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Amateur Radio

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NOVEMBER 1980 $2.00

CQ

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THE RADIO AMATEUR'S JOURNAL

Rack Attack from DenTron

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

DTR-1200L Linear Amplifier

Frequency Ranges:	
80 Meter Band	3.45 - 4.6 MHz
40 Meter Band	6.00 - 9.0 MHz
20 Meter Band	10.00 - 16.00 MHz
15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model
Modes:	USB, LSB, CW, RTTY, SSTV
Power Input:	1200W - SSB, 1000W - CW
Power Requirements:	234/117 VAC 50/60 Hz
RF Drive Power:	150 Watts maximum and 65 watts minimum for 1 KW DC input.
DC Plate voltage:	Idle + 2300V approximate
Duty Cycle:	100% SSB, CW, RTTY, SSTV
Input Impedance:	50 Ohms nominal
Input VSWR:	1.5 to 1 average
Output Impedance:	50 Ohms nominal
Antenna load VSWR:	2 to 1 maximum
ALC:	negative going, adjustable from front panel
Spurious Emissions:	IMD - greater than 30 db down Harmonics - greater than 40 db down
FCC Type Accepted	
Size:	5¼" H x 17" W x 13" D (19" W with rack brackets)
Weight:	46 pounds

Switchable 12VDC accessory output voltage
Multimeter:

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

Front Panel Plate Voltage Switching

DTR-3KA Antenna Tuner

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

Power Capability: 3000 watts P.E.P.
Wattmeter: 200 watts forward
2000 watts forward
200 watts reflected
Accuracy: ± 5%
Remote sensor box
3½" backlit meters
Dummy Load: with manual or automatic forced air cooling.
Integral 3KW Balun

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ON THE COVER: A picture of Saturn taken by NASA's Voyager 1 on June 24, 1980. The Voyager project is managed for NASA's Office of Space Science by the Jet Propulsion Laboratory, who graciously supplied the photo.

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Zero Bias

AN EDITORIAL

Although this is written for the November issue, it actually is being written in the last days of August. We're coming up on our first anniversary as the new *CQ* and still wondering where the time went. From the letters we have received over the past year and from all of the friendly encouragement we've received at hamfests and conventions, it's been a very eventful year for all of us.

In fact, *CQ* has moved up in the world, literally, as of last week. After several weeks of very hectic construction, the *CQ* offices moved up in the world exactly one story, or about 15 feet. New owners of our office building relocated our offices up the one story into all new and modern facilities so that they could have the entire floor we previously occupied. Although our accommodations are much nicer and in many ways better, it still will take addtional time to sort out the tremendous material we've accumulated during this past year. Anyway, I hope this doesn't become a yearly event.

This past week I took leave of the *CQ* offices and drove down at Asbury Park, N.J. to take a look at the home of Telrex Laboratories. In September we ran a picture on the cover of a Telrex antenna being raised in position by a hot air balloon, and so Jack Gutzeit and I went down to Telrex to present them with a large print of that photo. Charles Ercolino of Telrex took us on a plant tour where we could see how some of their really big antennas are put together. It's easy to see how if you had a few bucks put away you could go a little crazy trying to figure out where to put one of those big jobs. Maybe no one would notice it if you painted the top side in earth tones and the bottom side sky blue. I've always been fascinated with large machine tools, and it was quite an eyeful to see some of their products being turned out, especially how some large tubing easily can be swaged to precision.

The next day I flew down to Washington, D.C. and roamed the halls of the FCC trying to find everyone I knew. Like *CQ*, the FCC keeps everyone on their toes by moving offices around periodically. I probably came as a welcome relief to some, as I had no petition in hand, no request or personal favor to seek, and merely wanted to meet some of the newer people we hear about. Everywhere I went I was told that I was either one hour behind or one hour ahead of Perry Williams of the League, who apparently was making the same rounds. Our paths did not cross, though.

Part 147

I have to apologize to you for a lack of planning in some areas. In August we ran Part I of what I thought would be a two-part series on German WW II radio equipment. Well, Part II got out of hand in size due to the illustrations. It came out too long for a typical article, and so it has gone back to the drawing boards. Part II will probably be Parts II and III. I did, and still want to, make the extraordinary photographs as large as possible to really give you a look at some phenomenal engineering. I hope to have the new Part II ready for the December issue. Again, my apologies to you and to the author, who now tells me he has some other goodies in the works (a little shorter I hope) that many of us have only read about in spy novels.

The Future

Next week we'll all be off to Chicago for Radio Expo, which, of course, will be history by the time you read this. We'll also be at Boxborough, Mass., for the New England Convention, and then we'll wind up the 1980 circuit at the HARC Convention at the Pines Hotel in Upstate New York. We've really dotted the globe this past year with more planned for 1981.

With amateur radio growing and the new *CQ* growing, 1981 is shaping up to be a very good year for all of us. We've got some first-rate material in the works guaranteed to extend your enjoyment of both *CQ* and amateur radio. We've streamlined some of our contest and awards procedures to make some of you super achievers and competitive guys a bit happier. One immediate result that should be apparent is that the certificates for the 1979 CQ World-Wide DX Contest have been completed and mailed. Everyone, including the overseas entrants, should receive them before next month. It's a first!

