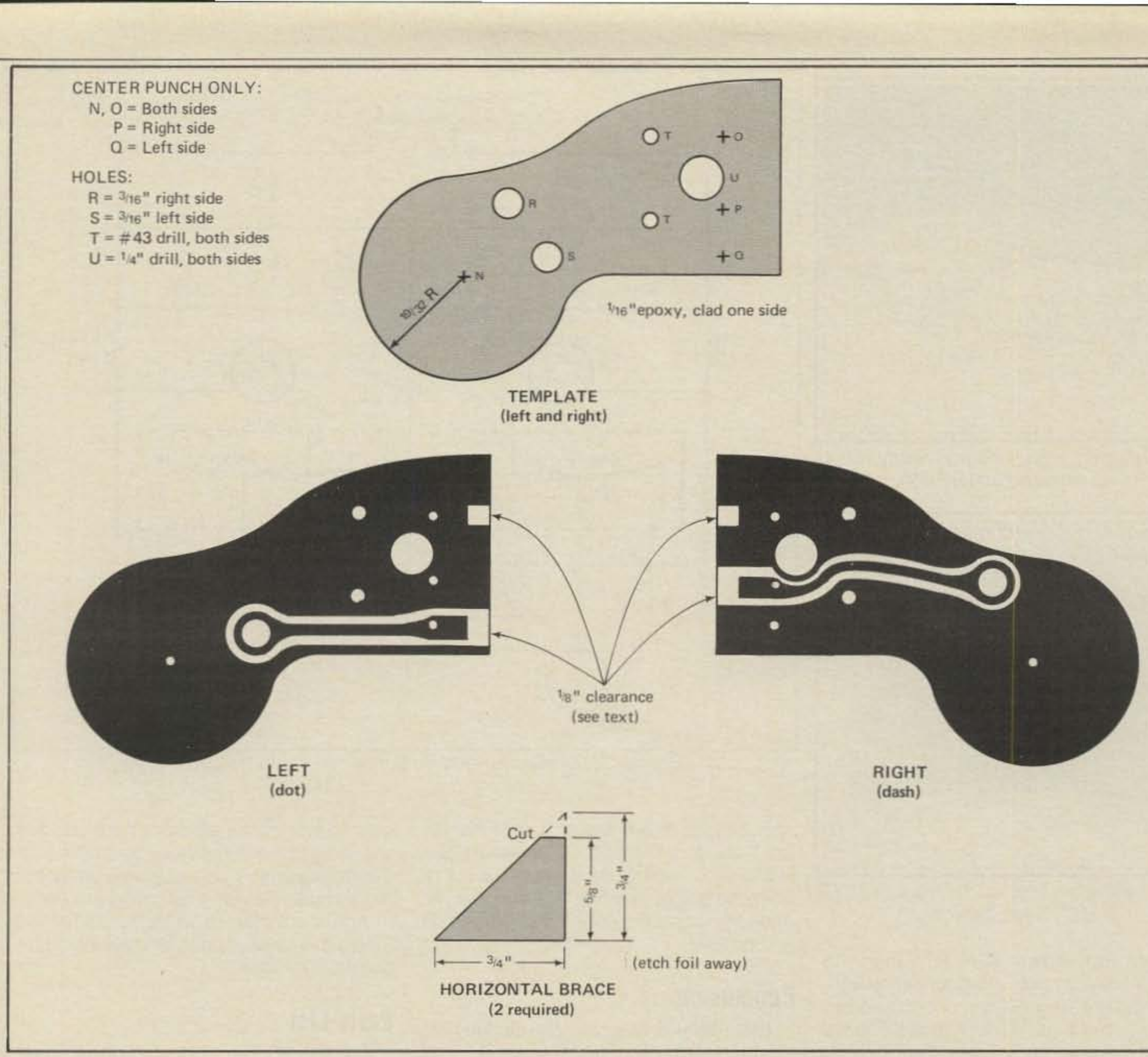


Fig. 2– The paddles (shown actual size).

surfaces at the centers of the round portions and use liberal amounts of (Devcon) 5-minute epoxy on opposing areas, alternately tipping face up and face down, to cement the buttons in place. Clip the lugs to about 1/16 inch in height and solder to their respective foils.

Cut four 1/2 inch lengths of light bus wire to make paddle-to-circuit-board jumpers, and solder these ahead of foil punch marks O, P, Q to enter the corresponding holes in the board. Correctly orient the stud in holes U, and join the paddle sections with 2-56 × 5/16" screws in holes T. Place two nuts on each and adjust between sides to keep these parallel against a 9/64 inch reinforcing spacer cemented behind the button centers. Two nuts on the outside complete the assembly, which may then be attached to the circuit board. The foil clearances shown allow a little jumper flexibility for final positioning.

Square things up and place a drop of epoxy at the 90-degree apex of each horizontal brace. Set the braces in position, flat corners toward the buttons, at the paddle sides. Line up while the cement is hardening, and then run a bead of epoxy around all paddle-to-brace-to-board adjacent perimeters.

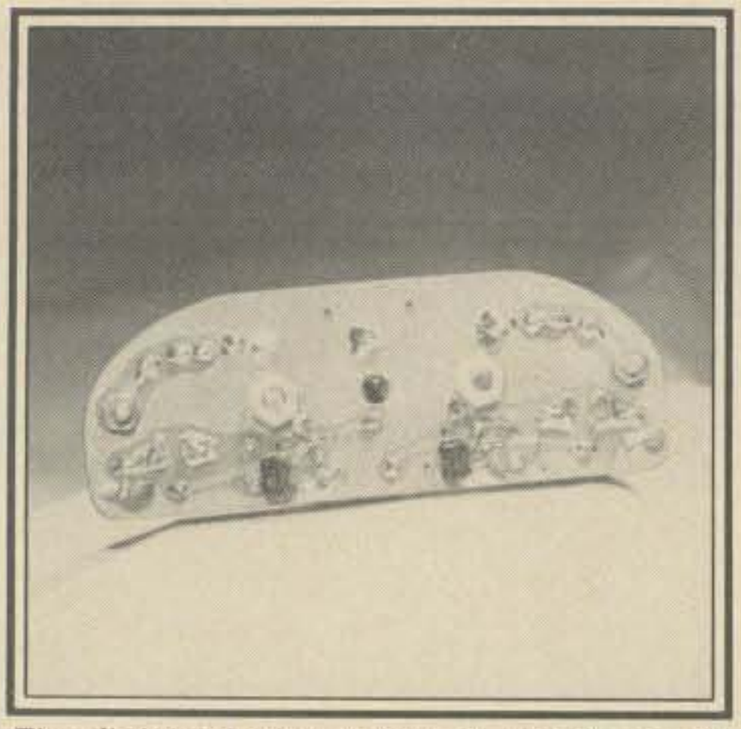
Circuit and Operation

Comparing the schematic, fig. 3, with the oscillator sections of previous touch control circuits[2] will reveal a few changes initially generated by the nonavailability of earlier transistors, and by the necessity of adapting to the already modified EK-1. Some values have shifted, and integral grounded foils shield the paddles from each other to reduce inter-oscillator coupling and facilitate the frequency setting process. With C5 and C6 one-quarter meshed, adjust the coil slugs to give output signals at least 25 kHz apart near the high end of the dial on a nearby broadcast receiver. Touching the paddle buttons stops the oscillators, and the resulting current gains control the keying sequence.

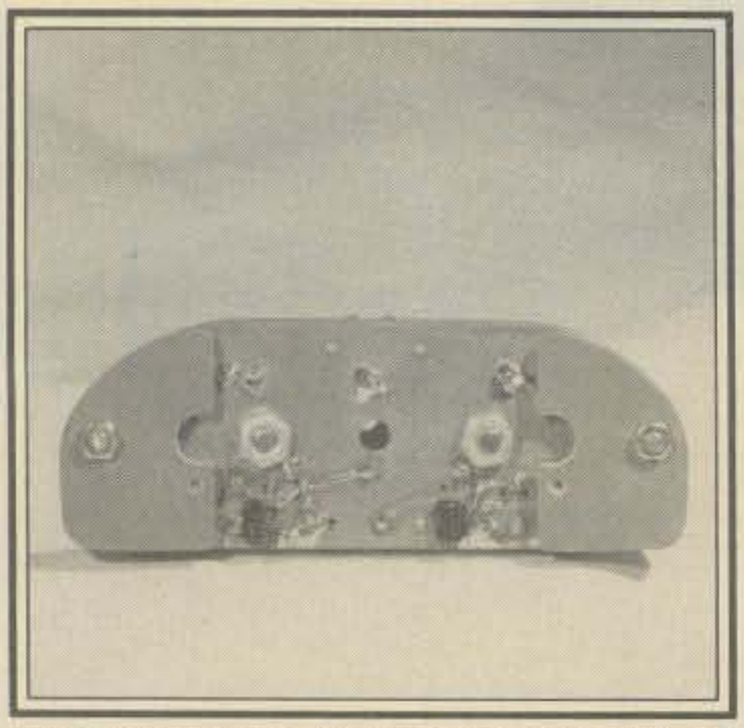
Either a 7 or 9 volt supply can be used, but don't let a dying battery drop much below 6½ volts. Though keying may continue normally, insufficient switching transistor turn-on will cause excessive currents in the 8044 IC key input lines. Make certain your equipment is well grounded.

Final Check

Clip a high-resistance voltmeter from the original EK-1 dot and dash key connections (switching transistor collectors) in turn to the negative supply. Key-open readings will closely approximate the supply voltage, and key-closed figures



The finished circuit board, ready for its covers and installation.



This view shows the end covers, with C7 and C8 near the bottom.

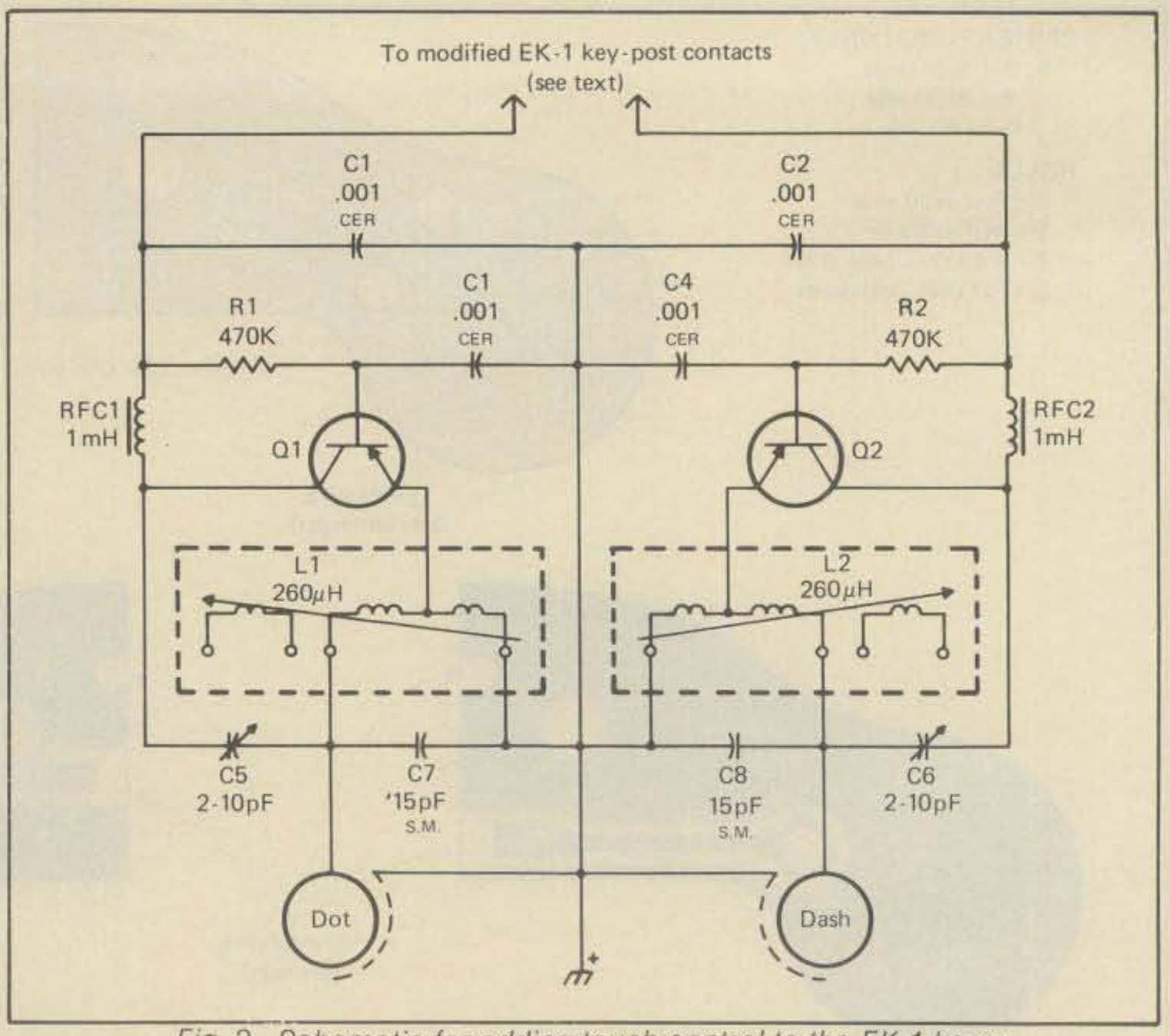


Fig. 3– Schematic for adding touch control to the EK-1 keyer.

should drop to zero (i.e., less than .05 volt). If they do not, change transistors, since gains can vary from one to another of the same type. Ideally these checks should be done at a lower than normal supply voltage to give some operating flexibility. Nevertheless, the transistors specified were not overly critical in this application. Power input to each oscillator should run about 1.2 milliwatt at 9 volts, and proportionately less at 7. Broadcast interference will be minimal, and retuning is the cure if it becomes objectionable.

Conclusion

Let's face it: large, silver, clicking key contacts are a traditional holdover from the long-gone days of spark. Keys used to break amperes of current in contrast to the often microamp requirements of today. Better, more efficient methods are available in the computer age, and touch-control keying is one of these. Why not modernize your EK-1 by giving it a try?

Again, my thanks to VE3OHO for the loan of his keyer, and to Mr. Neil Wood for the photographs.

Parts List

C1, C2, C3, C4: .001 uF ceramic, subminiature (Centralab CW15C102K)

C5, C6: 2–10 pF trimmer (Philips 808-11109)

C7, C8: 15 pF silver mica (Miconics DM5-150J)

L1, L2: 260 uH b.c. oscillator coil, subminiature (Armaco TRO315)

Q1, Q2: 2N3906 (Radio Shack 276-1604) or 2N5087

R1, R2: 470K ohm ¼ watt 5%

RFC1, RFC2: 1 mH RF choke, subminiature (Hammond 1530B103)

Radio Shack 2N3006's (276-1603) or 2N2222A's can substitute for the 2N2484 (276-2010) switching transistors of the previous article, and non-Radio Shack parts (hole-plug buttons included) may be obtained from Electro Sonic Inc., 1100 Gordon Baker Rd., Willowdale (Toronto), Ontario, Canada M2H 3B3.

References

[1]Jackson, A. H., "How To Improve The Vibroplex EK-1 Brass Racer Keyer," *CQ*, October 1984, p. 13.

[2]Jackson, A. H., "Touch Control For The Curtis Chip Keyers," *CQ*, July 1977, p. 17, etc.

Henry Report #3

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It takes a Texan to think big. If you're looking for the biggest county hunting challenge, then the Texas DX Society has something tailored just for you.

The Great Armadillo Run of 1986

BY TOM TAORMINA*, K5RC

If you love to operate and this is your first sunspot cycle in amateur radio, you've recently experienced quite a letdown, as the solar activity has closed down bands like 10 and 15, which were teaming with activity just a couple of short years ago. If you're a veteran of two or three sunspot cycles, you know that it's time to start adjusting your operating habits and find innovative ways to keep the "fun" in operating.

The members of the Texas DX Society love to operate about as much as any group of amateurs. In the club's 14-year history we have won many Field Days and captured three Club Gavels in the ARRL Sweepstakes, and we hold the multi-operator world record in both modes of the ARRL DX Contest. We also have a flair for the unusual and are constantly looking for club projects that stimulate operating activities.

In 1983 the club as a group decided to participate in the County Hunters' CW Contest. Only a couple of members had any experience with county hunting or with mobiling, but it sounded like a good club project. To make it interesting, we decided to try to put on all 254 counties in Texas in one weekend! Now Texans think big, but the idea of a club with less than 60 members covering 262,000 square miles in less than 48 hours seemed a little far fetched. To make it even more of a challenge, the club is based in Houston in the far southeast corner of the state. Some of the members would have to go over 700 miles to get to their first county!

If you want to witness the real amateur radio "spirit," get your club involved in a seemingly impossible project. KZ5M headed up the effort and dubbed it "The Armadillo Run." The armadillo is the state mascot of Texas and seemed to symbolize the "can do" spirit of our club. We spent months laboring over routes and logistics. We learned how to put HF radios in the family sedan and in motor homes, and even in the back of a pickup truck towing a generator. If there was ever an exercise in logistics and emergency preparedness, this was it. By early summer we had a map of the state with overlays for each "prime" mobile station and overlapping routes for "roamer" stations to back up the prime stations in the event of a breakdown or other disaster.

Signing ceremonies for "Armadillo County, Texas" on October 24, 1985 in Austin, Texas. Standing left to right are NA5R, KZ5M, N5DC, K2TNO, and K5RC. Seated is Governor Mark White. (Photo by K5RVK)

When that hot August weekend arrived, we had ten prime mobile stations and four roamers hit the road. Back in Houston we had two fixed stations keeping track of us, and K5IY orbited the center of the state in a private airplane in contact with many of the mobiles on 2 meters. It all came off without a hitch. We did a lot of overlapping and, with the roamers, covered a lot of the counties twice. We were mobile only during the daylight hours, and we each covered 30 to 40 counties. QSO totals of 1000 to 2000 were not uncommon.

There was very little advance publicity about the Armadillo Run, but it turned into a real on the air "happening." The Texas DX Society promised awards for anyone working 100, 150, or 200 counties and a special award for anyone who "worked them all." We heard later from folks like K1ZZ, N6AA, W2GD, K1TN: "I made the mistake of turning on the radio for a few minutes and got hooked tracking the mobiles as they criss-crossed the state and spent the entire weekend in the Armadillo Run." Against all odds, K1ZX/4 actually worked all 254 counties during the Run! Just to be sure it wasn't a fluke, in 1984 the club went out again for the CW County Hunter's Contest and activated all the counties in Arkansas, Louisiana, and Mississippi!

*Route 1, Box 307, Manvel, TX 77578

ARMADILLO RUN
1 9 OF 8 6
THE TEXAS DX SOCIETY
THE TEXAS SESQUICENTENNIAL

On October 24, 1985 Governor Mark White proclaimed that from March 2, 1986 through the end of 1986 any amateur radio operators operating from the Texas Independence Trail may broadcast that they are in "Armadillo County, Texas." This "new" county will be sanctioned for the duration of its existence and will provide many amateurs an opportunity to operate from Armadillo County and to try to contact Armadillo County. Attending the signing ceremonies in Austin were members of the Texas DX Society including Tom Taormina (Armadillo Coordinator), Bill Schrader (President, Texas DX Society), Grady Ferguson, Jim Lane, Dennis Motschenbacher, and Phil Shedd, all of the Houston area. During the various historical events of the Sesquicentennial Celebration the Texas DX Society will set up ham stations at the appropriate sites along the Independence Trail and operate "Armadillo County." The public will be invited to observe and learn more about amateur radio. The Texas Independence Trail is a series of state and US highways that stretch from just east of Houston to just east of San Antonio and down to the Gulf Coast. This trail marks the fight for independence from its beginning through the final battle at the San Jacinto Battleground near Houston. Armadillo County is open to all amateurs. The Texas DX Society is planning an all-band special events station, K5DX/A, for opening day. Armadillo County has been sanctioned by the USA-CA and will count toward the USA-CA awards. On December 31, 1986 it will become a deleted county. For further information, contact Tom Taormina, K5RC, at 713-489-1152.

Some months later a group of us was sitting around the campfire trying to figure out what we were going to do for our next club project. Someone suggested that we do an Armadillo Run *for the whole country!* That brought a round of laughter, but it started us on a five-month feasibility study to determine if such an undertaking was possible. We obviously would need the help of many other radio clubs around the country, and it would be one of the largest logistical efforts ever undertaken in amateur radio. However, the further we delved into it, the more achievable it appeared.

The first consideration was how many people it would really take. If you take the number of square miles in each state and divide it by the number of counties in the state, the average county in the average state is 35.3 miles wide. If we had to cover every single county mobile, at 40 mph it would take 2717 hours of driving to cover all 3076 counties. Assuming 22 hours of driving in a weekend per mobile, that would be 124 mobiles. For sake of practicality, let's say that we did it over two weekends (it now becomes 62 mobiles per weekend), allowing for a 100% round trip (124 mobiles per weekend) and allowing for toal duplication. The whole thing could be done with less than 250 participants. That is certainly within the realm of practicality, considering all of New England could be done with 9 mobiles (and we really did Texas with 14 mobiles). But what about the wide open spaces of the far west and Alaska and Hawaii?

In order to deal with these problems, we decided we would need regional coordinators who were familiar with the geographic and demographic peculiarities of each area of the country. As we discussed the project with amateurs around the country, after they got over the initial shock of the idea, just dealing with their specific region of the country, we found no major logistical problems that couldn't be overcome. As we talked with the county hunters, we found them to be a very eager and dynamic group who have overcome many of the problems of activating the "rare" counties. Their support and help made the improbable "do-able."

Since 1986 is the 150th anniversary of the state of Texas (The Texas Sesquicentennial), what better way to celebrate than invite amateurs worldwide to join in "The Great Armadillo Run of 1986" and activate all 3076 counties in the country in two weekends. The Run will be over the County Hunters' Phone and CW Contest weekends (phone in May and CW in July 1986). We will activate as many counties each weekend as possible, covering them all over the two weekends. The Texas DX Society will coordinate the effort, with the Regional Coordinators providing the interface with the local radio clubs, who will provide the manpower to cover the counties. The Run will be conducted as a contest with specific rules and many different fixed and mobile categories to give everyone an opportunity to participate and enjoy the event. Awards will be made for winners of the various categories.

What is your club doing for a project in 1986? Why not join in the Armadillo Run? Everyone is welcome. The Texas DX Society can provide you with planning data, rules and guidelines, and promotional material, and we can make speakers and slide shows available to help your group get the project rolling. We will be starting regional on-the-air meetings late in 1986 to interchange planning information. There will be monthly updates on the progress of the project in the Awards Column in *CQ* magazine. The Great Armadillo Run of 1986 may just be the cure to the low-sunspot blues. Y'all join us!

CQ REVIEWS:

The ICOM 735 Deluxe HF Transceiver

BY DAVE INGRAM*, K4TWJ

Until quite recently radio amateurs habitually related HF transceiver capabilities and performance to physical size and front-panel knob counts. The present evolution of pint-sized and deluxe rigs continues to challenge that viewpoint, however, and some truly full-featured units are now available in surprisingly compact cabinets. The small transceiver described in this review is a prime example of that situation. A large desk of equipment would have been required to equal the rig's capabilities one or two decades ago. Isn't modern technology grand!

Due to model number similarities and general cabinet size, one might initially visualize ICOM's new 735 as an "updated 730." Such simply isn't the case, however, as this little gem boasts circuits and features usually found only in larger and more expensive transceivers. I personally feel that its combination of 100 watts output, highly flexible receiver, and tailored audio capabilities are only a tip of the proverbial iceburg, and it could easily prove to be one of today's prime dollar bargains in amateur gear.

The ICOM 735 is a deluxe HF transceiver and general-coverage shortwave receiver in a package measuring 3½"H × 9½"W × 10"D. As a means of quick visualization, that's the size of an ICOM 730 minus its protruding rear heat sink. Its cabinet and front panel are smoke gray rather than ICOM's traditional black. There's a bottom tilt-up bail, top-mounted internal speaker, full-function LCD readout with continuously variable back light, and a flip-down front window that conceals its less frequently used controls. This front-panel arrangement is attractive in a couple of ways. If you like a simple and easy to operate unit, you can initially set its windowed/recessed controls for leaving the door shut and using less than a half dozen panel knobs for operations. If you prefer flexing capabilities, you can open or remove the semi-transparent door and use all 42 front-panel controls as desired.

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

The ICOM 735 HF transceiver with general-coverage receiver and numerous special features. Unit is quite compact and a true dream to operate.

Fig. 1– Example of the ICOM's multifunction display. Each parameter appears as commanded by the rig's controls.

This little rig is chock full of goodies, so let's begin with an overview of its various frequency selection methods. Similar to ICOM's 751, the 735's main tuning knob is used for several microprocessor-controlled functions. It initially tunes slowly, but electronically speeds up when the knob is turned faster. There are four silver buttons on the knob's right side. The top button shifts the tuning rate from 10 Hz steps (although only 100 Hz increments show on the display) to 1 kHz steps for long frequency shifting. The next button down shifts the knob to MHz tuning for zipping across the HF spectrum or quick excursions to random-desired shortwave frequencies. The next lower button changes the tuning knob's function to a (ham) band switch. A mere twist then cycles the unit from 1.8 through 29.0 MHz bands, including ready to operate WARC bands. The bottom button is a separately acting scan feature. Its lower and upper limits are first programmed into memories 11 and 12, and then personally-tailored band scanning is a snap. The rig will continuously scan if its all-mode squelch isn't used, or stop on a signal if squelched. Resume time and scan speeds are internal jumper selectable, and you can also stop scan or manually up/down scan via the 735's mike, which is great for mobiling.

There are two full-function VFOs and 12 memories in the 735, and stored information is continuously retained by a

5-year lithium battery. As an example of their use, one VFO might be set for 30 meter CW operation and the other for 20 meter SSB use. A single VFO button then toggles between bands and modes. Another button can recall memorized bands and modes as either a tunable memory or shifted directly to either VFO—punch 29.600 FM, punch 7.010 CW, punch 6.150 AM SWL, punch 10.051 SSB weather, etc. If you don't care for panel control, the rig can be set for automatic memory scanning, changing frequencies from the mike, or the whole operation can be rear-panel interfaced to a home computer. (That serial port uses 1200 baud rate and is RS232C compatible. Contacy ICOM or their dealers for more information on interconnections.)

Features and Frills

Considering the many attractions included as standard design in the 735, it's difficult to pinpoint exactly where "features" end and "frills" begin. General specifications are included in Table I. Naturally, it has a speech processor, VOX, SWR bridge, adjustable CW sidetone, RIT, passband tuning, and continuously variable noise blanker. Let's thus consider its additional features, or frills, depending on your point of view. A rear-panel control is included for audio tailoring the transmitted signal. It's continuously adjustable from bassy to high pitched, and it does a good job of glamorizing one's voice. A similar tone control is included for receive audio. The full break-in (QSK) is quite smooth, without excessive clatter or relay "thunks." Semi break-in is also front-window selectable if desired. The 735's noise blanker is continuously variable, a real "boon" for inserting just the right amount without quite reaching the point of adding distortion. (Of course, full blanking might be added in electrically noisy environments with strong signals and result in intermod/distortion. The 735 isn't alone here; nearly every transceiver experiences that situation with excessive blanker level.)

Receiver sensitivity and dynamic range can be varied in a couple of ways. There's a panel-selectable low-noise 10 dB RF preamp which boosts weak signals for DXing or poor-conditions copy, and another switch selects a 20 dB attenuator when strong signals are dominating a band. The preamp is really good on "quiet" 12 meters, and the attenuator can push the receiver's dynamic range to a respectable 105 dB, ideal for contesting. The 735's IF notch filter is quite deep and, by Jove, it's just wide enough to actually be useful on both SSB and CW. The combination of passband tuning, IF notch, adjustable noise blanker, and pre-amplified/attenuated receiver "front end" is a near perfect mix for operating enjoyment that must be experienced to be appreciated.

1-1 GENERAL

Number of semiconductors	: Transistors	124
	FETs	18
	Diodes	258
	ICs (Includes CPU)	42
Frequency coverage	: Ham Bands	
	1.8MHz ~ 2.0MHz	
	3.4MHz ~ 4.1MHz	
	6.9MHz ~ 7.5MHz	
	9.9MHz ~ 10.5MHz	
	13.9MHz ~ 14.5MHz	
	17.9MHz ~ 18.5MHz	
	20.9MHz ~ 21.5MHz	
	24.4MHz ~ 25.1MHz	
	27.9MHz ~ 30.0MHz	
	General Coverage (Receive Only)	
	0.1MHz ~ 30.0MHz	
Usable temperature range	: −10°C ~ +60°C (+14°F ~ +140°F)	
Frequency control	: CPU based 10Hz step digital PLL synthesizer. Independent Transmit/Receive frequency available on the same band.	
Frequency readout	: 6 digit 100Hz illuminated LCD	
Frequency stability	: Less than ±200Hz from 1 minute after switch ON to 60 minutes. Less than ±30Hz after 1 hour at 25°C Less than ±500Hz in the range of 0°C ~ +50°C	
Power supply requirements	: 13.8V DC ±15% (negative ground) Current drain 20A maximum at 200W input. AC power supply is available for AC operation.	
Current drain (at 13.8V DC)	: Transmitting	
	At 200 watts input	Approx. 20A
	Receiving	
	At maximum audio output	Approx. 1.5A
	Squelched	Approx. 1.2A
Antenna impedance	: 50 ohms unbalanced	
Weight	: 5kg (Includes options FL-32, IC-EX243 and UT-30.)	
Dimensions	: 94(107)mm(H) x 241(244)mm(W) x 239(272)mm(D) ( ) Dimensions include projections.	

1-2 TRANSMITTER

RF power	: SSB (A3J)	: 200 watts PEP input
	CW (A1)	: 200 watts input
	AM (A3)	: 40 watts output
	FM (F3)	: 200 watts input
	Continuously adjustable output power from 10 watts to maximum.	

Three more attractions worthy of recognition are the 735's cooling, rear audio input for AFSK RTTY and sideband selection. Inside the top cover there's a large final amplifier heat sink. An on-demand squirrel-cage blower moves air across the sink and out the cabinet's rear. During long transmissions the blower shifts from slow to high speed to keep everything nice and cool. The rear AFSK input is a convenient way of injecting audio tones from a popular computer interface unit without fumbling with front-panel microphone connectors. Proper sideband selection is automatic with the 735. However, an additional punch of its SSB button toggles operation to the opposite sideband.

Circuitry Overview

As we pointed out in our September and October 1985 *CQ* "World of Ideas" columns, a simple study of any rig's block diagram allows one to directly evaluate a unit independent of others' opinions or fancy advertisements. Realizing that fact, we'll briefly step through the 735's block diagram shown in fig. 2. Before stripping away its full digital control section for considering "bare bones circuits," notice the microprocessor section in the diagram's right bottom area. The "sensor" is the main tuning knob. It's connected to an infrared beam-interrupting flywheel. As the knob is turned, the light beam decoder (IC1, 2, 3) detects counts and direction and directs that information to the dial pulse counter (IC7). That circuit in turn drives the CPU (IC6) which controls the rigs main functions, including the complete oscillator and PLL block which is further detail-expanded in

Emission modes	:	A3J (J3E) SSB (Upper and Lower Sideband) A1 (A3A) CW A3 (A3E) AM F3 (F3E) FM
Harmonic output	:	More than 40dB below peak power output.
Spurious output	:	More than 50dB below peak power output.
Carrier suppression	:	More than 40dB below peak power output.
Unwanted sideband	:	More than 50dB down at 1000Hz AF input.
Microphone	:	600 ohm electret condenser microphone with push-to-talk switch and scanning buttons.

1-3 RECEIVER

Receive system	:	Triple conversion superheterodyne with continuous bandwidth control.
Receive modes	:	A3J (J3E) SSB (Upper and Lower Sideband) A1 (A3A) CW A3 (A3E) AM F3 (F3E) FM
Intermediate frequencies	:	1st: SSB, AM, FM 70.4515MHz CW 70.4506MHz 2nd: SSB, AM, FM 9.0115MHz CW 9.0106MHz 3rd: SSB, CW, AM, FM 455kHz
Sensitivity (PRE AMP ON on 1.6 ~ 30MHz)	:	SSB, CW 0.1 ~ 1.6MHz Less than 1.0μV for 10dB S/N 1.6 ~ 30MHz Less than 0.15μV for 10dB S/N AM (When selecting NARROW FILTER.) 0.1 ~ 1.6MHz Less than 6μV for 10dB S/N 1.6 ~ 30MHz Less than 1μV for 10dB S/N FM 1.6 ~ 30MHz Less than 0.5μV for 12dB SINAD
Squelch sensitivity	:	FM 0.3μV
Selectivity	:	SSB, CW 2.3kHz @ –6dB, 4.0kHz @ –60dB AM 6.0kHz @ –6dB, 18kHz @ –50dB FM 15kHz @ –6dB, 30kHz @ –60dB
Spurious and image response rejection	:	More than 80dB
Notch filter attenuation	:	More than 30dB
Audio output	:	More than 3 watts @ 10% distortion with 8 ohm load.
Audio output impedance	:	8 ohms

Table I– Technical specifications of the ICOM 735. Additional notes are in the text.

the diagram's bottom middle area. We've come a long way since the days of planetary drives coupled to open-air variable capacitors behind front panels, eh? Assuming you now understand/accept the fact the diagram's bottom middle area is supplying all necessary oscillator/injection signals, let's now mentally "strip away" that section and consider the rig's prime RF circuitry (diagram's upper area).

Following the receive path from the antenna to the T/R switch, there's the customary low-pass filter and RF attenuator. Incoming signals continue through a digitally-selected bandpass filter to the switch-selectable RF preamp, Q12 and 13, which uses popular and proven 2SK125s. Next is the Direct Feed Mixer, Q14 and 15, which gives the 735 its wide dynamic range—105 dB when the preamp is switched off. This is quite beneficial when nearby stations are crunching the S-meter and you're trying to work a weak DX station. Next are the two sections of FL1 (separated by Q16). Notice the popular up-conversion method is employed with a 70 MHz first IF. Signals then continue through the second IF's mixer, IC1, through or around the noise blanker, D26 through D29 plus its AGC keyed amplifier Q17, and on through a 9 MHz filter. Next is the IF notch (nice!), another mixer and filter section (IC4, FL5/6/7, Q45, Q47), mode switch (IC13), two audio amplifiers (Q55, IC14), and the speaker.

Looking in the block diagram's center area, the microphone's input is directed to an amplifier stage (Q57). This is internal; a preamplified microphone isn't necessary. Next is the speech compressor, Q59 (although it's at the audio rather than RF level, it does a good job). Following

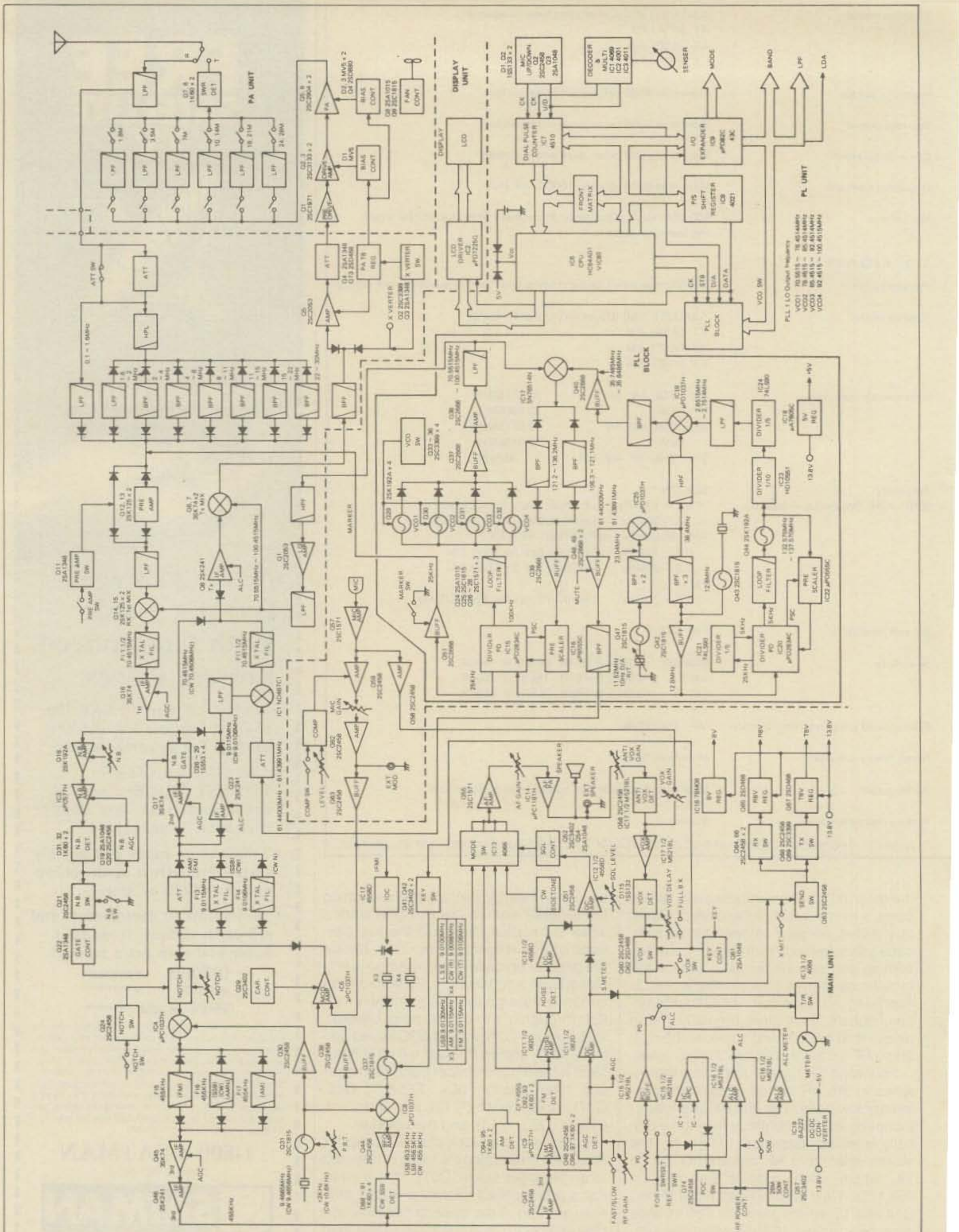


Fig. 2– Block diagram of the ICOM 735. Theory of operation is discussed in the text.

two more amplifiers, Q62 and Q63, signals enter the balance modulator, IC6 (a double sideband, suppressed carrier RF signal is produced). Next is filter FL3 (an SSB signal is now produced), IF amplifier Q23, mixer IC1, another filter (clean signal, eh!), another amplifier and mixer (Q8, Q6, Q7), a bandpass filter, then on to Q5. Finally, the ready-to-transmit RF signal is amplified by the predriver, driver and PA (Q1, Q2/3, Q5/6), filtered, and directed to the antenna. Everything looks straightforward and conservatively rated in this "series path," and I would say the rig is capable of a long and robust life while also being understandable in design. You might like to compare our previous notes with your own "dream rig" for further cross-analysis/evaluation.

On the Air

The ICOM 735 is a beautiful rig to operate fixed, mobile, or portable. Both the transceiver and its size/color-coordinated PS55 AC supply are compact enough to fit into almost any niche or small space, and the weight distribution of two small units versus a larger and heavier "single box" rig is ideal when moving around or negotiating stairways. As an example of that agility, I usually unplug two rear connectors on the 735 and carry it along mobile when driving more than 15 or 20 minutes time. I also carry a break-down rotary dipole which mates with mobile resonators, plus a length of transmission line in a knapsack. The full setup can then be hand-carried into a motel room or vacation cottage, and I'm back on the air in less than 30 minutes.

The solid-state and instant-on design plus various tuning flexibilities of the 735 let one spontaneously jump into HF activities, zip across bands, or eavesdrop on all kinds of shortwave happenings (underworld, foreign broadcasts, aviation, weather, etc.). Two enticing examples here are SWLing and operating CW (complete with QSK) while mobile—an absolute blast that's growing in popularity. The rig's CW sidetone level can be varied independently, then tracked with the AF volume control. If you prefer semi-break-in, a behind-door button makes the change a snap.

I found the noise blanker could be set to practically eliminate S9 ignition popping without excessive intermod. The blanker also does a very good job of reducing AC power-line noises during home use.

The first time I tried mating the 735 with my kw amplifier, the transceiver's keying relay hung closed. A quick check with the rig's manual revealed my oversight: the 735's relay is rated at 24 volts maximum, and I was applying 120 volts from my amplifier's relay circuit. An externally wired 12 volt relay cleared everything smoothly.

After adjusting the 735's transmit audio to "fit" my voice, compliments on signal quality were commonplace. I likewise adjusted receive audio to my own preference, and the results are a rig that's really enjoyable to operate.

During usual operations I set one VFO on SSB, one on CW, and two or three memories on desired QSOs or DX stations. I can then toggle between pileups, etc., and yes, we've even worked two DX stations *simultaneously* with the little rig (remember, you can monitor on one VFO between QSK keying on the other VFO). We occasionally get into heavy operating with the 735, but it keeps on purring and running cool. I wish the same could be said about my other solid-state transceiver. Incidentally, the 735's rear power connector is directly interchangeable with ICOM's 730 or 751, or Kenwood's TS120 or TS130. This can mean quick and easy swaps (both fixed or mobile) for many amateurs desiring a new rig.

Conclusion

Looking at the 735 overall, it's a stout little performer that's surely in the category of deluxe modern transceivers. Its various tuning and scan methods are attractive for both contesters and armchair operators alike, and the rig can be carried along on jaunts almost anywhere.

All of our modern transceivers are outstanding performers, and I seriously doubt hearing a DX station on one rig when it can't be heard on another. Selecting a particular unit thus equates to choosing one with the greatest personal appeal and a good service policy. ICOM "comes on strong" in this particular area. They're striving for top-quality servicing, and their turn-around time is surprisingly quick—important points if anything happens to one's prized investment.

The transceiver is complemented with a wide range of mating accessories, including the AT150 automatic antenna tuner, PS55 20 amp AC supply, IC2KL linear amplifier, and SM-8 desk mike. Internally-accepted accessories include the FL32 500 Hz or FL 63 250 Hz CW filters and the EX243 electronic keyer. No single transceiver on the market today is everyone's dream rig, but the 735 seems like a good step in that direction, especially when you're looking for full features in miniscule space.

For more information on the 735 and its accessories, contact ICOM America, Inc., 2380 116 Avenue N.E., Bellevue, WA 98004, or check with their many nationwide dealers. CQ

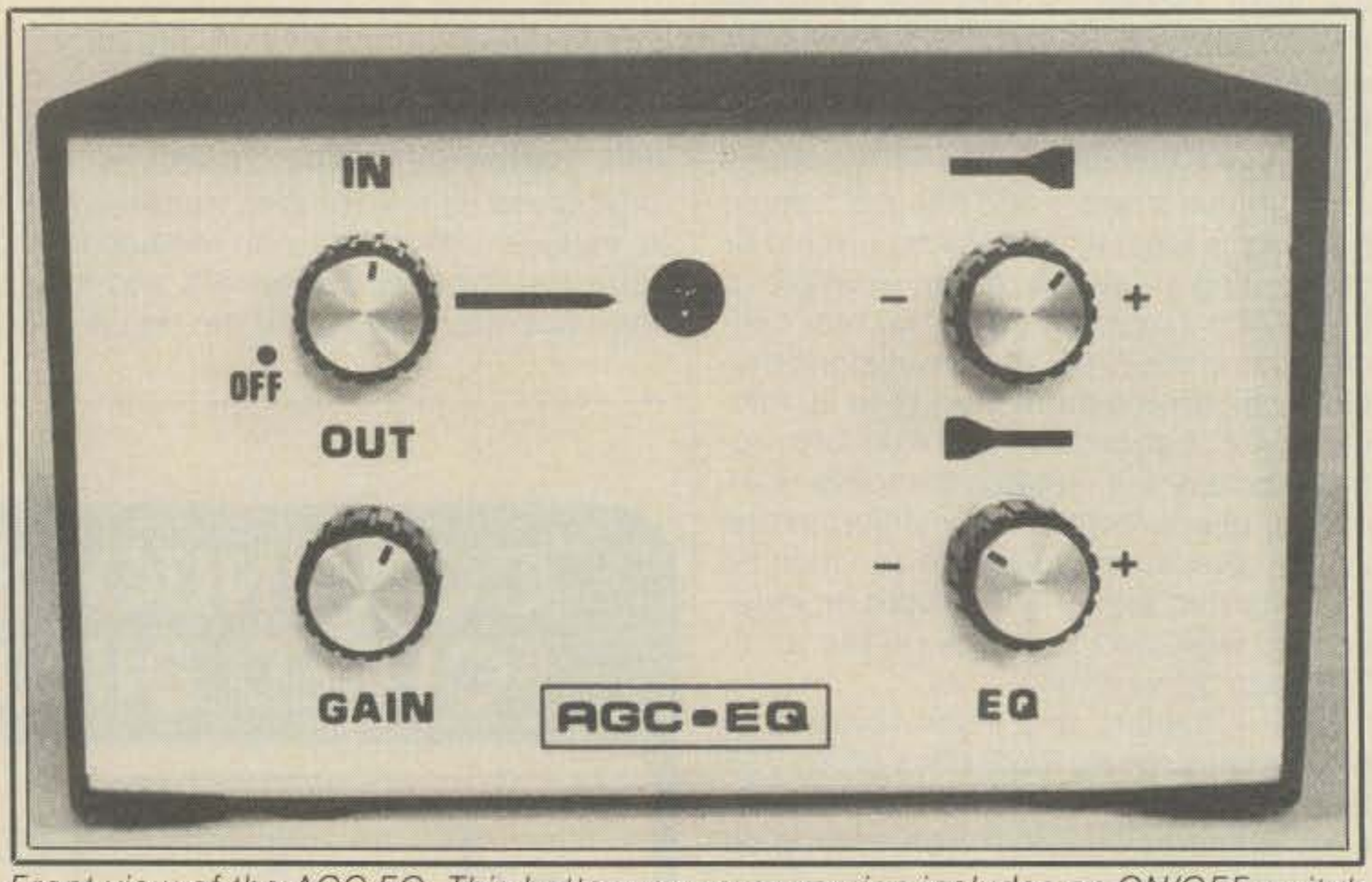
By itself or with RF clipping, you will sound louder and cleaner with this effective speech processing system.

Build The AGC-EQ Speech Processor

BY RICHARD A. NELSON* WBØIKN

Communications engineers agree on the need for amplitude processing to decrease the wide dynamic range of the human voice prior to transmission. However, most published SSB compatible speech processor designs are too complex for the average basement engineer. Presented here is construction information for the AGC-EQ . . . a simple speech compressor/equalizer that will add approximately 6 dB to your average signal strength.[1] The circuit includes continuously variable high- and low-frequency shelving-type equalizers to improve readability with all voice-microphone combinations, and an LED monitor to assure optimum control settings.

The design features very low distortion, making it ideal for SSB.[2] It may be used either by itself, or as a "pre-processor" for SSB rigs with RF clipping. On FM the AGC-EQ will maintain even deviation while adding no coloration to your audio. The EQ controls help make your rig sound like you, and the level control replaces the microphone gain control which is missing on most FM transceivers. It will eliminate adjusting your voice to suit your radio!