We've got a new trophy company lined up with speedier and better service, and they promise to expedite that bottleneck. By now many of you have used our new log sheets for the contest, and that, too, is a measure of efficiency. By next year's contest we hope to have a complete contest package available, including return envelope and easy to fill in dupe sheets. We're working very hard for you and amateur radio and all the good times ahead.

So keep saying you "Saw It In CQ" wherever you can, and fill in those subscription blanks. We would not be adverse to you urging your friends to do the same.

73, Alan, K2EEK

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Super Specs. *Optimized sensitivity*—a balance between dynamic range and sensitivity (2 μV on 160 to 0.3 μV on 10 meters) *Greater dynamic range*: better than 90 dB. And a PIN diode switchable 18 dB attenuator. *200 watts input* on *all* bands! *100% duty cycle* on *all* bands for up to 20 minutes.

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Super Design. *All Solid-State and Broadbanded*—from the pioneer, Ten-Tec. *Modular* plug-in circuit boards. *Functional Styling* with convenient controls, full shielding, easy-to-use size (5¾"h x 14¼"w x 14"d).

Super Hercules Companion. Styled to match, plus separate receiving antenna capability, plus transceiver front panel control of linear's bandswitching (one knob does it all).

Full Accessory Line including filters, remote VFO, power supplies, keyers, microphones, speech processors, antenna tuners—all in matching color.

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Automatic Bandswitching when used with OMNI (the OMNI bandswitch also controls HERCULES bandswitching through a motor driven stepping switch). Super convenient.

Full Break-In. HERCULES puts the conversation back into high power CW operation—you can hear between every character you send.

Full Coverage. 160 through 15 meters plus four "AUX" positions for 10-meter conversion by owner and future band additions.

Full Gallon. 1000 watts input on *all* bands, 600 watts output, typical. Built-in forced-air cooling. Driving power: 50 watts, typical. Adjustable negative ALC voltage. 100% duty cycle for SSB voice modulation; 50% duty cycle for CW/RTTY (keydown time: 5 minutes max.) Continuous carrier operation at reduced output.

Full Protection. *Six LED status indicators* continuously monitor operating conditions and shut down the amplifier whenever any one exceeds set limits (the exciter automatically bypasses the amplifier under amplifier shut-down for barefoot operation). The six parameters monitored are: 1) overdrive; 2) improper control switch setting; 3) heat sink temp.; 4) SWR; 5) overvoltage/overcurrent; 6) rf output balance. *Two meters* monitor collector current, voltage, and forward/reverse power. And a highly efficient *automatic line voltage correction* circuit (patent applied for) eliminates the need for selecting transformer taps, prevents applying too high a voltage to final amplifier devices, becomes operative under low line conditions.

Super Power Supply. Provides approximately 45 VDC @ 24 amperes, operates on 105/125 VAC or 210/250 VAC. Tape wound transformer and choke reduce weight (50 lbs.) and size (7½"h x 15¾"w x 13½"d). Separate enclosure.

Super Styling. Designed to match OMNI, the HERCULES has the same height as OMNI, plus matching bail and matching colors. The front panel is simplicity in itself with two push-button switches (power and mode) plus two knobs (meter and bandswitch), and a "black-out" monitor panel (when unit is off, meters are unobtrusive). Amplifier size is 5¾"h x 16"w x 15½"d.

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Synthesized/PTO Frequency Control—A Drake exclusive: carefully engineered high-performance synthesizer, combined with the famous Drake PTO, provides smooth, linear tuning with 1 kHz dial and 100 Hz digital readout resolution. 500 kHz up/down range switching is pushbutton controlled.

Advanced, High-Performance Receiver Design—The receiver section of the Drake TR7 is an advanced, up-conversion design. The first intermediate frequency of 48.05 MHz places the image frequency well outside the receiver input passband, and provides for true general coverage operation without i-f gaps or crossovers. In addition, the receiver section features a high-level double balanced mixer in the front end for superior spurious and dynamic range performance.

True Passband Tuning—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

Unique Independent Receiver Selectivity—Space is provided in the TR7 for up to 3 optional crystal filters. These filters are selected, along with the standard 2.3 kHz filter, by front panel pushbutton control, independent of the mode control. This permits the receive response to be optimized for various operating conditions in any operational situation. Optional filter bandwidths include 6 kHz for a-m, 1.8 kHz for narrow ssb or RTTY, and 500 Hz and 300 Hz for cw.

Broadband, Solid State Design—100% solid state throughout. All circuits are broadbanded, eliminating the need for tuning adjustments of any kind. Merely select the correct band, dial up the desired frequency, and you're ready to operate.

Rugged, Solid State Power Amplifier—The power amplifier is internally mounted, with nothing outboard subject to physical damage. A Drake designed custom heat sink makes this possible. The unique air ducting design of this heat sink allows an optional rear-mounted fan, the FA7, to provide continuous, full power transmit on SSTV/RTTY. The fan is not required for ssb/cw operation, since normal convection cooling allows continuous transmit in these modes.

Effective Noise Blanker—The optional NB7 Noise Blanker plugs into the TR7 to provide true impulse-type noise blanking performance. This unit is carefully designed to maximize both blanking and dynamic range in order to preserve the excellent strong-signal handling characteristics of the TR7.

* NOTE: Transmitter coverage for MARS, Government, and future WARC bands is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux7 Range Program Board. Prices quoted from the factory. See Operator's Manual for details. (Not available for services requiring type acceptance.)

TR7

ACCESSORIES

Model 1336	Drake TR7 General Coverage Digital R/O Transceiver
Model 1338	Drake RV7 Remote VFO
Model 1502	Drake PS7 120/240V Ac Supply for continuous duty operation (25 amps)
Model 1570	Drake PS75 120/240V Ac supply for intermittent duty (15 amps continuous, 25 amps intermittent)
Model 1553	Drake SP75 Speech Processor
Model 1230	Drake LA7 Line Amplifier
Model 1533	Drake CS7 Coax Switch
Model 7077	Drake Desk Microphone
Model 1520	Drake P75 Phone Patch
Model 1536	Drake Aux7 Range Program Board **
Model 1531	Drake MS7 Matching Speaker
Model 1537	Drake NB7 Noise Blanker
Model 1529	Drake FA7 Fan
Model 7021	Drake SL-300 Cw Filter, 300 Hz
Model 7022	Drake SL-500 Cw Filter, 500 Hz
Model 7023	Drake SL-1800 Ssb/RTTY Filter, 1.8 kHz
Model 7024	Drake SL-6000 A-m Filter, 6.0 kHz
Model 1335	Drake MMK-7 Mobile Mounting Kit
Model 7037	Drake TR7 Service Kit/Extender Board Set
Model 385-0004	Drake TR7 Service/Schematic Book

**Aux7 must be used with either Model 1546 RRM-7 Range Receive Module, or Model 1547 RTM-7 Range Transceive Module. Use one module per 500 kHz range. Modules plug directly into Aux7.

TR7 SPECIFICATIONS

GENERAL

Receive

Without Aux7	1.5 to 30 MHz, continuous, no gaps.
With Aux7	Same, plus 0 to 1.5 MHz at reduced performance.

Transmit

Without Aux7	1.8-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 MHz.
With Aux7*	Above ranges, plus any eight 500 kHz segments from 1.8 to 30 MHz.

Modes of Operation	Usb, Lsb, Cw, RTTY, A-m equiv. (A-3H).
Frequency Stability	Less than 1 kHz first hour. Less than 150 Hz per hour after 1 hour warm up. Less than 100 Hz for ±10% line voltage change.

Frequency Readout Accuracy

Analog	Better than ±1 kHz when calibrated at the nearest marker point.
Digital	15 ppm ± 100 Hz.

External Counter Mode

Maximum Input Freq.	150 MHz.
Input Level Range	50 mV to 2 V, rms.

Power Supply Requirements	11-16 V-dc (13.6 V-dc nominal), 3A receive, 25A transmit.

Dimensions

Depth	12.5 in. (31.75 cm), excluding knobs and connectors.
Width	13.6 in. (34.6 cm).
Height	4.6 in. (11.6 cm) excluding feet.
Weight	17.1 lb. (7.75 kg).

RECEIVER

Sensitivity

Ssb, Cw	Less than 0.5 μV for 10 dB (S+N)/N.
A-m (30% Mod.)	Less than 2.0 μV for 10 dB (S+N)/N.

Selectivity	2.3 kHz at −6 dB and 4.4 kHz at −60 dB (1.8:1 shape factor).
Ultimate Selectivity	Greater than 100 dB.
Agc	Less than 4 dB output variation for 100 dB input signal change, referenced to agc threshold.
Intermodulation	Intercept Point, +20 dBm. Two-tone Dynamic Range, 99 dB (at spacings of 100 kHz and greater).
I-f Frequency	First i-f—48.05 MHz. Second i-f—5.645 MHz.
Image and I-f Rejection	Greater than 80 dB.
Spurious Response	Greater than 60 dB down.
Internally Generated Spurious	Less than 1 μV equivalent, except 3 μV equivalent from 5 to 6 MHz (reduced specs on internal osc frequencies).
Audio Output	2.0 watts @ less than 10% THD (4 ohm load).

TRANSMITTER

Power Input (Nominal)

Ssb	250 watts PEP.
Cw	250 watts.
A-m equiv.	80 watts (carrier), plus upper sideband.

Load Impedance	50 ohms, nominal.
Spurious Output	Greater than 50 dB down.
Harmonic Output	Greater than 45 dB down.
Intermodulation Distortion	30 dB below PEP (24 dB below one of two tones).
Undesired Sideband Suppression	Greater than 60 dB @ 1 kHz.

Duty Cycle

Ssb, Cw	100%.
Tune, SSTV, RTTY, A-m	w/o 1529 FA7 Fan—33%, 5 min. transmit, max. with 1529 FA7 Fan—100%.

Wattmeter Accuracy	±5% @ 100 watts (50 ohm load).
Carrier Suppression	Greater than 50 dB.
Microphone Input	High Impedance.