Front view of the AGC-EQ. This battery-powerer version includes an ON/OFF switch on the GAIN control protentiometer.

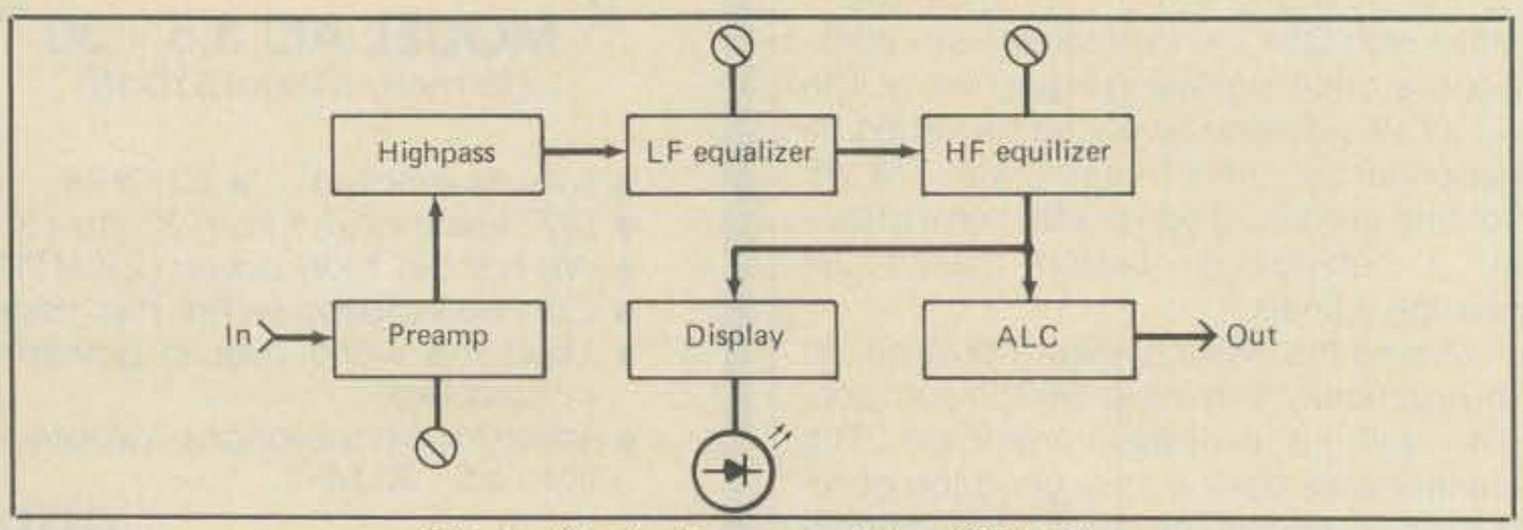


Fig. 1– Block diagram of the ACG-EQ.

Circuit Description

A block diagram of the AGC-EQ is shown in fig. 1 and the schematic diagram in fig. 2. Low-level audio from the microphone jack J1 is fed to an inverting operational amplifier stage, U1a. The gain is set by the ratio of the feedback potentiometer R1 to the 15k ohm input resistor (gain = R1/15k). Capacitors C1 and C2 set the low- and high- frequency cutoff points of the preamplifier. A 4.7k ohm resistor from the output of U1a to ground prevents crossover distortion in the preamp. Additional filtering is provided by a highpass filter stage based on opamp U1b. Its purpose is to remove any residual low-frequency components which could cause distortion in the AGC portion of the circuit.

Separate low- and high-frequency shelving-type equalizers follow the highpass filter. They allow you to independently vary frequency responses at the lower and upper ends of the processor's passband. The circuit will provide approximately 15 dB of boost or cut at 300 and 3000 Hz with the values shown. A detailed description of these equalizer circuits may be found in the *IC Opamp Cookbook* by Jung.[3]

From the equalizer the audio signal

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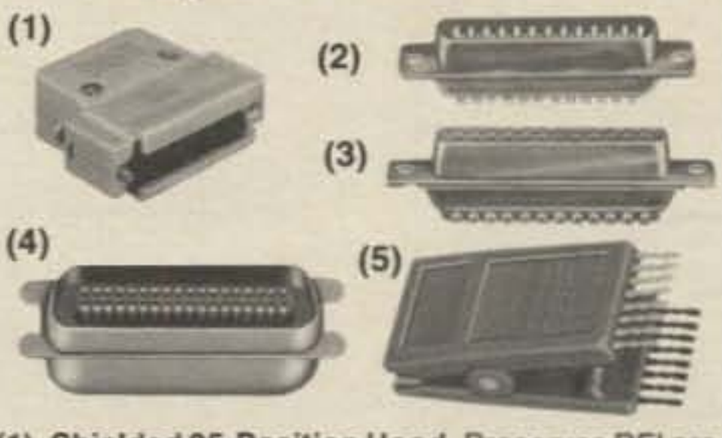

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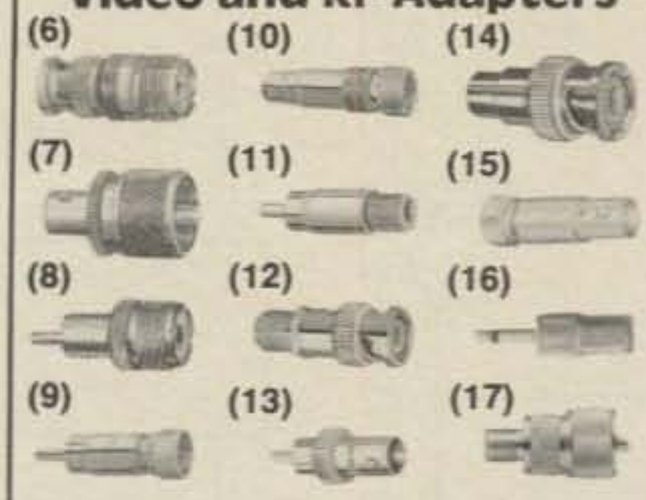

Fig.	Description	Cat. No.	Each
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8	SO-239 to Motorola plug	278-208	1.79
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10	RCA jack to male "F"	278-255	1.19
11	Female "F" to RCA plug	278-252	1.19
12	Female "F" to BNC male	278-251	2.39
13	BNC female to RCA plug	278-250	1.99
14	RCA jack to BNC male	278-254	2.19
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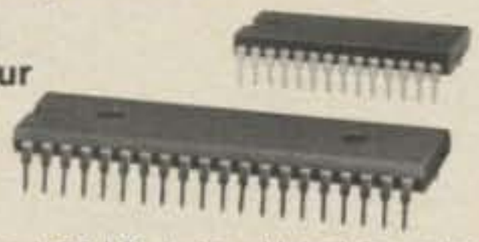

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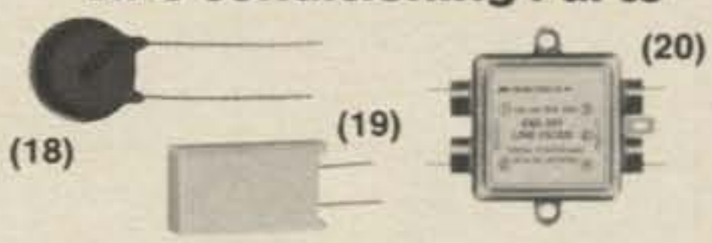

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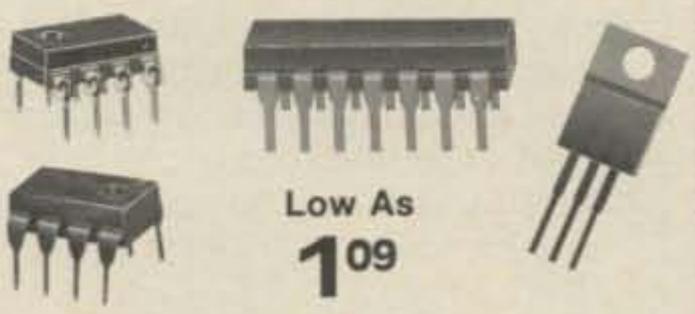

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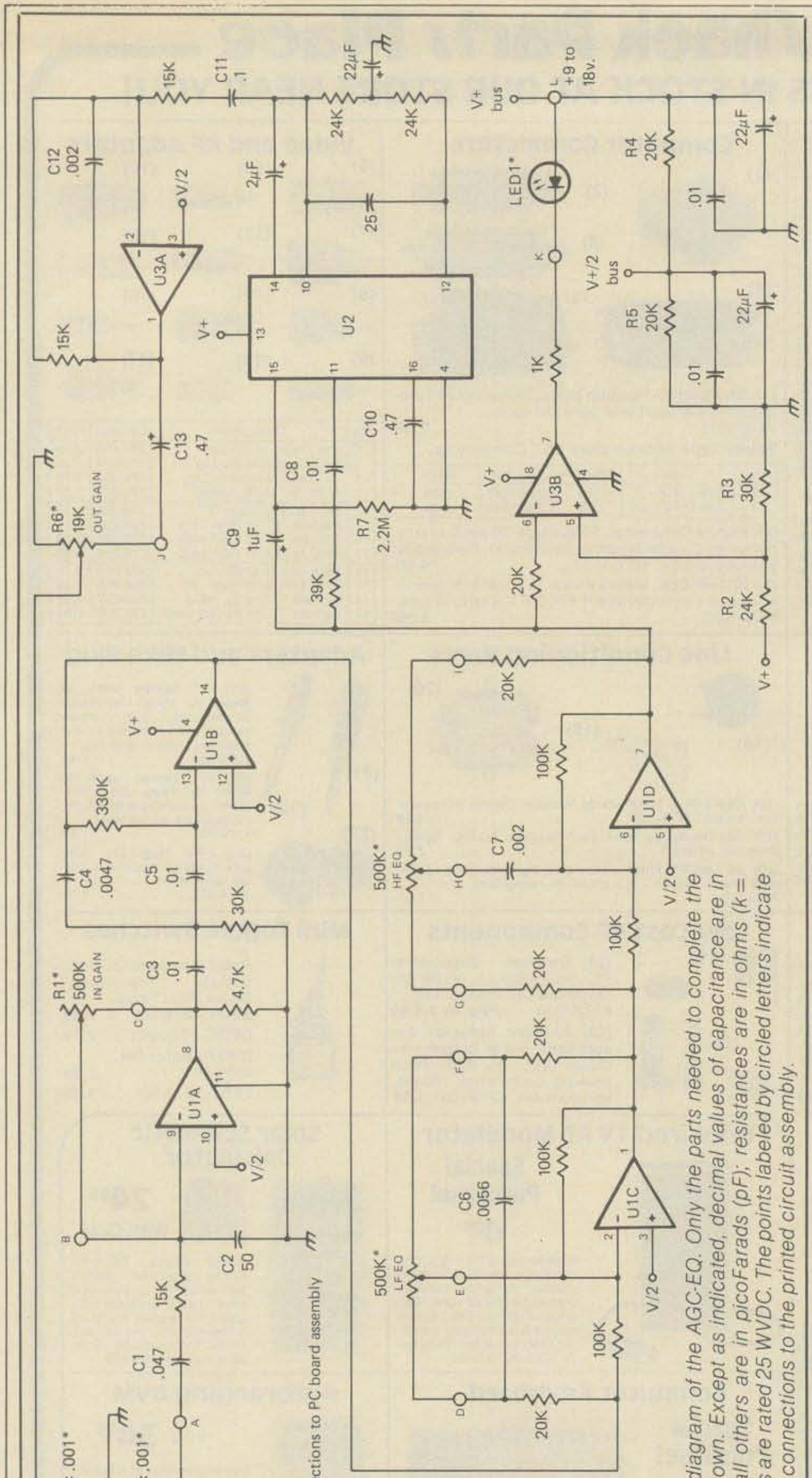


Fig. 2– Schematic diagram of the AGC-EQ. Only the parts needed to complete the basic design are shown. Except as indicated, decimal values of capacitance are in microFarads (uF); all others are in picoFarads (pF); resistances are in ohms (k = 1000). All capacitors are rated 25 WVDC. The points labeled by circled letters indicate connections to the printed circuit assembly.

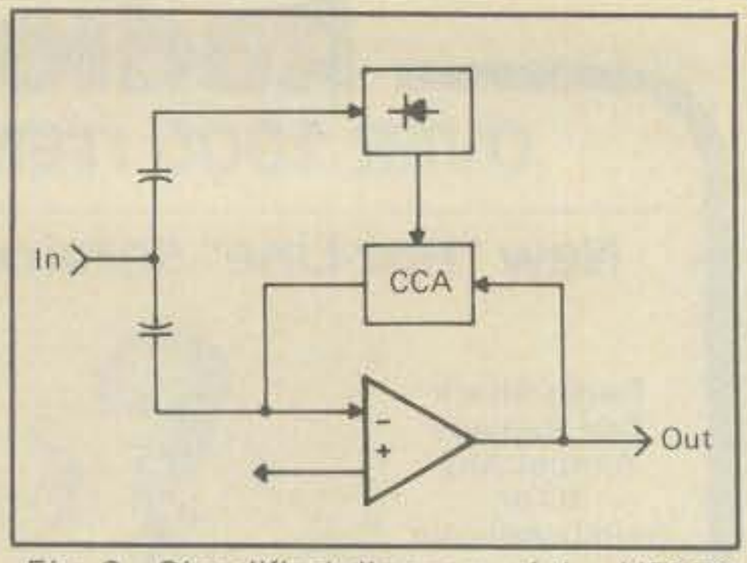


Fig. 3– Simplified diagram of the NE570 AGC circuit (see text).

goes to the automatic gain control and LED level monitor circuits. The AGC is based on a Signetics NE580 compander IC. This IC was developed for use in telephone systems and is ideally suited for amateur radio speech processors. The chip contains two identical gain control sections, although only one is used here. Each section consists of an opamp gain stage, a current controlled amplifier, and a precision full-wave rectifier. Fig. 3 shows how these subcircuits are connected to yield an AGC amplifier. The audio signal is AG coupled to the inverting opamp and the rectifier input. The rectifier produces an output current which is proportional to the average input voltage. This current controls the gain of the **C**urrent **C**ontrolled **A**mplifier (**CCA**). The CCA is placed in the negative feedback loop of the opamp, and thus its gain determines the opamp gain. Increasing the input to the AGC increases the rectifier control current which in turn increases the gain of the CCA and the amount of negative feedback. This increased feedback reduces the opamp gain, keeping its output constant.

Capacitor C10 determines the time constant of the AGC circuit by smoothing the output from the rectifier. With the .47 uF capacitor shown the attack time is .7 ms and the decay time is 3 ms. This is fast enough to reduce the amplitude of transients without generating significant distortion. The time constant with other values for C10 may be computed from:

Attack time = C10 (uF) × 1.5 ms

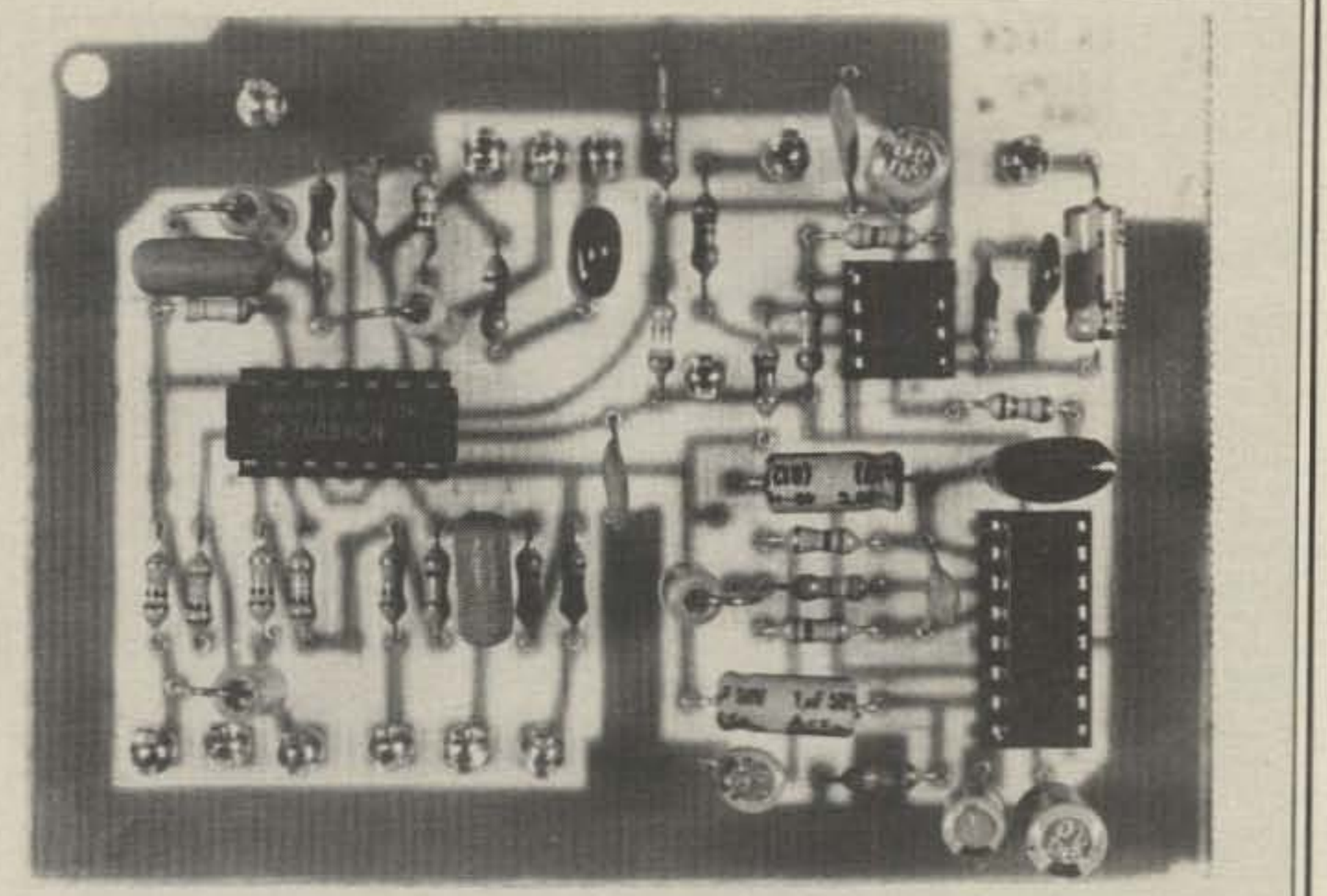
Decay time = C10 (uF) × 6.75 ms

With very short time constants the circuit produces distortion products resulting from ripple in the gain control current. The amount of distortion is inversely proportional to both frequency and the time constant of the AGC circuit and may be calculated from:

THD (percent at 1000 Hz) = .2 / C10 (uF)

With the value shown the distortion at 1000 Hz will be approximately .4 percent. Up to 10 percent distortion is tolerable before problems occur (4), so you can feel safe using values as low as .047 uF for C10.

From the AGC the audio signal goes to an inverting buffer, U3A. The buffer iso-



Close-up view of the printed circuit board assembly.

lates the AGC from the load and includes additional highpass and lowpass filtering. The output from the buffer is AC coupled through a .47 uF capacitor to the OUT GAIN control.

The LED monitors the signal level at the input of the AGC. Opamp U3b functions as a comparator, with the trip point being set by R2 and R3. With the values shown, the LED will light approximately 15 dB below the circuit's clipping point. This 15 dB of "headroom" provides an adequate margin to prevent distortion during voice amplitude peaks. The point at which the LED fires may be changed by scaling R2 or R3. Increase R2 to raise the trip point, and increase R3 to lower it.

Optimum In/Out Z	600–100k ohm
Freq. Response (–3 dB)	275–4800 Hz
AGC Control Range	40 dB min.
System Distortion	.5% max.
LF Equalizer Range	± 15 dB (300 Hz)
HF Equalizer Range	± 15 dB (3000 Hz)
Output Level	.25 volt RMS max.
Output Headroom	20 dB
LED Display Headroom	15 dB
Power Requirement	9 to 18 volt at 30 mA

Table I– Performance specifications for the AGC-EQ. Values are the average of three units. Unless stated, all measurements taken at 1000 Hz with a 12 volt power supply.

Construction

A printed circuit board is available to speed construction and reduce the possibility of errors.[5] You may use your own PC board design, or alternate wiring techniques. However, care must be taken when laying out the circuit. The microphone preamplifier and highpass filter stages provide up to 36 dB of gain, and the ALC stage has over 40 dB of available gain. This means that under idle or low signal conditions the overall system gain can exceed 75 dB. Attention must be paid to possible ground loops or feedback paths. Make sure that the printed circuit board assembly is grounded to the chassis at only a single point, and keep all input and output wiring separated if possible.

The values of all parts have been carefully chosen to provide optimum performance, and random substitutions should be avoided. In fact, the only noncritical values are the power supply filter capacitors. All resistors and capacitors (with the exception of electrolytics) should be 5 percent tolerance or better. Use only parts of known quality. Noisy resistors or leaky capacitors can seriously degrade the performance of this circuit. Small value capacitors should be mylar or polystyrene. Capacitors of .47 uF or more should be fresh electrolytics. Avoid salvaged parts for this project.

I use sockets with all ICs to prevent the possibility of heat damage during soldering. This also speeds troubleshooting should a problem occur; unsoldering 16 pins is a chore! I also like to use turret terminals for connections to my PC boards. This lets me make all external connections after the board is secured in the enclosure and hastens removal of the board should it become necessary to do so.

I did not include provisions for switching the processor out of the line simply because the audio quality is so good that there is seldom any need to do so. However, if you would prefer to be able to switch between processed and unprocessed audio, you may use a SPST switch to select either the microphone input (point A on the schematic) or the output from the OUT GAIN control. If you are using battery power, then you should also include a power switch. You can use a toggle, or potentiometer-mounted SPST, or you can use a DPDT to switch the power and select processed/unprocessed audio simultaneously. Only the basic circuit is shown in the schematic (fig. 2). The incorporation of these or other options is up to your imagination and requirements.

The PC assembly may either be mounted in its own enclosure, or within existing equipment such as transmitters, phone patches, repeater racks, etc. In this case you can either solder the potentiometers directly to the board or you can mount them on a separate bracket. Once you have found the optimum settings, you can even replace the pots with ¼ watt resistors of the proper value.

Most modern rigs have little spare room left inside, requiring a separate enclosure for the processor. I used a 3" × 4" × 5" (76.2 × 101.6 × 127 mm) aluminum box. Any metal enclosure of similar dimensions will work nicely. Lay out the placement of all parts carefully before you punch holes. It is discouraging to punch and label your enclosure before discovering that one of the controls does not have sufficient clearance! The input and output jacks, J1 and J2, should be chosen to match your installation. I keep all of my PTT lines separate from audio lines to reduce the chance of hum and RF feedback, so single conductor phone jacks were adequate.

Setup, Use, and Modifications

You must pay special attention to your choice of microphone when using any type of audio or RF processing. Compressing the dynamic range of the microphone's output amplifies hum, noise, and distortion. A low- to medium- impedance communications or broadcast-quality microphone should be used. Do not use a toy mike. Poor-quality audio into the processor will result in even worse audio coming out!

The unit should be powered by a clean, noise-free DC source. Power-supply ripple can cause hum in the output of the AGC-EQ. Do not use a "wall transformer" or "battery eliminator" type power supply. Although they may say DC, they generally have little if any filtering. Use either a good-quality bench supply or a 9 volt battery.

Plug your microphone into J1, and connect J2 to your transmitter through a suitable jumper. Apply power to the processor, and without keying your transmitter speak normally into the microphone. Adjust the IN GAIN control until the LED flickers occasionally during normal speech. This setting will provide enough headroom for voice peaks, plus a bit more for an occasional extra-loud shout in a pileup! Adjust the microphone gain control on your transmitter to its normal setting and press your PTT. While transmitting into a dummy load (or on a dead

band), adjust the OUT GAIN control on the processor until proper voice peaks are observed. An oscilloscope or peak-reading power meter will make this adjustment easier.

Using an external receiver, or with the aid of a friend, you may now set the equalizer controls. If the audio sounds low pitched or boomey, try increasing the HF and/or decreasing the LF controls. Do the opposite if the audio sounds high pitched. A correction of the IN GAIN control may be necessary after adjusting the EQ. Check the LED monitor to find out.

If your rig already has RF clipping, the AGC-EQ will provide an additional increase in signal strength by assuring that the clipping circuit is maintained at the optimum drive point. Without compression ahead of a clipping circuit the clipping percentage is constantly changing with changes in average voice amplitude. When using the AGC-EQ as a "pre-processor" in conjunction with RF clipping, follow the procedure outlined above before setting the clipping control on your transmitter (or outboard clipper). You may wish to reduce the amount of compression, and thus the backround noise, by making the value of R7 smaller. A 500k resistor for R7 will reduce the background noise by approximately 12 dB.

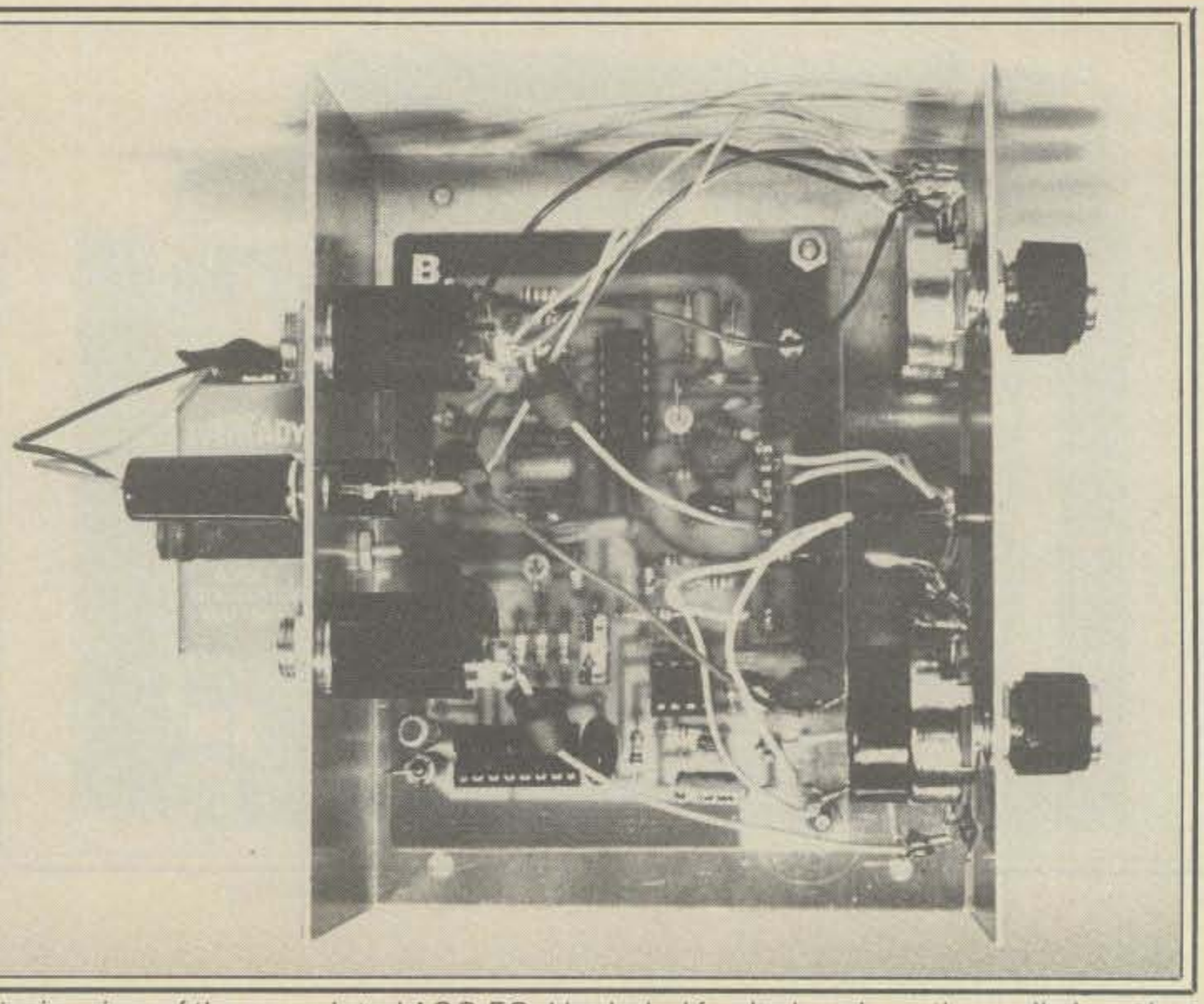
Experimenters will find the AGC-EQ circuit to be an ideal starting point for more complex designs. The equalizer stage may be used independently by tapping its output through a .47 uF capacitor at pin 7 of U1d. The time constant of the AGC circuit may be made variable by using a rotary switch with capacitors of several values to replace C10 on the circuitboard assembly. Try values between .01 and 10 uF. Remember that smaller values will provide faster transient response, but at the expense of higher distortion. The distortion level with values greater than .47 uF may be considered negligible. You might also wish to make the amount of available compression (maximum gain of the AGC) continuously variable by substituting a 5M to 10M potentiometer for R7. Or you can leave out R7 completely for nearly 60 dB of dynamic range control.

The AGC-EQ has uses other than a microphone line processor. When used with a phone patch, it will feed a constant-amplitude signal to your transmitter despite variations in phone-line signal. This makes it ideal for unattended phone patches such as simplex or repeater autopatches. The unit may also be inserted in the low-level audio portion of your receiver (ahead of the audio power amplifier stage). The AGC action will control eardrum-rattling heterodynes and other headache inducing, high-level garbage. And the EQ controls will allow you to remedy frequency response anomalies in your speaker or headphones.

The AGC-EQ is perfect for tape-recording of material with a wide dynamic range such as conferences, where microphone working distances may vary greatly. By scaling the values of a few capacitors, the frequency response can be extended to cover the entire audio spectrum. The result is a wide-range low-distortion compressor/equalizer suitable for high-fidelity material.[6]

The system gain and output level also make the AGC-EQ a good choice for the audio stage of a homebrew SSB or FM transmitter. The output from U3a may be used to directly drive a balanced modulator or voltage-controlled oscillator.

Remember that the quality of your on-the-air signal depends on what you feed into your transmitter. Properly used with a good microphone, the AGC-EQ will make you louder, cleaner, and easier to listen to!



Interior view of the completed AGC-EQ. I included ferrite beads on the audio input/output leads of this unit to reduce RF susceptibility in my kilowatt HF station.

Footnotes

1. Collins, "Ordinary and Processed Speech in SSB Application," *QST*, Jan. 1969, pp. 20–21.

2. Schreuer, "Speech Clipping in Single-Sideband Equipment," *Ham Radio*, 1971, p. 22.

3. Jung, *IC Opamp Cookbook*, Indianapolis: Howard W. Sams & Co., 1974, pp. 326–328.

4. Fisk, "Novel Audio Speech Processing Technique Offers Maximum Talk Power with Negligible Distortion," *Ham Radio*, June 1976, p. 32.

5. PC boards, parts, and kits available from Analog Technology, POB 8964, Fort Collins, CO 80525.

6. Questions regarding the circuit should be directed to the author. Please enclose an SASE.

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These MFJ 24 hour clocks make your DXing, contesting, logging and SKEDing easier, more precise.

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Both are mounted in a brushed aluminum frame, feature **huge easy-to-see 5/8 inch LCD numerals** and a sloped face that makes reading across-the-shack easy and pleasant.

You can read hour, minute, second, month and day and operate them in an alternating time-date display mode. You can also **synchronize them to WWV** for split-second timing. Both are **quartz controlled** for excellent accuracy.

They are **battery operated** so you don't have to reset them after a power failure, and battery operation makes them suitable for mobile and portable use. Long life battery included.

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The MFJ-1229 is a general purpose computer interface that will never be obsolete. An internal DIP switch, TTL and RS-232 ports lets you adapt the MFJ-1229 to nearly any home computer and even operate AMTOR with appropriate software.

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You can transmit both narrow (170 Hz) and wide (850 Hz) shift while the variable shift tuning lets you copy any shift (100-1000 Hz) and any speed (5-100 wpm, 0-300 baud ASCII).

Automatic threshold correction and sharp multi-pole active filters give good copy under severe QRM, weak signal and selective fading.

There's an FM (limiting) mode for easy trouble-free tuning that's best for general use and an AM (non-limiting) mode that gives superior performance under weak signals and heavy QRM.

A handy Normal/Reverse switch eliminates re-tuning while checking for inverted RTTY.

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12½ x 12½ x 6 inches. Uses floating 18 VDC or 110 VAC with MFJ-1312, $9.95.

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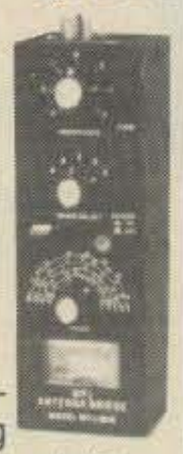
MFJ's Portable Antenna lets you operate 40, 30, 20, 18, 15, 12, 10 meters from apartments, motels, camp sites, vacation spots, any electrically clear location where space for full size antenna is a problem.

A telescoping whip (extends 54 in.) is mounted on self-standing 5½ x 6¾ x 2¼ inch Phenolic case. Built-in antenna tuner, field strenght meter. 50 feet coax. Complete multi-band portable antenna system that you can use nearly anywhere. 300 watts PEP.

MFJ-1621 **$79.95**

MFJ ANTENNA BRIDGE MFJ-204B $79.95



Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge that you can take to your antenna site—no other equipment is needed.

You can determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest and most convenient way to determine antenna performance available today to anyone. There's nothing else like it and only MFJ has it. Built-in resistance bridge, null meter and tunable oscillator-driver (1.8-30 MHz). Uses 9 V battery. 4 x 2 x 2 inches.

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The authoritative "World Radio TV Handbook" rates the MFJ-1024 as "a first-rate easy-to-operate active antenna ... Quiet, with excellent dynamic range and good gain ... Very low noise factor ... Broad frequency coverage ... the MFJ-1024 is an excellent choice in an active antenna"

54 inch remote active antenna mounts outdoor away from electrical noise for maximum signal and minimum noise pickup. Often outperforms long-wire hundreds of feet long. Mount anywhere-atop houses, buildings, balconies, apartments, ships.

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MFJ-1024 **$129.95**

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MFJ "DRY" DUMMY LOADS

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MFJ-260 **$26.95**

MFJ's "Dry" dummy loads are air cooled—no messy oil. Just right for tests and fast tune up. Non-inductive 50 ohm resistor in aluminum housing with SO-239. Full load to 30 seconds, de-rating curve to 5 minutes. **MFJ-260 (300 watt)**, SWR 1.1:1 to 30 MHz, 1.5:1, 30-160 MHz, 2½x2½x7 in. **MFJ-262 (1 KW)**, SWR 1.5:1 to 30 MHz, 3x3x13 inches.

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MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7 x 2 x 6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

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Join the exciting packet radio revolution and enjoy error-free communications ... for an incredible $129.95.

MFJ brings together efficient manufacturing and TAPR's (Tucson Amateur Packet Radio) leading edge technology to bring you affordable packet radio. You get a nearly identical clone of the widely acclaimed TAPR TNC 2 with identical software and hardware. It's in a new cabinet and includes a TTL serial port for extra versatility.

All you need is your rig, home computer with a RS-232 serial port and a terminal program. If you have a Commodore 64, 128 or VIC-20 you can use MFJ's optional Starter Pack to get on the air immediately. You get interfacing cable, terminal software on tape or disk and complete instructions ... everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), $19.95 each.

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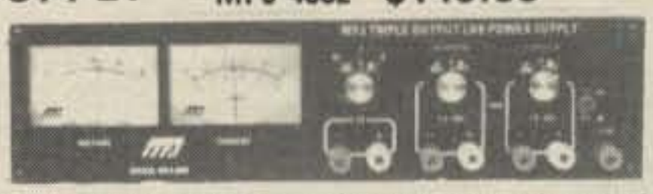
This 5 mode Super Keyboard lets you send CW, Baudot, ASCII, use it as a memory keyer and for Morse Code practice. You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold.

TRIPLE OUTPUT LAB POWER SUPPLY MFJ-4002 $149.95



Lab quality power supply gives you plenty of voltage and current for all your analog and digital circuits. **3 completely isolated outputs**: 2 variable 1.5-20 VDC at 0.5 amp and a fixed 5 VDC at 1 amp. Connect in series or parallel for higher voltage and current. It's short circuit protected, has excellent line (typ.0.01%/V) and load regulation (typ.0.1%). **Lighted meters** monitor volt./cur. 12x3x6 in. 110 VAC.

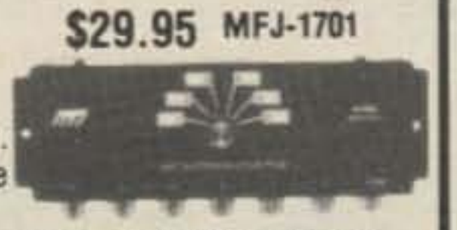
CROSS-NEEDLE SWR/WATT METER MFJ-815 $59.95

MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power —all at a single glance! SWR is automatically computed —no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter. Needs 12 V. ±10% full scale accuracy. 6½ x 3¼ x 4½ inches.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

$29.95 MFJ-1701



Instantly select any antenna or rig by turning a knob. Organizes coax cables and eliminates plugging and unplugging. Unused terminals are grounded to protect your equipment for stray RF, static and lightning. 2 KW PEP, 1 KW CW. For 50 to 75 ohm. Negligible loss, SWR, and crosstalk gives high performance. SO-239s. Convenient desk or wall mounting.

MFJ-1702, $19.95. 2 positions. Cast aluminum cavity construction gives excellent performance up to 500 MHz with better than 60 dB isolation at 450 MHz. Heavy duty, low loss switch has less than 20 milliohm contact resistance, less than 0.2 dB loss and SWR below 1:1.2. 2 x 2½ x 1 inches.

MFJ-1701, $29.95. 6 positions. White markable surface for recording ant. positions. 8½ x 1½ x 3 in.

ANTENNA CURRENT PROBE MFJ-206 $79.95

This new breakthru MFJ Antenna Current Probe lets you monitor RF antenna currents—no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- **Indicate transmission line radiation** due to high SWR, poor shielding or antenna unbalance.
- **Detect re-radiation** from rain gutters and guy wires that can distort antenna field patterns.
- **Detect RF radiation** from ground leads, power cords or building wiring that can cause RFI.
- **Determine if ground** system is effective.
- **Pinpoint RF leakage** in shielded enclosures.
- **Locate the best place** for your mobile antenna.
- **Use** as tuned field strenght meter.

Monitors RF current by sensing magnetic field. Uses an electrostatically shielded ferrite core, FET RF amplifier, op-amp meter circuit for excellent sensitivity, selectivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strenght meter. 4 x 2 x 2 inches.

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A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale.

Run up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Tune out SWR on dipoles, vees, long wires, verticals, whips, beams/quads. 10x3x7 in.

DIGITAL SWR/WATTMETER

MFJ-818 **$89.95**

Fully automatic Digital SWR/Wattmeter reads SWR 1:1 to 1:9.9 directly and instantaneously—no SWR knob to set. Huge 0.6 inch bright orange digits make across-the-room reading easy. 12 segment LED bar graph wattmeter gives instantaneous PEP readings up to 200 watt RF output.

Good, bad, mismatch tri-color LEDs indicate SWR conditions. Small size (5½ x 4¼ x 1 in.) and easy-to-read digital display makes it ideal for mobile use. For 50 ohm systems. 1.8-30 MHz. 12 VDC or 110 VAC with MFJ-1312, $9.95.

MOBILE ANTENNA MATCHER

MFJ-910 **$19.95**

Lower your SWR and Get more power into your mobile whip for solid signals and more QSOs. Your solid state rig puts out more power and generates less heat. For 10-80 meter whips. Easy plug-in installation. Complete instructions. Fits anywhere, 2½x2½in.

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Here's a one-evening project that can find use in your shack or help out that new Novice.

AN ECONOMICAL QRP WATTMETER

BY GARY P. CAIN*, W8MFL

This is a one-evening project that costs less than $5.00 and results in a practical addition to the shack. This simple project will give you a wattmeter and dummy-load combination that is invaluable when tuning or testing small rigs of RF output of 30 watts or less. Because you are loading into a dummy load, no signal is transmitted on the air, and the meter allows you to tune for maximum RF output. All in all it is a very desirable instrument to have, and for less than $5.00.

One of the relics of the famous Command Set series of World War II is the BC-442 antenna relay unit. At hamfests these are going for as little as $1.00, an absolute bargain by any standard. As is, the BC-442 has no practical value to the amateur. However, with a few dollars and an hour or so of work, it will take on a new lease on life and serve a useful purpose in the shack.

The unit consists of a meter, a thermocouple, a relay, a transformer, and various binding posts. In this conversion we shall use the meter and the thermocouple and discard all else. Begin the conversion by tracing the wires from the meter to the thermocouple. Remove all other components except the meter, the thermocouple, and the wires which run between them. Save the relay, as it can be made to operate off of 12 or 24 volts.[1]

Place the unit so that it is facing you with the meter in the lower right-hand corner. Drill a small hole in the lower left-hand corner and mount an RCA phono jack there. On the thermocouple find a terminal marked *line* and run a short wire from the phono jack to this terminal. Solder two 100 ohm 10 watt resistors (Radio Shack #271-135) in parallel to form a 50 ohm 20 watt resistor. Connect this resistor from the other *line* terminal on the thermocouple to ground. Mount a 2" × 3½" metal plate on the front panel directly above the meter to cover the holes left

*The American College, Bryn Mawr, PA 19010

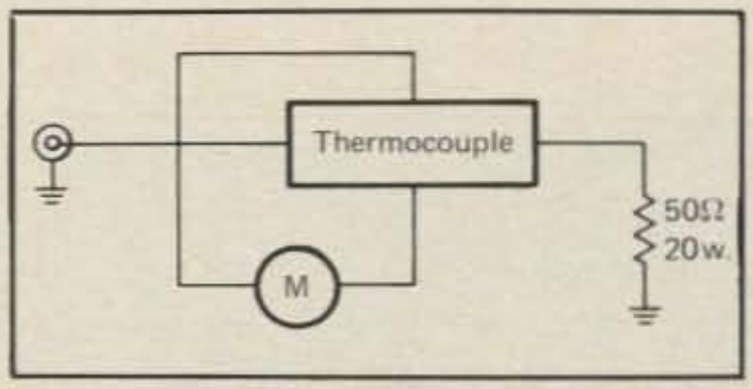


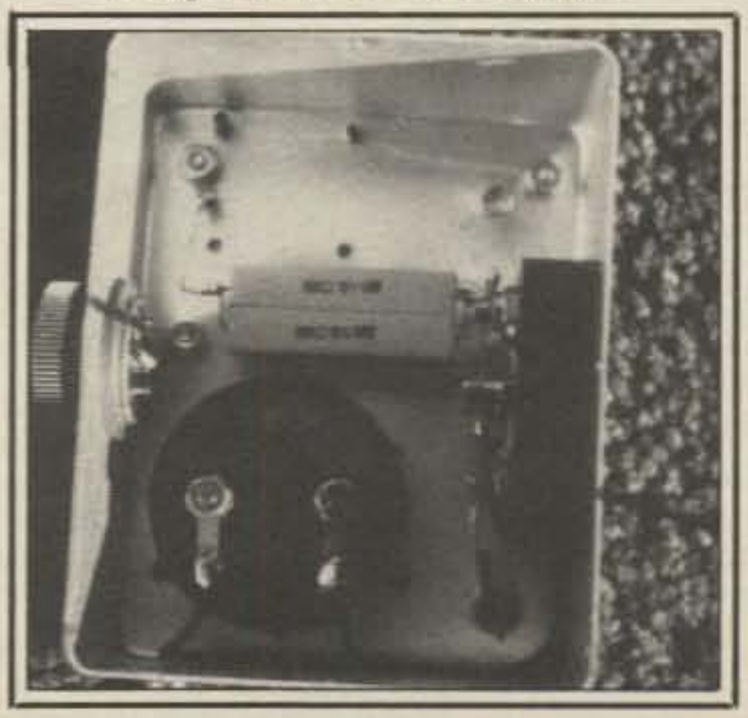
Fig. 1– Schematic diagram of the simple QRP wattmeter. The basis for the unit is the BC-442 antenna relay.

by the binding posts. To this plate attach the following chart.[2]

Meter Reading	Watts
1	0.72
2	1.62
3	2.42
4	3.38
5	5.12
6	6.84
7	9.25
8	12.50
9	17.41
10	28.12

You now have a wattmeter in series with a 50 ohm dummy load. The meter reads 1–10, but at full scale it really is a .75 amp RF wattmeter. We can convert

The interior view shows how simple and straightforward the project is.



The front view shows the new chart, transmitter jack, and meter.

the meter reading to RF watts by Ohms law, which reads $P = I^2R$. For a reading of, say, 4, you really have $(4 \div 10) \times .75$ amp or .3 amps. Square this and multiply by 50 ohms and this computes to 4 watts of RF power. This is a handy thing to know when tuning up any QRP transmitter. The meter, however, is not perfectly linear. Accurate power measurements using a wattmeter of verified calibration are reflected in the above table.[3]

This completes the conversion. Now add a few decals to dress up the device. It should prove to be very useful in the years ahead.