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

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Announcing

• **Heart of Ohio Ham Fiesta** - The 5th annual Heart of Ohio Ham Fiesta will be held October 29 at the Marion County Fairground's Coliseum in Marion, Ohio. Flea market, prizes, XYL drawing. Talk-in on 90/30 and 52. Dealer space available. For more informtion contact Paul Kilzer, W8GAX, 393 Pole Lane Road, Marion, OH 43302.

• **Suncoast Amateur Radio Convention 80** - This convention will be held on November 1 and 2 at the Bayfront Concourse Hotel, downtown St. Petersburg on the Bay of Tampa. Double the booth space will be available and the swap area will be inside. Dealers will display amateur radio equipment and hobby computers. Forums are scheduled. Registration is $3 each, under 12 free. Two award tickets free with advance registration. Swap table $10 both days, no one-day tables. For more information contact FGCARC Inc., P.O. Box 157, Clearwater, FL 33517, tel. 813-461-4267. Talk-in on 147.96/36, 147.66/06, and 146.52. FCC exams given, send to Tampa office for 610's.

• **Lakeway Amateur Radio Club** - The Lakeway Amateur Radio Club will operate from the David Crockett Tavern in Morristown, Tennessee on Saturday, November 1st, from 1300 UTC until 2200 UTC. Only s.s.b. operation on the following frequencies, plus or minus QRM: 28.560, 21.360, 14.280, and 7.235 MHz. Amateurs and the general public are invited to visit the site during regular operating hours (Mon. through Fri. 9 am to 5 pm, Sundays 2 pm to 5 pm). Call sign of the expedition will be WD4PEQ. For a certificate commemorating the event, send $1.00 or 3 IRC's and a legal size s.a.s.e. to Davy Crockett DXpedition, Route 11, Box 28, Morristown, TN 37814.

• **Defiance County ARC Hamfest** - The Defiance County Amateur Radio Club will hold its third annual Hamfest on Sunday, November 2nd, from 8 am until 4 pm at the Defiance County Fairgrounds in Hicksville, Ohio. Table space is free and on a first come first served basis, inside or out. Hourly drawings will be held with the main event at 3 pm. Tickets are $2 at the gate and $1.50 in advance. For more information, write to Ed Ballard, Jr., RFD #1, Roland Road, Sherwood, OH 43556. Talk-in will be on 147.69/09, .52 simplex.

• **Remember The Hostages** - Macon County amateurs will hold a "Remember the Hostages" special event on the weekend of the anniversary of their capture in Iran, Nov. 1 to Nov. 4. A special 4½" × 6" red, white, and blue QSL card will be offered to any amateur contacting a Macon County amateur during these dates. A 5" × 7" s.a.s.e. along with a QSL card made out to the amateur worked should be sent to: "Remember the Hostages" Anniversary, Box 72, Oreana, IL 62554.

• **Framingham ARA Flea Market** - The Framingham Amatuer Radio Association will hold its annual Fall flea market on Sunday, November 9 at the Framington (MA) Police Station drill shed. Doors open at 9 am. Admission is $1, sellers $6/table. Talk-in on 75/15 and 52. For more information or to register (sellers are advised to preregister), contact Ron Egalka, K1YHM, F.A.R.A., P.O. Box 3005, Saxonville, MA 01701; tel. 617/877-4520.

• **Auctionfest 80** - The 23rd annual auction, Auctionfest 80, sponsored by the Massillon ARC, will be held on Sunday, November 16, from 8 am until 5 pm at the Massillon Knights of Columbus Hall, Massillon, Ohio. The flea market opens at 8 am with auction action to start at 11 am. Auctionfest 80 features 3 major prizes plus a long list of door prizes to be given away hourly. Tickets are $2.50 in advance and $3.00 at the door. Extra prize tickets are available for $1.00 each. For further information, tickets, or table reservations, contact Steve Nevel, WD8MIJ, 1864 Massachusetts S.E.. Massillon, Ohio.

• **Please Report If Found** - The following amateur radio equipment was stolen in June of this year. All were obtained in Japan and were not imported through normal distribution channels, therefore they should be easy to identify should someone request information or order crystals for them. SRC 145A 2 meter walkie-talkie, serial #504279; SRC 432 450 MHz walkie-talkie, serial #408052; Midland 13-509 220 MHz transceiver, serial #61001736; Icom IC-320 transceiver (450 MHz), serial #3603560. If anyone should have any information regarding this equipment, please contact the Houston, TX police department, or Bob Wolters, W5XC, 11427 Longbrook Dr., Houston, TX 77099.

• **Scholarship Winners Announced** - The Foundation for Amateur Radio has announced the 1980 winners of the seven scholarships that it administers. These scholarships were open to all radio amateurs holding at least an FCC General Class license or the equivalent. The Foundation is a non-profit organization representing 51 clubs in Maryland, the District of Columbia, and northern Virginia. It is devoted to the advancement of and interest in amateur radio. The winners for this year were: Darryl F. Mihalek, WB4JZT, Katherine Hevener, WB8TDA, Maureen Porter, KA0DGT, Gregory Polanchyck, N3GP, Nicholas A. Ferro, Jr., WA2SFS, and Ann Waines, KA8CSM. Information regarding the scholarships to be awarded next year will appear in the May 1981 issues of major amateur radio publications.