Footnotes

1. Green, Severn T., "Converting the BC-442 Antenna Relay," *CQ*, March 1960.

2. Pafenberg, Roy, "A Deluxe Conversion of the Command Set Antenna Relay Unit," *73*, June 1963.

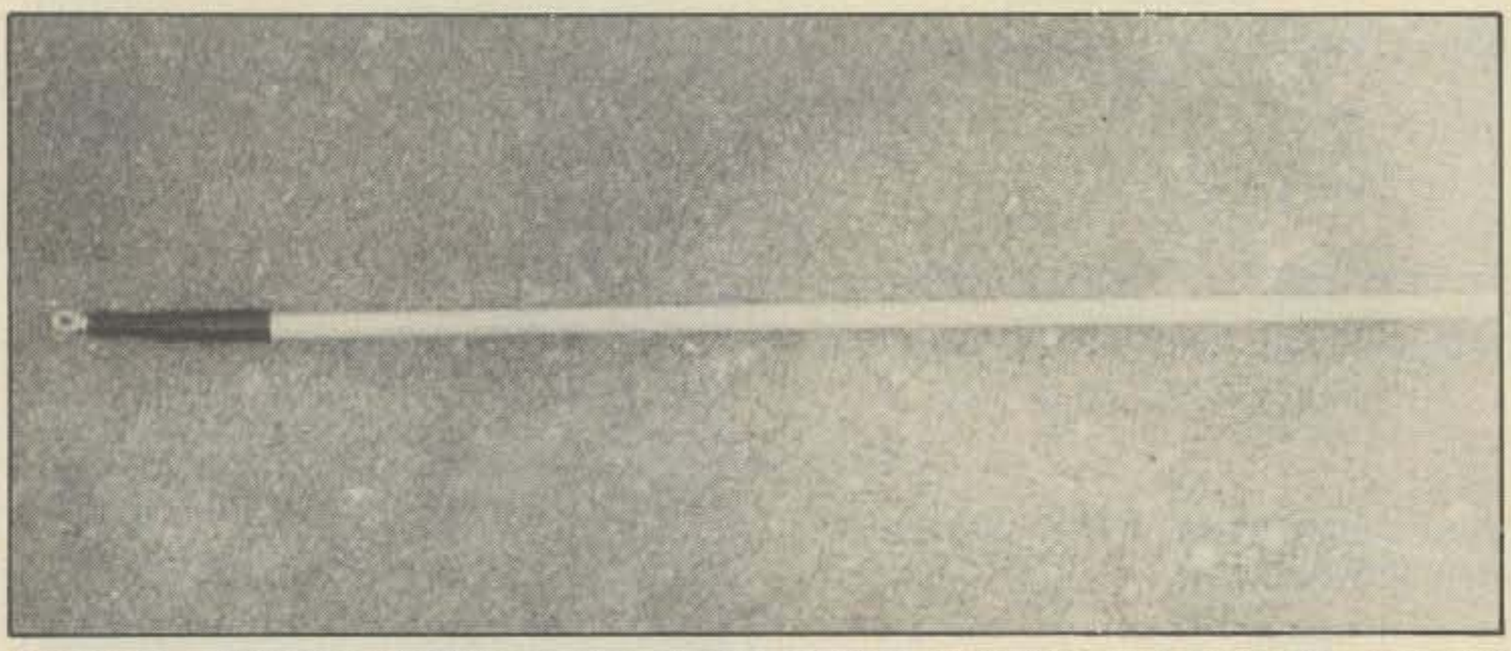
3. *Ibid.*

No-37-38

CQ REVIEWS:

The Cushcraft 20-3CD Skywalker 20 Meter Beam

BY JOHN J. SCHULTZ*, W4FA

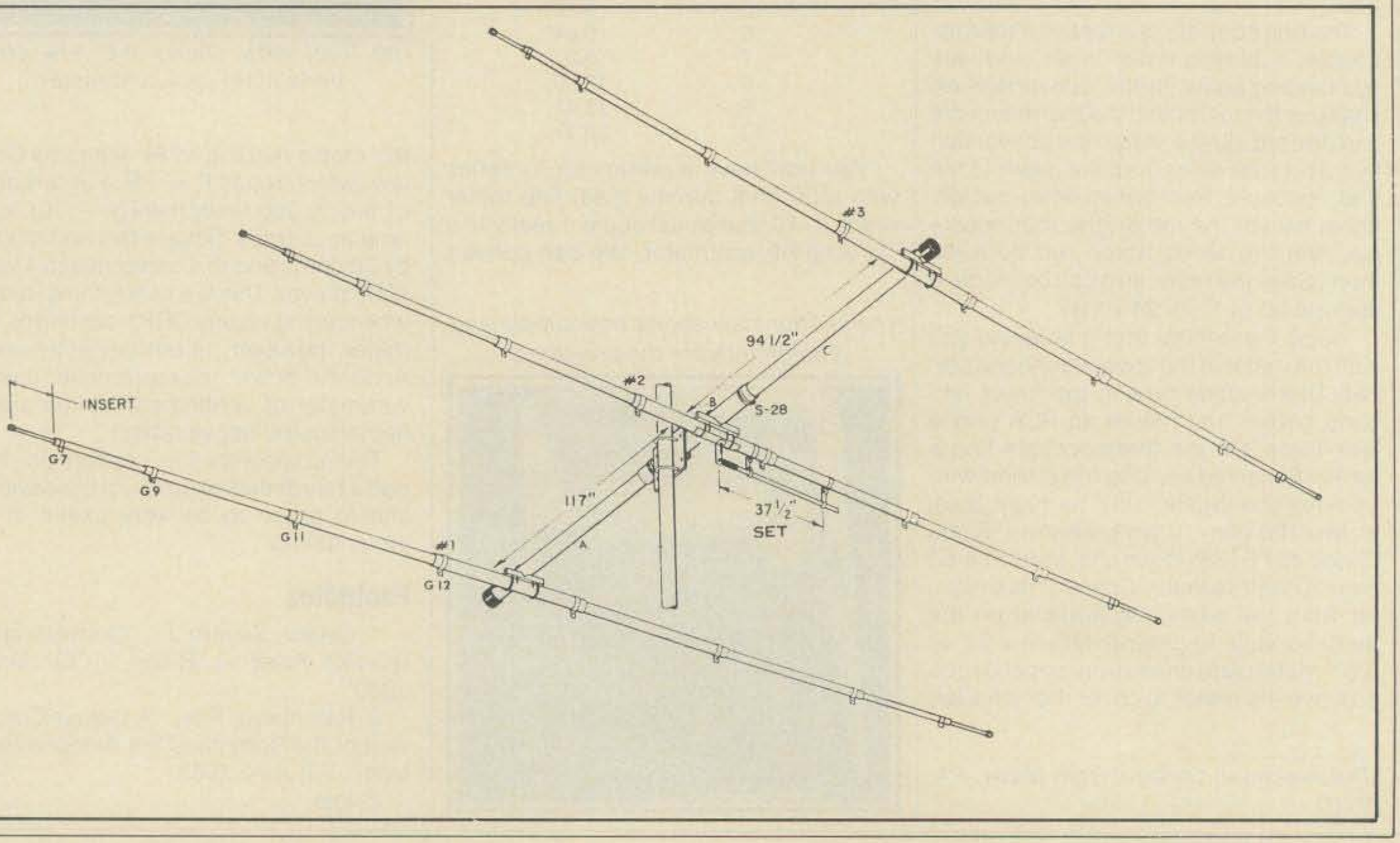


The rod for the "Reddi Match" used in the 20-3CD looks like that for a conventional Gamma match.

There are still definite advantages to using a single-band beam as compared to a multiband type if the great percentage of one's operating time is spent on only one band. The single-band beam has maximum gain and front-to-back ratio for the number of elements involved. Mechanically, it has slightly less weight than an equivalent tribander, and by the very nature of its straightforward construction, it is more likely to survive environmental conditions over a very extended period of time.

c/o CQ Magazine

Fig. 1– The 20-3CD, as assembled, represents a classic three-element monobander design.



The Cushcraft 20-3CD "Skywalker" is pretty much a classic three-element monobander beam design. The comments made about it in this review should apply also to the 20-4CD (a four-element version), although that model was not actually tried.

Table I shows the specifications for both the Cushcraft 20-3CD and 20-4CD. Generally speaking, the forward gain of the 20-3CD is 1–2 dB better than that of a shortened tribander, and the front-to-back ratio is at least 5 dB better. If one can accommodate the long boom length

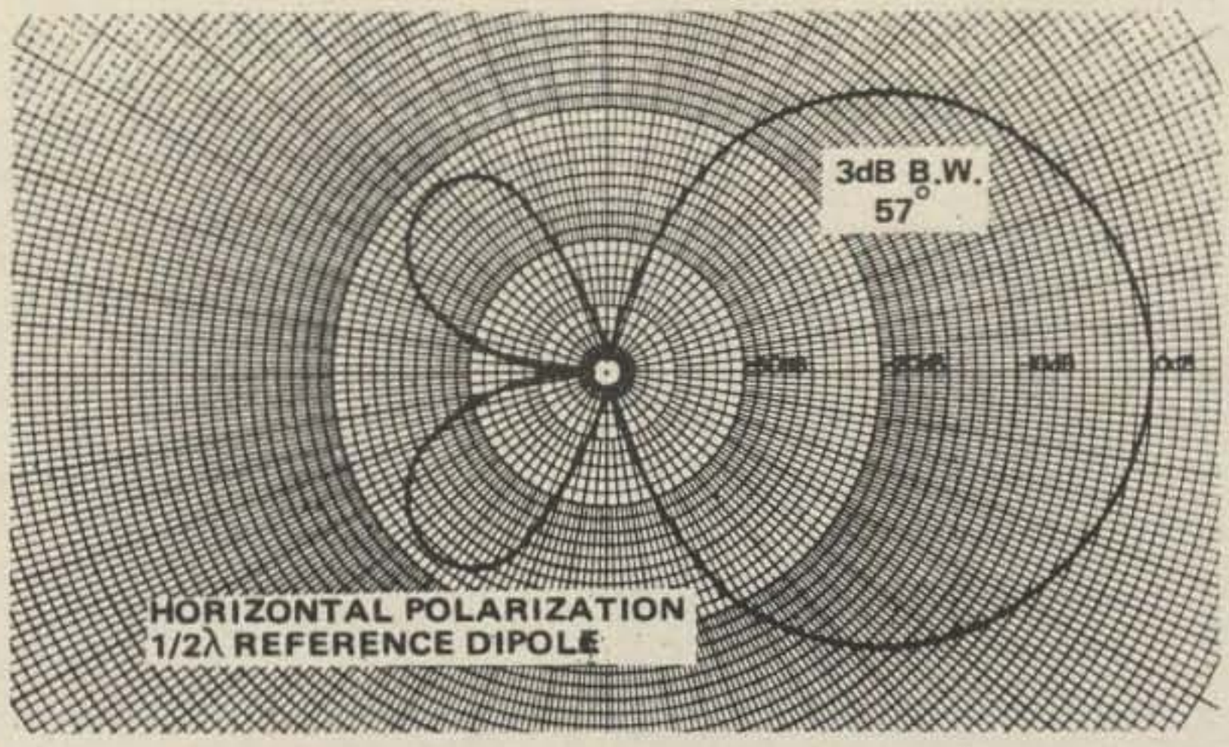
SKYWALKER SPECIFICATIONS

	20-3CD	20-4CD
Forward Gain	8.0 dBd	10.0 dBd
Front to Back Ratio	30+ dB	30+ dB
Boom Length	20 ft. (6.1m)	32 ft. 8 in. (10m)
Longest Element	35 ft. 11 in. (10.94m)	36 ft. 1 in. (109.9m)
Turning Radius	20 ft. (6.1m)	23 ft. 8 in. (7.2)
Beamwidth (-3dB)	57°	60°
Assembled Weight	30 lb. (13.6 kg)	55 lb. (24.9 kg)
Wind Surface Area	5.5 Sq. ft. (.52 Sq. m)	8.1 Sq. ft. (.87 Sq. m)
Recommended Stacking Distance	40 ft. (12.2m)	44 ft. (13.4 m)

BOTH MODELS

Frequency Coverage	14.000 - 14.350 MHz.
Bandwidth	See Curves Below
Wind Survival	80 MPH
Maximum Mast O.D.	2 in. (5.1 cm)
Materials	6063-T832 aluminum
Termination	50 ohm, S0239

20-3CD RADIATION PATTERN AT 14.1 MHz



20-4CD RADIATION PATTERN AT 14.20 MHz

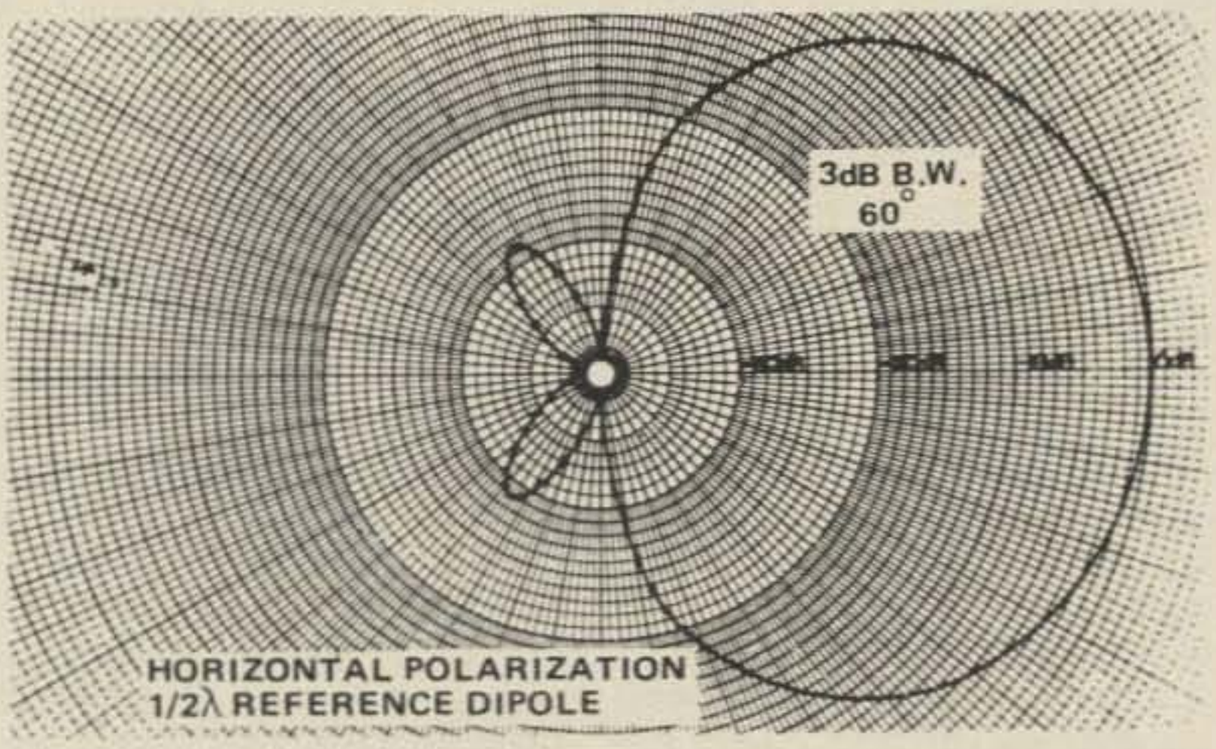


Table I– Specifications for both the Skywalker 20-3CD three-element beam and 20-4CD four-element beam.

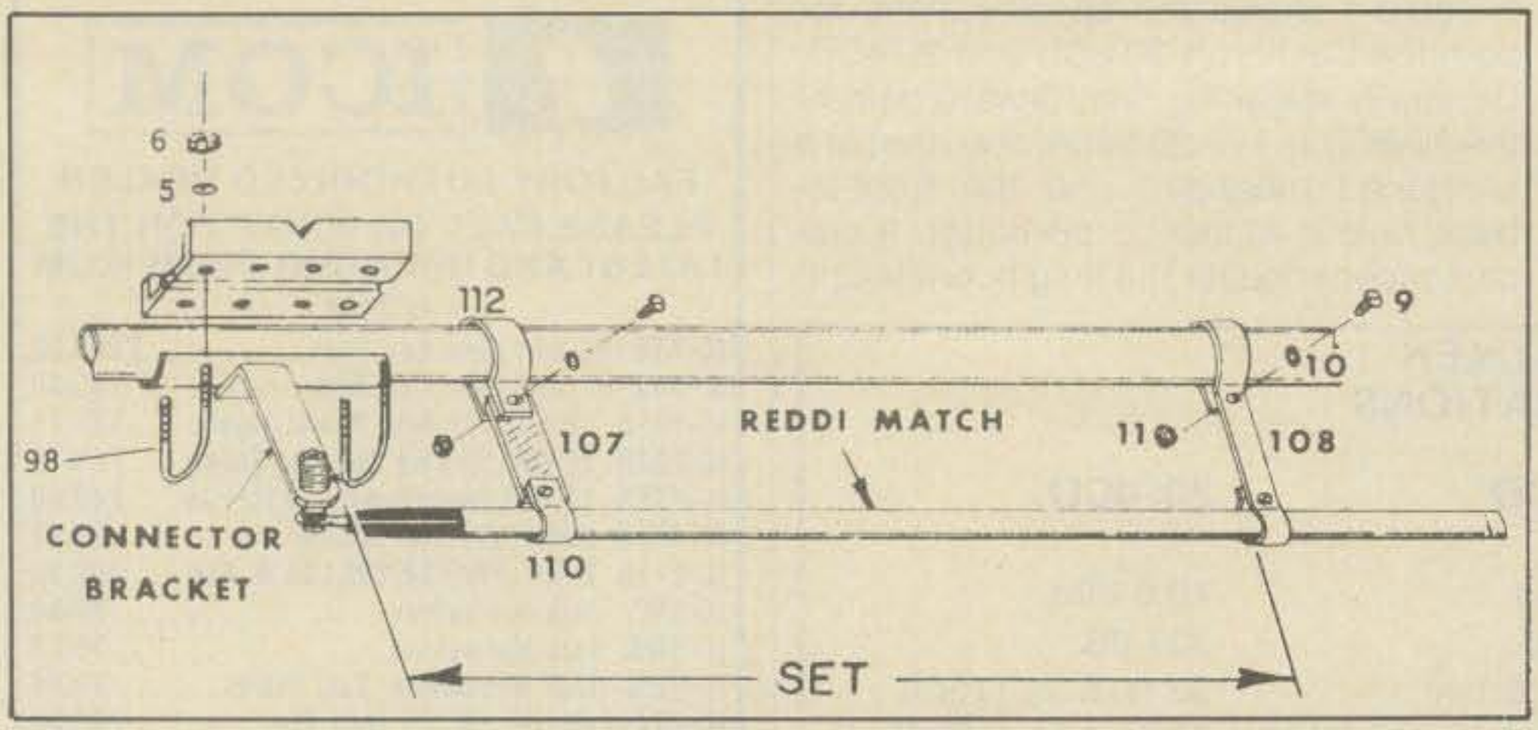


Fig. 2– The "Reddi Match" used by Cushcraft, as shown here from the beam's assembly diagrams, turned out to have some interesting features.

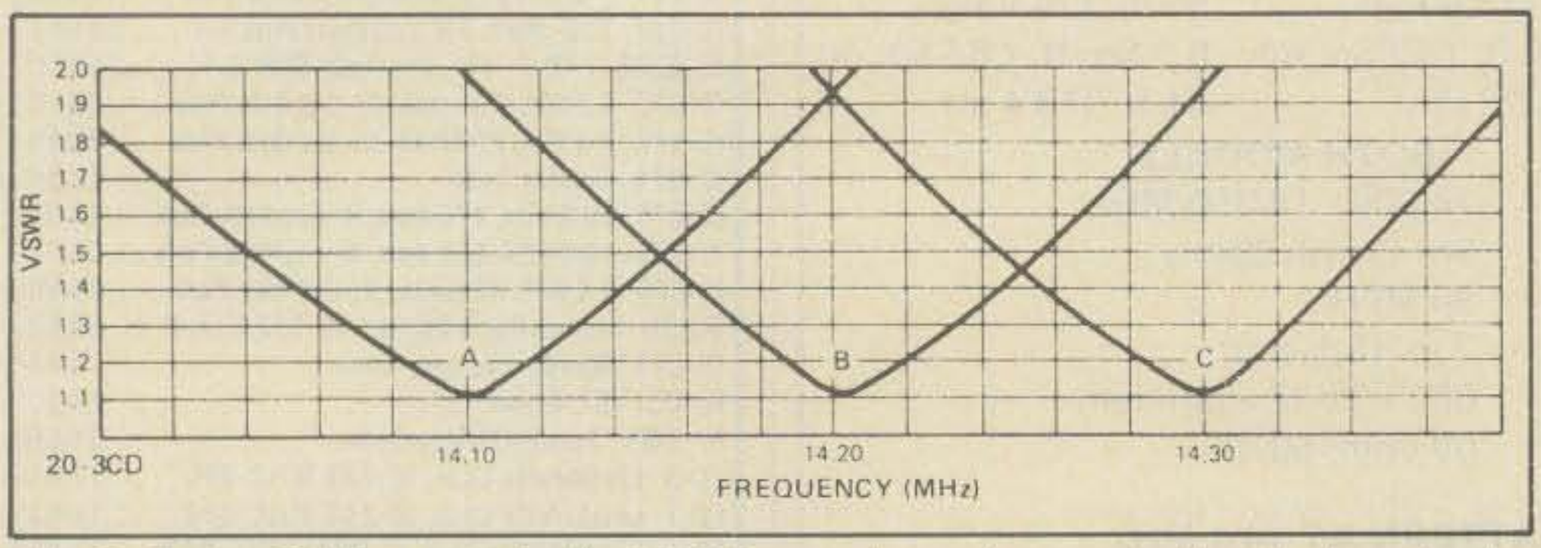
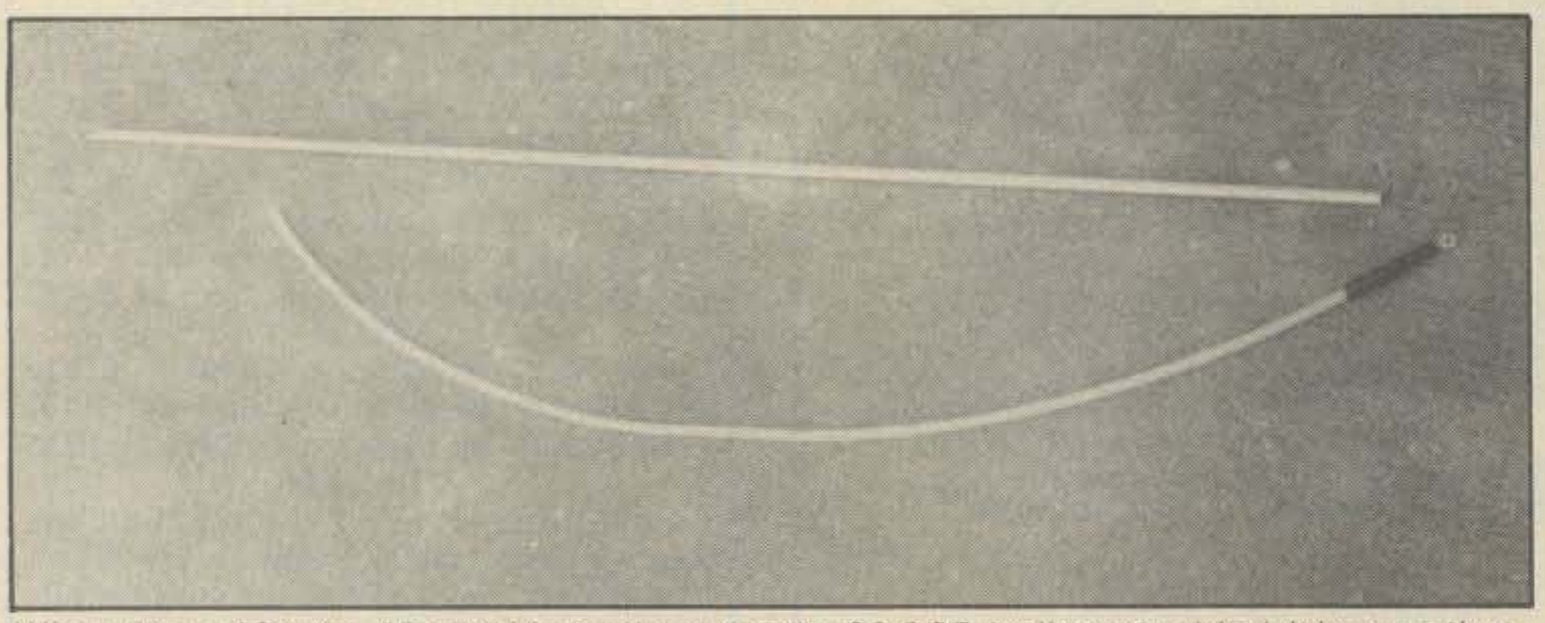


Fig. 3– Typical SWR curves for the 20-3CD vary depending on whether the beam's element lengths are set for 14.1, 14.2, or 14.3 MHz.



When the rod for the "Reddi Match" used in the 20-3CD is disassembled, it is seen that the center conductor from a length of coaxial cable has been inserted in the rod to form a capacitor as explained in the text.

of the 20-4CD, the forward gain jumps up to 10 dB. For about $100 or less in increased beam cost, one certainly gains an inexpensive 2 dB more in the 20-4CD over the 20-3CD, assuming that total installation costs are not elevated by increased rotator cost, etc.

The 20-3CD arrives in a package measuring about 6 inches square by 7 feet long. Inside one finds a total of some 180 odd parts, although that number should not frighten anyone, as the great majority of the parts are various nuts, bolts, and clamps. There are actually only 27 telescoping aluminum tubing pieces for the beam elements and three pieces for the boom.

Assembly is straightforward, although one should allow a leisurely few hours to do the job. The instructions that are supplied are complete with various diagrams, charts for element lengths, and a complete parts list. After one identifies the various parts, which is easy, assembly consists mostly of just joining the telescoping aluminum tube sections and tightening two dozen hose clamps. The finished beam looks as shown in fig. 1.

Fig. 2 shows the feedline matching system used. Cushcraft refers to it as a "Reddi Match," although at first glance it appears to be just a simple, classic Gamma match. When assembling the beam, it was noted that the end of the matching rod which connects to the center conductor of the coaxial cable feedline felt flexible. Therefore, the matching rod was taken apart as shown in the photograph. The inner conductor of a coaxial cable had been inserted in the matching rod tubing to form a capacitor with the walls of the rod. This capacitor represents the series capacitor one sees in the text book presentations for Gamma matches. Of course, in reality it is often difficult to mount and weatherproof a lumped capacitor for a Gamma match, and the system used by Cushcraft is an ideal alternative. The matching rod is a 45 inch length of $\frac{5}{16}$ inch diameter tubing, and the coaxial cable inner conductor used has a length of 40 inches. The far end of the rod is pinched closed to prevent water entry, and the feed end is protected with shrink tubing.

Exactly what SWR curves one will experience with a beam depends upon the height of the beam and the influence of surrounding objects. Fig. 3 presents the typical SWR curves given for the 20-3CD by Cushcraft. The letters A, B, and C refer to element-length charts used during assembly of the antenna, since one must choose if the SWR is to be a minimum at 14.1 (A), 14.2 (B), or 14.3 (C). Assembled for a center frequency of 14.2 MHz and at a height of about 35 feet, an SWR result almost exactly paralleling that shown in fig. 3 was obtained, except that the SWR only went up to 1.8 at 14.1 and 14.3 MHz. However, at 14.0 MHz it was slightly over 3.0. The SWR results bring up an important point about almost any single band beam that is optimized for gain—one has to make a choice as to whether it should be dimensioned for the CW or phone portion of a band. Both the gain and front-to-back ratio will suffer the further the beam is used away from its center design freqency.

Performance of the 20-3CD was excellent. It's a full-size beam and delivers the type of performance expected from such an antenna. Although the facilities available didn't permit side-by-side comparison, one could sense that the 20-3CD has a sharper pattern and certainly better front-to-back ratio than a conventional three-element triband beam.

If one desires a three-element beam that will optimize performance in the CW or phone portion of a band, an antenna like the 20-3CD has to be considered an excellent choice. The materials used are of very good quality, and with just the usual periodic cleanup and checks for tightness, the antenna should last for years of service. CQ

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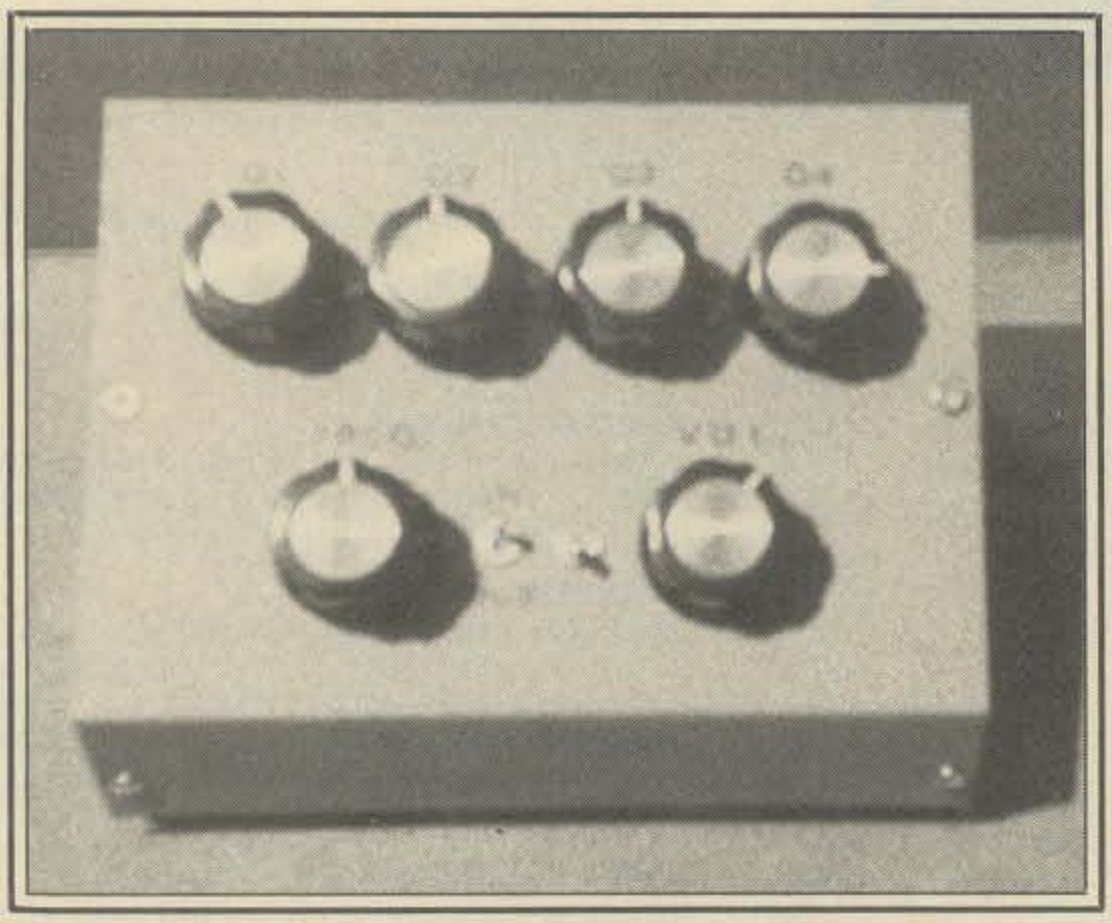
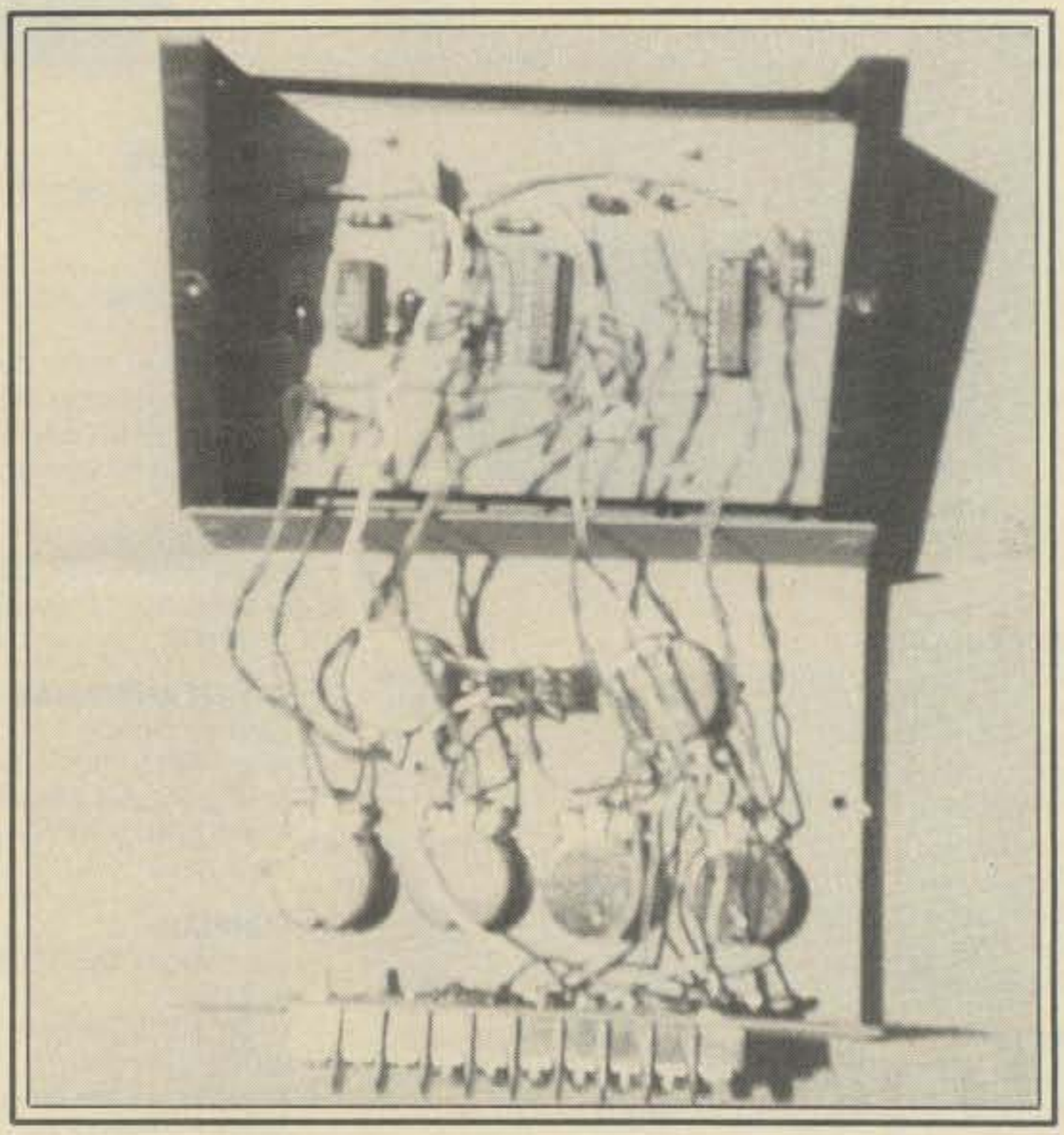
Here's something that will help you work some of the rare ones and give you a few evenings' building pleasure.

How To Build A Switched Capacitor Bandpass CW Filter

BY BARRY L. IVES*, AI2T



The Bandpass CW Filter includes separate bandpass controls, a frequency control, and an output volume control. The switch on the right is not used.



The completed filter with cover removed shows how few parts are required to make this very useful CW filter.

Representing a relatively new concept in audio filters, the National Semiconductor MF10 Universal Monolithic Dual Switched Capacitor Filter is one of a series of programmable integrated circuits providing lowpass, bandpass, and highpass and/or notch outputs from one device. Versatility, accuracy, and ease of use make this IC very attractive for use as a narrow bandwidth CW filter, SSB filter, or RTTY predemodulation filter. Because I use CW exclusively, I chose the first to provide an example which the interested amateur can modify to his own needs and preferences.

Using only a handful of parts, the Switched Capacitor Bandpass CW Filter produces results that are almost unbelievable: with a −3 dB bandwidth adjustable down to 2 Hz and a Q of up to 150, signals only 50 Hz from f_0 are down 40 dB! QRM from SSB, CW, or AM broadcast signals is all but eliminated, and QRN is reduced considerably, even in the presence of nearby atmospheric disturbances.

How does it work? The voltage across an internal capacitor is sampled at the rate of an incoming clock oscillator. The result is an integrator with no external capacitors. Varying the clock frequency varies the time constant of the integrator and thus the resonant frequency of the filter.

Each MF10 (fig. 1) contains two independent 2-pole filters in a 20-pin dual-in-line package (fig. 2). A single 8 to 14 volt or dual 4 to 7 volt power supply, a TTL or CMOS clock oscillator, and a few resistors are required to make a complete filter circuit. Pins 5, 15, and 16 are connected to Analog Ground, which is the midpoint between V+ and V−. If a single supply is used, analog ground is derived by a resistive divider between V+ and system ground. I chose this method for my prototype, assuming most amateurs wil be taking power from a single 12 volt supply. Pin 12 controls the clock ratio. When connected to analog ground, the clock is divided by 100; when tied high, it is divided by 50. When this pin is connected to V−, the filter shuts down in a power conservation mode. Pin 9, the level shift input, should be connected to V− unless a 5V TTL clock is used in conjunction with a dual 5V power supply, in which case it should be tied to system ground. V_A and V_D are internally connected and can be

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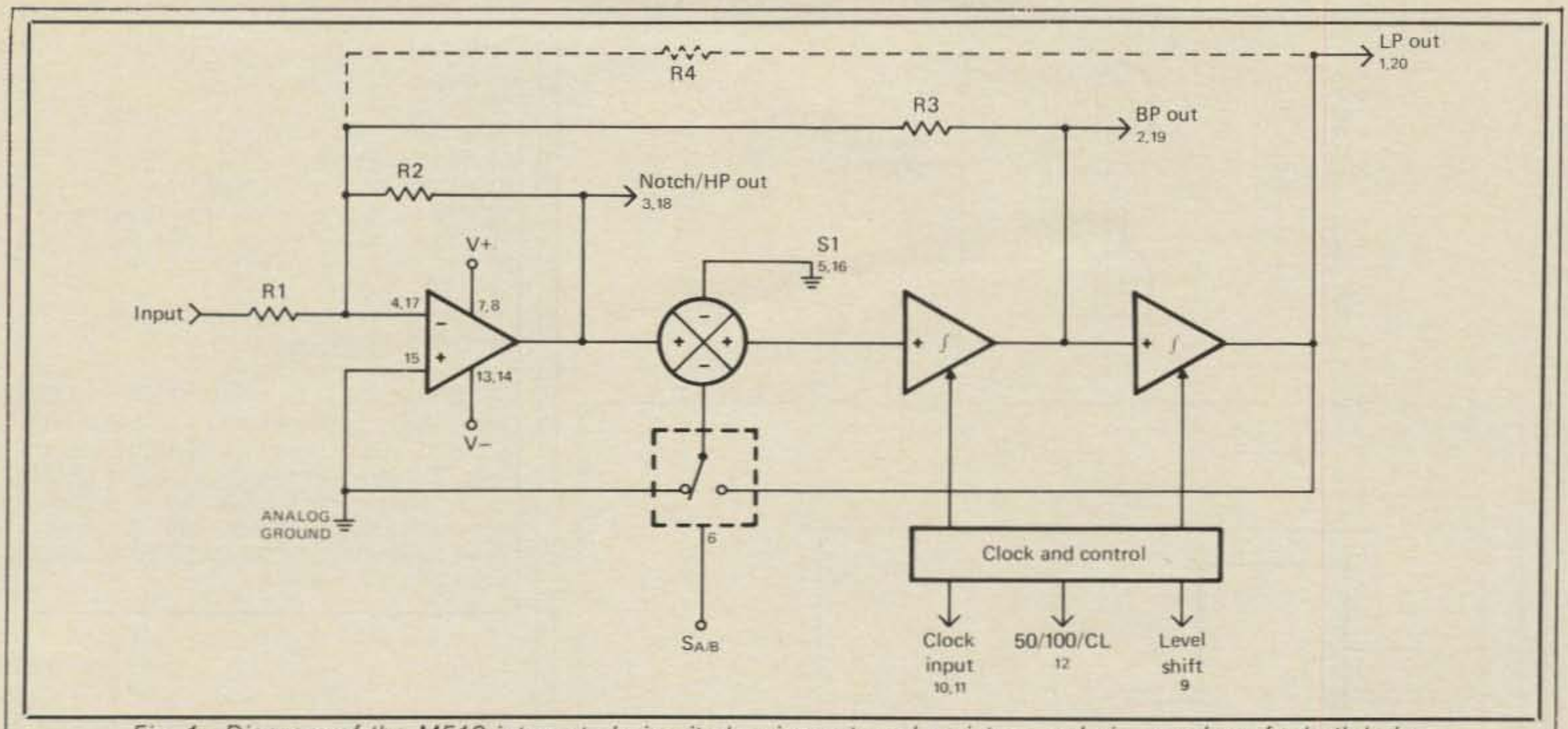

Fig. 1– Diagram of the MF10 integrated circuit showing external resistors and pin numbers for both halves.

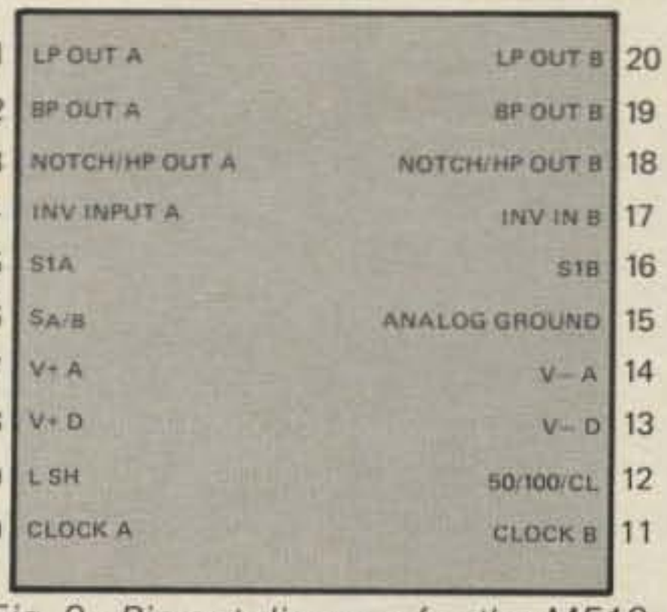

Fig. 2– Pin-out diagram for the MF10.

Notch/Bandpass/Lowpass
LP Gain = R2/R1
BP Gain = R3/R1
Notch Gain = R2/R1
$Q = f_o/BW = R3/R2$

Highpass/Bandpass/Lowpass
HP Gain = R2/R1
BP Gain = R3/R1
LP Gain = R4/R1
$Q = (\sqrt{R2/R4})(R3/R2)$

Table I– Formulas for the two modes discussed in the text.

bypassed separately or connected together.

Gain, bandwidth, and Q are controlled by the bias and feedback resistors R1 through R3 (and R4). If a highpass output is not required, connect $S_{A/B}$ (pin 6) to V+. This sets an internal switch connecting the lowpass output to the summer. R4 is not used in this mode. Notch output, if needed, appears at pins 3 or 18, depending on which half you are using. If a highpass output is required, connect $S_{A/B}$ to V– and add R4, taking the highpass signal from pins 3 and/or 18. Bandpass and lowpass signals appear at the indicated terminals.

Simple formulas for both these modes are shown in Table I. When choosing values for R1 to R4, keep in mind that circuit Q must be less than 150 for the filter to operate properly. For instance, using the bandpass/notch/lowpass mode, I chose R1 to be 100K and R3 to be 180K for a theoretical gain of 180K/100K, or 1.8 per section. With R2 variable to 100K, my Q will be 180K/100K, again 1.8, approaching 150 as R2 is decreased to 1.2K. Too much gain can also cause problems. If internal inputs are overdriven, distortion may occur. Instead, use an external amp if high gain is required. Other modes of operation are described

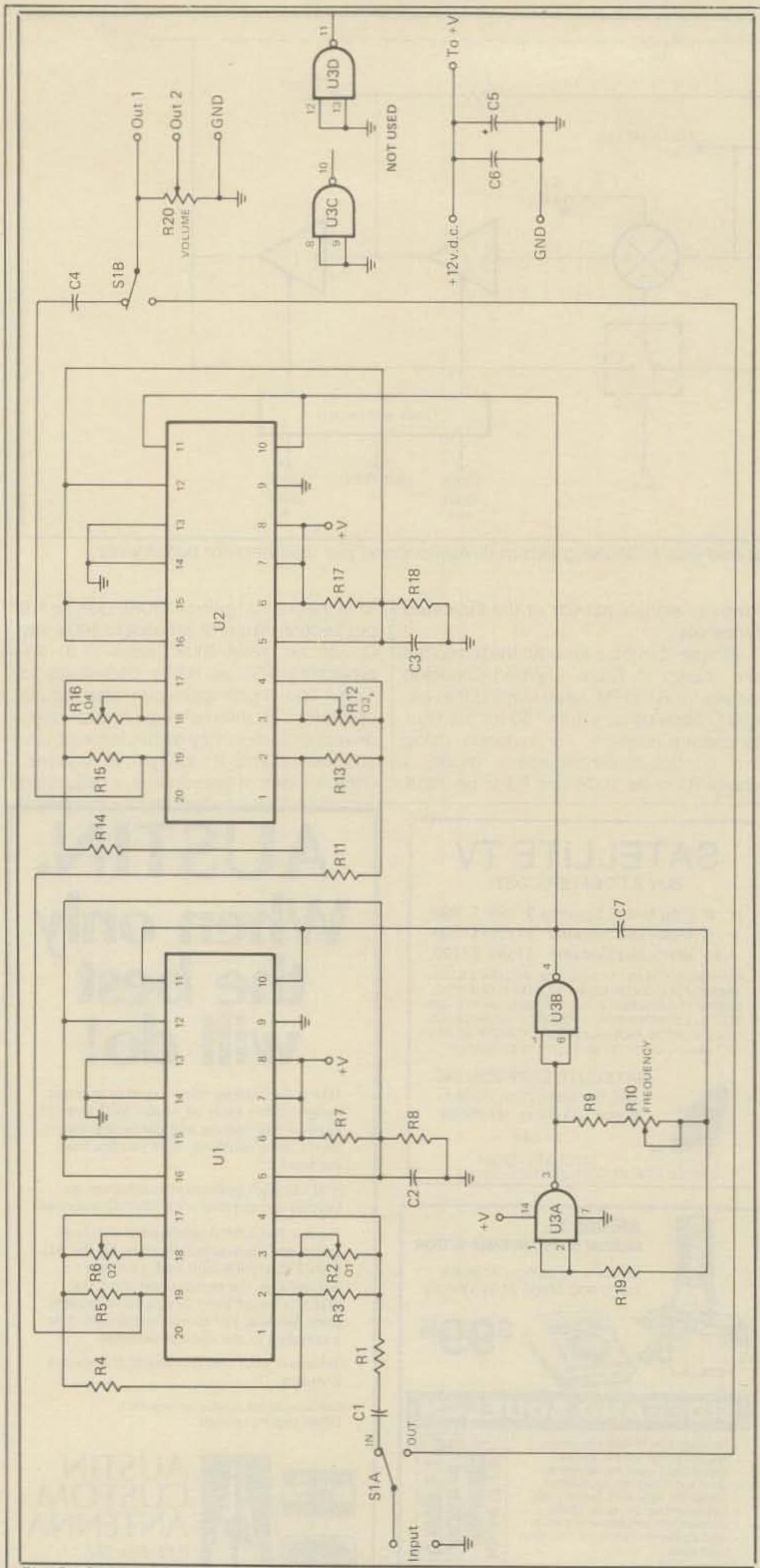

Fig. 3– Schematic and parts list for the Bandpass CW Filter designed by the author.

Parts List

C1,4: .1 mFd ceramic
C2,3,5: 10 mFd tantalum
C6: .01 mFd ceramic
C7: 180 mmFd mica
R1,4,11,14,19: 100K, ¼ watt
R2,6,12,16: 100K potentiometer, linear taper
R3,5,13,15: 180K, ¼ watt
R7,8,17,18: 2.7K, ¼ watt
R9: 1.8K, ¼ watt
R10,20: 50K potentiometer, linear taper
S1: DPDT mini-toggle switch
U1,2: MF10
U3: 4011 CMOS Quad NAND
Misc.: Radio Shack Sloping Panel Box (PN 270-264); nylon standoffs (270-1391); barrier strip (274-653); printed circuit board stock; knobs; stranded hook-up wire. MF10 available from Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002, for $3.95 (minimum order $10).

in National's MF10 data sheet (see end of article).