• **Personal Computer Nets** - Afficianados of 6502 microprocessor personal computers now have three new radio nets on which to exchange information. An East Coast Apple Net now carries on on Saturday mornings at 1300 GMT on or near 7260 kHz. Transmission mode for this 40 meter net is lower sideband with W1UKZ in Scituate, MA as net control. There is a new 2 meter net for those interested in the Apple computer on the Norwell repeater (Boston area) (144.65/145.25 MHz) with W1UKZ, WA1ZKB, and others acting as net control. The net is called to order at 8 pm local time on Wednesday evenings. A new Atari International Computer Net now meets at 0100 GMT Tuesdays (9 pm EDST, Monday evenings) on 20 meters. Look for this net on upper sideband around 14,329 kHz with W1UKZ as net control.

• **Evening Amateur Radio Classes** - The Flushing Radio Amateur Technical Society in association with The Academy of Aeronautics at New York's LaGuardia Airport is offering evening classes in amateur radio from Novice through Advanced. Qualified students will be able to use the Club's 2 meter facilities. For more information, call Frank, N2BAF, at 212-544-8530.

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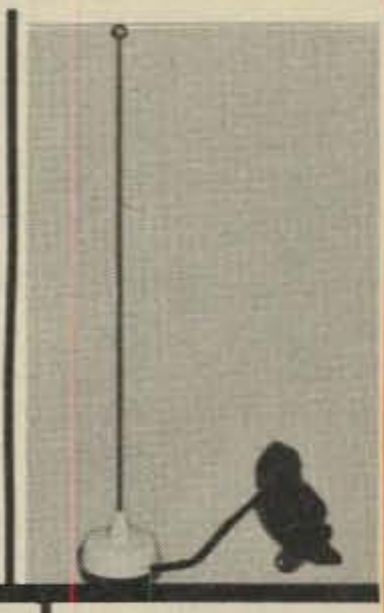

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CIRCLE 59 ON READER SERVICE CARD

Our Readers Say

Gotcha—Maybe

Editor, CQ:

In response to the Hopengarten, K1VR, article "Short Wave Listening—Legal or Illegal" in the August *CQ*:

If section 605 says in part, "no person...shall divulge or publish...contents or substance..." or transmissions, will it not be unlawful for the FCC to prosecute any offender who jams transmissions or uses improper language? In the prosecution of any such offender it would be necessary for the FCC prosecuters to *divulge* such transmissions and their *content* in order to identify the offense for which the offender would be convicted.

Arcane law, indeed!

John D. Dalzell, KB3FB

Queensland Heard From

Editor, CQ:

Congratulations on your efforts, even if your magazine is a bit difficult to pick up here. Unfortunately, your work doesn't reach us for up to three months. Perhaps some of your readers might like to know about our licensing setup here.

We have three grades: Novice, Limited, and Full Call, known respectively as NAOCP, AOLCP, and AOCP. Novice entails a working knowledge of valves, transceivers, amps, oscillators, CW, AM, SSB, mod/demods (no FM or above 50 MHz), antenna basics, and propagation. All classes require knowledge of regulations. Novice Morse Code speed is 5 wpm and must be sent for 2 min. 30 sec. with no more than 5 mistakes and received for 5 min.

The Limited class requires passing a full call theory and regulations exam. Even though Limited calls are restricted to 50 MHz, they must still pass LF, HF subjects.

To obtain a Full call, you must be capable of 10 wpm Morse Code (5 min. receive, 2½ min. send), plus pass the theory test, which is the same as for Limited calls.

The following can then be operated: Full Call: 1.8-1.86, 3.5-3.7, 7.0-7.15, 14-14.35, 21-21.45, 28-29.7, 52-54, 144-148, 420-450, 576-585, 1215-1300 MHz. Novice call: 3.525-3.625, 21.125-21.2, 28.1-18.6 MHz. Limited call: Same as Full call above 52 Mhz.

Full call/Limited power: 120 watts (mean power out) for all modes except A3A, A3J, which are allowed 400 watts pep. Novice power: 10 watts (mean out power) for A1, A3, A3B, A3H, and 30 watts pep on A3A and A3J.

I hope this information will be of interest to your readers.

Neil Harper, VK4NLU/VK4ZRI

The Timing Was Right

Editor, CQ:

Thank you for CQ magazine. I am in the process of putting up a trap dipole and a Cushcraft ATB-34 on a 45 ft. tower in Illinois where we are spending the summer, and the June issue had one of the best articles on antennas I have ever read and *understood*. Also, the July issue on The Dependable, Ubiquitous Dipole, by W8FX, Karl Thurber, Jr., came at exactly the right time for application in my construction.

Thank you for using my letter (June 1980 *CQ* Novice Column). I was quite surprised and had actually forgotten about submitting it. I made my WAS and am working on my YL WAS. I was upgraded to General on April 18th and am going for my Advanced in a couple of months.

We expect to return to Arizona and assemble and put up some more beams and a 40-80 meter antenna of some sort, possibly single banders. The more I learn, the better I like being a Ham.

Again, thank you, and I find CQ magazine very practical and read it from cover to cover.

Evelyn Cavallo, N7BTT

"I Saw It In CQ!"

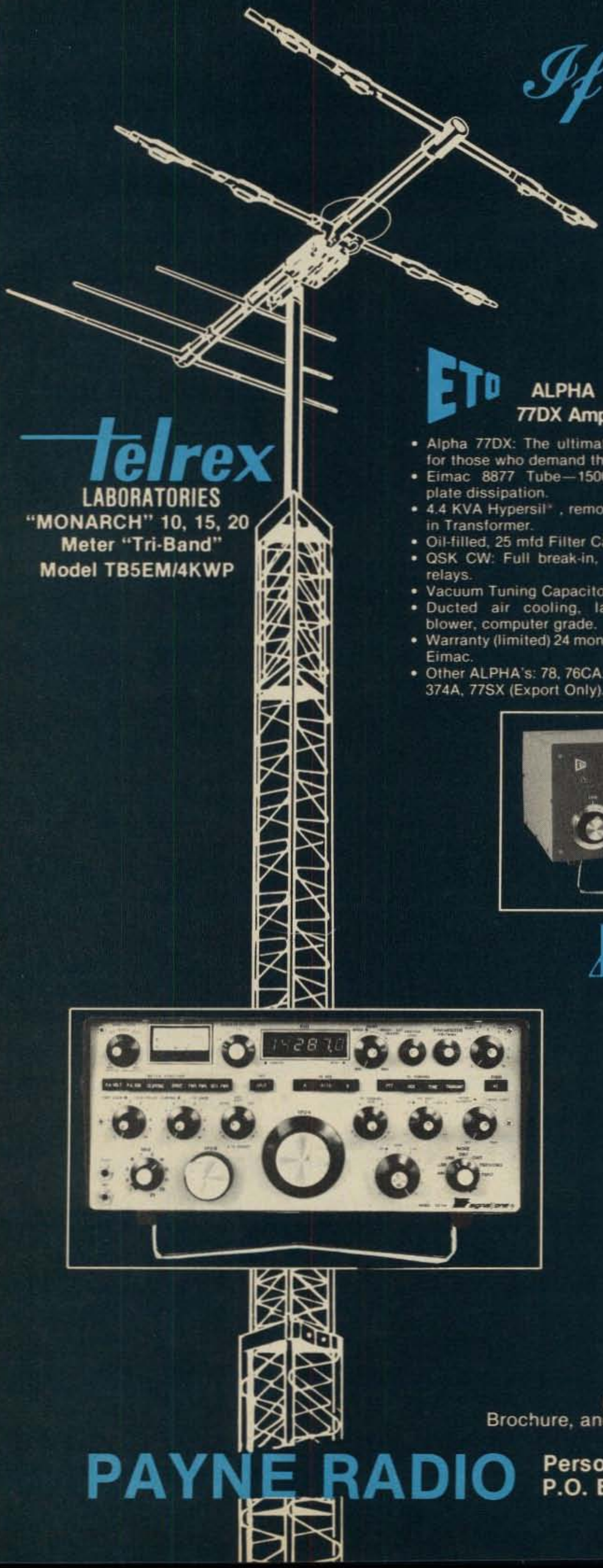
Editor, CQ:

I would like to commend you on a fine magazine. I think *CQ* is one of the best, and certainly the most diversified, amateur radio magazine published. No one else devotes the coverage you do to Awards, Contests, Propagation, Antennas, and DX. Every month you somehow find something new and interesting in your regular departments, and then add fine articles about DXpeditions, computers, RTTY, SSTV, OSCAR, and QRP. It takes others a year to cover the many facets of amateur radio that you cover in as little as two issues! I applaud your free offer to subscribers in using the Ham Shop ads, as well as the Reader Service System you provide. I hate to think of the postage it would have cost to get info on many of the items I've been interested in.

I really hate to miss an issue and truly look forward to it every month. I don't mind saying "I saw it in CQ" because it's usually the first place I saw it! Keep up the good work, and thanks again.

Ron Bolton, WB4PIQ

If You Want The Finest



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- SERVICING: Self service easiest of any transceiver by using gold-plated sockets for transistor and IC replacement.
- RELIABILITY: Less than 1% failure. 99% of problems resolved in field.
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CIRCLE 90 ON READER SERVICE CARD

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New MFJ keyer — small in size, big in features. Curtis 8044 IC, *adjustable weight and tone*, front panel *volume and speed controls* (8-50 wpm), built-in *dot-dash memories*, speaker, sidetone, and push-button selection of semi-automatic/tune or automatic modes.

Ultra-reliable solid-state keying: grid-block, cathode and solid-state transmitters (−300 V, 10 mA max; +300 V, 100 mA max). *Fully shielded*. Uses 9 V battery or optional AC adapter ($7.95 +$2)

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The BENCHER paddle is a best seller. Fully adjustable; gold-plated silver contacts; lucite paddles; chrome plated brass; heavy steel base with non-skid feet.

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Another MFJ "first," these low cost mobile SWL converters provide new excitement and variety for your driving/listening pleasure.