My version of the CW filter (fig. 3) uses two MF10's driven by a single CMOS clock oscillator. Each of the four 2-pole bandpass filters has its own Q, or bandpass, adjustment via R2, R6, R12, and R16. This allows more precise control than ganged pots. Total circuit gain is about 10. R10 allows adjustment of the resonant frequency over a range of about 740 to 2700 Hz. An output level is provided, and an IN/OUT switch to allow the filter to be bypassed for normal receiver operation. An output at full level is also provided for input to a computer interface or code reader. The components are mounted on an etched printed circuit board, fig. 4, installed with nylon standoffs in Radio Shack sloping panel box. If the controls are wired as shown in fig. 5, the associated parameter will increase when the knob is turned clockwise. A barrier strip is mounted on the back panel for external connections.

The filter has a low-level high-impedance input, and is intended for insertion between a low-level audio stage and high-impedance headphones or a speaker amplifier. If your rig has only low impedance outputs, place a load resistor of suitable value and power rating across the output connections and take the signal for the filter at the wiper of a 10K potentiometer placed across the load resistor. If you are willing to modify your rig, or if you want to incorporate the filter in a homebrew outfit, insert the filter at the wiper of the audio volume control pot preceding the final audio output stage.

Other possible filter configurations include using one MF10 as a notch filter, or one as a lowpass and one as a highpass filter. Either of these options would require an additional clock oscillator, but don't try to use one 4011 for both oscillators; they will interact, causing spurious oscillations. Battery power, an internal

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HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier **SALE**	79.95
SS-32M Commspec 32-tone encoder	29.95

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R-71A 100 kHz-30 MHz, 117V AC	$799.00	**649.95**
RC-11 Infrared remote controller	59.95	**49.95**
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	**144.95**
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	39.95	
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SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
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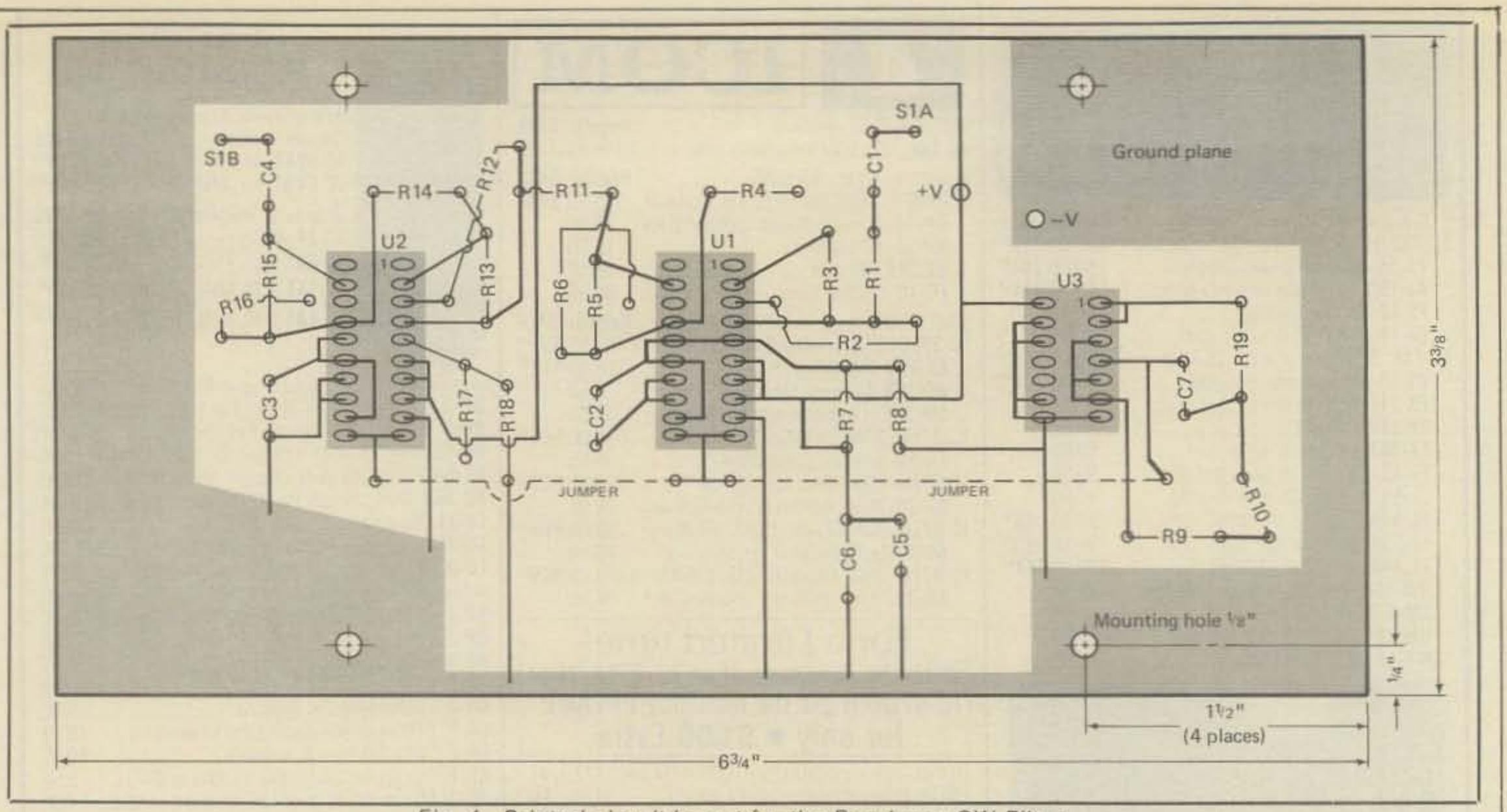

Fig. 4– Printed circuit layout for the Bandpass CW Filter.

AC power supply, and/or an internal audio power amp are options also worth considering. Gain and bandwidth can be adjusted for SSB or RTTY signals by changing resistor values. And, finally, wire-wrap techniques, or your favorite wiring method, can be employed to make your own custom Switched Capacitor Filter.

Operation is a snap! Tune in a signal with the IN/OUT switch in the OUT position, throw the filter IN, adjust the FREQUENCY pot to peak the output at the incoming frequency, and adjust the individual Q controls for the desired resonance. Note that if any of the Q pots are set too high, excessive ringing and perhaps oscillation may occur. The best response occurs when all four controls are set just below the point of oscillation and the center frequency of the filter is exactly the frequency of the incoming signal. At this setting you may tune between signals in the passband of the receiver just by turning the FREQUENCY control, without ever touching the dial of the receiver!

I had a good time building and using the Switched Capacitor Bandpass CW Filter, and I trust you will, too. It sure does sort out those crowded signals. Next time you offer a Q5, it probably will be true!

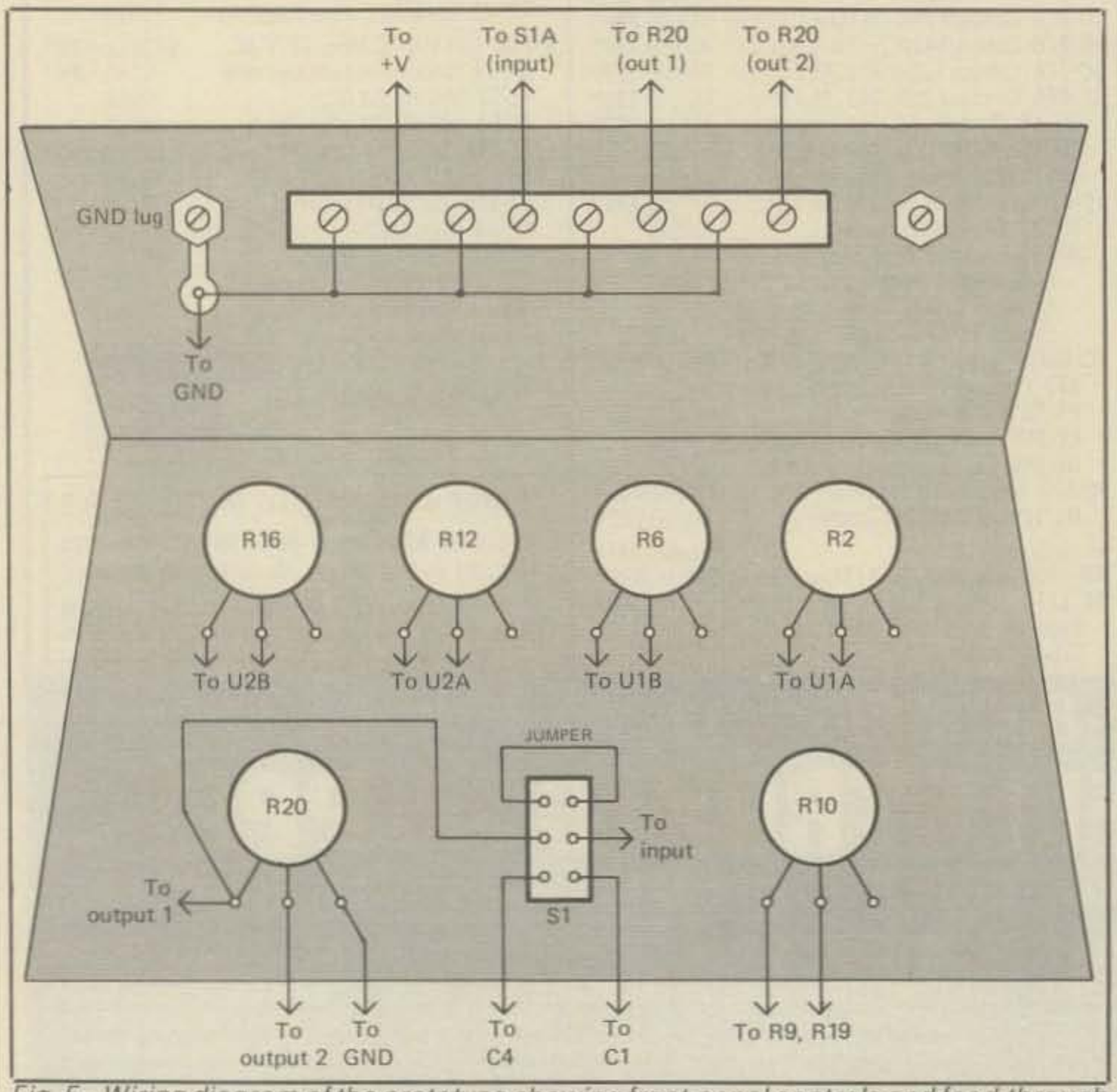

Fig. 5– Wiring diagram of the prototype showing front-panel controls and feed-through barrier strip on rear.

Notes

1. Measurements given were taken with a Potomac Instruments AA-51 Audio Analyzer used with a PI AG-51 Audio Generator.

2. The MF10 is a product of National Semiconductor Corporation, 2900 Semiconductor Drive, Santa Clara, CA 95051.

Bibliography

1. "MF10 Universal Monolithic Dual Switched Capacitor Filter," *National Semiconductor*, April 1982.

2. "Introducing the MF10: A Versatile Monolithic Building Block," by Tim Regan, *National Semiconductor Application Note Number 307*, August 1982.

3. "A Universal Active Filter," by Forrest M. Mims III, *Modern Electronics*, March 1985.

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THE INS AND OUTS OF THE WASHINGTON SCENE

Bills Threaten Use of Autopatch and Simpatch

Two virtually identical bills now pending in the Congress (H.R. 3378 in the House and S. 1667 in the Senate) would render unlawful any monitoring of telephone conversations. In effect, the bills would extend prohibitions on wiretapping to other media. Amateur transmissions, of and by themselves, would not be affected by the bills. However, because autopatch and simpatch calls involve a connection to wire-line facilities, there is concern that the proposed laws, if enacted in their present form, would protect such amateur transmissions from eavesdropping.

We will continue to monitor these bills as they move through the Congress, and will provide reports on actions affecting the Amateur service as they occur. Meanwhile, be assured that the League is working to clarify how the bills are intended to affect our operations.

Commission Allocates 421–430 MHz Band Segments to Land Mobile in Three Cities

As anticipated, the Commission has allocated portions of the 421–430 MHz band to the Land Mobile service in Buffalo, Cleveland, and Detroit. The move came in a Report and Order on General Docket 85-113, which allocates specific subbands within 50 statute miles of each city.

Amateur operating privileges in the band 420–430 MHz were already withdrawn from the area within 50 statute miles of Detroit's center because that area lies above Line A. (Line A is an imaginary line that stretches across the U.S. and that is located about 75 miles south of the Canadian border. Amateur operating privileges in the band 420–430 MHz were withdrawn above this line to protect Canadian land mobile operations.)

Softening the blow to amateur operations in the 420 MHz band around the affected cities, however, is the Commission's pronouncement that: "... amateur stations south of Line A may continue to operate in the 421–430 MHz spectrum as long as they do not cause interference to land mobile or Government radiolocation users." The Commission took this position because most amateur operations would take place during non-business hours, and because amateurs have generally demonstrated an ability to accommodate other users in shared bands.

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FCC Proposes Perimeter Protection Systems In the Band 54–88 MHz

In response to a petition from Control Data Canada, Ltd. to allow the operation of its "leaky" cable perimeter protection system (trade name: GUIDAR) at 50–88 MHz, the Commission has responded by proposing 54–88 MHz instead. This action, contained in a Notice of Proposed Rule Making (NPRM), General Docket 85-231, removes a threat to the amateur 6 meter band (50–54 MHz), without seriously affecting the operation of GUIDAR.

In operation, GUIDAR uses two parallel cables buried 5 feet apart and about 1 foot beneath the ground. Radio-frequency (RF) energy transmitted through one of the cables leaks into the other, whereupon it is detected. The steady-state RF field established in this way is a function of the environment around the cables. When a human being enters the region over the cables, however, the RF field is disturbed, thereby triggering an alarm. The system is intended to provide security surveillance for prisons as well as to protect high-risk sites such as nuclear power plants from terrorism and other threats.

The most favorable portion of the spectrum for systems such as GUIDAR is between 30 and 100 MHz. Below this frequency, wavelengths are too long, and the system cannot "see" objects the size of human beings. Above 100 MHz the system would be too sensitive to small animals; this, in turn, would increase the false-alarm rate.

According to the Commission, "... the public benefits to be derived from improved security at facilities such as prisons and nuclear plants (makes it appropriate) to accommodate such systems to the extent possible." Thus, the FCC has proposed a set of standards for perimeter protection systems that will allow their operation at 40.68 MHz, 54–72 MHz, and 76–88 MHz. In the band 54 to 88 MHz emissions may not exceed 10 microvolts per meter at a distance of 30 meters. This level is no greater than that imposed on computers used in residential areas. Further, operation on TV channels 2 through 6 was considered more than sufficient, "... since this ensures that in any given area, there will be at least two vacant TV channels on which a perimeter protection system could be set to operate."

Comments in this matter were due 11 October 1985, with Reply Comments due 12 November 1985. According to *The ARRL Letter*, the League will file in support of the FCC's decision to keep these devices out of the 6 meter band.

Amateur Service Shows No Growth Over Last Two Years

Statistics released by the FCC show that the amateur population in the U.S. has remained virtually unchanged over the last two years. However, recent trends suggest that the number of "dropouts" may be on the decline. According to John Johnston, Chief, Personal Radio Branch, Special Services Division, PRB, FCC, the number of "dropouts" during FY 85 (the year ending 30 September 1985) was 14,709, down over 25% from the number reported in FY 84. The number of newcomers to the service was 17,373 during FY 85, and while this is down over 7% from the previous year, the net gain for FY 85 was 2,664 amateurs.

Johnston also derived a set of statistics for amateur licenses issued during April 1985. In all, 9,632 new or upgraded licenses were issued, representing 2.3% of the total licenses outstanding. The average age of 9,632 licensees was 46.1 years, with the breakdown by class as follows:

Novice—38.5 years
Technician—45.1 years
Amateur Extra—47.3 years
General—50.0 years
Advanced—51.8 years

Johnston also noted that the Amateur Extra Class category exhibited the fastest growth in FY 85 (up 6.2%), with the data suggesting that younger people, in general, are upgrading their licenses to this class at an ever increasing rate. While the availability of exclusive subbands and preferred callsigns are surely

motivating factors here, said Johnston, many of those upgrading to Amateur Extra apparently do so because they want to become more involved in the Volunteer Examination Program.

Fee For Amateur Examinations Rises 3.2%

The new fee for amateur exams in 1986 is $4.29, a 3.2% increase over the 1985 fee of $4.16. According to John Johnston the increase is a result of a corresponding percentage increase in the Consumer Price Index. Johnston noted that the $4.29 fee is the maximum that can be charged any one examinee for any one examination, regardless of the number of elements involved. However, the fee can be less, he said, with some examiners charging nothing at all.

NCS Reports Results of "Exercise Night Tango X"

Exercise *Night Tango X* was conducted on 27 and 29 June 1985, and like similar tests before it, it was designed by the National Communications Systems (NCS) to evaluate the capability of various amateur, Military Affiliate Radio Systems (MARS), and Civil Air Patrol (CAP) operators to function as alternate communications resources during periods of national crises.

During the exercises four NCS representatives, simulating senior Veteran Administration (VA) officials, used volunteer radio operators and their high-frequency (HF, 3–30 MHz) radio systems to pass simulated time-sensitive or critical VA messages. Messages were transmitted at each exercise location, whenever possible, through all five participating volunteer systems (amateur; Air Force, Army, Navy/Marine Corps MARS; and CAP). Of concern to the NCS were evaluation factors such as message timeliness, message accuracy, effectiveness of the NCS/volunteer interface, and systems reliability.

In all, 24 messages were sent among the four NCS representatives. A total of 108 transmissions were made, with 97 of these received at the destination for an overall transmission success rate of 90%. The average receipt time for the 97 transmissions received was 1 hour, 9 minutes. The best performance in terms of reception rate was turned in by Navy/Marine Corps MARS, with 100% of their messages received. Amateurs received 83% of their messages (fourth by rank), but this was still better than the 72% score achieved by Army MARS. As for message timeliness, Navy/Marine Corps MARS again turned in the best showing (their average time was 36 minutes). However, amateurs came in a strong third (1 hour, 4 minutes average), only 1 minute behind the CAP, and over a half-hour ahead of both Air Force and Army MARS.

While is is difficult to make comparisons with earlier *Night Tango* exercises (because of variables such as propagation and the availability of operators, for example), the NCS noted that operating procedures of the volunteer systems continue to improve, further enhancing their ability to support national security and emergency preparedness requirements.

For more information on the *Night Tango* exercises, contact the ARRL. Support to the Deputy Manager, NCS, Office of Emergency Preparedness, for *Night Tango X* was provided by Electrospace Systems, Inc.

Goldwater Lauds Amateur Radio Operators

From all over the world came words of praise for the amateur radio operators who provided emergency communications for survivors and their families following the earthquake that devastated parts of Mexico City last September. And no one sung our service's praise louder than Sen. Barry Goldwater, K7UGA. The following statement is just a portion of the comments that Sen. Goldwater read into the Congressional Record on 24 September 1985:

"Thursday morning all communications were severed with Mexico City; yet, within minutes amateur radio operators were in touch, bringing news out of the city and handling much-needed traffic concerning relief requirements.

"Over the next 4 days hundreds of amateur and MARS (Military Affiliated Radio System) operators, including many in the United States, stepped in and voluntarily handled many of the messages and news dispatches.

"Many people tend to look upon the amateur radio service merely as a hobby. The events of this weekend once again clearly have demonstrated the public services repeatedly performed by the amateurs. This is a complete worldwide communications system manned by competent operators without governmental expense. As a amateur myself, I am proud to bring these events to the attention of my colleagues."

McKinney To Receive Distinguished Presidential Rank Award

As we go to press, we have learned that James McKinney, Chief, Mass Media Bureau, FCC, is to receive the Distinguished Presidential Rank Award. The award is the highest level of recognition given to career Senior Executive Service (SES) employees, and is given for sustained service of the highest caliber. By the time this is read, McKinney, who pre-

viously served as the Chief of the Private Radio Bureau (PRB), will have received his award at a White House ceremony.

No Fees For Amateur Licenses

Contrary to what you may have read elsewhere, Congress is not contemplating license fees for operators in the Amateur service. It is true, says Robert S. Foosaner, Chief, Private Radio Bureau (PRB), FCC, that bills now before the House and Senate would impose fees on users in a variety of telecommunications services administered by the Commission. The collection of these fees would, according to some estimates, reduce the federal deficit by over $40 million in the first year. However, says Foosaner, he has no knowledge of any intent to reinstate fees for amateur licenses.

U.S. Court of Appeals Upholds Commission's Position on AM Power-Reduction Ruling

In October 1985 the United States Court of Appeals in the District of Columbia *upheld* the FCC's AM power-reduction ruling scheduled to take effect in January 1990 (Docket 82-624). The appeal had been filed by Glenn A. Baxter, K1MAN, who claimed, among other things, that the Commission did not take his position into consideration when it ordered the AM power reduction. Baxter also claimed that the order would place AM operators at a significant disadvantage to SSB operators, and as such, that AM operators should be allowed to transmit at higher power levels than did those using SSB.

According to Jeffrey Young, Enforcement Division, Field Operations Bureau (FOB), FCC, the Commission countered Baxter's arguments by demonstrating that it had indeed reviewed and considered all material filed in the matter of Docket 82-624. Further, the FCC noted that the power increase requested by Baxter (to 3,000 watts total output power) would not yield a significant increase in communications capability.

FCC Begins Revocation Proceeding Against J. Fred Riley, WA8AJN

An Order to Show Cause was issued to Extra class amateur operator J. Fred Riley, WA8AJN, of Kenova, WV to show cause why his amateur station license should not be revoked. A Suspension Order was also issued, suspending Riley's amateur operator license until proceedings in the matter of alleged rule violations by Riley are resolved.

According to Carol Fox Foelak, Private Radio Bureau (PRB), FCC, the Order alleges that on 2 May, 5 July, and 14 July 1985, while investigating interference complaints, Commission personnel monitored and recording Riley causing willful and malicious interference to the communications of other amateur operators by transmitting directly over ongoing communications. These violations were observed on 3898 kHz (2 May and 5 July) and 3895 kHz (13 July). Also alleged were violations of those rules governing station identification.

ARRL Calls For Digital Communications Papers

According to *QEX*, the ARRL Experimenter's Exchange, the Fifth ARRL Amateur Radio Computer Networking Conference will be held 7–9 March 1986, in Orlando, FL. Held as part of the Florida State Convention, the conference will be hosted by the Florida Amateur Digital Communications Association (FADCA).

Technical papers are invited on virtually all aspects of amateur digital communications, including, but not limited to, packet radio, terrestrial networking, teleports and satellites, and meteor scatter.

Camera-ready papers must be submitted by 1 February 1986. For more information, and to obtain an author's kit, contact Paul Rinaldo, W4RI, 225 Main Street, Newington, CT 06111.

Metroplex Network Seeks More Affiliate Stations

The Metroplex Amateur Communications News Network is a non-commercial, weekly, amateur network program service for use on amateur repeaters, remote bases, and high-frequency stations. The program service is a co-production of Westlink and Metroplex, and is produced in Los Angeles and New York. Commercial equipment and professional talent are used to produce the programs.

The Network carries three types of programs directed to the amateur radio community:

1. News—Fifty-two weekly news shows per year, each 20 to 30 minutes long.

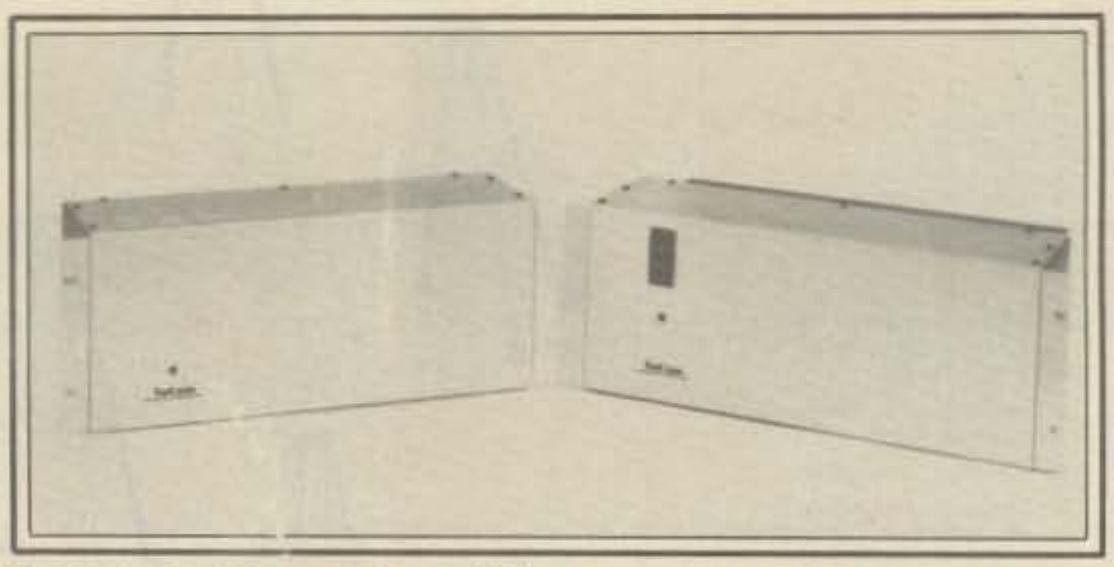
2. NTRN—Four North American Teleconference Radio Net shows per year, each involving an information program 2 hours long.

3. Swap—Fifty-two call-in "swap and shop" programs per year, each 20 to 30 minutes long.

For more information on how you may obtain programs for Metroplex Network, contact Metroplex Network, Attn: Alexander Magocsi, WB2MGB, P.O. Box 237, Leonia, NJ 07605 (201-592-7614).

Your Washington Editor thanks Messrs. David Siddall, K3ZJ, and Steve Thompson, N4TX, for their contributions to this month's column. And to all our readers everywhere, best wishes for a Happy, Healthy New Year.

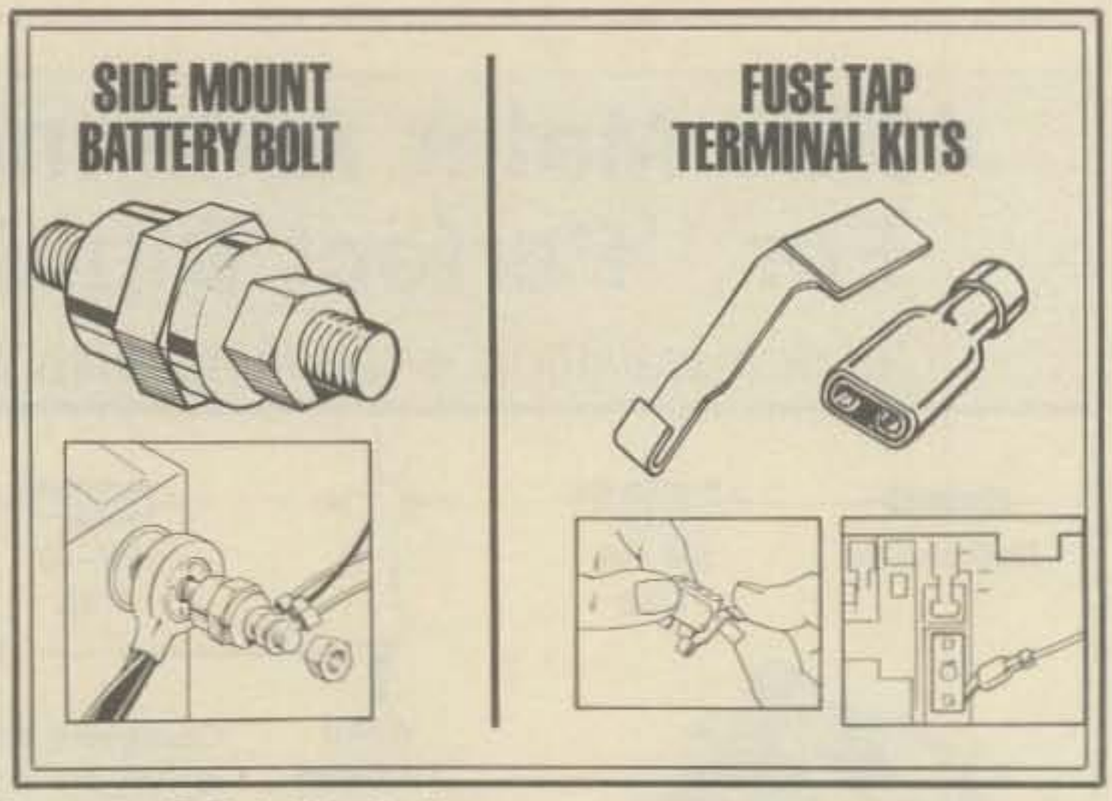
CQ SHOWCASE



VoCom RF Power Amplifiers

VoCom Products Corporation has introduced its latest line of rack-mounted RF power amplifiers for continuous-duty applications such as repeater or paging systems. Included in the new line are models which are powered directly from 110/220 VAC mains. These models can save the cost of a complete regulated power supply dedicated to the RF amplifier.

Available output powers are 50, 100, and 200 watts for both VHF and UHF frequencies. AC-powered models may be configured for battery back-up or automatic bypass in the event of power-line failure. For further information, contact VoCom Products Corporation, 65 East Palatine Road, Prospect Heights, IL 60070, or circle number 105 on the reader service card.



Larsen Quick Hook-Ups

Larsen Electronics' new side-mount battery bolt and fuse tap terminal kit have been designed to accommodate some changes in the newer automobiles. The side-mount battery bolt was devised to offer a quick way to hook up mobile communications equipment to newer side-mount battery terminals. Replacement of the existing bolt with the all-brass side-mount bolt provides a longer terminal to carry several power leads. The bolt accepts ⅜ inch ring terminals.

The fuse tape terminal kit was designed to quickly tap into blade-type fuse blocks now available on most new American and many import vehicles. To install, one end of the fuse post terminal is slipped over one leg of the fuse. The fuse is then reinserted and connected with the provided insulated female terminal. The kit includes the male and female parts to fit 14- to 16-gauge wire. For more information, contact Larsen Electronics, P.O. Box 1799, Vancouver, WA 98668, or circle number 101 on the reader service card.

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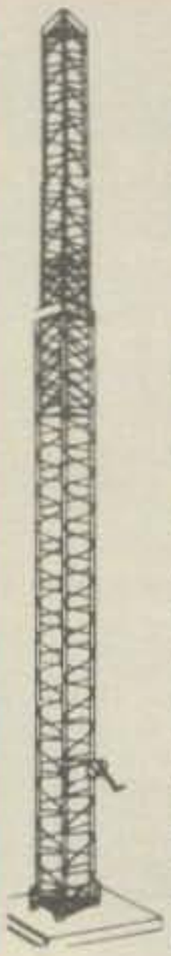

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HG54HD	54 ft	16 sq. ft.	$CALL
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HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

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LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$3199
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

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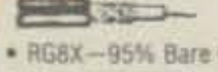

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RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
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⅞" Heliax	50	.1	.2	.5	.9

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⅞" Heliax™	$49	$49	$49	$49

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UG218 N Male	$2.95	UG23D N Female	$2.95

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Stranded Copper	14 ga $.10/ft	16 ga	$.09/ft
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6 inch heavy-duty end insulator			$2.00/ea
Dog-bone insulator	$.79	Coax seal	$2.50

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R3 20, 15, 10mtr Vertical	$259
AV5 80-10mtr Vertical	$99
D40 40mtr Dipole	$149
40-2CD 2-el 40mtr Beam	$279
A50-5 5-el 6mtr Beam	$79
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220B 17-el 220MHz Beam	$89
424B 24-el 432MHz Beam	$75
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TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2mtr Beam	
25BS 5-el 2mtr Beam	
28BS 8-el 2mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
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4BTV 40-10 mtr Vert	$89	G7-144 2-mtr Base	$119
G6-144B 2-mtr Base	$89		

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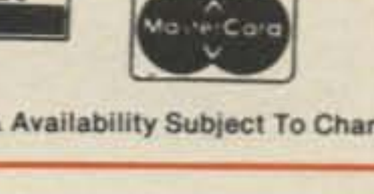

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B3016	2M	Yes	30W	160W	$199
C22	220	No	2W	20W	$ 79
C106	220	Yes	10W	60W	$179
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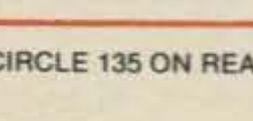

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Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice Licensing Data—Conclusion

This article covers all of the material one must know to pass an FCC Novice written examination (FCC element two). All parts should be studied prior to attempting to pass the test. The first six parts of this article provide an overall introduction to this instruction material, plus in-depth coverage of electrical principles, circuit components, practical circuits, signals and emissions, operating procedures, amateur radio practices, plus rules and regulations. This concluding part covers the remaining two categories, which are radio-wave propagation, plus antennas and feedlines. Previous issues of *CQ* are usually available at $2.25 each; requests can be sent to *CQ*, 76 North Broadway, Hicksville, NY 11801. If you know someone who is interested in becoming an amateur radio operator, you should bring this article to his/her attention.

Radio-Wave Propagation

2C-1.1 What type of propagation uses radio signals refracted back to earth by the ionosphere? Ionospheric propagation, which is also known as sky-wave propagation and skip propagation. *(The March and April 1980 Novice columns explain ionospheric propagation and radio-wave propagation predictions.)*

2C-1.2. What is the meaning of the term skip propagation? It is another term for ionospheric propagation or sky-wave propagation.

2C-1.3. What is the area of weak signals between the ranges of ground waves and the first-hop called? The skip zone. The ground wave radiates outward, away from the antenna. It gradually fades with distance traveled and eventually becomes too weak to be useful. The sky wave travels up to an ionosphere layer that refracts (bends) it back to earth at a point which is fairly distant from the transmitting antenna. The area between the point where the ground wave is no longer strong enough to be heard, and the point where the first-hop sky wave returns to earth, is called the skip zone.

2C-1.4. What is the meaning of the term skip zone? It is the zone where the transmitted signal is not heard well. It is the area between the end of the useful ground-wave signal and the point where the first-hop sky wave returns to earth. There are also skip zones between all subsequent points on the earth's surface where second, third, and fourth (etc.) hop sky-wave signals return to earth.

2C-1.5. What does the term skip **mean?** It refers to the areas on the earth's surface which are skipped (missed) as a sky wave travels away from the transmitting antenna. The sky wave is alternately refracted (bent) back to earth by an ionosphere layer and reflected back towards the ionosphere by earth's surface.

2C-1.6. What type of radio-wave propagation makes it possible for radio stations to communicate long distances? Ionospheric propagation is the most reliable type of long-distance propagation. There are other types of long-distance propagation, but they do not generally apply to the high-frequency (3 to 30 MHz) bands used by Novices.

2814 Empire Ave., Burbank, CA 91504

This is Hiram Wolf, Jr., KB6FKE, of Newark, California. He is a 42-year-old maintenance mechanic in a glass company. Hiram obtained his Novice license during May 1984. He has worked 17 states, including Hawaii. His antenna is a 25 foot ground-mounted vertical. Hiram is anxious to upgrade and use the teletype system shown in the photograph.

2C-2.1. What type of propagation involves radio signals that travel along the ground? Ground-wave propagation, which follows the contour of the earth's surface.

2C-2.2. What is the meaning of the term ground-wave propagation**?** It is a transmitted signal that travels over the earth's surface. It weakens as it moves away from the transmitting antenna, and it eventually becomes too weak to be useful for reception. Vertically polarized ground waves bend forward as they move away from the transmitting antenna. When they reach the extremity of their useful reception range, the originally vertical waves are close to being horizontally polarized.

2C-2.3. Daytime communication between two stations on 3.725 MHz is probably via what kind of propagation, when they are located a few miles apart but separated by a low hill blocking their line-of-sight path? Ground-wave propagation, which would follows the earth's contour (shape) between two such stations. The line-of-sight (antenna-to-antenna) path would be blocked by the intervening hill in this case.

2C-2.4. When compared to skip propagation, what is the usual effective range of ground-wave propagation? Ionospheric propagation provides communication range capability that far exceeds communication ranges provided by ground-wave propagation.

Antennas and Feedlines

21-1.1. What is approximate total length in feet of a half-wave dipole antenna cut for 3725 kHz?

$$l = \frac{468}{f(MHz)} = \frac{468}{3.725} = 125.64 \text{ feet,}$$
or 125 feet 8 inches

(The May through July 1983 Novice columns cover dipole antennas in detail. They are "must" reading to anyone planning to erect a dipole.)

21-1.2. What is the approximate total length in feet of a half-wave dipole antenna cut for 7125 kHz?

$$l = \frac{468}{f(MHz)} = \frac{468}{7.125} = 65.68 \text{ feet,}$$
or 65 feet 8 inches

21-1.3. What is the approximate total length in feet of a half-wave dipole antenna cut for 21,125 kHz?

$$l = \frac{468}{f(MHz)} = \frac{468}{21.125} = 22.15 \text{ feet,}$$
or 22 feet 2 inches

21-1.4. What is the approximate total length in feet of a half-wave dipole antenna cut for 28,150 kHz?

$$l = \frac{468}{f(MHz)} = \frac{468}{28.15} = 16.63 \text{ feet,}$$
or 16 feet 8 inches

21-1.5. How is the approximate total length in feet of a half-wave dipole antenna calculated?

$$l = \frac{468}{f(MHz)} \text{ or } \frac{468{,}000}{f(kHz)} \text{ or } \frac{468{,}000{,}000}{f(Hertz)}$$

21-2.1. What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 3725 kHz?

$$l = \frac{234}{f(MHz)} = \frac{234}{3.725} = 62.82 \text{ feet,}$$
or 62 feet 10 inches

21-2.2. What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 7125 kHz?

$$l = \frac{234}{f(MHz)} = \frac{234}{7.125} = 32.84 \text{ feet,}$$
or 32 feet 10 inches

The answer is the same whether an antenna is vertical, horizontal, or anywhere between these two positions.

21-2.3. What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 21,125 kHz?

$$l = \frac{234}{f(MHz)} = \frac{234}{21.125} = 11.08 \text{ feet,}$$
or 11 feet 1 inch

21-2.4. What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 28,150 kHz?

$$l = \frac{234}{f(MHz)} = \frac{234}{28.15} = 8.32 \text{ feet,}$$
or 8 feet 4 inches

"Adjusted" is a poor word to use in this series of questions. When assembling a dipole, one cuts the wire to produce resonant lengths. This should be the only "adjustment."

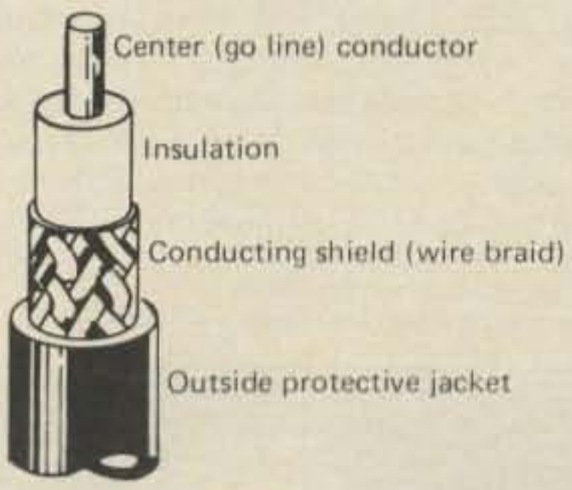
21-2.5. When a vertical antenna is lengthened, what happens to its resonant frequency? The resonant frequency of any (horizontal or vertical) antenna varies inversely with its physical length. Therefore, in this case the lengthened vertical antenna resonates at a lower frequency.

21-3.1. What is a coaxial cable? It is a transmission line (feedline) that is commonly used in amateur radio station installations to interconnect the station equipment (usually a transceiver) to the antenna. The center (go)

Ten-year-old Greta Hanson, KA9SMY, lives in Tanglewood, a country subdivision of Bloomington, Illinois. She shares a station with her father, AC9S. It includes a Drake TR-7A transceiver, Wilson System One beam, AEA CK-2 electronic keyer, Bencher paddle, and Viewstar VS-1500A antenna tuner. Greta has contacted amateurs in 40 states, plus Canada. She made 162 contacts during the 1985 ARRL Novice Roundup. Her other interests include playing the piano, softball, and gymnastics. Her school science-fair project was dipoles. Greta is studying to upgrade to General.

conductor is surrounded (in sequence) by insulation, shielding (usually copper braid), and a protective outer jacket. *(The August 1983 Novice column provides useful data about coaxial cables.)*

2I-3.2. What kind of antenna feedline is constructed of a center conductor encased in insulation, which is then covered by an outer conducting shield and weatherproof jacket? Coaxial cable, which is commonly called coax.

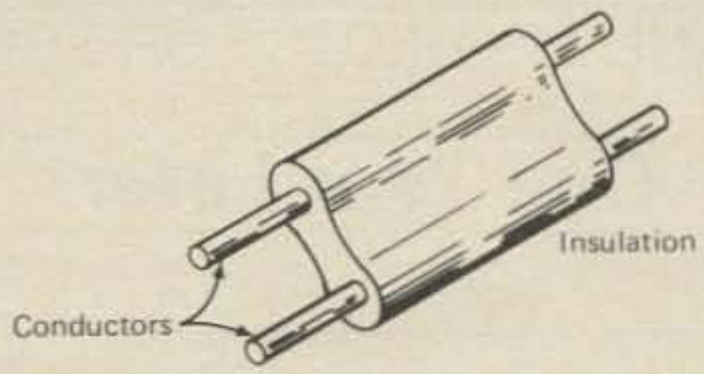


2I-3.3. What are some advantages in using coaxial cable as an antenna feedline? It is easy to install and it can be used many years without requiring maintenance. It is priced reasonably. Good coax has low attenuation (loss). It has good power-handling capability. The shield protects the intended (inner) signal from being degraded by any nearby electromagnetic energy. The signals travel along the outer edge of the inner conductor and the inner edge of the outer braid, minimizing the possibility of the amateur radio signal interfering with home entertainment devices. The National Electric Code (NEC) does not require coax feedlines to be held clear of buildings by using standoff insulators, as is required of some other types of feedlines.

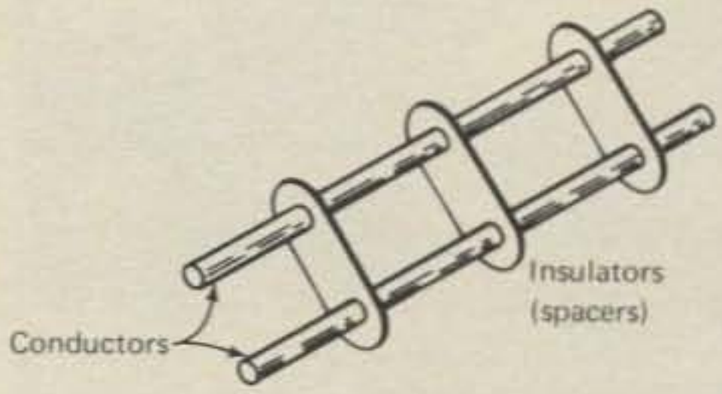
2I-3.4. What commonly available antenna feedline can be buried directly in the ground for some distance without adverse effects? Coaxial cable.

2I-3.5. When an antenna feedline must be located near grounded metal objects, which commonly available feedline should be used? Coaxial cable.

2I-4.1. What is parallel conductor feedline? Common TV twinline is a type of parallel conductor feedline.



Ladder line is another type of parallel conductor feedline. It is no longer popular with amateurs, despite its excellent low-attenuation (loss) characteristic. It is difficult to install, it must be insulated from structures, and it requires occasional cleaning.



2I-4.2. Can an amateur radio station use TV antenna "twin lead" as a feedline? Yes. Common 300 ohm TV twinline matches the 300 ohm input impedance of a folded dipole antenna. Polyethylene insulation is common to most twinline. It does not have outstanding resistance to heat or oil. Its resistance to flame, gasoline, kerosene, benzol, toluol, and degreaser solvents is poor to fair. Teflon-insulated twinline has excellent to outstanding properties with regard to all of these characteristics.

2I-4.3. What are some advantages in using a parallel conductor feedline? Its 200 to 600 ohm characteristic impedance directly matches several types of antennas that have high input impedances. Ladder line is more efficient than coaxial cable.

2I-4.4. What are some disadvantages in using a parallel conductor feedline? It requires separation from structure. TV twinline loss increases as outer surface is contaminated. Ladder line is difficult to install and it requires occasional cleaning. Parallel conductor feedlines are usually unshielded, leaving them subject to unwanted pickup of electromagnetic energy.

2I-4.5. What kind of antenna feedline is constructed of two conductors maintained a uniform distance apart by insulated spreaders? Parallel conductor feedline, such as ladder line.

Summary

This month's column completes the Novice licensing data article. The April 1985 Novice column explains the Novice examination program. If your code receiving speed is at least 5 wpm, it is advisable to locate a suitable volunteer examiner and to make arrangements to take your Novice test. This article contains references to 17 previous Novice column articles, which you are advised to read. Assuming that you will soon be licensed, it is advisable that you also read the following Novice column articles:

QSL cards—January through March 1979.

Phillip's code—November and December 1979.

Worldwide sources of code practice—October and November 1980.

Operating privileges—October 1984.

VEC program (Technician through Extra)—May 1985.

Please let me know if you use this article to prepare yourself to pass the Novice written examination. I would also like to know the callsigns such Novice column readers receive, and hope to contact them on the air.

73, Bill, W6DDB

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

One Year Later

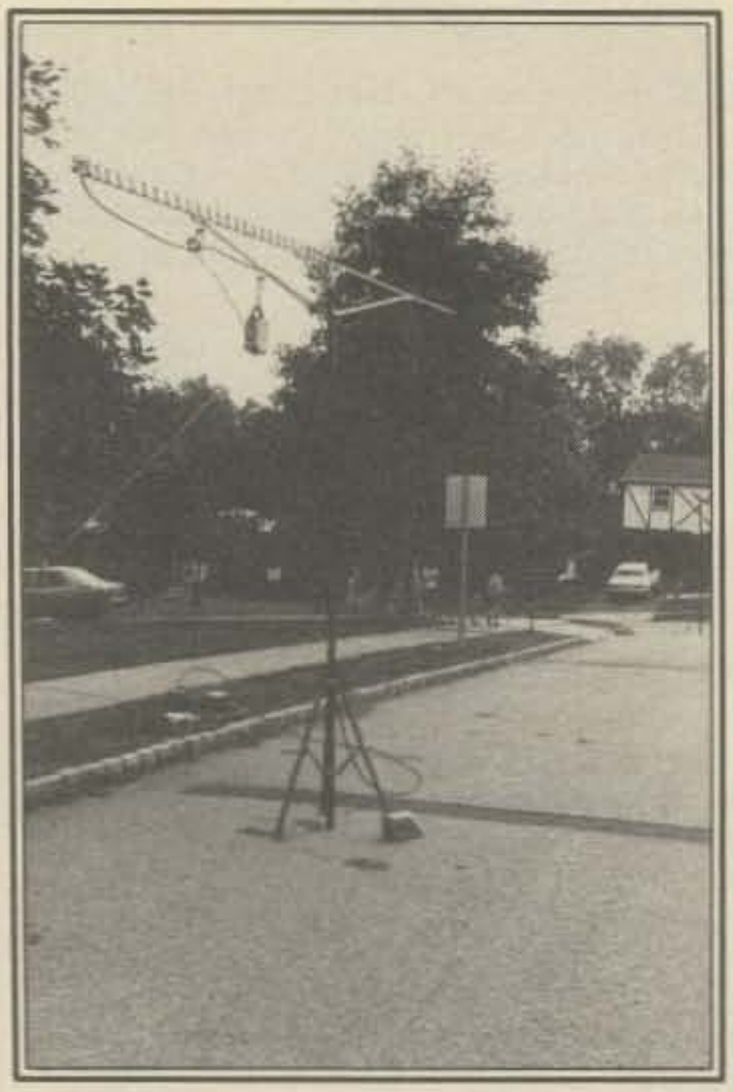
This issue marks the first anniversary of our new VHF column. We began in January 1985 with a four-month tutorial discussing VHF propagation, equipment, antennas, transmission lines, and accessories. I'd recommend that new readers, especially those recently licensed or newcomers to VHF/UHF work, get the January through April 1985 issues of *CQ* to read and understand the contents of those VHF columns, as much of our current and future discussions are predicated on our readers' familiarity with this information. I'd love to rehash the basic nature of VHF/UHF from time to time, but column space is limited and we don't want to bore monthly readers to death. Anyone having a question regarding VHF work or any material presented in this column is most welcome to write to me. I'll do my best to reply to every letter received, and shall print the most interesting correspondence here.

Anyway, the past year has been interesting to say the least! Time goes fast when you're having fun, and writing about one of my favorite activities is surely enjoyable.

Product Review: The F9FT "Tonna" 55-Element 23 cm Yagi

As promised in the December column, we obtained an evaluation product from The VHF Shop (Mountaintop, PA) and put it through its paces over the past several weeks. The new antenna is called "Antenne 55 Elements Long Yagi" by its manufacturer, Antennes Tonna S.A., 132 Boulevard Dauphinot, 51100 Reims, France. It is the longest-boom Yagi antenna (in terms of wavelengths) I've ever worked with, featuring 55 elements on a 15'3" (20 wavelength) long boom, optimized for 1296 MHz. An equivalent 20 meter beam would be over a quarter-mile long!

The monster 23 cm antenna is very lightweight and UPS shippable, thanks to a three-section boom. Assembly is straightforward, following three pages of printed instructions and a two-page assembly diagram supplied with each antenna. I was very happy that my friend Pete, KT2B, also received an identical evaluation antenna. This allowed us to make an important performance measurement which would not have been possible with just a single unit. Pete assembled his antenna first, taking about two hours to do so, and then assembled mine while I was busy building a new 23 cm cavity amplifier in the same room (misery loves company). The second antenna didn't take as long to put together. Assembly requires only the simplest hand tools, including a 10 mm "spanner" (British for open-end wrench). A small hammer is required to install the elements through their insulators, and a ruler with 1/64" graduations is handy for positioning (centering) these elements properly.



One end of the "antenna range," showing the "transmit" antenna on its 10 foot mast. The tree that looks close by isn't. It's about 30 feet to the side.

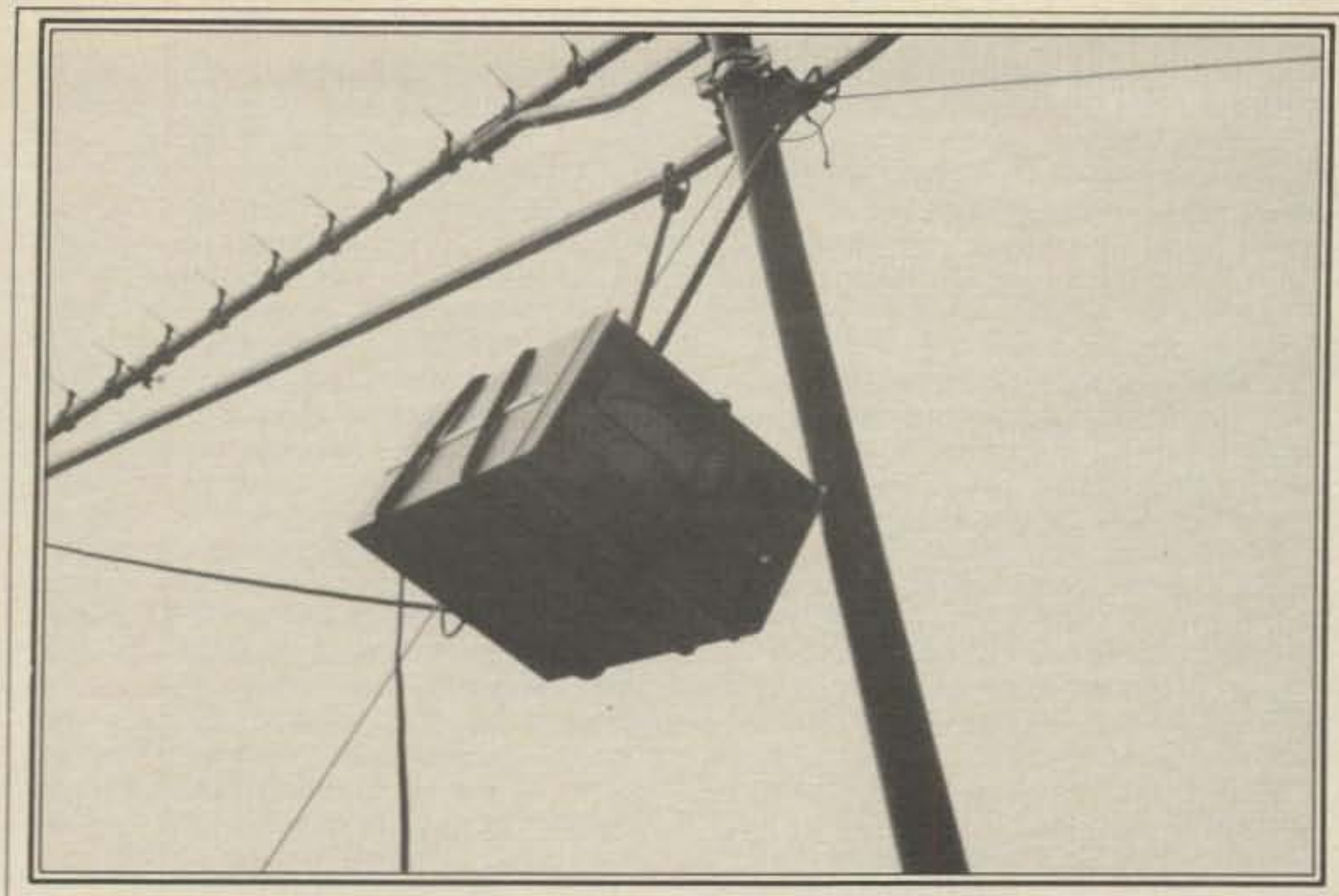
Anyone acquainted with the 23-element F9FT 1296 MHz Yagis—which are very popular in 4-bay configurations—will be happy to know the 55-element long-boom product uses identical assembly procedures and driven element design. This is significant, I think, because the Tonna 23 cm antenna's parasitic elements require no mounting hardware. They are pushed through their insulators, which are then "snapped" onto the boom for quick, easy, and permanent installation.

The driven element is rather unique, as well. It appears to be a folded dipole made of one continuous loop of enameled copper wire, molded to its insulator and having a weather-sealed feedpoint, preassembled by the factory to a coaxial "pigtail" feedline of RG213/U. Whatever the dipole is called, it appears very much like a 50 ohm resistive load to any length of compatible transmission line, and all the F9FT 23 cm antennas I've seen exhibit amazing match to their feedlines. A measured VSWR of <1.2:1, even with very short transmission line length, is common for these antennas. The driven element mounts with two screws that hold its insulator firmly against the boom.

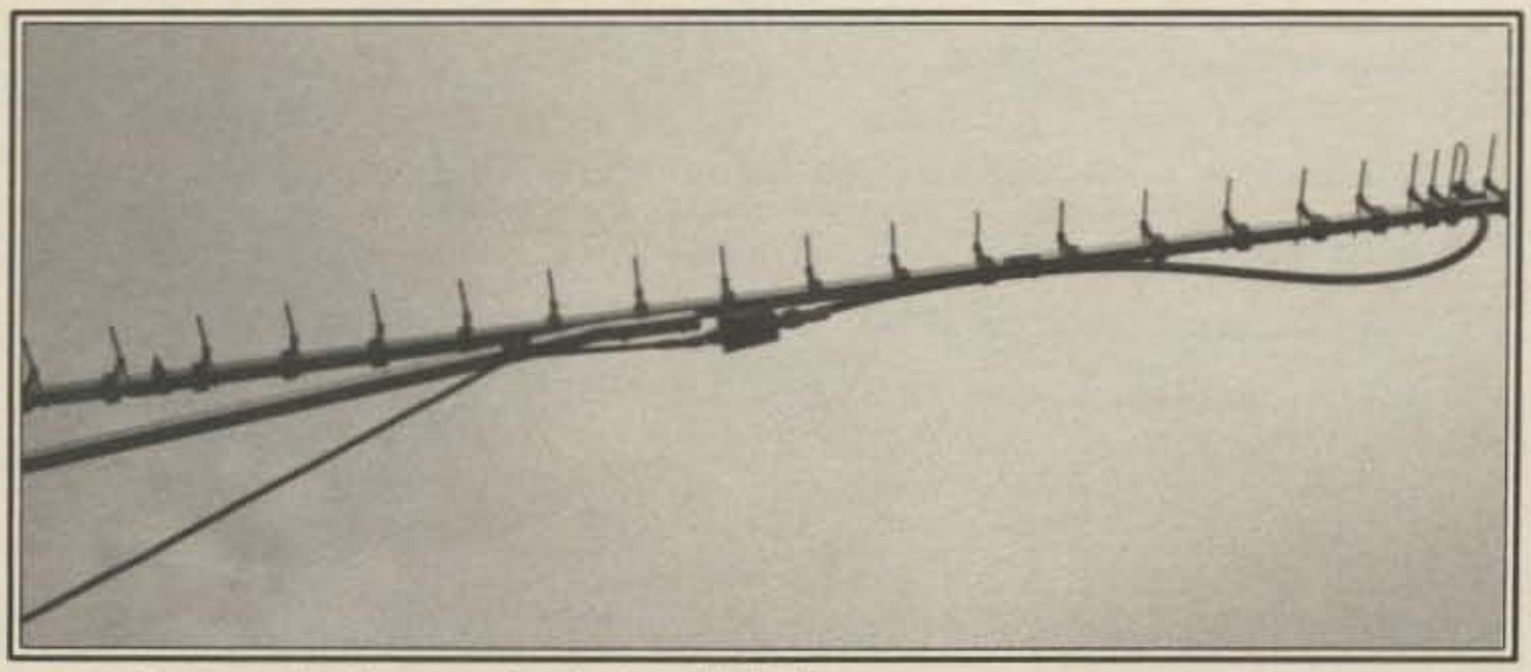
All the Yagi elements, driven and parasitic, mount 1½ inches above (or below) the boom, rather than directly against it. The Tonna assembly instructions don't go into great detail on this point, but they do state, "For best efficiency, it is necessary to keep the elements at some distance from the antenna boom." Presumably, this spacing off the boom allows the antenna design to be optimized as if it were a free-space array, and the effects of boom dimensions and proximity can be ignored. The element insulators are made of high-impact plastic, and their dimensions are quite precise to assure excellent alignment of all elements in a single plane. Each driven element assembly is factory-connected to a short length of RG213/U, as mentioned earlier, and

The 23 cm 10 watt transmitting equipment used for antenna gain testing at WB2WIK.

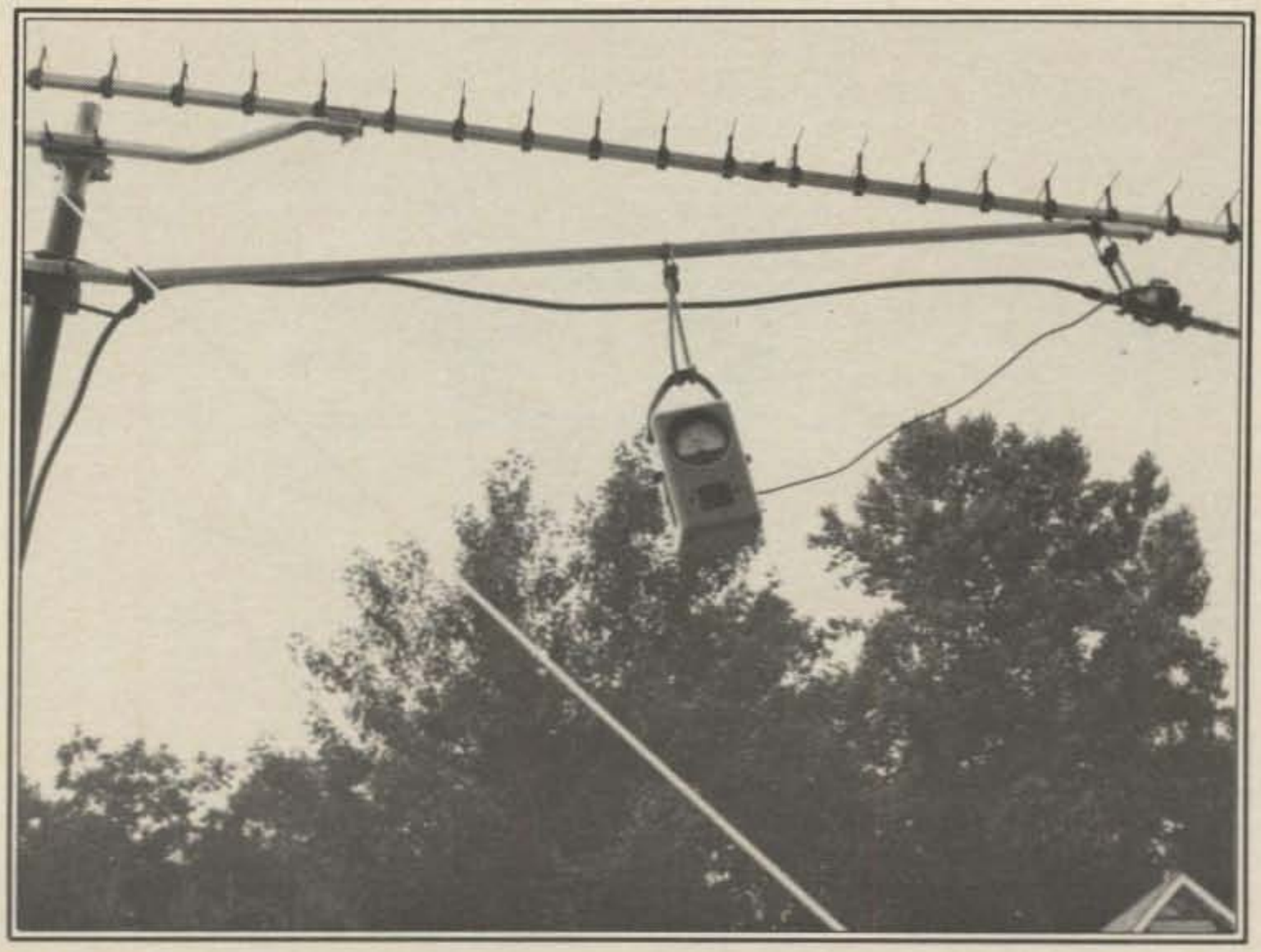
24 Louis Dr., Budd Lake, NJ 07828



The Boonton microwattmeter hanging below the boom of the "receive" 55-element Yagi. Its RF detector is up by the boom, inches from the driven element.



Detail of the "receive" antenna feedpoint with the Boonton microwatt RF detector head coupled to the short RG-213/U pigtail. We assumed the pigtail to be lossless.



Bird Thruline wattmeter hanging below the boom of the "transmit" 55-element Yagi. Its RF coupler is up by the boom, just inches from the driven element.

the "polarity" of each driven element is indicated by a "bump" in the plastic dipole insulator. This polarity indication is not important for anyone contemplating a single Yagi installation, but it is handy for those considering a stacked array. As the F9FT instruction sheet warns, "During mounting process on the stacking frame, make sure antennas are properly phased. The bump on the plastic shell of the driven element marks the outer conductor of the feedline. *All the bumps must face the same side* (all left or all right, in horizontal polarization)." I guess this says it all.

The instructions offer stacking information and the part numbers for commercially available (Tonna-manufactured) two-port and four-port 23 cm splitters. The manufacturer also includes a discussion on antenna mounting, pointing out that most antenna masts are of a diameter which approaches one-quarter wavelength at 23 cm (40 to 54 mm). This means you **cannot** allow the antenna mast to pass through the plane of the elements! Tonna recommends their 23 cm antennas be mounted at the very **top** of their mounting masts for maximum efficiency. This is easily accomplished in four-bay stacked systems using an "H" frame.

The 55-element 23 cm Yagi, like other Tonna products, is supplied with a high-quality type-N connector for assembly to the coaxial "pigtail," and a spare reflector element which can serve as a replacement for any passive element in the system.

Alright already! How does it work? In a word, I'd say "GREAT!" Before even installing the connector on my 55-element Yagi, it was loaned out to Dave Collins, K2LME, who was going to use the antenna for the ARRL September VHF QSO Party at multi-op station K2DEL. The group at "DEL" installed the antenna atop their mast at a rather average location in northeastern New Jersey, where they ran a whopping 3 watts to it for the contest weekend. Results? They made 15 contacts on 23 cm, including one with W1TKZ/1 in VT, 200 miles away. This is nearly 70 miles per watt, not bad for 1296 MHz under "flat" band conditions. I think they could have done even better, but their operators were totally unfamiliar with 1296 MHz operation and were pretty much flying by the seats of their pants.

Dave returned the antenna to me the following week, and Pete and I got together on September 22 to build an "antenna range" which we hoped would allow us to measure the gain of these products by an indirect but proven procedure. The details of our test plan were contained in the December 1985 column, but I'll include a summary here as well. There is a way in which antenna gain can be calculated after a measurement of recovered signal over a known path from a known source is made. This technique is not exactly new, having been described by C.G. Montgomery in his article "Technique of Microwave Measurements" published in 1948 as part of the M.I.T. Radiation Laboratory Series. Antennas are oriented directly toward each other at an appropriate distance in the far-field region, and measurements of transmit power, received power, and antenna separation are made. Assuming absence of reflections and obstructions, the data collected can be applied to the formula shown in fig. 1 to determine total antenna gain (for both antennas).

This figure doesn't do you much good, unless you know the gain of one of the antennas with some degree of accuracy. However, you needn't know even this much, if you use two

Gain calculation based on measurements of recovered signal of known power:

$$G = \frac{4\pi R}{\lambda} \sqrt{\frac{Pr}{Pt}}$$

G = total gain of two indentical antennas under test
R = separation of antennas under test, in units of λ
λ = wavelength
Pt = transmitter power to one antenna (measured at the feedpoint)
Pr = received power measured at the feedpoint of the second antenna

In the case of the F9FT 55-element 1296 MHz Yagi, our test setup derived the following:

R = 75 feet = 100 λ = 2300 cm
λ = 23 cm
Pt = 5.00 watts
Pr = 22.4 mw

$G = 1256.64 \sqrt{.04} = 265.98$ (both antennas)
Gain for one antenna = 265.98 ÷ 2 = 132.99
Gain in dB = $10 \log_{10} 132.99 = 21.24$ dB

Fig. 1– Gain calculation formula.

identical antennas. The gain of either antenna should be exactly half the total gain measured, or 3 dB less. Pete and I set up our "antenna range" using two 10 foot masts supported by 3 foot tripods, spaced so that the most forward directors of the two antennas were 100 wavelengths (about 75 feet) apart. This was a "far-field" distance, I reasoned, and the field was certainly unobstructed and quite free of reflecting objects. To assure the antennas would be in the same horizontal plane, we used a very level section of pavement (auto road) aside my house as the "range." We did get some unusual looks from the occasional passerby, but proceeded in the footsteps of Montgomery (not to mention Maxim, Tilton, *et al*) to make our measurements.

We mounted a Bird Model 43 Thruline coupler within a few inches of the feedpoint of the "transmit" antenna, and installed a 1.2–1.8 GHz element for measurement of Pt, transmit power. We mounted a microwattmeter RF detector (Boonton Electronics type 41-4D power detector good to 12 GHz) within a few inches of the feedpoint of the "receive" antenna for measurement of Pr, recovered power. Rather than assemble long DC cables for the meters themselves, we used the standard-length cables and supported the Bird power meter and Boonton microwattmeter from the antenna booms using stretch cords. The meters hung sufficiently below the antenna booms to be out of the plane of radiation. Despite their hanging nearly 10 feet above ground, the meter scales were easy to read, since they are large and we had plenty of available light.

Using an SSB Electronics LT23S 1296 MHz transverter driven by a Kenwood TR9000 multimode 2 meter rig, we generated enough power to indicate exactly 5.0 watts at the transmit antenna's feedpoint. It should be noted that there was no measurable reflected power. This "exact" 5 watt measurement should be ±5%, as previously confirmed in a laboratory, using precision equipment (microwave bolometer and 0.1 dB accuracy power attenuators). The Boonton microwattmeter, set to the +10 dBm range, went right off scale! Eureka! The doggone system works.

Climbing a small step ladder, I changed the microwattmeter range to the +20 dBm (100 mw) position. I then moved the ladder away, and gently twisted and tilted the receive antenna mast for a peak detected meter reading. After some fumbling around, I was able to achieve a stable +13.5 dBm (22.4 mw) reading while Pete reconfirmed the transmit power to be 5 watts. This was all somewhat anticlimatic, in that our actual measurements took all of about two minutes, while the setup consumed a couple of hours.

I couldn't wait to plug the numbers in the antenna gain formula to see if our readings were "in the ballpark." Let's see . . . R = 2300 cm, Pt = 5w, Pr = .224 w. The formula yields an answer for total antenna gain, expressed mathematically, not in dB. The answer: 265.98. The gain for one antenna, then, should be 265.98/2, or 132.99. The gain in dB should be 10 log 132.99, or 21.24 dB.

How close is this to the gain claimed by the manufacturer? Very close. Tonna claims the gain of their 55-element 23 cm Yagi to be 21.25 dB! I don't think we could have correlated better than this.

We did not attempt to measure the antenna pattern, as this would have been a bit complicated for our simple antenna range. Tonna does provide a polar plot of their antenna, taken in both the *E* (vertical) and *H* (horizontal) planes, and the *H*-plane plot is reproduced in this article (see fig. 2). They state the 3 dB beamwidth to be "2 × 5.41 degrees," or 10.82 degrees. This is in line with the claimed (and measured) antenna gain, and shows the antenna to be *very* sharp—possibly too sharp for the average installation. I'm not a big fan of really sharp antennas for routine VHF work, as they are too critical to steer and make even scheduled contacts too easy to miss. However, most 23 cm operators are becoming experienced enough with sharp antennas, including large parabolic dish systems, that these obstacles can be overcome with patience. Besides, the 55-element F9FT antenna appears to have a dozen sidelobes (not unusual for very long-boom arrays) which would serve to assist in making contacts with "locals" not peaked by the forward lobe. According to the Tonna-supplied plots, the first six minor lobes on each side of the main are within 20 dB of the main lobe's intensity.

In all, I'm very satisfied that the Tonna

Fig. 2– H-plane polar plot, 55-element F9FT 23 cm Yagi.

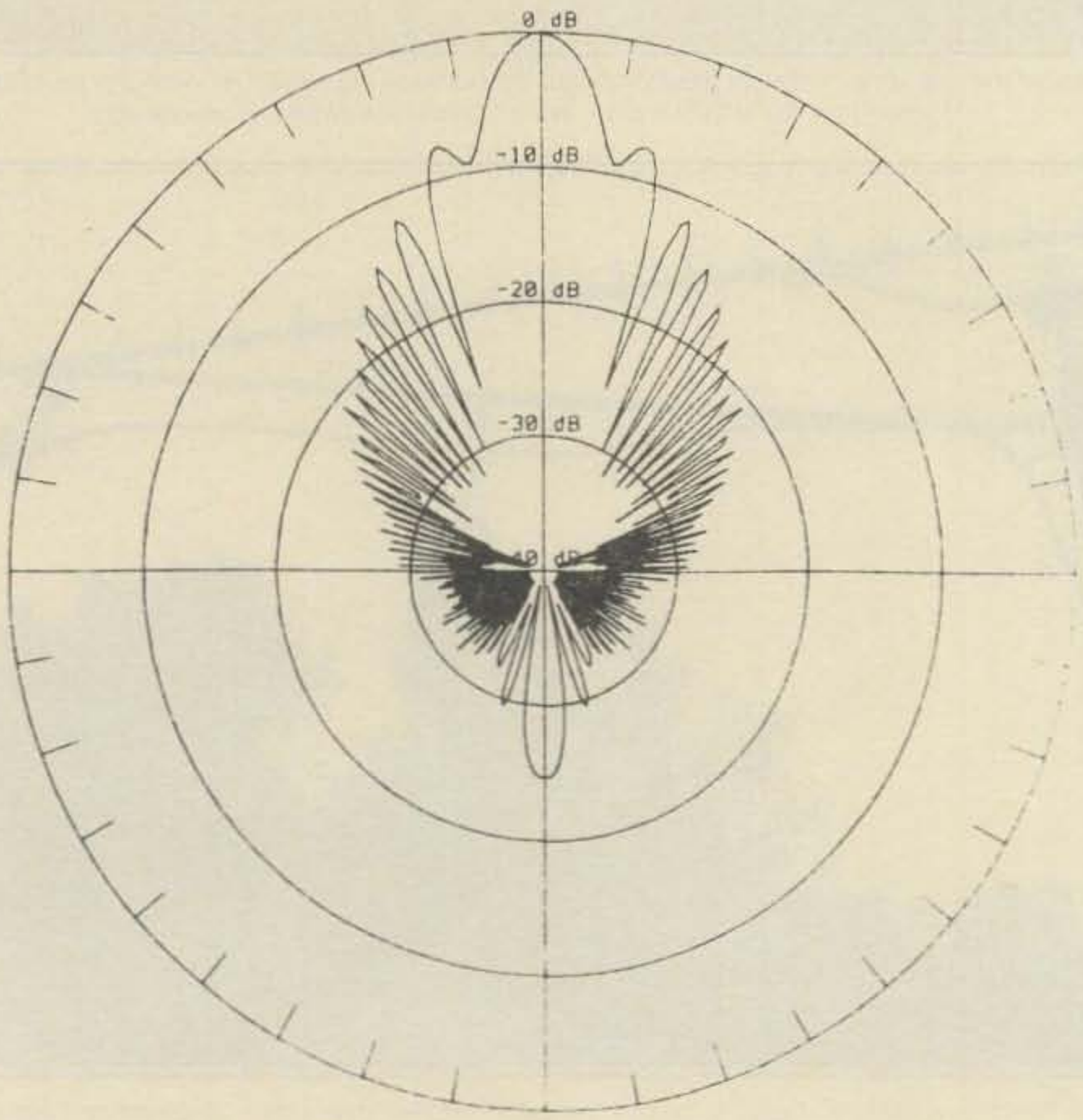
ANTENNES TONNA S.A. 132 Boulevard Dauphinot 51100 REIMS FRANCE

DIAGRAMME DE RAYONNEMENT CALCULE: ANTENNE 55 ELEMENTS LONG YAGI

FREQUENCE: 1296.0 MHz PLAN: H

GAIN CALCULE : 21.25 dB iso RAPPORT AV./ARR.: 24.72 dB

ANGLE D'OUVERTURE A -3dB : 2 × 5.41 deg.



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Line feed speed: 5 lines per second in character mode. 7.5 lines per second in graphics mode.
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55-element 23 cm Yagi is an excellent, well-built product which likely meets or exceeds its specified forward gain and is capable of providing even minimal stations with many enjoyable contacts. The price is in the $69 (U.S. funds) class. This and other Tonna UHF products are available from The VHF Shop, 16 S. Mountain Blvd., Mountaintop, PA 18707.

VHF Contesting

I'm often asked (well, once or twice anyway) advice about VHF contesting. While I've won lots of contests, I don't claim to be an expert in this complicated field. However, I do have some opinions that might be helpful. If you always win every VHF contest you enter, why not turn the page and look at some nice ads?

Ahem. I'd like to begin by stating that all of the following is my opinion, so don't bother getting all upset if you happen to disagree.

To win a VHF contest for a geographic area with any real competition, you must be a contester. Sure, it's fine to be an expert moonbouncer, satellite enthusiast, or workbench tinkerer as so many of us VHFers are, but to score above vigorous competition requires something more. You must be a contester. As such, you must be willing to operate for 30 or 40 hours with little or no sleep; you must plan some part of your life around contesting; you must refine certain practices (logging, duping, spotting, talking, sending . . . all at once) until they become second nature; you must have understanding life associates (wife, children, parents, or whoever will be affected); you must have the desire and genuine need to win. Without these things you may have a bit of fun in a contest, but you won't win consistently.

VHF contesting is only a little different from HF/DX contesting. Our bands are even less predictable than the most fickle HF band, with propagation ranging from ionospheric *F*-layer skip to pure line-of-sight. The very-high and ultra-high frequencies are greatly influenced by solar activity and local weather conditions. Our antennas don't work well when they're ice-covered. Our transmission losses increase by unbelievable amounts when our coaxial connectors take in a little moisture. We're dealing with signals that range in strength from .01 uV to 10 mV, a ratio of one million to one, and trying to cope with these vastly different levels from moment to moment. We're working at frequencies where static and atmospheric noise are so minimal that the noise generated in our receiver front ends is likely to be a limiting factor. We can't just splice onto our feedlines without paying a severe price in overall performance. Everything has to be carefully calculated, tested, compared. A 1 dB difference in signal strength can make or break the contact.

Heavy stuff, huh? Well, this column often deals with station optimization, so I won't go into this here. Hopefully, you've already assembled a station that is capable of competitive contest work. Now you just need to know how to use it to your best advantage.

Arrange your station for maximum flexibility. A guest operator shouldn't require hours of instruction to get the station going. The "KISS" system ("keep it simple, stupid") is the name of the game. Of course, wiring the station up for easiest operating can be a tough, complicated job. But all this should be done before the contest starts, so the actual operation is smooth and pleasurable. Keep the most-used controls (receiver dial, rotator control, etc.) within easy reach. Position a 24-hour clock so that it faces you when you're tuning the receiver, and set your contest log on the bench, desk, or table directly in front of you. The operating desk surface should be about 30 inches above the floor, and should have plenty of space for log and dupesheet, plus a key (paddle, keyboard, or whatever) if the contest involves CW work. If this leaves no room for a microphone, then use a boom mike on a flexible neck; this can be hung from just about anywhere that isn't in the way.

Avoid VOX operation. A few big-gun contesters use VOX, but most have found footswitch operation much more efficient. Wire up the footswitch in parallel with your push-to-talk line, and position the switch on the floor just ahead of where your feet would naturally fall when operating. If you have several rigs set up for the contest station, have a footswitch for each.

If you have transmitting equipment which requires occasional retuning, have a handy "tune" switch set up within easy reach. There isn't the time to go fumbling around behind the rig, reaching for a key plug or something, during a contest. If you use "split" transmitter and receiver frequency controls, have a "spotting" switch which does not key the transmitter final amplifier and which mutes the microphone during frequency spotting. There's nothing more annoying than listening to the "swish" of VFO's zeroing in for the kill.

Have your rotator control handy. If you have several rotators, be sure the correct control box is within easy reach of the appropriate station. This sounds awfully fundamental, but you wouldn't believe some of the shacks I've seen, with rotor controls on the other side of the room from the radio equipment.

If at all possible, have the 220, 432, and 1296 MHz antennas on the same rotator (for single-op stations). This makes for easy "band-jumping" without figuring beam headings. Single-op stations can get away with a single tower/rotator for all bands, but it is a very nice luxury to have more than one tower, even for single-operator work. I use two (sometimes three) towers/rotators, with at least two 144 MHz antennas on two separate rotators. I keep the two beams headed in different directions, generally towards population centers, for quick changes with a coaxial switch. Murphy's law dictates that when you call CQ with your beam aimed northeast, you will be answered only by stations to the southwest. Having two beams on two rotors helps defeat Murphy.

Multi-operator stations *must* have at least three towers/rotators (more are preferable): 50 MHz should be on its own rotor, since this band will often require a beam heading that would be unusual for the higher bands; 144 MHz should be on its own rotor, since this is our most popular VHF band and activity can come from any direction; and 220, 432, 1296 MHz can be on one rotor, as explained above.

Arrange your station for instant bandswitching, or better still, set up several independent stations if you have the space and the funds to do so. Don't be "stuck" on one band just because you're there. If you work someone on 2 meters who asks for a sked on 432, jump right over to 432 and make the contact. The "I'll see you over there later" approach works about 25% of the time, but the instant bandswitch sked is far more successful. Obviously, the use of common sense is imperative here. It may not pay to leave a good frequency on 2 meters just to make one

contact on 70 cm, unless that one contact is with a "rare" multiplier who may not be on later.

Follow the "activity hour" system. It works. For neophytes, the activity hours are 220 MHz, 8–9 o'clock local time; 432 MHz, 9–10 o'clock local time; and 1296 MHz, 10–11 o'clock local time. These times apply for both AM and PM. Operating the "higher" bands during the activity hours uses your time most efficiently. No use being on a band when you're the only one there.

Stick with 6 meters when it's open. This band offers the longest-range propagation and can help you capture the greatest number of multipliers. However, the band may only open for 5 minutes, and if you're elsewhere when it does, you lose out. There are exceptions to the 6 meter rule, however. During the September 1984 VHF QSO Party some amazing tropospheric conditions allowed all kinds of DX work on 144 MHz and above, while 6 meters was dead. I guess you can never be totally sure, so it pays to keep an ear on as many bands as possible. Certainly monitoring 6 and 2 meters for the whole contest isn't impossible. I have my headquarters wired up with resistive splitters so that I can work 6 meters while listening to 2 meters, and vice versa. This is not complicated electrically, but can become confusing after 24 hours without sleep.

Look for 50 MHz meteor scatter at sunrise. I'd recommend doing this no matter what's happening on the other bands. In the ARRL VHF contests you've only one good opportunity for meteor-scatter work, and that's Sunday morning at about sun up, so you really should take advantage of it. If you're unskilled at meteor-scatter work, contests are not the place to practice! Try working some scatter each Sunday morning for a few weeks before the contest so you'll know what it's all about. Not all 6 meter stations follow 15 second sequencing for m.s. work. Since 50 MHz scatter is often combined with good tropo or brief-duration *E*-skip, this is the easiest band on which to work the mode. I've made scatter contacts in less than 10 seconds, complete. I wish they were all that easy. Some scatter contacts can take several minutes to complete. Try to determine the potential multiplier before wasting all this time. There's no reason to spend 15 minutes working a multiplier you already have.

When all else fails, try 146 (or 223) MHz FM. The ARRL contests prohibit use of 146.52 and all repeater frequencies, even "outputs" not in local use. The *CQ* WW VHF WPX contest allows all FM frequencies but prohibits repeater use. Follow the rules, but by all means, do give FM a try. If there's nothing happening elsewhere, what have you got to lose? I find 223.50 MHz simplex a very valuable asset to my VHF contest operations. Not only do I make points here, but I also use this frequency for making skeds for the higher bands. As such, I have my 223 MHz FM beams on the same rotator as my 1296 MHz antenna system.

When do you sleep? Not at all, if you can make it without crashing your head onto the log. But if you need to sleep, try between 2 am and 6 am. Not much happens during this period, anyway. Sure, there's some 6 meter scatter going on in the wee hours, but it's easier to work at sunrise, and the same stations will be there. You might also be able to rest between about 2 pm and 6 pm on Sunday. Traditionally, this is a time when VHF contest activity slows down and everybody has already worked everybody else. However, the band(s) can open during this period, and you won't want to miss it when it does. So either take your rest close to your station receiver(s), or arrange to have a good friend call you on the telephone to wake up if the band opens. And if you do this, don't tell anyone I told you to. There are all kinds of finnicky people out there who will spend years discussing the fine line between single-op and multi-op stations. If you're a multi-op, no worry about who helps.

Call CQ sometimes, but spend other times tuning the bands in search of new stations and multipliers. I wouldn't recommend even the "big guns" spend *all* their time calling CQ. But then the big guns should already be winning contests and not reading this. One tip for the "little pistols": Don't waste your time arguing with big guns about whose frequency it is, or anything else. Simply getting out of their way probably uses your time most efficiently.

Is that enough advice for one column? It's probably more than enough for many folks, but I've been asked to do this, so don't blame me. If even one operator works up a bigger VHF contest score as the result of my advice, I'll feel good about it. If anyone would like even *more* advice on VHF contesting, there's lots more that can be written. Just let me know.

Can There Be More?

Sure there can. As I'm sure you know, American amateurs were authorized used of the 902–928 MHz (33 cm) band as a secondary (shared-use) allocation effective September 28, 1985. By the time this reaches print, we'll have had the band for three months. Can anyone report about successful contacts made on 33 cm yet? The first construction article I've seen for the new band was published in the October 1985 *QST* and was written by Don Hillard, W0PW, but I expect we'll see lots more. A die-hard tinkerer, I'll be building some 902 MHz gear and hope to write a construction article on this before the year's out.

We'll be happy to include information about the 902 MHz band in this column. I'm happy we U.S. amateurs received the allocation, but I don't think the 33 cm band should be included for awards programs and VHF/UHF contest credit. The use of the 902–928 MHz band is prohibited in portions of Colorado, Wyoming, Texas, and New Mexico, and is restricted to <50 watts PEP operation within 150 miles of White Sands Missile Range, New Mexico. Based on these factors, I don't think it would be fair to include the band for awards and contests at this time. Still, I hope experimenters everywhere are busy designing, building, and modifying equipment for 33 cm use, and I'd love to run some of this in our column.

I received an interesting letter from Andrew Reynolds, WD9IYT, of Rochelle, IL who says ". . . the last few years that I've had 6 meter SSB gear have been exciting. In work that has been less than steady, (I've worked) most of the east coast, Florida, Gulf coast states, and a couple of Plains states. Not very impressive, but not too bad when the rig is an IC-502 barefoot into a sloper at about 30 feet." Wow! For the uninitiated, an IC-502 is a 3 watt PEP solid-state, battery-operated transceiver; a "sloper" is a sloping dipole antenna, where one end is higher above ground than the other. This is a real minimal station with a zero-gain antenna, and WD9IYT has reason to be proud of what he's accomplished. Andrew goes on to say, "Guess the point I was trying to make is don't knock the simple rig and antenna . . . they work." Right on! Still, I wonder what Andrew would have worked with a small beam antenna?

Many of us have had exciting experiences on VHF. One of my more memorable QSOs was with a South Carolina station on 144 MHz CW when I was using an ICOM IC-202 (3 watt battery-operated portable) and its built-in whip antenna from my hotel room at the Sky Line Inn on Mt. Equinox, VT. This was an 800 mile contact that established my personal DX record of 267 miles per watt. Not bad for 144 MHz under flat band conditions. I've worked lots farther, but not with 3 watts ERP (effective radiated power). Do you have a personal anecdote? Let us know! I'll be pleased to print it.

Not to beat a subject to death, but monthly readers know how pleased I've been to report on the success of our first *CQ* World-Wide VHF WPX Contest, held July 20–21, 1985. The number of logs received has exceeded our wildest expectations (400 logs representing North America, Europe, Asia, and Africa). The winners are known, and we'll publish a full contest report in a couple of months. Our first VHF contest brought in about as many logs as a September VHF QSO Party, and we expect the 1986 VHF WPX Contest to show significantly increased activity. We're off to a great start, thanks to *you*.

73, Steve, WB2WIK

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

Amateur Radio Is Constantly Changing

We have been getting many letters from readers of this column asking all sorts of questions! We enjoy getting them, particularly because it gives us an idea of what you want to know about, what confuses you, your interests, and where you stand. Many are from nonamateurs. I didn't expect that.

Being a ham for some three decades, I frequently lose sight of the fact that many of you aren't familiar with the fast-changing hobby that is amateur radio. An individual who has been away from amateur radio for just a single year is amazed and bewildered when he comes back! Practically nothing is the same. It's like being in a different world.

CW and RTTY have given way to AMTOR, which has now been made primitive by packet radio networking. HF sideband is great, but the exciting long-distance action is now accomplished with amateur OSCAR satellites—space operation by amateurs in orbiting vehicles is getting to be commonplace—and flying amateur radio satellite electronic mail boxes with worldwide capability are just around the corner!

Ham gear gets more complex, and practically no amateur has the microprocessor expertise to repair his equipment anymore, much less build it. Technology changes fast! This year's new gadget is next year's antique. It is hard to believe that home computing is only ten years old, yet micros really have only been around since 1975.

When I started in amateur radio, it was basically a CW high-frequency hobby. Today it is VHF voice oriented. I still have the chirpy CW 6L6 rig that I made as a youngster from junkbox parts sitting on a shelf in the garage. I thought I was an engineer when I built it. I intend to keep it as a reminder that I, like most amateurs, haven't been able to keep up with the fast-moving world of communications hardware technology. While we do have many engineering-type qualified amateur radio experimenters, for the majority of us amateur radio means operating commercially-made equipment for social reasons and participating in public service.

The rules have changed! Thanks to WARC, we have several new bands. Amateur licenses are now issued for a ten-year term. Maximum amateur power input is now 1500 watts instead of 1 kw input to the final amplifier. Amateurs and not the FCC administer amateur examinations. Nothing is carved in stone anymore.

Even the overall flavor of rulemaking has changed. President Ronald Reagan and FCC Chairman Mark Fowler, while not amateurs, have forever left their influence on our pastime with their "regulation by marketplace" and "get government out of private citizens' lives" approach. The regulatory direction seems to be you can *market it, operate it,* or *do it* if no problems are caused. The FCC is creating the atmosphere for new things to happen. Not everybody likes it. Some go running to their elected hobby and government officials to put pressure on them for the status quo.

I get the impression from some of my mail that maybe the telecommunications world is moving too fast for some. Maybe it is time for us to refocus our attention from "how it was" to "how it is" and look to the future and "how it might or will be." It is a fact of human nature that our thinking changes slower than the times. The status quo does not and cannot exist in our hobby. We build on prior accomplishments. Progress, like evolution, continues.

As a general rule I can tell you how long a reader has been an amateur by the question he asks or the letter he writes. The newcomer—the life blood of our hobby—is interested in computers, satellites, networking, bulletin boards, microprocessor-oriented gadgets. It is little wonder. His environment is totally filled with it. Everything with which he comes in contact screams microprocessors, space, or some fantastic new technology. The age of Buck Rogers is here. Although I hold DXCC CW only and find the code fun (its only value now), when was the last time you saw something in the media about it? Time marches on. Longtime amateurs belly-ache about the younger generation and the direction amateur radio seems to be taking. I doubt that it will ever change.

But Some Things Stay The Same

This month let's go to the mailbag and cover perhaps the most common question of the newcomer entering amateur radio today.

Why is it necessary to learn Morse code to get an amateur license? This is a very complex and perhaps the most controversial issue in amateur radio today. First of all, Morse code is the oldest tradition in amateur radio. Some feel it is "the tie that binds," the common denominator among all amateurs. It is older than radio itself. Like most inventions, the telegraph code has a disputed ancestry. The United States, Russia, Germany, and England all claim to have originated it.

In this country we like to think that *Samuel F. B. Morse*, a mildly talented American portrait artist, invented the code in 1836 when he devised a system whereby electric currents would deflect a pen or pencil on a moving strip of paper. His middle initials don't stand for "fine business," but for Finley Breeze. Morse proposed to have a dictionary with each word having a numerical reference. This meant only ten (1 through 0) individual characters would be necessary.

It soon became apparent that a very long list of words would be necessary and that the time necessary to compose and translate a message would be excessive. Two years later he devised the first complete dot/dash alphabetical/numerical code. The first receiver that Morse built consisted of a magnet-operated pen writing jiggles on a moving tape.

He soon discovered that the human ear could interpret the long and short buzzes directly without the necessity of a written message. Thus the Morse sounder came into general use. By means of the dot-dash code, a single key could send any letter or combination of letters. In 1844 Morse sent his famous first telegraph message, "What hath God wrought?" on an experimental line between Baltimore and Washington.

The *International Telegraph Union* (ITU) was formed in 1865 in Europe by 20 member countries to regulate telegraph communication across international borders. Handing a telegraph message to another operator at a national boundry was the way it was done prior to the formation of the ITU. It wasn't very efficient!

Although radio experimentation commenced in the late 1800s with studies by James Clerk Maxwell, Sir Oliver Heaviside, and German physicist Heinrich Rudolph Hertz, it was *Guglielmo Marconi* who actually was the first to utilize radiated electromagnetic waves for signaling by using a battery-operated induction coil connected to a spark gap.

It is generally considered that amateur radio *communication* began in 1901 when Marconi received the first radio signals sent across the Atlantic Ocean.

P.O. Box 10101, Dallas, TX 75207

The Morse code letter "S" was sent from England to Newfoundland. In 1906 "SOS"—three dots, three dashes, and three dots—was adopted as the international radiotelegraph distress call.

In 1912 the ill-fated Titanic resorted to the code. It was also in 1912 that regulation came to amateur radio. Lawmakers prohibited amateurs from operating on frequencies lower than 1500 kHz. The amateur was the first to discover the value of the "useless" short waves. During World War I governments used the radiotelegraph extensively.

The amateur was silenced during World War I and came very close to being permanently silenced for all time. The government, having had complete control of communications for the period 1917 to 1919, had inclinations to maintain this control. The pleadings of the amateur experimenter finally won out, and the amateur returned to the CW airwaves in 1919.

The ITU member nations agreed that knowledge of the International Morse code should be a prerequisite for radio operation—any radio operation, amateur or commercial. The name of the ITU was changed to the *International Telecommunications Union* in 1932 to recognize modes other than telegraph.

Although the ITU code requirement was later revised by the member nations to require code proficiency *only when operating in the lower HF bands*, our FCC requires it as a prerequisite for *any* amateur radio operation. This position is really not one of the FCC, but of the public which opposed Commission plans to abolish or modify the Morse code requirement.

Thus, retaining the code requirement has its roots in the democratic process—government by the people. The ITU countries wanted to retain it, at least in some form, and the strongest lobbying force in amateur radio, the American Radio Relay League, wanted to retain it. The majority of the amateurs who commented on the rulemaking wanted it. Even the highest ranking politician/amateur, *Barry Goldwater, K7UGA*, wanted to retain it. So we have it. It is that simple.

Why Require The Code?

The code is looked upon today as more of a tradition than a viable means of communications. It can be likened to a form of amateur radio "hazing" not too unlike the foolishness that goes on at colleges—underclassmen wearing beanies, fraternity initiation stunts, and so forth. Even the military has its traditions and forms of hazing—the unnecessary requirements that admit one as a bonafide member of a group. Historic conventions handed down through the ages are very important to any group, be it civic, religious, fraternal, corporate, or hobby. Traditions might defy reason, but try to tell a long-time amateur or any member of a group that they aren't an integral part.

CW, as the code is called, has very little communications use today. I was amazed to find out during a cruise this past summer, however, that all maritime ships that have messages or radiotelephone calls waiting are first called by the marine operator in CW before they go to the voice mode to pass their traffic. They do this because the shipboard radio operator is "tuned" to his ship's CW callsign and responds when he hears it. It was the first actual use of CW I had heard in years!