Two models to choose from. The 4-band "World Explorer I" (MFJ-304) offers complete *19, 25, 31 and 49 meter coverage* (the most popular HF bands due to their distance capabilities at various times of the day and year). Hear countries from Europe, Africa, Middle East, Asia, the Islands, North and South America. The 8-band "World Explorer II" (MFJ-308 adds *13, 16, 41, and 60 meter* bands) for even greater listening variety.

Compact and sensitive. The 4-band model measures just 5¼W x 1¼H x 4"D to *fit anywhere* in your vehicle (the 8-band version is just 1" wider and 1" deeper). Two dual-gate MOSFETS give these converters *excellent sensitivity and selectivity* when combined with your automotive receiver.

Easy to use, easy to install. Push a converter button to choose the band, tune in stations with your regular car radio. To install, just plug the car antenna into the converter and insert the converter cable into your car radio antenna jack; connect the power lead to 12 VDC.

Listen to the world on the road. Get the new MFJ mobile SWL converters — "World Explorers I & II."

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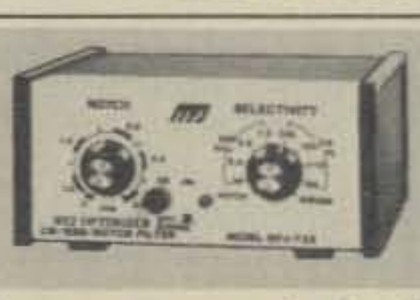


MFJ-722 $69.95 (+$4)

MFJ-723 $49.95 (+$4)

Two new super-selective filters. The new MFJ-722 "Optimizer" offers *razor sharp, no-ring CW filtering* with switch-selectable bandwidths (80, 110, 150, 180 Hz centered on 750 Hz), *steep-skirted SSB filtering*, and a *300-3000 Hz tunable 70 dB notch filter*.

The 8-pole (4-stage) active IC filter gives *CW performance no tunable filter can match*. (80 Hz bandwidth gives −60 dB response one octave from center and up to 15 dB noise reduction). *The 8-pole SSB audio bandwidth is optimized* for reduced sideband splatter and less QRM (375 Hz highpass cutoff plus selectable lowpass cutoffs at 2.5, 2.0, and 1.5 kHz, 36 dB/octave rolloff). Size: 5x2x6".

New model MFJ-723 is similar to the 722 but is for CW only, has a 60 dB notch tunable from 300-1200 Hz, and measures 2x4x6". Other models: **MFJ-721. $59.95,** like 722 but less notch; **MFJ-720, $39.95,** like 723 but less notch.

Versatile, all models plug into the phone jack, provide 2 watts for speaker or can be used with headphones. All require 9-18 VDC, 300 mA max (or 110 VAC with optional AC adapter at $7.95 +$2).

Enjoy pleasant listening and improved readability with one of these new MFJ filters.

NEW MFJ "Dry" 300W & 1KW Dummy Loads

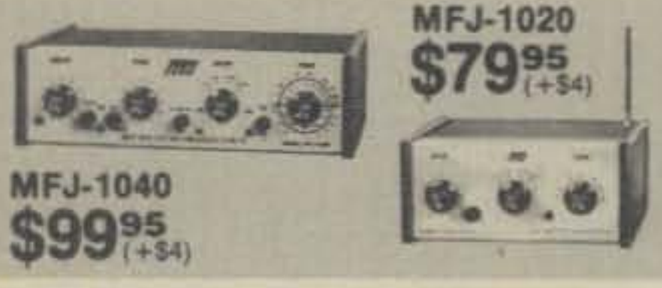
MFJ-262 $49.95 (+$4)

MFJ-260 $26.95 (+$4)

Air Cooled, *non-inductive 50-ohm resistors* in perforated metal housings with SO-239 connectors; both rated to full load for 30 seconds; de-rating curves to 5 minutes included. Just right for tests and fast tune up.

Low VSWR. 300W: 1.1:1 max to 30 MHz, 1.5:1 max. 30-160 MHz. **1 kW:** 1.5:1 max to 30 MHz. **MFJ-260** (300W) is just 2½x2½x7"; **MFJ-262** (1kW) is 3x3x13".

NEW MFJ Shortwave Accessories



MFJ-1020 $79.95 (+$4)

MFJ-1040 $99.95 (+$4)

MFJ-1040 Receiver Preselector

Boosts weak signals, rejects out of band signals, reduces images. *Covers 1.8-54 MHz* with up to 20 dB gain from low noise MOSFET circuitry. *Works with 2 antennas and 2 receivers* (even XCVRS to 350W input).

Built-in 20 dB attenuator prevents receiver overload. Also includes auto-bypass, delay control, PTT jack. Operates on 9 V battery, 9-18 VDC, or 110 VAC with optional AC adapter, $7.95 +$2.

Model MFJ-1045, $69.95, is the same less attenuator, bypass, delay, PTT, 1 antenna & 1 receiver.

MFJ-1020 Indoor Active Antenna

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CIRCLE 37 ON READER SERVICE CARD

During this month the Voyager I spacecraft will take a close look at Saturn and its moons. Club station W6VIO will be on the air in commemoration of this "close encounter."