There is another reason for the code. Few people like quick radical change. This is particularly true in a hobby as important to many as amateur radio. Amateur radio is almost like a religion to some! Few of you were licensed before 1955 and the advent of CB. The 11 meter amateur band, which essentially wasn't used by the amateur, was reallocated for business/personal use. It became fashionable for delivery and service vehicles to be "radio controlled"—sort of a space-age status symbol back then, somewhat like having a cellular telephone today, or tomorrow's brain-wave transducer.

The FCC never intended for 27 MHz to become a hobby service. It just happened, aided by the trucker looking for "smokies" and gasoline. CB exploded in the late 60s and 70s to millions of participants, each getting in the other's way. It got completely out of hand. Efforts to enforce the rules were fruitless. Eventually the FCC just built a fence around the band and let everyone go at it without callsigns. This scares the heck out of today's amateur who views it as a potential future possibility for amateur radio.

The FCC has tried unsuccessfully on numerous occasions to eliminate or modify the Morse code amateur entry requirement. But our government is "of the people, by the people." The democratic process prevails, aided by a healthy dose of lobbying and political assistance. When you consider that federal agencies get their budgets approved by Congress, it is little wonder that no-code has never been enacted.

In my opinion, the argument that the code is valuable in times of emergency, that it is a small price to pay for entrance into the service, or the "I did it so you should, too" syndrome are not valid reasons for retaining the code. And there is really no relationship between an individual having code proficiency and being a credit to the service.

What About The Future?

On December 14, 1983 the FCC refused to adopt a codeless form of amateur radio license *for a final time* they said. The FCC stated they "were burying the concept of a no-code license . . . period!" *Ray Kowalski*, Chief of their Special Services Division, which oversees the Amateur Radio Service, told me that we would never again see another no-code amateur radio rulemaking *during our lifetime*.

"Never say never" seems to apply. Discussion on the issue within the amateur community has recently resurfaced. Barry Goldwater is now on record as rethinking his previous position on no-code. He carries a lot of weight in amateur and government regulatory circles. There may be a way that it can be done without changing the Amateur Radio Service's basic character too quickly. We'll have to see what develops.

One thing seems a certainty, however. Entry-level amateurs will be obtaining HF and VHF voice-mode privileges even though they will be required to have 5 word-per-minute code proficiency. There are those who say we have a no-code class now, since to obtain a Novice class license only requires one General class voluteer examiner. Testing is usually done in private. This is the reason why the ARRL has recently petitioned the FCC to require two volunteer examiners for future Novice licensees. It seems to me that the only sure thing you can say about amateur radio is that it will change. See you next month. De W5YI.

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month is:

The CW Group of Rio de Janeiro (CWRJ)

Established on December 16, 1980 by a small group of very active CW operators—PY1BVY, EWN, DPG, AFG, AJK, DIN, BQQ, BBM, UOE and PY1DUH—the CWRJ is a noncommercial group of operators bonded together for the promotion of interest in CW communications.

At first the group sponsored the CWRJ Award and a Brazilian annual contest. Later seven more awards were established, all of them interesting and challenging. The CWRJ soon became known around the world as well as in Brasil. The operators are very active on all bands and QSL 100%. The awards are forwarded within a week after receiving the application. Because of this it is not unusual to hear on the bands, "Please QSL for CWRJ Awards."

Niteroi, the former capital of Rio de Janeiro State, is located 14 kilometers from the new capitol, the City of Rio de Janeiro. To reach the capital, you need to cross the Presidente Costa e Silva Bridge, or Rio-Niteroi Bridge as it is sometimes known. Its geographic coordinates are 22 54' 00' S and 43' 00' 00' W, and it is located about 3 meters above sea level. Its area is 130 square meters. It has a population of about 400,140 inhabitants. The main economic activities are fishing and the construction of naval vessels. Niteroi has 31,452 companies, 207 schools, 8 universities, 10 hospitals, 2,335 doctors, 65,000 motor vehicles, 10 cinema houses, 5 theaters, 1 broadcasting station, 8 newspapers, 8 hotels, and 72,000 telephones!

Niteroi, located across the Guanabara Bay from Rio de Janeiro, has some beautiful beaches, and because of this location is always crowded with tourists.

The CWRJ Board of Directors is composed of the following: Co-ordinator Ronaldo Megalhaes Costa Leite, PY1BVY; Secretary Ronaldo Curi Gismondi, PY1EWN; Treasurer Mauro Fernando de tavora Freire de Andrade, PY1DGP; Deliberative Council PY1AFG, BQQ, BVY, BXT, DPG, DWM, EWN, QH, VMV; BICWRJ Editors PY1BVY, DPG, DWM, EWN; and BIDXCWRJ Editors PY1APS, BVY, EWN.

To stimulate interest among non-Portuguese speaking Association members and friends, CWRJ will publish biannually an English supplement. This is to keep everyone informed about CWRJ activities of international scope, since their regular bulletin is of local and national interest only. If you see an item you believe will be of interest to others in your country, please share it with your club or national organization.

Since September 29, 1984 the CWRJ has had its own station call, PY1GCW.

From time to time CWRJ will sponsor DXpeditions to Trindade Island, Fernando de Noronha Island, and Sao Pedro e Sao Paulo Rocks. At all times the operators will be looking especially for CWRJ members and friends.

333 South Lincoln Ave., Mundelein, IL 60060

Dulce, PY1BUL, Carl, PY1CC, and Co-ordinator for CWRJ, PY1BVY, display their CW awards.

Gunnar, SM7QY, Associate Member of CWRJ.

Awards Issued

Joseph A. Vanat, WA1KPJ, worked them all from his home QTH in Vermont and qualified for USA-CA 500 #2057, USA-CA 1000 #894, USA-CA 1500 #726, USA-CA 2000 #649, USA-CA 2500 #592, USA-CA 3000 #531, and All Counties #499, Mixed. All awards are dated 9-9-85.

Edward A. Sanders, WA6VJP, worked and confirmed the last 76 counties and qualified for All Counties #500, endorsed all CW, dated 9-11-85.

Robert L. Klepper, W7IEU, sent for USA-CA 500 #2059, USA-CA 1000 #896, USA-CA 1500 #727, USA-CA 2000 #650, and USA-CA 2500 #593, all CW, all dated 9-13-85.

Bob Matthews, KH8I, qualified for USA-CA 1000 #893, 9-6-85, Mixed.

Edward B. Springer, KA5ORL, won USA-CA 500 #2058 and USA-CA 1000 #895, Mixed, 9-9-85.

USA-CA 500 certificates were sent to:

Robert F. Imhof, AG2K, #2056, 9-7-85, Mixed.

Joseph A. Vanat, Jr., WA1KPJ, #2057, 9-9-85, Mixed.

Edward B. Springer, KA5ORL, #2058, Mixed, 9-9-85.

Robert L. Klepper, W7IEU, #2059, All CW, 9-13-85.

Jim Cunningham, VK2ESI, #2060, 9-18-85, Mixed.

The CWRJ Awards

The CWRJ Award. Work 20 different PY1 stations, including 5 members of the CWRJ operator team (Q.O.). Valid QSOs after December 16, 1980. Log with call and date of QSOs and a declaration that all QSOs were in CW. No QSL; only GCR. Fee 10 IRCs. Endorsements: at each 5 new PY1 stations, including one new Q.O. member for each new series (total 6).

CWRJ operator team members (Q.O.)—PY1: AFG, ALS, APS, ASI, AYE, BMF, BOA, BQQ, BUL, BVY, BXT, CBW, CC, CCX, CCY, COA, DCG, DEA, DFF, DGB, DJY, DMX, DN, DPG, DUB, DWM, EBK, ECL, ELB, ENW, EWN, FF, GO, HQ, JN, KX, MKA, PL, QN, QQ, RJ, TG, UET, URQ, UX, VB, VKA, VMV, WO, WX: and

---

USA-CA Special Honor Roll
Joseph A. Vanat, Jr., WA1KPJ
All Counties #499, 9-9-85

Edward A. Sanders, WA6VJP
All Counties #500, 9-11-85
All 2× CW

USA-CA Honor Roll

3000		1500		500	
WA1KPJ	531	WA1KPJ	726	AG2K	2056
		W7IEU	727	WA1KPJ	2057
2500				KA5ORL	2058
WA1KPJ	592	**1000**		W7IEU	2059
W7IEU	593	KG8I	893	VK2ESI	2060
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WA1KPJ	649	W7IEU	896		
W7IEU	650				

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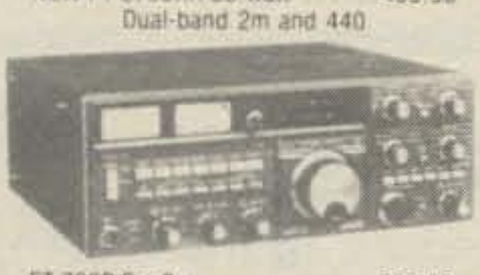

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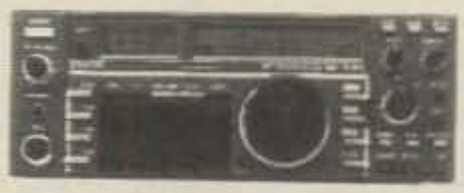

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PU1: VEC, WDS, YOC. Awards Manager: Ronaldo Curi Gismondi, PY1EWN, P.O. Box 621, CEP 24000, Niteroi, RJ, Brasil.

Brazilian Stations Award. Work 75 Brazilian stations, including 10 UF's (states, territories) and 2 CWRJ Q.O. members. Endorsements: First—50 more Brazilian stations; second—25 more Brazilian stations. Log (GCR) with calls, dates, and a declaration that all QSOs were in CW. Fee: 6 IRCs. List of Brazilian prefixes, UFs and regions appears later in this column. QSOs must be after January 1, 1982. Awards Manager; Ronaldo Curi Gismondi, PY1EWN, P.O. Box 621, CEP 24000, Niteroi, RJ, Brasil.

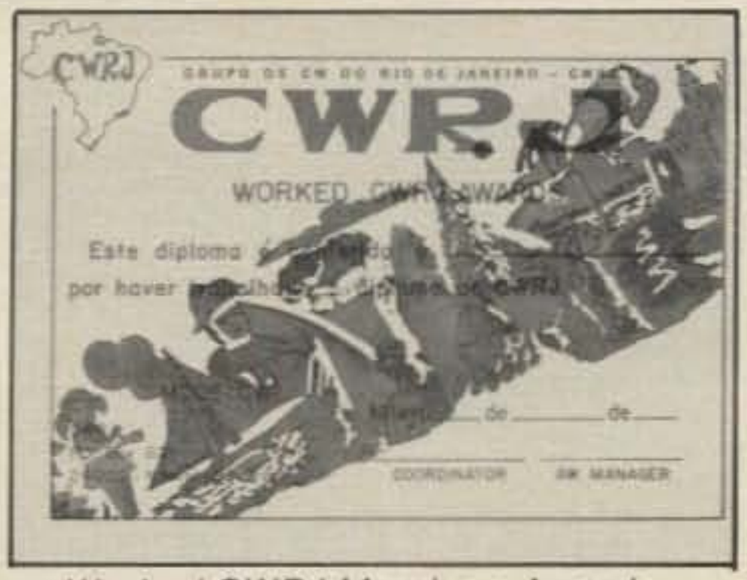
Rio de Janeiro State Cities Award. Work 10 cities of the Rio de Janeiro State. RJ (PY1 stations), including 2 members of the Q.O. of the CWRJ. Log (GCR) only with calls, dates, and cities and a declaration that all QSOs were in CW. Fee 6 IRCs. Valid QSOs after January 1, 1982. Awards Manager: Roberto Quito de Sant'anna, PY1DWM, P.O. Box 24039, CEP 20522, Rio de Janeiro, Brasil.

Diploma Brasil Geografico. Work three stations in each geographical region of Brasil (see list later in this column). Total of 15 QSOs. One of the QSOs in the southeast region must be a Q.O. member of the CWRJ. Send long (GCR) with calls, dates, and a declaration that all QSOs were in CW. Fee: 6 IRCs. Valid QSOs after January 1, 1982. Award Manager: Claudio Roberto Soares Pinto, PY1DFF, P.O. Box 621, CEP 24000, Niteroi, RJ, Brasil.

Worked CWRJ Associate Members Award. Work 10 CWRJ Associate Members (not PY1 stations) and/or CWRJ Q.O. members (PY1). Two endorsements: First—5 more; second—5 more. Log (GCR) with calls, dates, and declaration that all QSOs were in CW. Fee: 6 IRCs. Valid QSOs after January 1, 1982. Awards Manager: Ronaldo Curi Gismondi, PY1EWN, P.O. Box 621, CEP 24000, Niteroi, RJ, Brasil.

Brasil's Frontiers Award. Work 5 countries that have frontiers with Brasil (FY, 8R, YV, HK, OA, CP, ZP, LU, CX). Log (GCR) with calls, dates, and a declaration that all QSOs were in CW. Valid QSOs after January 1, 1982. Fee: 6 IRCs. Awards Manager: Claudia Roberto Soares Pinto, PY1DFF, P.O. Box 621, CEP 24000, Niteroi, RJ, Brasil.

CWRJ YL Flowers Award. With the first letter of the suffix of the callsigns of stations worked on 28 MHz, write the names of 5 flowers (all names must be in English or Portuguese). Among the stations worked, there must be 5 YL stations, which may be substituted for letters in the name of the flowers. YL QSOs on any band may count for this award. Log (GCR) with the calls listed in order to form the names of the flowers and indicate which are the YL stations, date, and declaration that all QSOs were in CW. Fee: 6 IRCs. Valid QSOs after January 1, 1982. Awards Manager: Roberto Quito de Sant'anna, PY1DWM, P.O. Box 24039, CEP 20522, Rio de Janeiro, RJ, Brasil.



Worked CWRJ Members Awards.

Diploma Brasil Geografico.

CWRJ YL Flowers Award.

Worked CWRJ Awards. If you have the CWRJ Award (basic) and five other awards from the CWRJ Awards Program, send log with the numbers of the awards and 6 IRCs to: Awards Manager, Claudio R. S. Pinto, PY1DFF, P.O. Box 1045, CEP 24000, Niteroi, RJ, Brasil.

Brazilian UFs, Prefixes, and Geographical Regions. The following apply for all the CWRT awards.

Regiao Nordeste: PP6 (Sergipe SE); PP7 (Alagoas LA); PR7 (Pa-NE-raiba PB); PR8 (Maranhao MA); PS7 (Rio Grande do Norte RN); PS8 (Piauf PI); PT7 (Ceara CE); PY6 (Bahia BA); PY7 (Pernambuco PE).

Regiao Norte: PP8 (Amazonas AM); PT8 (Acre AC); PUB (Amapa-No AP); PV8 (Roraima RR); PW8 (Rondonia RO); PY8 (Para PA).

Regiao Sudeste: PP1 (Espirito Santo ES); PY1 (Rio de Janeiro SE - RJ); PY2 (Sao Paulo SP); PY4 (Minas Gerais MG).

Regiao Sul: PP5 (Santa Catarina SC); PY3 (Rio Grande do Sul SU - RS); PY5 (Parana PR).

Regiao Centro-Oeste: PP2 (Goias GO); PT2 (Distrito Federal DF - CO); PT9 (Mato Grosso do Sul MS); PY9 (Mato-Grosso MT).

General rules for CWRJ Awards:

1. One CWRJ Q.O. member may be used for more than one award, but only if worked on different dates or different bands.
2. All awards must be worked in CW (two-way or SWL).
3. Contacts on all bands are valid.
4. All awards may be endorsed for QRP.

CWRJ Associate Membership. If you have three awards from Brazilian CW groups and five other CW awards, you may be an Associate Member of the CW Group of Rio de Janeiro. Send log with the numbers of the awards and a fee of 5 IRCs to CWRJ, P.O. Box n. 621, CEP 24000, Niteroi R.J. You will receive a number as a CWRJ Associate Member. Contacts with you will then be valid for the WAMAW Award. You will receive their publication and information about their activities. (The fee is annual.)

Congratulations, Emily!

Emily Maytan, AC2V, of Yonkers, New York, has become the first American YL to win the "100-SM" award for confirmed contacts with 100 Swedish amateurs. Only 659 other amateurs worldwide have won the award. AC2V's was endorsed for making all 100 contacts on 21 MHz CW.

Primarily a CW operator, Emily was first licensed as a Novice in 1976. Originally WB2DXP, she rose quickly through the license classes, earning her Extra class ticket, and one-by-two callsign, in 1978. AC2V has won some 40 other operating awards and is a member of the "Diploma Interest Group" (#3189), a certificate-hunting group which requires a minimum of 25 operating awards before issuing a number.

Emily shares her shack with husband Paul, AC2T, and soon to be married daughter Karen, WD2AHI. She is a member of the ARRL, YLRL and 10-X International, and serves on the board of directors of the Westchester Emergency Communications Association, a Westchester County, New York, public service club and ARRL Special Service Club.

Silent Key

We regret to tell you that Gary Medford, N2CW (ex: K3SWU, W2EQK), became a Silent Key on August 21, 1985. Along with many other amateur radio accomplishments, Gary held USA-CA All Counties #70, 12-10-71.

Notes

Another New Year is just about here. I hope this year brings you happiness, a sense of accomplishment, and peace. See you next month.

73, Dorothy, WB9RCY

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Our 160 Meter CW Contest was first organized some 25 years ago when the band had little activity and was loaded with Loran QRM and many AM signals, and we were limited to low power, depending on where we were located. (We might cause QRM to the multi-KW's Loran signal, you know.) We recognized Stew Perry, W1BB's "DX window" band plan for working the few weak DX stations that were on the air at that time, and it was incorporated into our rules.

In recent years more and more countries have opened the top band to amateur operation, but unfortunately some countries have placed restrictions as to what portions they can use, making the "window" unavailable to some stations. However, the majority of Europeans can still take advantage of split-frequency operation out of the "window," and we are going to retain this band plan feature in our rules.

The success of working split out of the "window" cannot be realized without the cooperation of the overseas DX stations. In last year's contest a few of the more powerful DX stations continued to solicit on frequency contacts in the "window." The resulting QRM not only cut down their own contact total, but made it impossible to hear the many weak DX stations trying to make split-frequency contacts out of the "window."

Because of a feeling of guilt or perhaps a fear of being disqualified, these offenders did not submit a log. No credit was given to those who worked them.

By the same token, we take a dim view of W/K's and VE's who do not observe the recommended plan of operation on 160 during a contest and also continue to solicit DX contacts in the "window." They are certainly not setting a very good example.

I am a bit apprehensive of what to expect in this year's coming contest, especially now that the FCC has added to the confusion by permitting additional modes of operation without assigning a band plan of operation.

I hope we do not experience too many problems.

I have been advised by Eden, ZF1EJ, who is knowledgeable about local matters, that the ZF2 calls assigned to non-resident license holders in the Cayman Islands are to be used *only* when operating in the Caymans and *not* as a portable from other locations. The ZF/4X4 heard in the recent WW Phone Contest therefore was not a legal operation.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Jan.	1	AGCW Happy New Year Pty
*	Jn.1-	De.31	U.B.A. SWL Competition
	Jan.	5	ARRL Midnight Special
	Jan.	11-12	ARRL VHF Sweepstakes
	Jan.	11-12	Mich. QRP Club CW Contest
	Jan.	18	AGCW-DL QRP Contest
	Jan.	18-19	R. Nest & C. Stick Sprint
	Jan.	18-19	Hungarian DX Contest
	Jan.	18-19	White Rose SWL Contest
	Jan.	18-20	North Dakota QSO Party
	Jan.	**24-26**	**CQ WW 160 M CW Contest**
	Jan.	25-26	French CW Contest
	Feb.	1-3	New Hampshire QSO Party
	Feb.	8-9	QCWA CW QSO Party
	Feb.	8-9	YL-OM Phone Contest
	Feb.	8-9	YL-ISSB Phone Contest
	Feb.	8-9	Dutch "PACC" Contest
	Feb.	15-16	ARRL DX CW Contest
	Feb.	**21-23**	**CQ WW 160 M SSB Contest**
	Feb.	22-23	French Phone Contest
	Feb.	22-23	YL-OM CW Contest
	Mar.	1-2	ARRL DX Phone Contest
	Mar.	8-9	QCWA Phone QSO Party
	Mar.	8-9	RSGB Commonwealth
	Mar.	15-16	YL-ISSB CW Party
	Mar.	15-16	Bermuda Contest
	Mar.	**29-30**	**CQ WW WPX SSB Contest**

* *Covered last month.*

It is always a difficult chore to report a Silent Key, especially when it is for a personal friend. Tom Peruzzi, W4BVV, died on October 5th after a 10-month bout with acute leukemia. Tom was a long-time member of the PVRC, and his multi-multi station contributed many big scores to the PVRC's Championship years.

He had recently moved to a new location and was in the process of putting up a 100 foot tower. In spite of his failing health he completed the job just three days before the diagnosis of his health problem.

Tom was also a long-time sponsor of the World-Wide European Trophy. His wife, Sherry, wishes to continue this award as a W4BVV Memorial. Her wishes are being honored. Final arrangements are being worked out and will be given in this column when completed.

Rest in peace, good friend. Your big signal will be missed come contest time.

Deadline for the April issue is January 15th, and February 15th for the May issue.

73 for this time, Frank, W1WY

ARRL Midnight Special

0400Z to 0600Z Sun., Jan. 5
(11 p.m. to 1 a.m. EST Sat., Jan. 4)

This is a new 80 meter shorty. The first hour will be on CW (3540–3570 kHz) and the second hour will be on phone (3855–3895 kHz).

The exchange is also short, a 3-digit QSO number starting with 001 and your name.

Each station may be worked once on each mode.

Final score, total number of contacts. No multiplier. Scores will be listed in *QST*.

Send your entry to the ARRL, Newington, CT by February 3rd.

ARRL VHF Sweepstakes

1900Z Sat. to 0400Z Mon., Jan. 11–13

This is the 39th ARRL January VHF Sweepstakes. ARRL Headquarters recommends that you use the official log forms. It will make your log keeping and the scoring much easier. A large SASE to Newington will get you the necessary forms.

Complete rules will be found in the December issue of *QST*. They are a bit complicated, so look them over carefully.

Michigan QRP Club CW Contest

1500Z Sat. to 1500Z Sun., Jan. 11–12

This is the sixth annual QRP contest sponsored by the Michigan QRP Club. It's a CW only on all six bands, 10–160 meters.

Each station will be competing with own state, province, or DX country in one of the following categories:

1. One (1) watt or less output.
2. Five (5) watts or less output.
3. Over five (5) watts output.

Exchange: RST and QTH. Sstate or province for W/VE's, country for DX, and power output.

Scoring: Each contact is worth one (1) QSO point. Multiply total QSO points by number of states, provinces, and DX countries worked on each band.

There is a bonus multiplier of 1.5 for stations using emergency power (natural or battery).

Awards: Certificates to the top-scoring station in each state, province, and DX country.

Use a separate log sheet for each band, and include a summary sheet showing the scoring per band, equipment used, and power output. Also include the usual signed declaration and your name and address in block letters.

Here's Ron Moorefield, W8ILC; Tony England, WØORE, second radio amateur to operate in space during the Shuttle Challenger flight last July; and Bernie Welch, W8IMZ, CQ's Contest Advisor at the ARRL National Convention in Louisville, KY last October. Do you suppose Bernie and Ron are trying to convince Tony that he should suggest that NASA schedule his next space flight during a CQ World-Wide Contest? Wonder how we would classify his Country/Zone status.

Logs must be received no later than six weeks after the end of the contest by Chris Hethorn, KM8X, 6818 Meese Drive, Lansing, MI 48910. Include an SASE (or 2 IRC's) if results are desired.

Rat's Nest and Crooked Stick Sprint

2300Z Sat. to 0400Z Sun., Jan. 18–19

The Issaquah Amateur Radio Club of Bellevue, Washington is sponsoring this unusual contest with a funny name. A review of the rules will verify how it got its name.

Requirements are that you use a homebrew wire antenna in any configuration as long as it includes the use of a crooked stick for a support. *(Wonder if a crooked tree qualifies?—ed.)*

Exchange: Name, QTH, and type of antenna. Club members will indicate their membership.

Scoring: CW contacts 5 points, SSB 2 points. The multiplier is determined by the number of states, provinces, and countries worked, ×2 (?).

Bonus: To encourage "Elmering" and participation by new individuals and old-timers alike, the following bonus has been established: contacts made with apprentice's assistance +2 points; contacts made by apprentice +5 points. Minor coaching allowed.

(I'm a bit confused, so the above rules are quoted verbatim.—ed.)

Frequencies: CW—7050–7150 MHz. SSB—7225–7300 MHz. Maximum of 250 watts input.

Awards: Issued in six different categories—(A) Best using a rat's nest antenna; (B) Best Novice/Tech.; (C) Best Elmer; (D) Best CW; (E) Best SSB; (F) "Rat Catchers" certificate if you contact three or more club members. (Club members must indicate their membership.)

Include a summary sheet with your entry showing the scoring, plus description of antenna and equipment used. Indicate your contacts with IARC members.

Submit your log no later than February 1st to: Issaquah ARC, c/o Steve Pack, WB7VAS, 4609 158th Ave. SE, Bellevue, WA 98006.

Hungarian CW Contest

2200Z Sat. to 2200Z Sun., Jan. 18–19

This is an annual affair organized by the Hungarian Radioamateur Society to promote better relations between HA's and amateurs in other countries.

Classes: Single operator, both single and all band, and multi-operator all band (club stations).

Exchange: RST and QSO contact number starting with 001. HA stations will also add two letters to identify their county. There are 20 counties: BA, BE, BP, BN, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA.

Points: Contacts with HA stations count 6 points. With other stations outside own continent, 3 points. Same station may be worked on each band for QSO points.

Multiplier: Each different HA county worked on each band.

Score: Total QSO points from all bands times the sum of the multipliers from each band.

Frequencies: 3500–3590, 7000–7035, 14000–14090, 21000–21090, 28000–28090 kHz.

Awards: Certificates to the top scorers in each class in each country. Additional awards if returns justify.

Use a separate log sheet for each band and include a summary sheet showing the scoring, etc. The usual signed declaration is also requested.

Mail your entry within six weeks from the end of the contest to Hungarian Radioamateur Society, Contest Bureau, P.O. Box 86, H-1581 Budapest, Hungary.

AGCW-DL QRP CW Contest

1500Z Sat. to 1500Z Sun., Jan. 18–19

This is the winter edition of this QRP contest organized by the AGCW-DL. It's a CW only on all 6 bands, 10–160 meters. The same station can be worked on each band for QSO and multiplier credit.

There are five classes as follows:

A. Single Op.—3.5 watts or less.
B. Single Op.—10 watts or less.
C. Multi-Op.—10 watts or less.
D. QRO stations, over 10 watts.
E. SWL's.

Multi-operator stations may operate the full 24 hours. All other classes must take a 9-hour break.

Exchange: RST, QSO no., and power input. Add × if transmitter is crystal controlled (559001/5×, QRO stations 579002/QRO).

No - 75 - 76

Points: QSO with own country, 1 point. Other countries own continent, 2 points. DX outside own continent, 3 points. Crystal-controlled stations are limited to 3 crystals for each band, and take double above points.

Multiplier: One for each country and one for each DX contact. For scoring purposes call areas in JA, PY, VE, VK, W/K, and ZS are counted as multipliers.

Final Score: Total QSO points times the multiplier on that band. Add the sum of scores from each band.

Awards: Certificates to the first three places in each class on each band. Use a separate log for each band.

All entries must be received no later than six weeks after the end of the contest. Include 1 IRC for copy of results.

Entries go to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Republic of Germany.

White Rose SWL LF Contest

1200Z Sat. to 1200Z Sun., Jan. 18–19

Very few DX contests have an SWL category. Here is one for SWL's only sponsored by the White Rose Radio Society of England.

You can use up to 18 hours out of the 24-hour contest period, but be sure to indicate times off in your log.

There are two separate sections, phone and CW, no mixed mode entries. Only the three LF bands—1.8, 3.5, and 7 MHz—may be used.

Points may be claimed only for stations heard in contact with another station. Both stations may be logged, but the practice of logging a series of QSO's made by one station is not allowed. Logs must not include the same call in the "station worked" column more than 10 times on each band. A station appearing in the "worked" column can only be claimed once for scoring.

Score 1 point for each station heard on each band from one's own continent, and 5 points if station is in another continent. Multiply total points by the number of different countries heard on each band. Add the total of the three bands for final score.

The ARRL country list is the standard. In addition, each call area in the U.S., Canada, Australia, and New Zealand will be considered a separate multiplier.

Show date and times in GMT, band, station heard, station being worked, and signal report. Points may only be claimed for stations actually heard. If points are claimed for both stations, both calls must appear in the "station heard" column.

Certificates of Merit will be awarded at the discretion of the Society.

Entries must be received no later than February 24th and go to Contest Manager, John Hart, G3ZGA, White Rose ARS, 146 Street Lane, Leeds LS8 2AD, England.

North Dakota QSO Party

0000–0800Z & 1600–2400Z Sat., Jan. 18
0800–1600Z Sun., Jan. 19

Sponsored by the Red River Radio Amateurs of Fargo, North Dakota, this one will make one of the rarer states available for WAS and County Hunters.

The same station may be worked once on each band and each mode.

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

Scoring: Count 10 points for phone QSO's, 20 points for CW, and 50 points for RTTY. ND stations add 250 bonus points for working 5 Novices.

Final Score: ND stations multiply total QSO points from all bands by sum of states, provinces, and countries worked per band and mode. Others multiply by total number of ND counties worked (maximum of 53).

Frequencies: CW—1810, 3540, and 35 kHz up from edges on other bands. Phone—1810, 3905, 7280, 14295, 21380, 28500. Novice—25 kHz up from edges of Novice bands.

Awards: None mentioned, but include a large SASE with your entry for a copy of the results to see if you won anything.

Mail logs by February 28th to Mike Beaton, KD0A, 2267 Flickertail Drive, Fargo, ND 58103.

CQ WW DX 160 Meter Contest

CW: Jan. 24–26 SSB: Feb. 21–23
2200Z Friday to 1600Z Sunday

Since this year's announcement was prematurely published in the October issue, a brief summary of the rules might be helpful.

Essentially, the rules are the same as those used in previous years. However, the penalties listed last year for making on-frequency contacts in the "DX window" were not included. We are still very critical of those abusing this long-standing and recognized "gentlemen's agreement."

Classes: Both single and multi-operator.

Exchange: RS(T) and QTH. State for U.S., province or call area for Canada. Not necessary for DX to spell out their country, but it is recommended that only standard prefixes be used in their call.

Scoring: Contacts with stations within own country 2 points, with other countries but same continent 5 points, with other continents 10 points.

Multiplier: Each U.S. state (48), each Canadian area (13), and each DX country.

Awards: Certificates to top-scoring station in each state, VE area, and DX country in both classes. The trophy awards list has not been completed, but will be announced in this column when it is completed.

The disqualification clause for excessive duplicate contacts and other violations is still very much in effect.

Include a summary sheet with your entry showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

Mailing deadline for CW entries is February 28th, and March 31st for the SSB section. Logs can be sent directly to the 160 Contest Director, Don McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904. They, of course, can always be sent to *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. *(Please indicate CW or SSB on the envelope.)*

French DX Contest

CW: Jan. 25–26 SSB: Feb. 22–23
0600Z Saturday to 1800Z Sunday

This year's announcement from the REF showed no change from last year's format. It's still the world working the French Europeans as well as the other French departments and territories all over the world. The French areas can usually be identified by the letter "F" in the prefix.

Classes: Single operator and multi-operator. Multi stations must remain on the same band at least 15 minutes.

Exchange: RS(T) plus a 3-figure QSO number starting with 001. French stations will also include two figures or letters identifying their department.

Points: One point per contact between stations in the same continent, 3 points if with other continents.

Multiplier: Each French European department (95) and each overseas department and territory worked. Also DA1 and DA2 French Army, 2A and 2B Corsica, and the Club station F6REF.

Final Score: Total QSO points from all five bands (3.5–28 MHz) times the sum of the multipliers from each band.

Awards: Certificates to the top scorers in each country. European single operator must make at least 100 QSOs; multi-operators 250 QSOs. All other areas 50 QSOs for single operator, 100 QSOs for multi-operator.

Stations making over 250 contacts must include a dupe check list with their log. The usual disqualification rules for excessive duplicate contacts and other violations will be strictly enforced.

All entries must be postmarked no later than March 15th for CW and April 15th for SSB. This year they go to The REF Contest Committee, Att: Lucien Aubry, F8TM, 53 Rue Marceau, 91120 Palaiseau, France.

(Of the 286 CW and 121 phone overseas logs received in the 1985 contest, the following were the only North American entries. CW: W1BWS 37548 points, KA1DWX 12432, W3ARK 5550, K5ZP 686, WA3JXW 240, W1OPJ 126, KB0YK 8, HI0A 7744, HP1XKR 2160, TI4BGA 2262. Phone: W3ARK 1152, VE1NG 17640, VE2AFC 324.)

New Hampshire QSO Party

1900Z Sat. to 0700Z Sun., Feb. 1–2
1400Z Sun. to 0200Z Mon., Feb. 2–3

The New Hampshire ARA is again sponsoring this year's party.

The same station may be worked on each band and each mode for QSO points, but the multiplier is counted once only. NH-to-NH contacts are permitted for QSO credit.

Exchange: RS(T) and QTH. County for NH stations; ARRL section or DX country for others.

Scoring: One point per QSO for NH stations. Multiply total by sum of ARRL sections + NH counties + DX countries worked. (Excluding NH section. US and Canada not countries. KH6 and KL7 count as countries.) Others count 5 points for each NH contact. Multiply total by number of NH counties worked (maximum of 10).

NH counties: BP, CL, CE, CS, GN, HO, MK, RM, SD, SN.

There is an additional bonus of 20 points for all stations working club member stations WB1CAG, W1OC, WB1FFZ, K1RD, W1WQM, N1BYQ, KB1HJ, and K0UNJ (a maximum of 160 bonus points).

Frequencies: CW—1810, 3559, 7055, 14055, 21055, 28055. Phone—1875, 3935, 7235, 14280, 21380, 28580, 50115, 144205. Novice—3730, 7130, 21130, 28130.

Awards: Certificates to the top scorers in each NH county, each ARRL section, and each DX country (minimum 5 QSOs).

The Concord Brasspounders are awarding a plaque to the top scorer in New Hampshire. Also, W1JB is awarding the All NH Award to all participants working all 10 NH counties.

Mailing deadline for logs is March 25th to Mount Moriah Repeater Assn., c/o Bud Valcourt, N1BYQ, 19 Teague Drive, Salem, NH 03079.

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DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

The wind passeth over it,
And it is gone,
And DXers thereof shall know it no more.
Deleted!

While most DXers suspect there is always a basic logic to the ways of DXing and the simple rules guiding the great endeavors, there are times when some ask, "Why?" It was not long ago that one of the Locals came up the hill one afternoon through a year-end storm to again ask the question. This one came to learn.

"Tell me about these deleted countries," he said, and the field of his inquiry was marked. "How come they take them away from me once I have earned them? And why, when I check the June Honor Roll listing, do I see those numbers still behind DXers on the Honor Roll? There are some there as high as 367. With only 315 countries on the current DXCC Country list, is there a plan to reduce the number of DXCC countries? Is there something that I don't know about?"

Something he did not know about? Everyone knows that DXers know everything, and some more so. The feeling was that this one knew about all of this but perhaps did not understand. Wisdom usually comes with age—that and a listing on the Honor Roll. And it is the old DXers with those big numbers after their calls on the Honor Roll listing. But that is the way it has always been.

"No," we replied, "there is no plan to reduce the number of DXCC countries. And no, they don't take countries away from you once you have worked them. The glory is yours forever. They are deleted from the country list. They may not count for the Honor Roll, but they will be in your DXCC total always." When the Local started nodding his head at all of this, we felt that he was understanding. As it sometimes happens, we were a bit ahead of ourselves.

"Well, that sounds good," the Local said. "I was thinking that if I have those deleted countries taken off my total, I would have problems with the Honor Roll. But if I keep them always, there should be no problem. I'll just work them and keep them. And that's the way things should always be in DXing, right?"

Not quite. We had to again note that deleted countries do not count for the Honor Roll listing, but that the biggest worry comes when you do make the Hon-

77 Coleman Dr., San Rafael, CA 94901

Those who have get, and Billy Williams, N4UF, shows the award given to him by the North Florida Amateur Radio Society. N4UF has handled the CQ DX Awards Program for a good number of years. At conventions and gatherings you will recognize him easily behind that CQ logo. If you want more information on the CQ DX Program just check elsewhere in this column. N4UF is there every month.

or Roll and cling to the lower edge by a mere country or so. The joy of attaining the exalted realm is dulled by the apprehension that comes in the long hours of the night when a DXer must worry if he will be bumped from the Honor Roll by a deletion. With a number of the current countries not available and hardly expected to be in the foreseeable future, a low standing on the Honor Roll can be more worrisome than a receding hairline to a maturing DXer. One needs a cushion and there are none available. But the Local was ready with a question sometimes asked: "Why delete at all? And, if you have to delete, why not just wipe things clean? Delete a deletion from everything!"

We had to take things one at a time. "Countries are deleted more often than not because there has been a change in the sovereignty of an area. Some of those deleted were colonial areas. They are deleted under one designation or callsign and show immediately under another. Some were disputed territory, this showing frequently after WW II. But when the dispute was settled, so was the fate of the DXCC country. Countries disappearing to show under another DXCC credit include Malaysia, which is now 9M2, but was also 9M2 before independence and overnight went to a deleted status for contacts up to a certain date and to a new country for contacts after a certain date. Others such as Trieste and Saar, disputed after WW II, were absorbed into another country. Then again, a restudy of criteria showed that an area once credited might not really qualify for country status. Things like that." If the Local was not yet understanding, it was obvious that he was thinking. "And why not delete them completely?" he said, prodding us to further explanations. We had to try.

"Years back," we had to admit, "we were asking the same question ourselves. Delete a country and it should be wiped clean. But there would be a terrific bookkeeping problem, and it actually is only pertinent to the Honor Roll. Elsewhere all it means is another sticker for your certificate, and once you have countries you keep them. The Honor Roll started out by counting everything, current and deleted countries, but along the way and after a number of years it was realized that including deleted countries was affecting the qualification for the Honor Roll. So in April 1962 when there were only 46 callsigns on the mixed Honor Roll and 15 on the phone roster, the rules were changed so that deleted countries no longer counted for the Honor Roll, though the total current and deleted countries continued to be noted for those on the Honor Roll. Back then, because of the small numbers two were removed from the mixed Honor Roll roster and three new ones were added. In the phone listings it resulted in one new callsign being added. In April 1962 PY2CK was atop the Honor Roll with 306 countries; 23 years later he still is in the top of the current countries with 315 of the current and 364 combined. In the last Honor Roll listing W1GKK has the biggest combined total of current and deleted countries; back in 1962 he was stuck at 304 with 9 other calls between him and the top. Now George leads the pack. Think of that!"

The Local was thinking. More than once it has been heard said that longevity is a factor in DXing, that the top DXers are the old DXers. Some qualify this by saying that the old DXers have the biggest total of countries only because they have DXed so long. But one must face the inevitable truth in that the country total is always a significant factor in DXing. The more countries you work, some say, the better DXer you are. Some, naturally, have some reservations about this, noting that no true-blue DXer, no matter what his total, is ever heard calling "CQ DX." But the Honor Roll is always the ulti-

The WPX Program

Mixed

1180	N7AIH	1183	VE7EDA
1181	JA4EPE	1184	SV1PL
1182	KØIYF		

S.S.B.

1762	VU2JPN	1765	W9GMV
1763	DL7ABZ	1766	YB2BOT
1764	N4DIT		

CW

2335	W3GXK	2337	SMØCCE
2336	JJ1EMA		

Endorsements

Mixed: 450 N7AIH, KØIYF, SV1PL. 500 W3KHQ, SV1PL. 550 AA4LB, W3KHQ, SV1PL. 600 W3KHQ, SV1PL. 650 WI4K, W3KHQ, SV1PL. 700 WI4K, SV1PL. 750 WI4K, SV1PL. 800 WI4K, KX1A, SV1PL. 850 WI4K. 1050 W6OUL. 1100 YU2CQ, W6OUL. 1150 K2OLG, YU2CQ, W6OUL. 1200 W6OUL. 1250 W6OUL. 2200 W4BQY.

S.S.B.: 350 CP8IH, W6YLJ. 400 CP8IH, ZS6BCR. 450 NE8Q, CP8IH, KS3F. 500 AC3T. 550 AC3T. 650 WI4K. 700 WI4K. 750 WI4K, K3IXD. 800 WI4K. 850 WI4K, IØSGF. 900 IØSGF. 1050 I1HAG. 1100 AC2J. 1300 WA1JMP. 1550 W4BQY.

C.W.: 350 SMØCCE. 400 SMØCCE. 450 VE2PT, SMØCCE, KD2KL. 500 VE2PT, SMØCCE. 550 SMØCCE. 600 SMØCCE, ZS6BCR. 650 VE4AEX, SMØCCE. 700 W9PWM, SMØCCE. 750 YU2CQ, WA2CNF, SMØCCE, SM5DAC. 800 SMØCCE. 850 SMØCCE. 900 W9NO, SMØCCE. 950 SMØCCE. 1000 W1DMD, SMØCCE. 1050 SMØCCE, IT9VDQ. 1100 SMØCCE, ISØFPH. 1150 SMØCCE, ISØFPH. 1200 SMØCCE. 1250 SMØCCE. 1300 SMØCCE. 1350 SMØCCE. 1400 SMØCCE. 1450 SMØCCE. 1500 SMØCCE. 1800 W4BQY.

10 meters:	PY2DBU, SMØCCE, ZS6BCR.
15 meters:	PY2DBU, SMØCCE, ZS6BCR.
20 meters:	SMØCCE, PY2DBU.
40 meters:	SMØCCE.
80 meters:	SMØCCE.
Asia:	IV3PVD, PY2DBU, SMØCCE, ZS6BCR.
Africa:	W6OUL, SMØCCE, ZS6BCR.
No. America:	N7AIT, VE4AEX, SMØCCE, ZS6BCR.
So. America:	W6OUL, PY2DBU, SMØCCE.
Europe:	IV3PVD, VE4AEX, SMØCCE.
Oceania:	SMØCCE.

Award of Excellence I8YRK

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Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

mate achievement to most DXers. Reach that goal and your call will be forever engraved in granite, or so some believe. But we can remember some old DXers saying that that is just the way things should be. "Old DXers are at the top because they worked to get there" is the explanation often given. When it is noted that younger DXers have a number of entrenched hurdles to clear, the advice is heard: "Let 'em earn it like we did!" We are still grappling with that argument. Sometimes it is suspected that the closer you are to the 315 current country mark, the easier it is to understand it. But right then we were still trying to understand the questions of the Local.

Bobby Martin, VP2MO, at his operating position on the Island of Monserrat, British West Indies. (Photo by KG6IP)

"Okay," he said after listening to all of our explanations, "so George De Grenier, W1GKK, has the big totals. But how does a DXer like myself ever hope to work them all? That's what bothers me!"

Frankly, one does not. Times change, the criteria change, and what was yesterday's DX is gone forever. Probably no one will work them all. "The present DXCC started afresh after WW II," we said, "and the first deleted country came in 1949 and Newfoundland-Labrador was deleted. Thus, one would have to have been a journeyman DXer prior to that first deletion to have any hope of working them all, deletions and everything else. But maybe that wouldn't have been enough." We knew that it would be hard to have worked every possible DXCC country because we had to remember Wrangel Island. The Local was waiting for our explanation to continue.

"Back in September 1960," we continued, "there was a notice that Wrangel was being deleted from the DXCC Country list. The notice said that since Wrangel Island met none of the DXCC country criteria, it was being dropped. However, the notice also mentioned that since no one had ever worked Wrangel Island, no one's DXCC totals would be affected. What do you think of that?"

The Local was shaking his head. "So that's why some say no one will ever be able to say they worked them all. But do you think that that will ever happen again?"

Possibly not. But always there will be something to draw a DXer's attention, and we just had to drop one on the Local. "Maybe not. But how about deleting a whole band from DXCC?" We had him nailed for sure.

"Never," he stoutly retorted. "While I haven't read all the rules for some years, I do recall that a contact in an authorized amateur band is all that is required." But hardly had he said this when he paused, the question clear on his face.

"You mean? . . ." he said. "Get a new DXCC list," we advised, and that was the way it went. Sometimes there are things to be learned on the 10 MHz band. We were sure that he would.

There were other things that this one was thinking about, mostly about DX. Finally he said, "I used to think that the DXCC list was something that never changed, but I am learning differently." We had to agree with him, for the original criteria after WW II took a year or so to develop, and there have been changes over the years. "The big problem with the DXCC to some," we had to note, "is that they want to judge the list and the criteria in the context of the present and fail to remember that it has almost 40 years of development and change worked into it. What you have now is what you are going to have to work with. It changes, but slowly." We were thinking that having come to this point, the Local was about through with his questions. He still had one more.

"If all of this is true and one is a young DXer or wants to be one," the Local continued, "what can you do to make sure that you get to the top of the DXCC list? Certainly there must be a way."

Maybe there is and maybe there are a lot who would find that way. Maybe even we could help him on the way.

"Check the last listing of the Honor Roll," we advised, "and you will find a K6JG listed at 315/341. A bit further down you will find a WA6OET listed at 315/340. Check the Callbook and you will find them at the same QTH—Pete and Jessie Billon. What do you think of that?"

The Local was bugged-eyed at the thought. "You mean? . . ." he said. "That's right!" we replied. When it comes to DXing those OM/YL teams are unbeatable. Sometimes we wonder why this is never mentioned at Novice classes and such places. But then again, there are some things about DXing which must be learned. Alert DXers do before the

The WAZ Program

10 Meter Phone

303 N4BAA

20 Meter CW

234 N5CJQ

80 Meter CW

5 SM5AKT

All Band WAZ

S.S.B.

2983	EA8AFS	2986	AD8W
2984	DL3ML	2987	JA4AFK
2985	5B4MF	2988	W6CZY

C.W. and Phone

5910	JH3CBN	5912	DL5GGA
5911	AD8W	5913	DJ9RR

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

Standings as of October 1, 1985

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4. AA6AA	40. OH3YI	76. DL8MAG
5. W8AH	41. I4RYC	77. OK3DG
6. W6KUT	42. ZL1BIL	78. ZL1BOQ
7. EA8AK	43. I4EAT	79. EA9IE
8. LA7JO	44. ZL1BQD	80. DL7HZ
9. EA3SF	45. TG9NX	81. DJ9RQ
10. OH1XX	46. XE1J	82. EA5SP
11. EA8OZ	47. F5VU	83. EA2IA
12. W0SD	48. W3AP	84. SP3BQD
13. K0ZZ	49. YO3AC	85. LZ1NG
14. ON6OS	50. K3TW	86. N4JF
15. OK3TCA	51. XE1OX	87. CT2AK
16. K6SSS	52. VE7IG	88. HB9CIP
17. ZL3GQ	53. OK1ADM	89. OK1MG
18. OK3CGP	54. CT1FL	90. CT4BD
19. SM0AJU	55. WA1AER	91. VK6HD
20. OZ3PZ	56. N4RR	92. EA6ET
21. I3MAU	57. UW0MF	93. VK3QI
22. I2ZGC	58. W4DR	94. LZ2DF
23. 4Z4DX	59. OK1MP	95. ON4QX
24. N4KE	60. W1NW	96. SM0DJC
25. K5UR	61. OE1ZJ	97. CT3BM
26. K9AJ	62. HB9AHL	98. K2TQC
27. SM3EVR	63. HB9AMO	99. EA8XS
28. LA5YJ	64. LA6OT	100. HA9RE
29. DL3RK	65. UR2QD	101. SM4CTT
30. N4WJ	66. UK2RDX	102. A71AD
31. G3MCS	67. ZS5LB	103. LZ2CC
32. SM5AQD	68. F6DZU	104. SM5CLE
33. W0MLY	69. DL4YAH	105. LZ1HA
34. I0RIZ	70. LA7ZO	106. SM5AKT
35. ON5NT	71. W9ZR	107. CT4NH
36. OH6JW	72. W1NG	108. ZL4BO

The top 12 contenders for 5 Band WAZ are:

1. DK5AD, 199	7. LA9GV, 198
2. JA1BWA, 199	8. W6GO, 198
3. JA3EMU, 199	9. W4CEB, 198
4. N4WW, 199	10. W2YY, 198
5. K6YRA, 199	11. G3GIQ, 198
6. W8UVZ, 199	12. K7UR, 198

343 Stations have attained the 150 zone level

magic hour is gone—along with the deleted countries.

The WPX Program

Norm Koch, K6ZDL, who handles the WPX program, notes that the WPX Honor Roll files are all in the great computer and the coverage is down to those with 1000 prefixes to their credit. In the future, once a WPX activist reaches the threshold of a thousand prefixes, into the computer the file goes.

The computer listings are a big step forward. Previously the files were in each applicant's own, distinctive, and sometimes almost undecipherable handwriting. Now it is neat and clean, and duplicates have been identified and weeded out. Duplicates? More than one instance of over a hundred dupes was uncovered in the computer printouts.

Norm notes an influx of claims for European VHF calls. These include DA4, DB, DC, DD, DG, and EB prefixes. The DARC and the EA-license authorities indicate that these are VHF calls and no WPX can be gained from them. WPX has always been an HF operation.

Richard Danine, TR8DR, on the left, points with pride to a QSL valued by many DXers—a true-blue TN8EE QSL delivered by the call holder himself. TR8DR is on the left, TN8EE is in the center, and on the right TR8JLD is there to certify that the card is true-blue. This was taken in front of the TR8DR country estate in downtown Libreville at the Central Africa Hamfest last August. (TR8DR photo)

In these days of declining sunspots and the long wait for the bottom of the cycle, WPX can provide a lot of action. Considering that there is a vast horde of prefixes out there, and more all the time, you will never run out of WPX prefixes to work. That's for sure.

Albania

While ZA stations are being heard, often drawing a lot of attention and things like that, there are many who are skeptical about just about everyone who shows. ZA1AS was on a couple of months back, an EA3 taking a list to work him.

From downtown Molndal SM6FLL and SM5DXL write to pass on what they have learned from their own cultural contacts with that needed country. Stefan and Ullmar write: "We consider DXpeditions to Albania unrealistic, both due to the general policy and outlook of the Albanian government and due to the specific conditions in the area at present.

"Albania takes pride in her independence and foreign attempts to 'enforce' ham radio may only lead to suspicion. National amateur radio exists in Albania but not in the regular amateur bands. Recently a big national competition was held and the results announced in the daily press.

"Most likely, at least after a release in the tension existing in the Balkan area, ZA callsigns will be heard in the international ham bands. Until official notice is given, there is good reason to consider all 'ZA' callsigns *NO GOOD*.

"Our point of view is based on our cultural contacts with Albania.—Stefan, SM6FLL, and Ullmar, SM5DXL.

The Pribilofs

When the matter of country status for the Pribilofs got to the ARRL Awards Committee, it was flatly turned down—and unanimously. The vote was seven to zero against country status. The decision was based on an interpretation of Rule 2(a) of the DXCC Country criteria, and possibly even on some questions of semantics. Anyhow, the pertinent portion of the ARRL announcement in this matter went:

"In reviewing Rule 2(a) of the Countries List Criteria, the Awards Committee concluded that the first sentence was operative in making measurements: 'Islands situated off-shore from their governing area must be geographically separated by a minimum of 225 miles of open water.' Since the Aleutian Islands are indeed a part of the 'governing area' of Alaska, and since the Pribilofs are less than 225 miles from the Aleutians, the Committee failed to see how they would qualify for separate status. The Committee further determined, through examination of precedent and evolution of the wording of the criteria over some 40 years of the DXCC, that the 'mainland' reference in 2(a) only pertains to what situations the rule applies."

The contention of the Alaska DX Group seeking country status for the Pribilofs was that the distance should be measured from the mainland, and not an off-shore island. In the above, the distance apparently was measured from Unalaska in the Aleutians. In the July meeting of the ARRL Board of Directors the matter was taken directly to the board by the DX Advisory Committee, thus by-passing the Awards Committee. The board tabled the motion to accept the affirmative recommendation of the DXAC, and in view of the action of the Awards Committee, the outlook for action at the January meeting later this month must be considered as not hopeful. It may be interesting to note the future activity of the Alaskan group, they having devoted a couple of years to a well-organized, articulate, and heavily researched program to gain country status for the Pribilofs.

VE DX Report

Most newly minted DXers sense it. Oldtimer DXers are sure of it. DXers are always part of the whole and to lose any part is a regret. In August Alan Leith, VE3FRA, the longtime publisher of the "DX Report," announced that job responsibilities necessitated his ending the publication of that DX bulletin.

Modeled after the long-established "DX News Sheet" founded by Geoff Watts and now published by RSGB, the "DX Report" gave a brief, concise, but comprehensive review of DX activity. The August 27th issue was the 120th and last edition of the bulletin. VE3FRA in the last issue announced that "QRZ DX" published by Bob Winn, W5KNE, would fill out any remaining subscriptions to the "DX Report."

Many DXers believe that the DX bulletins are a basic part of DXing. Fresh, relevant, and complete DX information is always needed, and though many may never actually subscribe to a bulletin, the information disseminated shows up in many places and from many relays. They are part of the whole picture of DXing. No DXer nor any DX bulletin ever disappears from the scene without the feeling of loss. The "DX Report" was highly considered by many and it will be missed.

FCC Preemptive Strike

For a number of months last year the FCC had the ARRL petition for declaratory relief for amateurs from local antenna ordinances. In late fall the FCC made a ruling which, while not going all out for the across-the-board preemption that had been asked, did declare that local regulations which preclude amateur radio communications are in direct conflict with fed-

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 315. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is $1.00.

C.W.

ON4QX	316	K6EC	312	AB4H	304	WD9IIX	294	K7ZR	280
W9DWQ	316	W6ID	311	SM6CST	304	W9RY	293	I5XIM	280
W6PT	316	W4BQY	310	WØIZ	303	N5DX	291	W2LZX	280
K4CEB	316	DL3RK	310	WA8DXA	302	I3OBO	290	K1VHS	280
N4JF	316	K4XO	309	YU2TW	301	WA4JTI	290	HB9AFI	279
K9MM	315	AA6AA	309	EA2IA	301	W1WLW	289	W6YQ	279
N4PN	315	N4MM	308	SM3EVR	300	W4BV	289	WA4DAN	278
DL7AA	314	W9BW	308	W6SN	300	WA2HZR	286	WB4RUA	277
W3GRS	314	K1MEM	308	WØSR	299	K8LJG	284	DL1QT	277
W8KPL	314	W4OEL	307	K3FN	298	WD9IIC	284	G2GM	276
K6LER	314	W1NG	306	W7GNL	298	N8MC	284	NN4Q	276
N6AV	313	OK1MP	306	DJ7CX	297	WØHZ	283	KA3R	276
K6JG	313	K9QVB	306	K3UA	295	K8PYD	281	K4SE	275
N6CW	313	N4KG	305	K9IW	294	JH1VRQ	281	K4CXY	275

S.S.B.

K2FL	316	I8YRK	312	XE1J	304	EA9IE	298	KE4HX	285
W4EEE	316	WØSD	312	WB1DQC	304	XE1NI	298	KC8EU	284
K6WR	316	K9RF	312	W6SN	304	HP1JC	297	KB5RF	284
W4UG	316	K8LJG	312	KM6B	304	K5DUT	297	N8BKF	284
W6EUF	316	K4MQG	312	WD8MGQ	304	NA5W	297	W9NUF	284
VE3MR	316	N4MM	312	VE7HP	304	K4CXY	296	VE3DLR	284
DL9OH	316	I2LLD	312	XE1KS	303	YU7KV	296	AG9S	284
N4JF	316	VE7WJ	312	W2LZX	303	KE3A	296	WB3HAZ	283
IØZV	316	W9SS	312	KR9O	303	WZ4I	296	WD8PUG	283
KD8VM	316	N2SS	312	KU9I	303	WB3GPR	296	VE3MV	283
IØAMU	316	N7RO	312	IØMBX	303	I8ACB	295	IN3ANE	283
F9RM	316	LA7JO	312	KB8DB	303	I3OBO	295	KI3L	283
KS2I	316	K6EC	311	W6NLG	303	WA9PWN	295	AE5B	282
W3GRS	315	W4SSU	311	K1MEM	302	K7LAY	295	CT1UA	282
VE3MJ	315	I4LCK	311	N5FG	302	WØIYR	295	KC8YM	282
I8AA	315	LU3YL	311	W6FET	302	KQ9W	295	AI9R	282
4Z4DX	315	W8PCA	311	W2FGY	302	KKØC	295	TG9EP	282
W9DWQ	315	K9BWQ	311	K9HQM	302	W4BQY	295	I1POR	281
W9JT	315	YU1DZ	311	KV2S	302	I8ZTE	294	KD5ZM	281
ZL1AGO	315	K6XP	310	WA4DAN	302	NN4Q	294	W5LLU	281
W4NKI	315	OE2EGL	310	K9IW	302	WDØBNC	294	K9TI	280
VE2WY	315	DK2BL	310	K9UAA	302	I5BDE	294	N5FW	280
K6YRA	315	K4XO	310	NJ2C	302	IØSGF	294	ZL1BOQ	280
W3AZD	315	IV3YRN	310	VE3FJE	301	K4SE	293	G4FAM	280
XE1AE	315	AA6AA	310	WB4NDX	301	KC8JH	293	KA8T	279
VE3GMT	315	N6OC	310	WA3HUP	301	AI5I	293	KB5DN	279
ZL3NS	315	VE3GCO	309	K8CMO	301	KB3OQ	293	EA3KW	279
EA2IA	315	DL6KG	309	W8ILC/QRPp	301	WA4LOF	292	EA6DE	279
YV1KZ	315	N4PN	309	AI8S	301	ACØA	292	W9OKL	279
DJ9ZB	315	K1UO	309	W1LQQ	301	I2MOP	292	JH8NYK	279
W4DPS	315	W8JXM	309	W9RY	301	VE3FEA	292	KX5V	279
I4ZSQ	315	9H4G	309	YU2TW	301	VP9CP	292	AI8M	278
I8KDB	314	W1NG	308	W4UNP	301	W8LKG	292	K4BYK	278
N4WF	314	VK4VC	308	N4CRU	301	XE1OW	292	I5EFO	278
OZ3SK	314	YV5AIP	308	W4OHZ	300	W6BCQ	292	VE3IUE	278
K9MM	314	ZL1BIL	308	I5EFO	300	VE3IPR	291	K3LUE	278
YV5DFI	314	N6AV	308	W8IMZ	300	N5AWS	291	KB3KV	278
K6JG	314	WA4JTI	308	K9QVB	300	WB6GFJ	291	WA2FKF	278
CT1FL	314	W2CC	308	KB5FU	300	W4JFE	291	KB8O	277
OZ5EV	314	N4KG	308	KB9KD	300	K1VHS	291	WBØUFL	277
W2SUA	314	VE4SK	307	K3UA	300	W6MFC	291	W4PTT	277
K9LKA	313	K8PYD	307	VE4AT	300	KBØU	291	KBØSY	277
ZS6LW	313	IØMBX	307	KB8KW	300	K2JLA	291	I8XTX	277
ON5KL	313	WØSR	307	I8KCI	300	KP4EQF	291	K2JF	277
OE3WWB	313	W7FP	307	WB3DNA	300	KZ2P	290	N7ASL	276
OK1MP	313	W6DN	307	WB4UBD	300	VE3CKP	290	WA6DTG	276
VE1YX	313	WD9IIX	307	WAØTKJ	299	JA5PUL	289	WA4OPW	276
WØSFU	313	SM4CTT	307	I6PLN	299	W9TA	289	AI9U	276
W9BW	313	G4CHP	307	KB9OC	299	K8ZZU	289	KC2RS	276
WØYDB	313	N4KE	306	JH1VRQ	299	KØGT	288	I8INW	275
W8ILC	313	W7OM	306	XE1OX	299	OK1AWZ	288	WB3CQN	275
TI2HP	313	WAØDCQ	306	DJ7CX	298	I8KCI	288	WB1EAZ	275
EA4LH	313	VE3MRS	306	K9SM	298	WØULU	288	VE7BSM	275
OZ8BZ	313	VK3JF	306	I8LEL	298	AB9E	287	K8NWD	275
N6AW	313	WA4WTG	306	K8NA	298	N3ARK	286	KA9ABC	275
K5OVC	313	EA1QF	305	JH4PRU	298	K4LR	286	G3XTT	275
F2MO	312	KZ8Y	305	K8VFV	298	VE3CYX	285	G4GED	275
W3GG	312	KB8KW	305						

On holiday in England, Keith Hollow, A92P, met with another DXer from his home town in California. From the left are: Keith Hollow, A92P, his XYL Andra Hollow, Jack Reeder, W6NGZ, and his XYL Pamela. From Bahrain A92P has made over 9000 A92 contacts with the Deserving. Keith is also ex-ZD7KH, 9L1KH, MP4BJS, A9XP, and G8SLT. He also holds the current call of G4SOK. The group met on the Cornish coast in England at Penzance and toured southwest England together. At home W6NGZ runs stacked Yagis on 20, a well-known landmark on the edge of Silicon Valley.

eral objectives and are, therefore, preempted. The FCC stated that local regulations which involve placement, screening, or height of antennas based upon health, safety, or aesthetic considerations must reasonably accommodate amateur communications and must also represent the absolute minimum practicable rules necessary to accomplish the goal of the local authority.

In its concluding remarks to PRB-1, the FCC stated that it had no intention of trying to legislate any minimum height limit for amateur antennas, stipulating that any local regulations must be the minimum regulation needed over amateur antenna installations.

All things considered, it does appear that DXers made a significant gain under the FCC ruling, though some may think it may not have gone far enough. There have been, and probably always will be, gray areas where a decision might go either way. These are not only in FCC rules, but in such as the Taft-Hartley law and similar public policy legislation. Sometimes neither side wants to take a chance challenging such situations, considering that an adverse decision might be disastrous to a prevailing *laissez-nous faire* condition. Some might, in such instances, urge caution in not rocking the boat. In this instance it does seem that the ARRL took the action and got a decision benefiting to DXers.

Council of Europe

At Strasbourg in France, the Council of Europe has authorized a headquarters station, this signing the call TP2I. The council is an international organization representing 21 of the democratic countries in western Europe, and it coordinates member country activity in political, cultural, and judicial fields. It also handles problems dealing with human rights.

Patrick Biggiger, F6EYS, passes along all this information. F6EYS is also the QSL route for CW contacts with TP2I. This station is under Director Francis Kremer, F6FOK, who is the QSL Manager for SSB activity with TP2I. Other headquarters operators include F8RU, Ted Robinson; F6EQG, Partick Egloff; and F6HIX, Jean-Claude Drzewinski.

TP2I was due to be heard starting in late December and should be on the air about the time you get this issue of *CQ*. In its location at Strasbourg, the headquarters of the Council of Europe enjoys extraterritorial status, and there was hope for new country status on the DXCC country list. However, the adoption of Rule 5 to the DXCC country criteria at the last ARRL Board meeting probably will dull that anticipation. That TP prefix was deleted from the French international callsign series and officially attributed to the Council of Europe by the ITU. The address for TP2I is: 8 Rue du General Ganeval, 67000 Strasbourg, France. The Council of Europe is located in the Palais de L'Europe in Strasbourg.

One-Sixty

During the last year there have been some voices raised in an effort to bring some order to the operations on 160. In some instances there are calls for "gentlemen's" agreements

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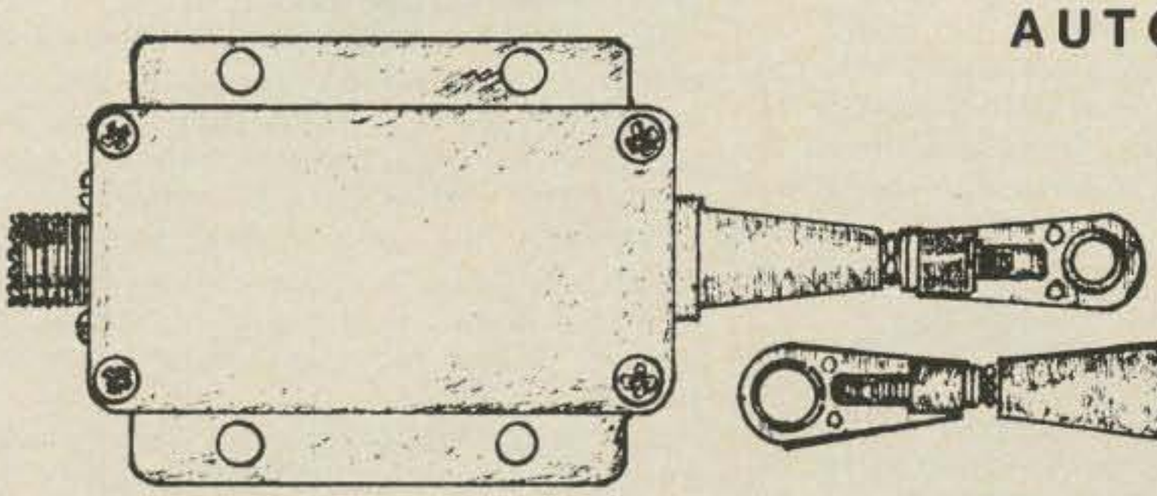

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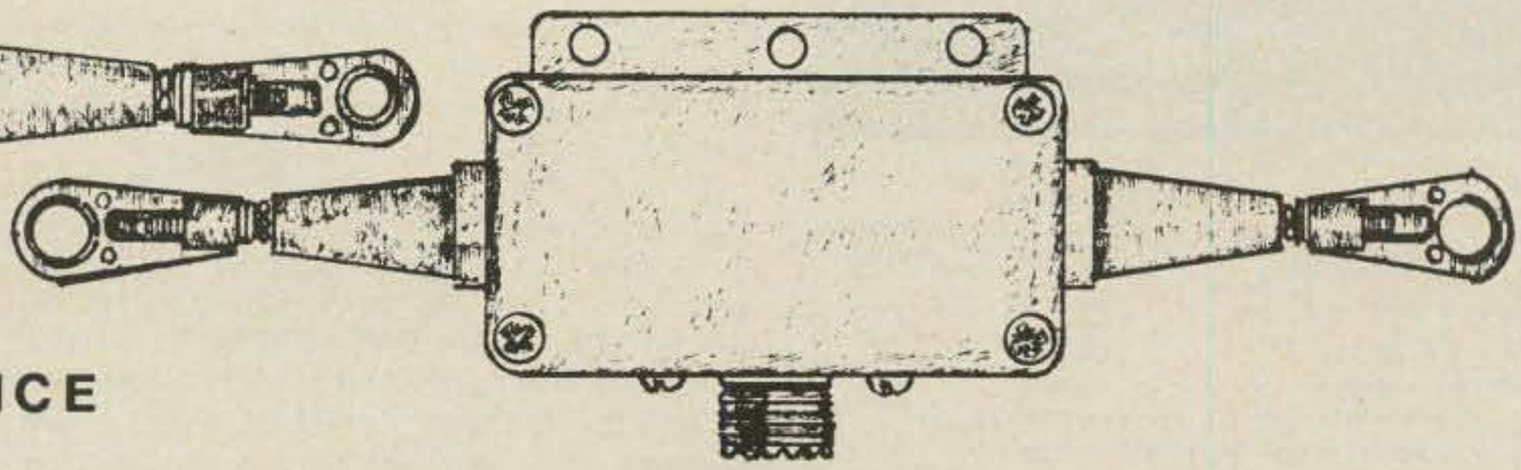

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WAZ

50th Anniversary Award

To commemorate the 50th anniversary of the WAZ Award, *CQ* is offering a special WAZ certificate for those working the 40 zones between January 1 and December 31, 1986. QSLs should be submitted directly to our WAZ Award Manager, Mr. Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904.

A special plaque will be awarded by *CQ* to the first amateur to qualify, as determined by postmark. Sequential numbers beginning with number one will be assigned to the WAZ-50 certificates in the order in which the applications are received by W4KA. Regular WAZ application forms will be used and are available from W4KA and from CQ Magazine, 76 North Broadway, Hicksville, NY 11801. SASE please. All standard WAZ rules apply except that the award application fee is $5.00 for all applicants, regardless of whether the applicant is a CQ subscriber.

CQ DX Awards Program

S.S.B.

1437	EA5DW	1439	JL1BYZ
1438	DL7ABZ		

C.W.

648	N4JF

S.S.B. Endorsements

310	K6WR/316	300	W6NLG/303
310	YV1KZ/315	300	WB4UBD/300
310	EA2IA/315	275	JH1VRQ/299
310	N6AW/313	275	I8SGF/294
310	LA7JO/312	275	W5LLU/281
310	AA6AA/310	275	G4GED/275
300	N4KG/308	200	KZ2W/200
300	WD9IIX/307	Mobile	WB4UBD
300	KZ8Y/305	28 MHz	JL1BYZ

C.W. Endorsements

310	N4JF/316	300	N4KG/305
310	N6CW/313	300	EA2IA/301
300	AA6AA/309	275	WD9IIX/294
300	K1MEM/303	275	JH1VRQ/281

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

for CW or SSB to stick to certain portions of that band. Others feel that while all low-banders are "gentlemen," some are less so, and some more rigid regulations must be considered.

Generally the intent is to have CW in the 1800–1840 kHz area, with 1840–2000 kHz for SSB and other modes. There is a desire to save the traditional DX window in the 1825–1830 kHz area, the 1907–1913 kHz JA window, and possibly an SSB window at 1850–1860 kHz section.

Some urgency is expressed by those seeking understanding on 160. The bottom of the cycle generally brings good conditions on the lower bands, and 160 can be interesting in the next couple of years. Previously we have mentioned the efforts of K1MEM in this area. Another effort is being pushed by N4SU, Dave Kennedy, Rt. 3, Box 100, King, North Carolina 27021.

Overall, both Jim Dionne, K1MEM, and Dave Kennedy, N4SU, are looking to attain the same objective. There is a feeling that the coming meeting of the ARRL Board of Directors later this January could be critical. If you are interested in 160, and a lot of DXers are with the sunspot cycle wilting, you might want to learn more of what K1MEM and N4SU are working for. You might want to strike a blow for low-band DXing.

A Lot of DX Warmed-Overs

Most everyone has heard about the gourmet cooking expert who proclaimed that he would rather be invited to dine at your home when you were having leftovers than at any other time. Some have long suspected that that one was a refugee from DX Convention dinners. Others say that the DX gleanings always are the most interesting of all. So that's what you're getting. Leftovers—or interesting gleanings!

Grupo Argentino de CW says that LU6UO/Z from Marambio Island made over 2K QSOs on CW and SSB. This island is east of the Palmer Peninsula in Antartica. GACW is also the QSL route for LY7X, LU3ZY, LU3ZI, LU1ZA, and LU1ZE, all to 1854 Longchamps, Buenos Aires. Jim Hadlock, K7WA, in the "Totem Tabloid" notes FT8XB should have a three-element Yagi up by this time and the signal should improve. Also, he notes that VK0CC was a technican working with a scientific group on Heard Island, but that station probably has long gone by now. P29JS indicates he may be in the states next year and might show at the International DX Convention at Visalia's Holiday Inn, April 18–20th. P29JS plans for another Heard effort apparently are not moving well.

The Colvins departed in early fall for Africa, showing up a couple of months back from ZS-land. They should be heard from a number of other stops, these including planned three-week stays at ZS3, A2, 7P, 3D6, S8, ZE, 7Q, 9J, and possibly others. You can usually catch the late word on their plans at 14002 kHz on Sunday at 1800Z or Mondays at 0200Z. A team from the Uruguay DX Group operated from the Isla de Flores at the mouth of the River Plate in early October using the special callsign CV0U. QSL to Box 20063, Montevideo.

The ARM, Association des Radio-Amateurs de Monaco, is passing out the word that 3A2TO is Cousin Slim. 3A2TO says his home call is EA5FDO, but there is no reciprocal agreement between Monaco and Spain. ARM says the activity was in Spain. QSLs sent to the alleged manager in Seville quickly produced an 3A2TO QSL in return. ARM has passed along this information to the ARRL and the Spanish Radio Society. As of last summer the Monaco licenses were down to the "L" suffixes—3A2LF. A 3A1 prefix indicates a VHF/UHF license, 3A2 are general licenses, and foreign amateurs sign their own call 3A. The 3A0 for visitors has not been issued since January 1978. Some special calls such as 3A3WPX, 3A3EE, 3A3LF, 3A4E, 3A4F, 3A5E, 3A5F, and 3A8EE have been issued. Anything else that does not fit the above should be suspect. Seems as though that 3A3WPX was issued for a WPX Test.

The Southern California DX Club included the log sheet for the CQ WW DX Tests with the club bulletin last fall. With the WPX coming up, it is a good way to jack up club activity. The test sheets? Just ask for them by name in a note directed to downtown Hicksville. And speaking of the Southern California Club, Dave Bell, W6AQ, picked up an Emmy Award for a Drama/Comedy Special starring Joanne Woodward.

N7DF/TT8 ran into some silent periods last summer. Seems that each of the 20 or so relief organizations operating out of N'Diamena on drought relief set up their own radio networks with little attention given to obtaining authorization or operating licenses. This from the Kansas City DX Club bulletin, which also reports V85HG active at 3799 kHz from around 1130Z, and that ZL9AA on Auckland Island often shows after 0800Z at 3787 kHz.

Dany Prevostat, J28EI, was scheduled to return home in December. He made something over 11K QSOs from Djibouti. His home call is F6CZB, and if you thirst for a J28EI QSL, the CBA is your guide. Jorge Cangas, EA4LH/CE3, and Pedro Barroso, CE3BFZ, were due on from Juan Fernandez in the CQ WW Phone Test. They planned to sign XQ0ZFZ and EA4LH/XW0Z and QSLs go to P.O.B. 13.312, Santiago 21, Chile.

With the new year at hand and your own

long-range planning committee looking to the future, keep in mind that the International Travel Host Exchange Program may have something to fit your needs. Naoki Akiyama, JH1VRQ/N1CIX, administers the program. If nothing else, if you travel abroad it might be interesting to know if any active amateurs are on your itinerary if you are headed for places such as Kenya, Lesotho, Ireland, Germany, Sweden, Syria, or other exotic spots. Get the full details from Naoki at the ARRL in uptown Newington. He even tells you what languages they speak. Just ask for the ITHE List. You might even want to put your name on it.

EH9IA was the callsign used by the Malaga Radio Club when they operated from Alboran Island in the Mediterranean. Mostly barren, a Spanish Air Force unit maintains navigational gear on the island, and it is a refuge for fishermen. It is 55 miles south of Spain and 37 miles north of Morocco. Operators were WA7TK, EA7TL, EA7XC, EA7AAW, EA7AIN, and EA7BUD. Some 5K QSOs were made with over 100 countries. QSLing is handled by EA7BW, Box 262, 29080 Malaga, Espana. Malaga was the site for the October 1984 meeting of the ITU, ED7ITU being put on the air by the Malaga club at that time.

Ron Pipes, WB6NBR, is the new president of the Redwood Empire DX Club. Doug Bender, WA0JRB, is vice-president, and Chod Harris, VP2ML, the secretary/treasurer. DX Incorporated notes TK5EL operates from Bactia on Corsica and is found often at 14195 kHz after 1400Z. Also JX3EN operates intermittently from Jan Mayen at 14225 kHz between 2100–2300Z. And FP5HL has a new beam up on St. Pierre & Miquelon.

WORLDRADIO News has gone to a new format, now coming in the same size as most amateur magazines, and it is bound. The Maritime Mobile section by WB6NOA is especially good.

The sunspot numbers continue to feel for the bottom. The average for last July was 30.8. Someone mentioned that the solar flux got down to an SF-67 during the fall. This may not look too bad until someone notes that the bottom is supposed to be about SF-65. But what goes down does come back up, some say wistfully. But then again, the sunspot numbers always have. 73, Cass, WA6AUD

5BWAZ #57

Mike Filippov, UW0MF, was the first Soviet station to receive the 5BWAZ plaque. If you take a look at Mike at his operating position, you can see that he has the major DX awards on the wall.

He was first licensed in 1969, was an SWL before that, and has been interested in amateur radio for over 20 years. He holds the Extra class license, which allows 200 watts input on all bands and all modes. Mike is 38 years old and is a ship's radar repair engineer. The XYL's name is Ludmila, and there are two children, Elen who is 17 years old and a son, Denis, who is 11. Mike graduated from a Radiotechnical College in 1968.

UW0MF has been the first in the Soviet for a number of awards. Besides being first with 5BWAZ, he was also the first for 5BDXCC (plaque #1092) and 5BWAS (plaque #2041). He also has 5BWAC, WAA, WAE-I, WAP, WA-VK-CA, DUF-EX, and is on the DXCC Honor Roll. He needs just four of the currently listed countries: ZA Albania, XZ Burma, 3Y Bouvet, and 70 Yemen.

Mike works SSB primarily, but also does some CW operating. He has quads on 10, 15, and 20 meters, and inverted Vees on 40 and 80. All the antennas are about 45 feet high. All the gear is homebrew, and this includes a 200 watt amplifier.

Mike Filippov, UW0MF, first in the Soviet Union to gain 5BWAZ, first to earn 5BDXCC, and first to gain 5BWAS. The awards on the wall attest to his DX skills. He is also a member of the DXCC Honor Roll and holds a large number of the major amateur awards. All the gear, antennas, and accessories are homebrew. You may already have one of his QSLs.

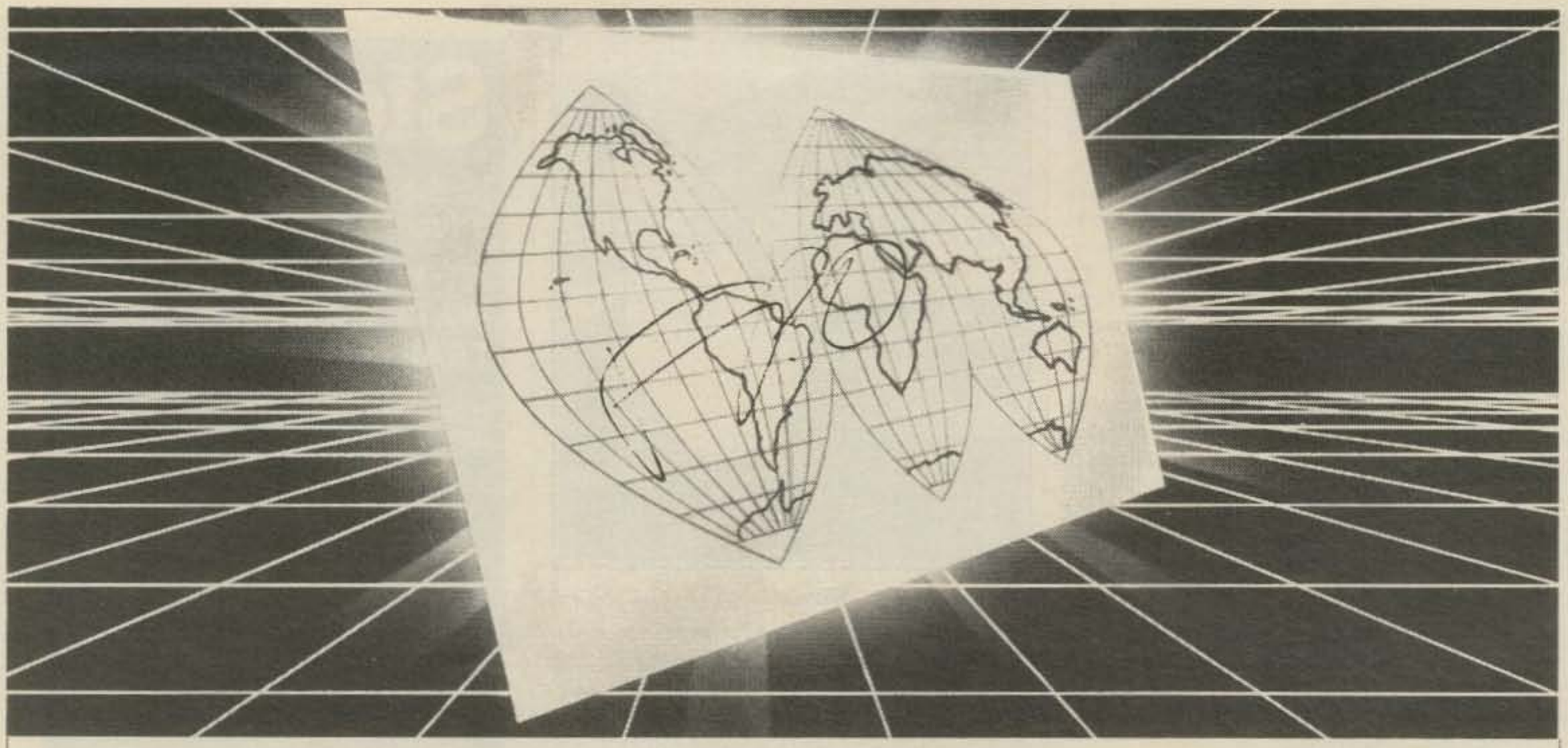
Mike found 80 meters the most difficult to fill out, because of the necessity of working split into 75 meters.

No other members of the family are amateurs, though young son Denis has been showing interest. Mike is a member of the Vladivostok Radio Club, which has about 150 members. Always interested in contests, Mike tries to cover all of them. He competes in the USSR Championships and is a "Sport Master of the USSR." In downtown Vladivostok he is the custodian of the local award, the "Primorie" award. Mike usually works on his own picking up the counters but does at times check into some DX nets.

A top DXer, Mike Filippov is more proof that 5BWAZ is only earned by the top operators. The record shows that Mike is one of the world's best.

DX Ten Years Back

In January 1976 Lloyd and Iris Colvin were in the Pacific for the independence ceremonies which changed the Ellice Islands to Tuvalu and immediately put VR8B on the air as a new country. Later that month they were headed for another operation at Nauru. 3B8DA was headed for 3B7-St. Brandons and a March operation. W6UAP/YI was heard but was Baghdad Slim. UK1PAA was on from Franz Josef, and FR7ZL/G was heard from Glorioso. PY7PO and PY7BXC were headed for Fernando de N., and LU1ZA was on from the South Orkneys. VP8MS was expected on from South Georgia within weeks. In a most-wanted poll YI led with 88.7% of amateurs needing that one. It was followed by South Sandwich, Clipperton, Bouvet, Saudi-Iraq Neutral Zone, China, Kamaran, Burma, South Yemen, and Malpelo to round out the top 10 needed. Only 7.7% of the respondents needed YA-Afghanistan, 2.9% needed Laos, and 3.2% needed Vietnam.



The 30th Annual CQ World Wide WPX Contest

S.S.B.: March 29–30, 1986

C.W.: May 24–25, 1986

Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

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

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

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used.

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

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

VI. Points: Contacts between stations:

1. **North America Only**

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

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

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

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

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

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

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

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

A "**PREFIX**" is considered to be the three letter/number combination which forms the first part of an amateur radio call (N1, W2, WB3, K4, AA6, WD8, 4X4, DL7, G3, IT9, KH2, AL7, NP2, WP4, 9M2, CT9, 4J9, PY7, VK4, JE3, VE3, Y32, Y33, Y45, AN8, AB8, H44, KT4, etc.). **A station in a call area different than that indicated by its call sign is required to sign portable.** The portable prefix would be the multiplier. Example: W8IMZ/4 would count for prefix W4 only and W8IMZ/LX would count for prefix LX**0** only.

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

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

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

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

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

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

1. In every participating country.

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

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

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

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

XI. Trophies, Plaques and Donors:

S.S.B.
Single Operator, All Band
WORLD - North Florida DX Assn.
U.S.A. - Bob Epstein, K8IA
CANADA - Ed Sleight, K4SB
CARIB./C.A. - Arturo Gigante, Jr., HI8GB
EUROPE - Bernie Welch, W8IMZ
*JAPAN - Palm Garden Radio Club
SO. AMERICA - Ron Moorefield, W8ILC
OCEANIA - Down Under DX'ers
AFRICA - Southeastern DX Club
WORLD QRPp - Dayton A.R.A.

Single Operator, Single Band
WORLD - John N. Reichert, N4RV
U.S.A. - 7 MHz - William Diggins, WA8LXJ
*CANADA - Gene Krehbiel, VE7KB
EUROPE - Myron E. Crofoot, WB4VQO
JAPAN - Ken Ruddock, K6HNZ
*JAPAN - 28 MHz - Joe Arcure, W3HNK & Toshi Kusano, JA1ELY (Terry Appleton, W4GSM Memorial Award)
*WORLD - 21 MHz - Lee Wical, KH6BZF
WORLD - 7 MHz - William Diggins, WA8LXJ
WORLD - 1.8 MHz - Arch Doty, Jr., K8CFU/4
U.S.A. - 14 MHz - Doug Zwiebel, KR2Q

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

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

Contest Expedition
WORLD - Kansas City DX Club

• • •

C.W.
Single Operator, All Band
*WORLD - Canadian DX Assn.
U.S.A. - Steve Bolia, N8BJQ
*CANADA - Canadian A.R.F.
*JAPAN - Palm Gardens Contest Club
OCEANIA - Tom Morton, KT6V
WORLD - QRP/p - QRP A.R.C.I.

Single Operator, Single Band
WORLD - Pedro Piza, Jr., NP4A (Pedro Piza, Sr., KP4ES Memorial)
U.S.A. - Kansas City DX Club
U.S.A. - 7 MHz - Dennis Younker, NE6I
ASIA - Bruce Frahm, KØBJ
WORLD - 3.5 MHz - Lance Johnson Eng.
U.S.A. - 14 MHz - Gene Walsh, N2AA

Multi-Operator, Single Xmtr.
WORLD - Ron Blake, N4KE
U.S.A. - Austin Regal, N4WW
*CANADA - Tehrahedral Contest Circle

Multi-Operator, Multi-Xmtr.
NORTH AMERICA - Dick Weber, K5IU

Contest Expedition
WORLD - Ed Roller, K4IA

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

**Donor is responsible for this trophy.*

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

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

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

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

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

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

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

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

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

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

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

XV. Deadline: All entries must be postmarked no later than **May 10, 1986** for the S.S.B. section and **July 10, 1986** for the C.W. section. **Indicate S.S.B. or C.W. on the envelope.** From isolated areas the deadlines can be made more flexible.

All logs go to: CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801 U.S.A.

Questions pertaining to the WPX Contest can be sent to: WPX Contest Director, Steve Bolia, N8BJQ, via CQ Magazine, 76 North Broadway, Hicksville, NY 11801 U.S.A.

Please remember to send in early for the WPX Contest Logs and Summary Sheets.

Antennas & Accessories

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

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Spotlight on Software—Part II

Is your radio shack ready for the "software revolution"? This month columnist W8FX continues his examination of new and useful computer software for the hamshack, begun in last month's column. —K2EEK

Last time we took advantage of *CQ* Editor Alan Dorhoffer, K2EEK's charge for use to broaden the column's scope to include a wider range of topics, to include "a look at the shack from both ends of the coax." To that end we examined a wide range of software for the well-equipped hamshack. We discussed several new software offerings for the IBM-PC, Atari, Radio Shack, Commodore 64, Apple, and Timex/Sinclair machines. We opened the reader mailbag again, and finished up with a comprehensive update of the Amateur Radio Software Sources Listing which we have published.

This month we'll continue our focus on hamshack software. First, we'll describe and discuss the Xantek Computerized DX EDGE™ software for the Commodore 64. We'll then highlight several sources of software for a variety of personal and home computers, and we'll make note of several "good reading" ideas. We'll also discuss two new products, and again open the reader mailbag.

Let's begin with a look at the Computerized DX EDGE.

Computerizing the "EDGE"

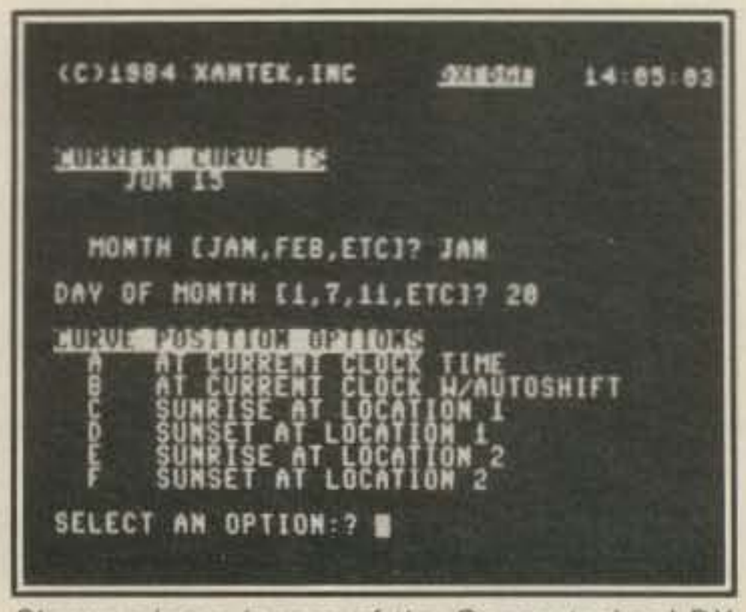
Currently popular propagation prediction techniques involve the calculation and following of so-called "grayline" and sunrise/sunset phenomena. Such techniques are becoming increasingly useful and very much in vogue, especially as the 11-year sunspot cycle bottoms out, and propagation shifts markedly to the lower bands, where taking advantage of all-darkness paths and anomalous propagation bordering on sunrise and sunset periods can be particularly advantageous.

We first discussed the original slide-rule-like DX EDGE in the May 1984 column. With this device, which we found to be a very useful operating aid for the DXer and contester, you can rather quickly determine those areas of the world which are in darkness, and those which are in daylight, at any time of the day and in any month of the year. It is also possible to determine sunrise and sunset times throughout the world, the location and shape of the "grayline" (an important propagation indicator), and local times around the world.

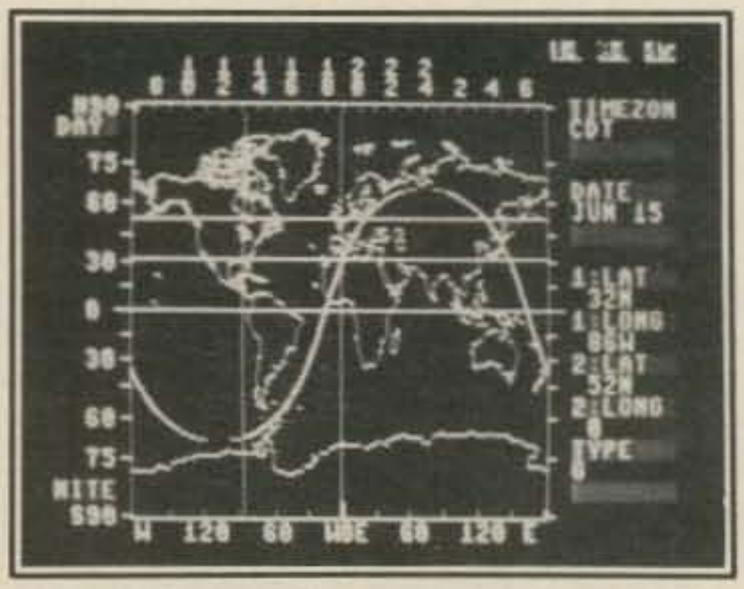
The DX EDGE, which consists of a carrier and a set of slides, is basically a device for tracking the Sun's path across the Earth's surface. It allows you to "solve" a number of problems relating to unusual long-range propagation paths. You can, for example, find local sunrise and sunset times for operating at those times when transient or "freak" conditions are likely to occur. You can also determine the direction in which to look for unusual DX; find propagation paths that will see the most sunlight or darkness, as you choose; ascertain when and where to look for rare DX multipliers; and determine when long-path openings are most likely to occur.

317 Poplar Drive, Millbrook, AL 36054

Main Menu of the Computerized DX EDGE™ is shown here. Several "grayline" and sunrise/sunset calculation options are provided. (W8FX photo)



Shown above is one of the Computerized DX EDGE™ options used to solve a sunrise/sunset "problem." This option gives you sunrise or sunset times for any location you choose, for the date of the curve currently displayed. (W8FX photo)



A typical "grayline" curve is shown on the Computerized DX EDGE™ display screen. The presentation isn't complicated, but it holds a good deal of information and takes some getting used to. The map is a Miller Cylindrical projection which displays the world from 90 degrees north to 90 degrees south latitude. (W8FX photo)

The Computerized DX EDGE performs a useful function in letting you graphically see the actual shape of the "grayline," which separates the areas of the world which are in darkness from those which are in daylight. The shape of this demarcation changes throughout the year, and its position changes during the day. An accessory set of slides is available to fit on the DX EDGE slide-rule device to allow you to determine great-circle beam headings to any location in the world; and also to determine headings to use to point an antenna along the "grayline," itself a great circle.

The Computerized DX EDGE is a high-tech follow-up to the original paper and plastic version, one which utilizes the computational power of the Commodore 64. The menu-driven program lets you see the shape and position of the grayline on keystroke command, displayed on a hi-resolution world map. At the same time, you can also see the areas of the world that are in daylight and those which are in darkness. When day and date are input, the grayline is shown in the correct position; new curves are built into the program for 15-day increments.

Using the computer's internal clock and the program's automatic update feature, the position of the grayline may be shifted automatically every 15 minutes in real-time. This allows you to simulate the motion of the earth, in order to keep track of daylight and darkness areas. Thus, the most interesting and "productive" propagation paths are instantly visible, and you can move the grayline by command, too. As with its slide-rule predecessor, the program is also used to see the times for sunrise and sunset at any location in the world. QTHs are keyed to the DXCC and zone lists, so that you can enter a country prefix or one of the 40 zones to pinpoint the QTH desired. In addition, the position of the map may be changed to place any area of the world in the center of the screen to suit individual preferences.

The Computerized DX EDGE is useful on all HF bands from 160 through 10 meters, though for differing purposes. On the higher frequency bands, paths fully in daylight are often desired, while on the lower bands—40, 75/80, and 160 meters—darkness paths are used. To be sure, finding darkness paths on the lower bands will be increasingly rewarding during the current years of low sunspot activity and declining opportunities for daylight DX on the higher bands.

The program is easy to use, and requires a minimum of setup, which basically just requires the inputting of date and time, and your location, which serves as a reference point. The correct grayline is placed on the world map, and areas of daylight and darkness are immediately visible. As indicated previously, both the grayline and the world map may be changed to any desired position.

Documentation consists of a 12-page book-

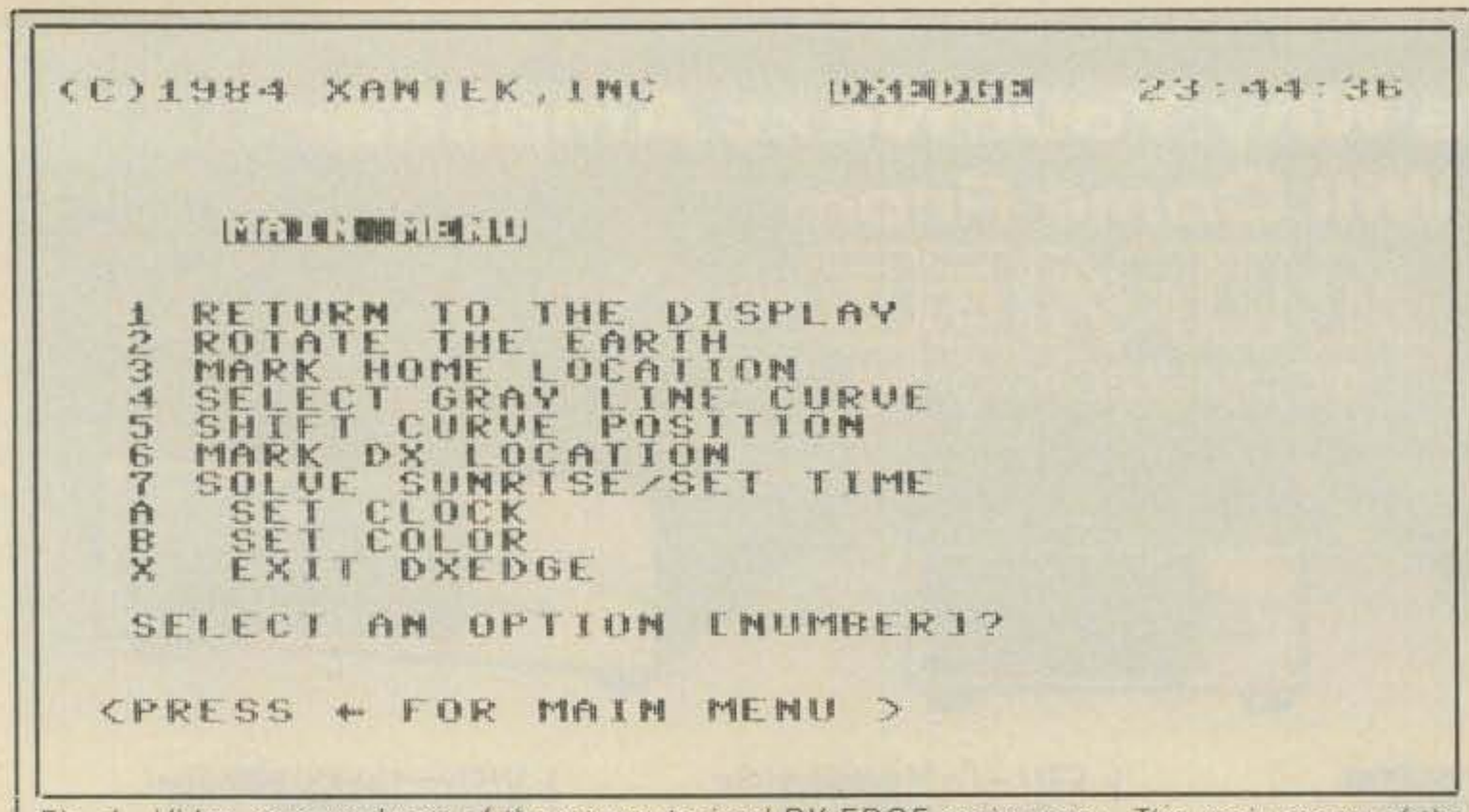


Fig. 1– Video screen dump of the computerized DX EDGE main menu. The main menu of the Computerized DX EDGE is shown in this screen dump to the author's Star Micronics Gemini 10X printer. The first seven choices represent main program functions, while the last three are utility/setup choices.

let, which provides basic instructions for the program, an explanation of the display screen and main menu options, operating procedures, miscellaneous rules, and several problem-solving oriented examples. The disk-based Commodore 64 program is priced at $34.95.

Early versions of the program, which were released last April, were quite slow, and this fact limited the usefulness of the program. Tony Japha, N2UN, and his crew, worked hard to improve the program's operating speed, and issued a much speeded-up disk less than two months later. For example, a complete shift of the grayline curve (one of the main menu options) now takes but one minute when using the new version, compared to the four minutes it took with the original. Owners of the original disk can receive the new version on exchange for a $1 handling charge—not a bad deal.

Both DX EDGES (slide rule and computer program) represent excellent station DX operating aids. One should be aware, however, that neither predicts ionospheric conditions such as Maximum Usable Frequency (MUF) or Lowest Usable Frequency (LUF). Nevertheless, the two tools can be very effective if used in conjunction with current information regarding atmospheric propagation. This information may be based on published magazine data, or on computer-assisted MUF/LUF determination computer programs. Several such programs have been described in previous columns.

Also, the Computerized DX EDGE does not specifically provide beam-heading information, which must be determined separately or "eyeballed" from the screen display. Hopefully, someone like N2UN, or perhaps the MUFPLOT gang at Base 2 Systems, will invent the "ultimate" DX computer program which will incorporate grayline, sunrise/sunset, MUF/LUF, and beam headings wrapped in one tidy package that will all fit inside the limited memory of most home computers. In the meantime, the Computerized DX EDGE is a good bet if you want some DX assistance from your computer.

For more details contact Tony Japha, N2UN, at Xantek, Inc., P.O. Box 834, Madison Square Station, New York, NY 10159. Fig. 1 is a "screen dump" I made from the main menu screen of the Computerized DX EDGE.

More Software for the Hamshack

Science Software Update. We've mentioned David Eagle's Science Software several times in previous columns. Dave writes and markets a wide range of astronomical and other technical programs for the Commodore 64, many of which are of interest to hams who, for one purpose or another, have reason to point their antennas skyward.

Dave now has two demo disks available. One is the Science Software Demo Disk, and the other is a specialized Science Software Satellites Disk. The former is $3 postpaid, and the latter is $19.95 ppd. Actually, both are more than just "demos."

The Demo Disk contains several programs designed to introduce you to some of the unique features and educational capabilities of Dave's line of computational software. This disk contains six public-domain programs which may be modified or shared freely. Put together with the amateur astronomer at heart, examples of the programs offered are titles such as Galilean, Kepler, Sidereal, Tnode, Syncsat, Glider, Planet, Lunar, Comet, and Eclipse. Several of the programs support graphics and output to printer. Fig. 2 shows a typical printout from the Eclipse program included on the disk.

The Satellites Disk includes several programs of interest and assistance to the those involved in various satellite-tracking activities. The programs offered support not only amateur radio satellites, but also TVRO (TV Receive Only) and DBS (Direct Broadcast Satellite) reception, and even visual observations of large Earth satellites by amateur astronomers. This disk contains programs labeled variously as ASTROS, OSCAT, TSAT, and VSAT, as well as several of the public-domain celestial programs contained on the demo disk previously described.

Both of these disks include documentation, either within the programs themselves, or in the case of more complex programs, in a separate user's manual. While most of the programs are written primarily with the amateur astronomer in mind, many of the programs can be used in OSCAR work. Too, a nice "freebie" which Dave throws in is a marked-up sample of the NASA Prediction Bulletin, a

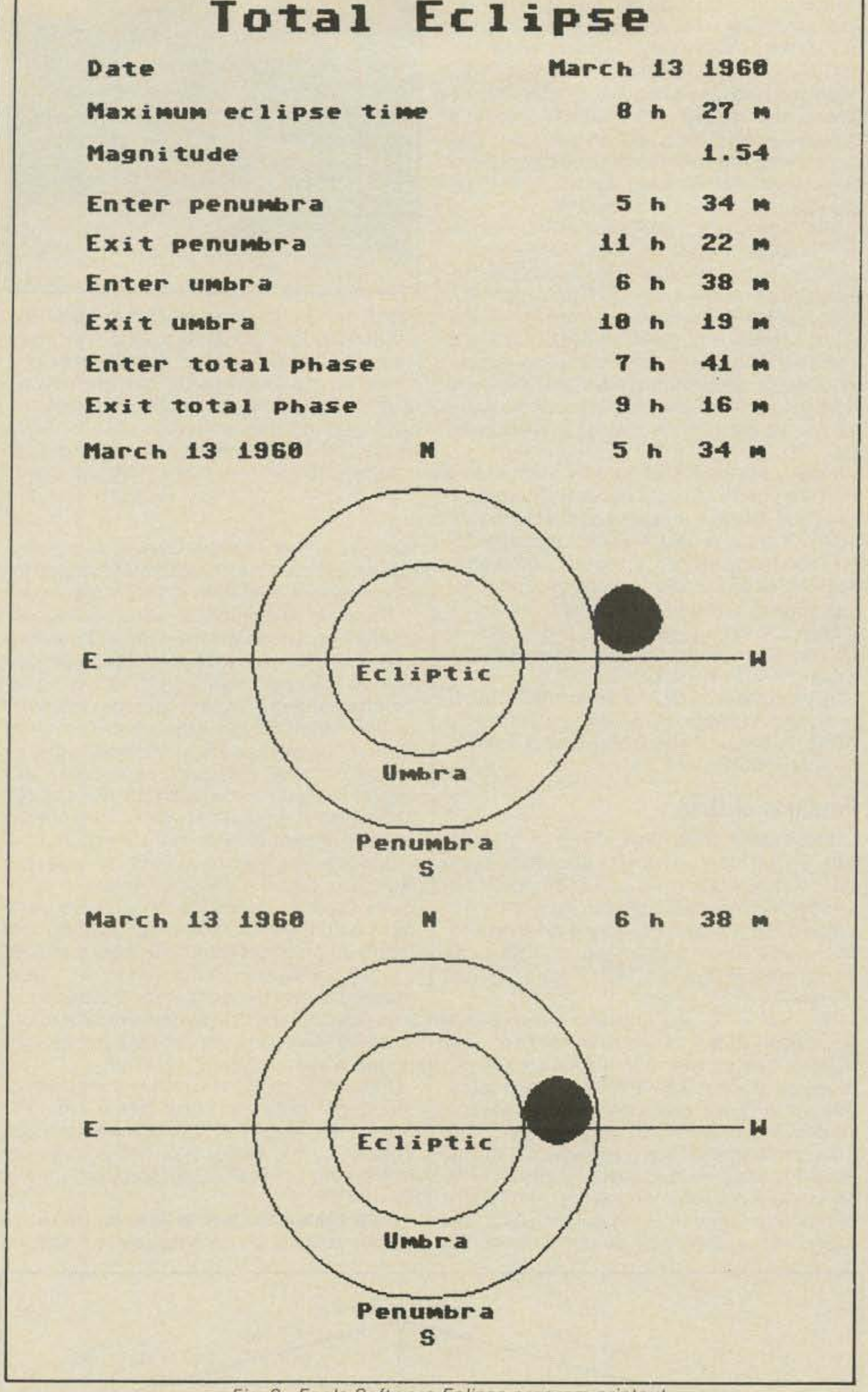


Fig. 2– Eagle Software Eclipse program printout.

government subscription publication which satellite trackers use to input orbital data to their prediction programs. The NASA bulletins are fairly difficult to use, even with the NASA-supplied instructions, but Dave's marked-up sample goes a long way toward simplifying their use.

For more information contact David Eagle at Science Software, 7952 W. Quarto Dr., Littleton, CO 80123.

AC3L Morse Code Software. Also for the Commodore 64, Ed Oros, AC3L, has available an inexpensive but comprehensive code training package, known as the International Morse Code Trainer, or IMCT. Ed's product is a very detailed program to aid in the teaching of Morse, and it takes newcomers to the code step-by-step through the learning process.

Several testing methods are provided. One tests basic sound recognition, while another sends random letters to you for a period of time which you select (1 to 5 minutes), and at the speed which you choose. Another similar exercise sends letters as well as special characters. Still another sends single code sounds and asks you to hit the key (letter or number) which matches the sound just heard. A final testing method is user defined: you can design your own tests (10 lines of 40 characters each), which may be sent back to you in random order by line or just as entered. Scoring is kept by the computer. A number of nice options are included, such as one to simulate a "straight key."

The Commodore 64 version, on disk, is priced at $19.95; a scaled-down version is available for the Vic-20 for $9.95. Ed also advises that an enhanced "Super-IMCT" is on the horizon. It will feature more user-definable features, such as adjustable spacing between letters and characters. For details contact Edward Oros, AC3L Software, P.O. Box 7, New Derry, PA 15671.

Timex/Sinclair Support. Gary Smith at Hawg Wild Software provides considerable support for serious users of the various Timex/Sinclair computers. A number of ham software products by authors such as Ken Carpenter, KC4UG, Earl Cunningham, K6SE, and others are available through his firm. Several programs for beam heading and distance calculation, sunrise/sunset and HF propagation, Morse code instruction, and other hamshack purposes, are offered for the ZX/TS-1000 and T/S-2068 computers.

Hawg Wild also offers a wide range of "goodies" for the Timex/Sinclair line, including utility, game, and personal productivity software, as well as hardware accessories. Several other computers, including the Jupiter Ace, TI, Commodore, TRS-80, Apple, Atari, and others are supported. For information contact Gary Smith at Hawg Wild Software, P.O. Box 7680, Little Rock, AR 72217.

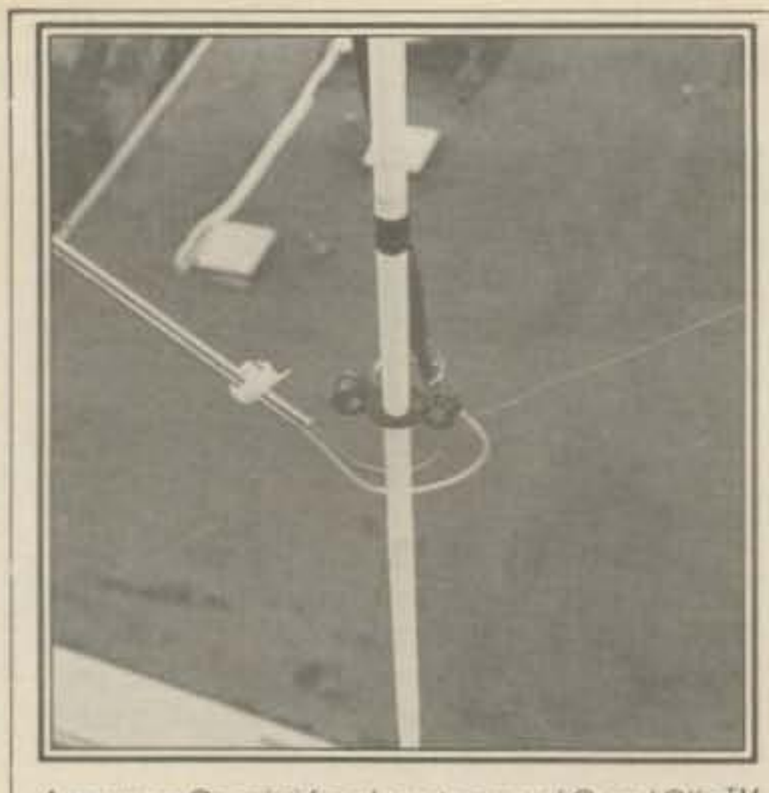
Good Reading

Quad Reference Book. Not long ago I came across an interesting antenna book by Peter L. Demmer, KH6CTQ. This is *The How-to Quad Manual,* published by the AMPRUSS Company. Of particular interest to the serious Quad builder, KH6CTQ's manual is an 80-page, 8½" × 11" publication which contains many of the "nitty-gritty" mechanical details of quad construction that only come from experience.

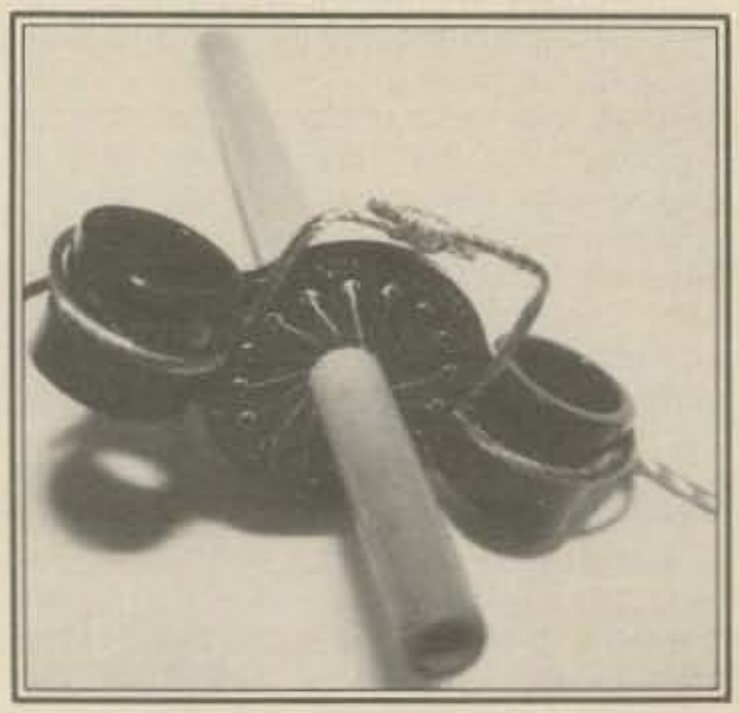
The manual is divided into 11 chapters, which address mechanical factors, spreader layout and banding, wire elements, element installation, and feeding and matching considerations. Numerous photos and drawings, as well as detailed "how to do it" instructions, are provided, to help build and feed the Quad. The information represents the author's 16 years "labor of love" experience in cubical Quad design and construction.

Special emphasis is on solving one of the main problems Quad users experience—that of wire element constriction, abrasion, and ultimate element failure. To this end, the author developed the Quad Clip™, a patented, one-piece Lexan device used to provide the means to properly anchor the wire elements to the spreaders, to eliminate wire abrasion and the need for spreader drilling. According to the author, use of the clips vastly simplifies Quad construction and increases overall long-term reliability under adverse environmental conditions.

Peter's manual also contains useful, hands-on information on various Quad feeding systems—another problem area for Quad builders. A good portion of the manual is devoted to an evolutionary discussion of feed systems, with a description of the author's own "hybrid" Gemini Match™ matching system. Somewhat similar to the Gamma and Omega Matches, and drawing from them, the Gemini Match also makes use of premeasured sets of coaxial cable as the Omega and Gamma ca-



Ampruss Gemini feed system and Quad Clip™ shown installed in the photo above. (Photo courtesy Ampruss Company)



The Quad Clip™ is a one-piece device that you slip on your Quad spreaders at each wire element anchor point. The clips are said to eliminate drilling, wire fatigue, and failure due to construction and abrasion. Their use is described in KH6CTQ's The How-to Quad Manual. *(Photo courtesy Ampruss Company)*

pacitors, for mechanical considerations. Detailed instructions for construction of these assemblies is provided in his manuals, and precut and assembled Gemini Matches are available from the author.

Peter's manual is available for $14.95 plus $2.50 packing and shipping via air. Also, the book is free with the purchase of 24 or more Quad Clips. For more information, contact Peter L. Demmer, KH6CTQ, at The AMPRUSS Company, P.O. Box 551, Aiea, HI 96701.

Incidentally, out of curiosity, we asked Peter what the significance of this company's name, AMPRUSS, was. Is it an acronym, or what? His business card answers the question: "American Made Products Radio Users Specialty Systems."

Computers and Amateur Radio. An interesting, newspaper-style publication for the hamshack computerist is offered by the Kantronics people. The bi-monthly publication is "dedicated to the future of amateur radio and use of personal computers to enrich the hobby"; a goal is to "billboard" information that recognizes the link of computers and ham radio—and we're all for that!

The publication is, as might be expected, very heavily oriented toward Kantronics equipment, and thus is something of a "Kantronics users magazine." However, general computer-related subjects are covered as well, especially in the area of the newest communications modes, such as packet radio and AMTOR. Also, Kantronics president, Phil Anderson, W0XI, is a frequent contributor; his pieces add measurably to the magazine's stature. Subscriptions are $6 per year, and more information can be obtained by writing to *Computers and Amateur Radio,* 1202 East 23rd Street, Lawrence, KS 66044.

QEX. A relatively little-known ARRL publication is *QEX: The ARRL Experimenter's Exchange.* This publication, which looks something like a cross between *QST* and a technical newsletter, has three main purposes: (1) providing a medium for the exchange of ideas and information between amateur radio experimenters; (2) documenting advanced technical work in amateur radio; and (3) supporting efforts to advance the state of the amateur radio art.

Newsy but technical, *QEX* is authored by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ. Recent articles have included articles on antenna design, packet meteor scatter communications, computer programs, AMTOR, cellular radio technology, and other topics which might be too specialized or technically controversial for publication in *QST* or other major monthly amateur magazines.

A yearly sub to *QEX* is $6 for ARRL members, and $12 for non-members. Contact the ARRL, 225 Main Street, Newington, CT 06111 for more information.

Products of Note

Phillystran™ Tower Guys. Tired of messing with metallic guy wires, with all of their attendant disadvantages? A product introduced in 1973 to the broadcast industry is beginning to catch on with amateurs looking for nonmetallic, insulator-free guying systems. This product is the Phillystran HPTG tower guying material.

According to the manufacturer, United Ropeworks (U.S.A.), Phillystran has been used successfully by over 800 broadcast stations since its introduction in 1973. In these applications, it was chosen over wire strand materials because of its light weight, high strength, electrical transparency, suitable dielectric properties, and ease of installation. Interestingly, diameter for diameter, Phillystran is stronger than extra-strength galvanized steel, and is also three to four times lighter

Too large for the hamshack? Possibly the granddaddy of them all, this 1956 Burroughs Atlas Guidance Computer, Mod I, may in a sense be the ancestor of the present-day solid-state personal computer. This unit, on display in the Smithsonian Institution, is said to be the first operational unit to use transistors rather than vacuum tubes. (W8FX photo)

than extra high strength steel. It is jacketed with an extruded olefin copolymer selected for its abrasion and weather-resistant qualities.

The main advantages to using such a nonconductive, noncorrosive material derive from the effective isolation of the tower guy system from the antenna field, as well as reduced distortion of signal coverage caused by radiation from the guy wires or absorption by them. As a result, there is no need to use insulators to break up guy wire resonances. In a residential setting, the product's use assures a neat tower appearance without steel guys to corrode or ceramic insulators to act up.

These advantages must be balanced by the high cost of the material (a minimum of 26 cents per foot, depending on diameter), and the requirement for rope ends to be specially prepared and "socketed" in special end fittings. A potting compound, sold by the firm, is required to seal the cable ends. The additional expense and installation complexity involved in using Phillystran may or may not be warranted in your particular situation.

Phillystran HPTG is available from many of the larger amateur radio distributors. For more information on this unusual product, contact United Ropeworks (U.S.A), Inc., 20 Commerce Drive, Box 306, Montgomeryville, PA 18936.

B&W Continuous Coverage Antenna. Hams are always looking for a "no problem," all-band

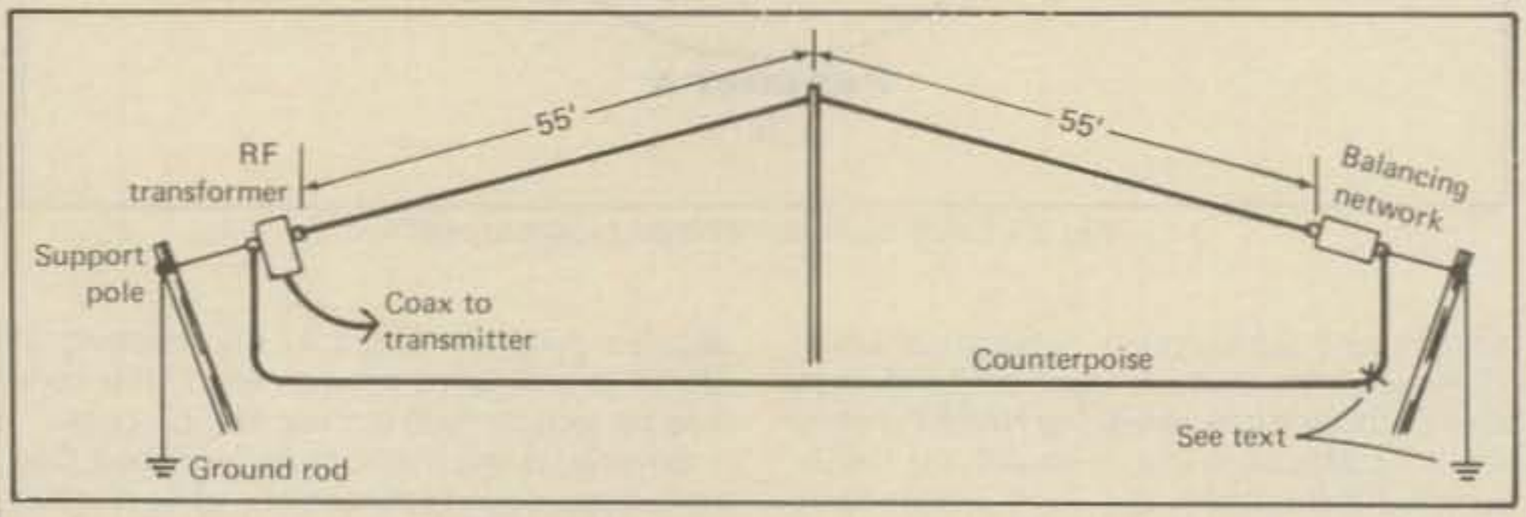


Fig. 3– B&W Model AC-1.8-30 typical installation (inverted-V configuration). The basic configuration for the B&W antenna is as a ground-mounted inverted-V; it may also be installed on a roof or as a Sloper, as shown in fig. 4. The antenna ends may run directly to stakes in the ground or to poles 8–10 feet high. Good ground rods are suggested at each end. If the location has good, moist soil conditions, the counterpoise may not be required. If needed, the counterpoise wire should be connected to the ground side of the RF transformer. The antenna may, in fact, work best with the opposite end of the counterpoise not connected to the ground side of the balancing network. Try unterminated and terminated configurations to determine the best results for your particular installation. Bear in mind that the counterpoise is essential in poor ground, dry-soil situations, and it does not have to run directly under the antenna wire.

netic waves which alternate according to their particular frequency. If extremely fast alternating waves (three billion times a second, or 3 GHz, for example) are induced directly into nonmetallic substances, the resultant "back and forth" internal molecular agitation will create extensive heat. This is the concept employed in microwave ovens. An internal high-power magnetron generates RF energy which is output to radiating plates in the oven's compartment, and a mode stirring fan disperses that energy within the compartment. Food in the oven is cooked via a timed exposure to internal molecular agitation.

Commercial and military radar operate in the mid to upper microwave range of roughly 3 to 12 GHz, and these units are also capable of inducing hazardous energy within the immediate field of their dish antennas. This energy decreases quite rapidly with each centimeter distance from the dish and each degree variation from its major lobe's beamwidth. Exact facts regarding how many years exposure at a distance of, say, 400 feet from a dish radiating 1000 watts of energy would be hazardous is unknown at this time. Since few people care to experience irreversibly dangerous exposures, the obvious solution is ensuring high field intensities aren't "sprayed" where human exposure may be possible (aiming dishes upward, using side lobe protection, etc.). These parameters will become important to amateur radio during the next decade, when main activities move upward in spectrum allocations.

As studies move toward lower frequency radiations, the effects of immediate nonmetallic heating become less apparent. Effects of long-term exposures or nonheating, however, haven't been proven damaging or nondamaging, and additional speculations must be approached with caution. We do know that 27 MHz energy can be inducted into bones with "warming effects." Also, a large resonant cavity/load connected to a 100 to 200 watt 2 meter transmitter can cook a hamburger patty within roughly 30 minutes. We do not know, however, if mere (long term) exposure to (weaker) radiated waves within this general frequency range could affect body tissues of maximum sensitivity. If "old timer" amateurs might be considered examples, a clean bill of health is indicated. Interestingly, aged amateurs (our major population) were "open air" exposed to both vast amounts of RF energy and possible "soft" x-rays from large vacuum tubes. Looking negatively at the previous consideration, it's always possible some yet undiscovered parameter may be a by-product of or evolve from RF exposures. Recoursive actions here involve standard amateur practices: mounting antennas as high and in the clear as possible while using their directivity (and end) effects to advantage, plus using the lowest power possible for communicating effectively. Actually, all of us would enjoy simpler operation and lower investment cost with reduced power limits.

The Radio Amateur's Position

The main questions at this point obviously center around amateur transmitting gear and their RF related effects on society. Since each of us pursues life's pleasures with these hypothetical radiation sources within our own environment, we're logically subjected to their effects. Naturally we don't endorse placing ourselves or our neighbors in stressful situations.

Since medium- to high-power microwaves are proven areas of hazardous radiation, amateurs pioneering EME and mode L satellite communications should avoid direct exposures to their RF fields. Dish antennas are definitely suggested because of their sharp beamwidth and high rear attenuation. Study the dish's radiation pattern, and then position it so the parabolic reflector protects both you and your neighbors. If side-lobe radiations are questionable, add a fine mesh fence around its part of the yard for additional protection (the unattenuated main lobe can travel above the fence). Occasionally, dish installations can advantageously

use "natural" protection such as hills or ravines. Likewise, metal buildings such as mobile homes can prove ideal "shacks" for microwave setups. Transmission lines and connectors should also include double shielding as an additional margin of safety. If high-power RF amplifiers are used, stay alert to possible body currents circulating around their cabinets. Why such extensive precautions? Simply because the long-term exposure to low power levels of microwave energy are unknown, and overprotection is more logical than relaxed attitudes.

Moving lower in frequency allocations, our next areas of consideration are the popular 70 cm and 2 meter amateur bands. While direct induction field molecular agitations in these ranges are substantially less than microwaves and heating effects are over 100 times longer, one or two lifetime-type long-term effects still can't be accurately defined. Once again we advocate the "ounce of prevention" or "overkill" approach. When using power levels above 50 watts, strive for beam antennas positioned at least three wavelengths from any potential RF recipient. Likewise, try to use minimum radiation end effects advantageously. That is, locate operating positions (including house rooms used by others) in line with beam element ends. Again, pay special attention to coax and connectors for ultimate protection.

One possibly overlooked area of potential radiation exposure in the UHF and VHF range involves handheld talkies using rubber-ducky antennas. General design and use of these units places their antenna's major radiation directly in line with one's eyes. In effect, the eyes are electromagnetic receivers with sharp tuning and narrow bandwidth. Their resonance curve peaks at green with violet and red near each edge of the curve, but might "outside" signals "bulldoze through?" Our suggestions here involve using less than 1 watt of power at 2 meters and ½ watt of power at 70 cm when utilizing stubby antennas, and canting talkies to avoid eye exposure. Long antennas such as ½- or ⅝-wave whips are suggested for higher power talkie use, and external antennas are prime mobile suggestions. Their best locations are obviously above rear-window areas. Visualize RF radiation as light illumination and you can't go wrong.

Our final considerations involve the classic HF range of 1.8 to 30 MHz, the area in which most of us "cut our teeth" and affectionately call "home." Molecular agitation at these frequencies is extremely low, and immediate field heating effects are practically nonexistent (assuming normal amateur radio levels). The long-term effects of exposure (two or more lifetimes) to HF energy, however, can't be confirmed or denied. Our gusto ancestors were exposed to every radiation imaginable (and continued living to ripe old ages), true, but each generation of society becomes slightly weaker and inferior. Although quite doubtful, it's possible that long-term exposure to absolute legal-limit low-band RF sprayed at random might affect its closest recipients (1500 watts directed to a ground-mounted vertical less than one wavelength from normal living areas). Our "ounce of prevention" suggestions thus again employ mere common reasoning. When using power levels above 200 watts, place antennas where their induction fields do not include daily living areas (one or two wavelengths away, for example), and use minimum radiation end effects advantageously. Try to avoid use of ground-mounted verticals when using high power levels, or position them in wide-open fields. Remember that horizontal radiators emit energy around their full circumference, including above and below elements. A directional array directly above the radio room, for example, can radiate RF through wood and back towards family members. Finally, there's the traditional consideration of using low power levels (100 watts or less) when possible. This measure will surely extend adverse effects of RF to several lifetimes, and its also a grand way to add new enjoyment and freedom of operations in our daily activities.

Conclusion

The question of RF energy hazards can't be answered in a single sentence. It must consider frequency, power levels, and field strengths. This consideration must also be separated from other influences affecting operators rather than neighbors. The short wavelengths of microwaves can be radiated into nonmetallic substances, but long wavelengths of HF pass right through those materials. Related molecular action is extremely slow—similar to mere motion rather than friction—but it does exist. Through careful planning, however, *any amateur radio setup could easily prove the least RF polluting part of our existing environment. Considering the advantages our service provides to society versus our strictly hypothetical disadvantages, we truly offer encouraging returns to all mankind.*

73, Dave, K4TWJ

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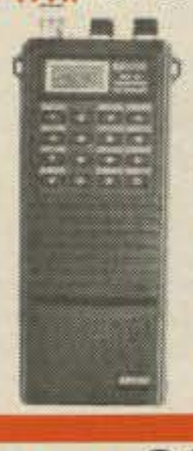

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CIRCLE 79 ON READER SERVICE CARD

JUST IN TIME FOR CHRISTMAS: Estate sale still going on. Signal One Milspec 1030, CX11A, JIL SX400 Scanner new, Yaesu FRG8800, FRG9600 New FT980, FT902DM, Kenwood TS930S Speaker Microphone, etc. Collins 75A4 KSW1 mint restored btr than new. Factory sealed cartons Drake C Line T4XC, R4C, AC4, MS4 FS4. Signal CX7 CX7A, B, etc. Factory sealed carton Collins KWM380, new National NCX1000 transceiver 1kw SSB, HRO500 LF-10 Preselector. Henry 4K Ultra Linear & much much more. I will send U a list. Export inquiries welcomed. Pls write Mark, P.O. Box 0280, Baldwin, NY U.S.A. 11510.

FOR SALE: Antique and modern radio, TV, and electronic parts, tubes, and used books. SASE for revised list. H. Lash, 19 E. 157th Street, South Holland, IL 60473.

CHASSIS AND CABINETS KITS: SASE K3IWK.

RADIO REPAIR DATA Service Manuals: Amateur and SWL. Write for prices. Specify Model Number(s) desired. Arnco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

NOVICE RADIO OUTLET New and used equipment dealer! Special attention beginners! *January Special!* SPI-RO Five Band Trap Dipole $62.95, (NEW) AZDEN PCS-5000 2M Mobile $305.00, free shipping U.S.A. Call 919-286-7927. 1604 Delaware Ave., Durham, NC 27705.

ROSS $$$$ USED JANUARY SPECIALS: (OVER 200 USED ITEMS IN STOCK) KENWOOD TS-520 $359.90, TS-520S $379.90, TS-180SDFC $389.90, TS-930SWAT $979.90, TS-820S/DG1 $439.90, TS-711A $609.90. YAESU FT-101ZD $459.90, YO-901 $379.90, FT-625RD $425.90. ICOM IC-490A $399.90, IC-251A $369.90, IC-701 $295.90. If this month's special is not what you are looking for, send SASE, Call letters, name & phone # for used list. Also 7,500 NEW ham-related items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 on Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

ELECTROLYTIC Engraver Plans: Inexpensive, easy construction from household materials. Etches characters, information in metals. Decorate, protect belongings. $5.00. Protolech, 83 Woodward, Staten Island, NY 10314.

POWER: 15 VDC regulated, 300 amp. Send SASE for: Stardrive, P.O. Box 672, Asheville, NC 28802.

TELEGRAPH KEYS WANTED: Collector seeking pre-1940 bugs. Vibroplex, Martin, Thomas, Lippencott, Abernathy, etc. Also need spark keys and pre-1910 telegraph (keys, sounders, pocket sets, etc.). Visitors welcome. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081. Tel. (214) 234-1653.

ELECTRON TUBES: Radio & TV types 75% off List Price—Huge Inventory! Also industrial types. Send for Free Catalog Today or Call Toll Free (800) 221-5802. Box CC, Transleteronics, Inc., 1365 39th St., Brooklyn, NY 11218. See Our Display Ad This Issue.

LIVE RENT-FREE! Save Money. Legal & Easy when you know how. $5 to Robinson, POB 76799O, Vancouver, Canada V5R5S7.

HAPPY NEW YEAR from the Crew at Junior High School 22 on Manhattan's Lower East Side. Be a WINNER in 86! Send us your QSL via WB2JKJ and we might send you our QSL OF THE WEEK AWARD.

THANK YOU very much for all the amateur radio equipment that you guys bought. I also have a few other items in my father's estate, like a 1967 Corvette coupe completely restored, 427-396HP, four-speed, power everything, loaded to the sky for twenty thousand dollars. A 1963 split-window Corvette fully restored to showroom looks, 327-265 hp, automatic, all power, blue red int., price 20K (twenty thousand). Other cars available. Note can be seen by appointment. Cessena 175 twin-engine plane 1981 yr, bought new, low hours, can deliver anywhere in the country. Pls inquire about other amateur radio items available, Collins, Signal One, Drake, Yaesu, etc. P.O. Box 0280, Baldwin, NY 11510. Mark or Mike.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Free catalog. CBCI, Box 31500CQ, Phoenix, AZ 85046. (602-996-8700).

KT5B ANTENNA 160M–10M no Traps! $59.95. Weather Boot Kit $8.95. Open-wire, Roller-Inductor, Antenna Accessories, and Much More! Kilo-Tec, P.O. Box 1001, Oak View, CA 93022. Tel: 805-646-9645.

WANTED: Motorola HT220's and HT100's, VHF or UHF, P.O. Box 4344, Chatsworth, CA 91313.

FOR SALE: Regency SR-1000 Satellite TV Receiver with block down converter. Never used, $230.00. Darrell Hohensee, 217 N. Hamilton, Pratt, KS 67124.

C*64 OWNERS: IMCT-The professionally designed Code trainer $19.95. BAND/AYDE—The Ham Shack helper w/screen notepad; 12/24-hour clock; ID timer; built-in word-processor $14.95. Order both for $24.95. PA residents add 6%. (Diskette only.) AC3L SOFTWARE, Box 7, New Derry, PA 15671.

MILITARY RADIO SETS: GRC, PRC, SRC, TRC, URC, VRC, system components, test equipment, night vision, intrusion det. BEST PRICES, buy and sell. Complete catalog, send $2.00, shipping and handling. MIL-COM EXCHANGE, P.O. Box 982, Orange Park, FL 32067-0982.

TI99/4A QUAD & GAMMA/M, Plus 3 More FREE! Mail disk + $5 to Robinson POB 76799Q, Vancouver, Canada V5R5S7.

FCC COMMERCIAL General Radiotelephone License Correspondence Course. 60 individual lessons for $89.50. Payment plan. Results guaranteed! Details free. AMERICAN TECHNICAL INSTITUTE, Box 201, Cedar Mountain, NC 28718.

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1986 CALLBOOKS: Either, $19; both, $33. Any 4 or more, $16. Postpaid U.S. CA, 6% tax. Century Print, 6059 Essex, Riverside, CA 92504-1599 (714-687-5910).

HELLO RADIO AMATEURS. Thank you so much for all of your inquiries, purchases that have been made in selling three generations of amateur radio equipment. There is still more. Brand new Ameritron Linears AL-80 3-500Z $577.00, AL84 4X6JM6 $370.00, AL1200 3CX 1200A $1,300.00, RCS8 Coax Switch $100.00, ATR8B 300 watt Antenna Tuner $80.00, ATR-10 1kw Tuner $230.00, ATR-15 1.5kw Antenna Tuner $268.00, Drake MN75 $75.00 Antenna Tuner 200 watt. Henry Console Linear Model 2K Classic $1000.00. All FOB NY U.S.A. I will export anywhere in the free world to the foreign hams. All inquiries answered. Please write. Mark, P.O. Box 0280, Baldwin, NY U.S.A. 11510.

NEED CASH? Junk piling up in the shack? Let me know what it is and what you want. I pay shipping! KA9CAQ, P.O. Box 6349, Evansville, IN 47712.

ARMY FIELD RADIOS: CPRC-26 Infantry Manpack Radio, compact, transmits-receives 46–54 MHz FM, 6 channels, with battery box, antenna, crystal, handset: $22.50 apiece, $42.50/pair, good condition. PRC-9 Backpack Radio, factory mint, transmits-receives 28–39 MHz FM continuous tuning: $52.50 apiece, $77.50 with good condition battery box, antenna, handset. PRC-510 Backpack Radio (Canadian version of American PRC-10), transmits-receives 38–55 MHz FM continuous tuning, with battery box, antenna, handset: $39.50 apiece, $77.50/pair, good condition. R-390A Communications Receiver, .5–32 MHz AM-CW-SSB, shortwave, amateur, military frequencies: $175 good condition. R-108 Military Vehicle/Field Receiver, 20–28 MHz FM: $27.50 mint. 45 Day Replacement Guarantee. Add $9.50 shipping-handling. Baytronics, Dept. CQ, Box 591, Sandusky, OH 44870.

ESTATE SALE: Dentron amateur radio equipment from the new Dentron Radio Co. called Coilco Corp. I have one each of the following: QRO Linear 4X572Bs 2kw $660.00, GLA 1000C 4X6LO6 tubes 1kw $375.00, GLT1000C Antenna Tuner 1kw $149.00, MLT2500 2kw Tuner the best $330.00, Antenna Doublet $29.00, big Dummy Load with oil $25.00, QRV-1 transceiver $208.00. Factory sealed cartons or come with original carton tubes burnt in only. All FOB NY U.S.A. Will export. Mark, P.O. Box 0280, Baldwin, NY 11510.

HAM RADIO REPAIR! Tube through solid state. Robert Hall Electronics, Box 8363, San Francisco, CA 94128 (408-729-8200).

SALE STILL GOING ON: Collins 30S1, $1,295.00, 30L1 $375.00, 62S1 $450.00, 312B4 $150.00, 516-F2 $100.00, KWM2 $600.00, KWM2A $700.00, 75S2 $250.00, 75A4 $250.00. Swan 117XC $75.00, 250C $175.00, 270B Cygnet $250.00, 1200 watt Cygnet Linear $275.00, 350 transceiver $200.00, TV2B $150.00, 508 VFO $130.00, HAL ST6 $175.00, RVD 1002 $175.00, HAL 1550 $175.00, RKB-1 Keyboard $100.00, DKB 2010 KUBD $135.00, Heath SB-220 $400.00, SB-620 $125.00, HO-13 Scope $100.00, HO-10 $100.00, Seneca $75.00, Tempo 2002 2 mtr Linear $750.00, Gonset 2 mtr Linear $175.00, Dentron 160XV $100.00, Super Tuner $150.00, Millen Transmatch $175.00, B&W 334A $75.00, Waters 334 $75.00, Clegg 22'er $50.00, Yaesu FRG-7 $150.00, Infotech 100 trimodel $100.00, matching TU $175.00, KLM Multi 2000 $200.00, IC21A ICOM $175.00, TS700A $250.00, Clegg Interceptor $150.00, matching all bander $150.00, Comcraft CTX 144 $100.00, National NC155 $100.00, SBE 34 $75.00. I will export anywhere to the free world. Most come with manuals. All replies answered. Most items UPS ship. Make offers. Mark Paulson, Post Office Box 0280, Baldwin, NY U.S.A. 11510. Please note that many items are more than one of a kind. Thank you. Export inquiries invited.

TELL THE WORLD what you would really rather be doing! "I'd Rather Be DX'ing" bumper sticker with "Amateur Radio" written down the sides. Send $2.00 plus $.50 postage to Dan Jordan, P.O. Box 6349, Evansville, IN 47712.

SELLING: SWAN CYGNET 270, ideal go anywhere rig, 12V 120V built in, $200 or best offer. KENWOOD TS520S, $300 or best offer. New York 516-285-5196.

20% OFF COMPUTER PROGRAMS! Send SASE for free catalog. E.P.O. SOFTWARE, 7805 N.E. 147th Ave., Vancouver, WA 98662.

SALE: Info-tech keyboard, Model 150, Info-tech converter, Model 150, Panasonic 9" video/monitor, $200. Call (718) 698-8069.

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FOR SALE: Swan 270B with VX-2. Best offer. Excellent condition. Will ship UPS K3AQR, 904 68th Ave. West, Bradenton, FL 33507.

FOR SALE: Heath HW-16 and HG-10B VFO. $100 or offer for both + shipping. Doug Kiessling, 7414 Colshire Dr., McLean, VA 22102 (703-821-0509).

TEN-TEC DELTA HF transceiver, power supply, keyer, mic. Good condition, $600. Erik, N1CFO, 802-775-3666.

FOR SALE: Kenwood TS-930S Transceiver with AT-930 and CW Filter $1300. Kenwood SM220 Station Monitor with BS-8 pan dislay $275. Wm. Shevtchuk, 1 Lois Ave., Clifton, NJ 07014 (201-471-3798).

WANT: UTC Linear Std MLF amplifier (mono) or McIntosh A-116 or MC-30 (mono) both circa 1954. Don, Box 48, B'val Stn., Andover, MA 01810.

WANTED: Kenwood TW-4000A. 8930 Tubes & 1296 MHz gear. Clem, W8VO, 33727 Brownlea, Sterling Hgts., MI 48077.

WANTED: Drake model P-75 phone patch and a KLM 11-element 6 meter beam. Johnny Carr, Route 2, Rockmart, GA 30153.

FOR SALE: Yaesu FT-901DM, excellent rig. Call 215-445-5643. $550 or best offer. Stephen Mozeliak, Box 8 RD 1, Main St., Stevens, PA 17578.

CANADIAN HAMS: Heath HR-1680, HS-1661 spkr, HW-8 SCVR, HD-1250 Dipper, SA-5010 Umatic Keyer. R.W. Boyd, Box 793, Stn "A", Montreal, Quebec, (514) 481-4830 after 18:00 hrs.

HELP! To keep in touch with my family, a Venezuelan student needs donation of equipment. CB's with SSB are also accepted. R. Lopez, YV1DWO, 1409 Oak St., Melbourne, FL 32901.

FOR SALE: Drake Twins, R4B, T4X, AC4/MS4, manuals, cables & extra xtals. Excellent condition. $325. Mel Toren, W2GMA, 1762 Larkspur Rd., Cherry Hill, NJ 08003 (609-795-3294).

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YAESU FT-101E with 600 Hz xtal filter, FT-650B 6m xvtr., $600 plus shipping. K4DDB, B. Earp, 428 Dracena Way, Gulf Breeze, FL 32561.

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CIRCLE 126 ON READER SERVICE CARD

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The large LCD readout and conveniently located controls enable easy operation, even in the mobile environment. Controls which require rare adjustment are placed behind a hatch cover on the front panel of the radio. VOX control, mic gain and other seldom used controls are kept out of sight, but are immediately accessible.

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