Saturn—Here's Looking At You, Up Close

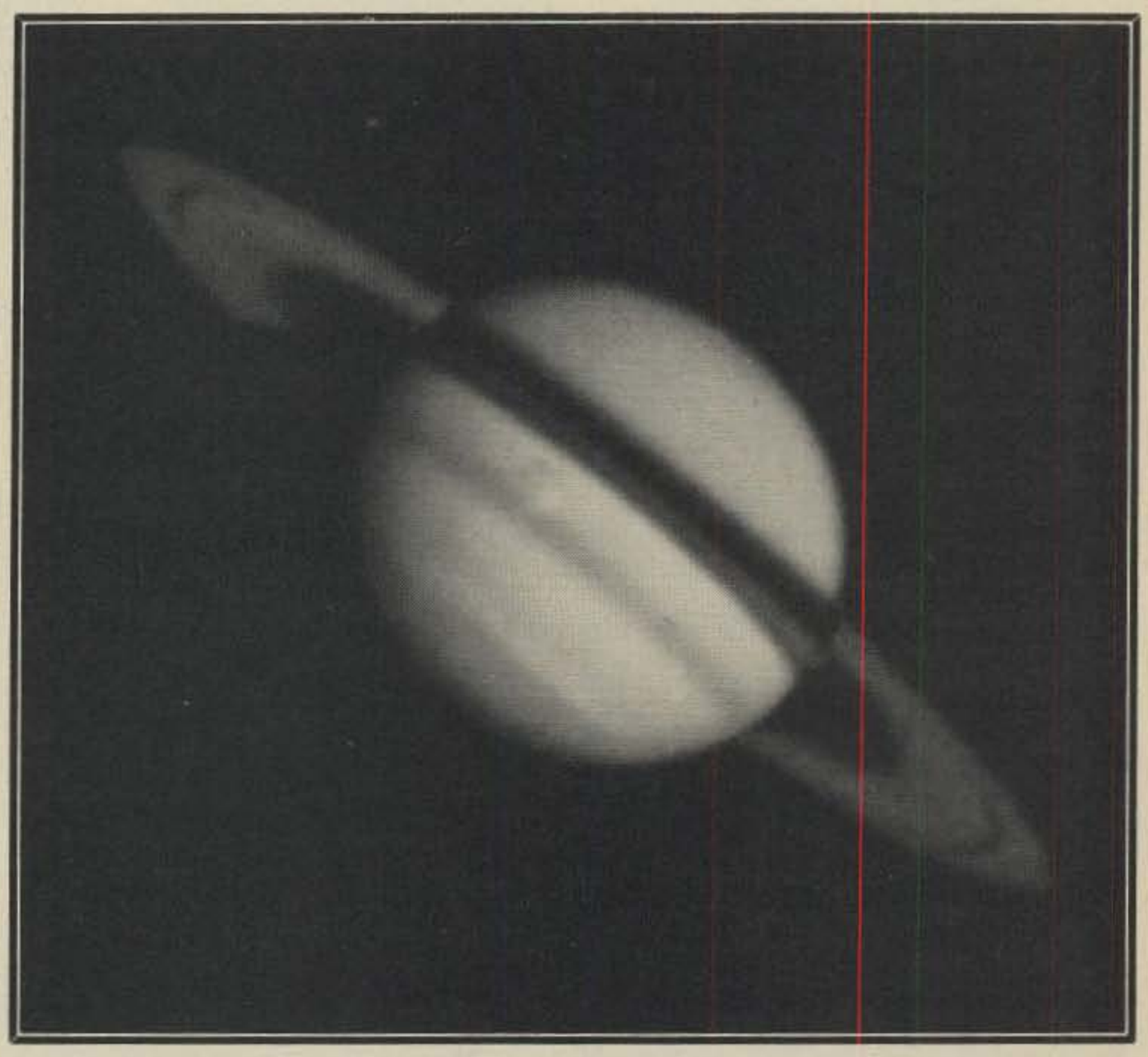
BY NORMAN L. CHALFIN*, K6PGX

Encounters of very special kinds are the subjects of the commemorative operations of the JPL Amateur Radio Club. The next one upcoming is the Saturn close encounter, which the Voyager I spacecraft will make during November. The club station W6VIO will be on the air making contacts on all modes but ATV and RTTY and on all of the popular h.f. and v.h.f. bands during the Voyager Flyby of Saturn and its moons from November 1, 1980 through November 16, 1980. The operating times will be between 1930 and 2130 GMT and also between 0030 and 0430 GMT each day during this period. As important images of the planet Saturn are received, they will be transmitted via Slow-Scan TV on 14,235, 21, 340 or 28,680 kHz (± 5 kHz) s.s.b. This is the minimum coverage planned.

As the availability of club members and guest operators will permit, the various positions of the W6VIO multi-position stations will be put into service. Announcements of the services being opened on h.f., v.h.f., s.s.b. or c.w. will be made at 10 to 15 minute intervals on the frequencies listed above. Additional coverage is expected during the weekends of November 2-3, 9-10 and 16-17.

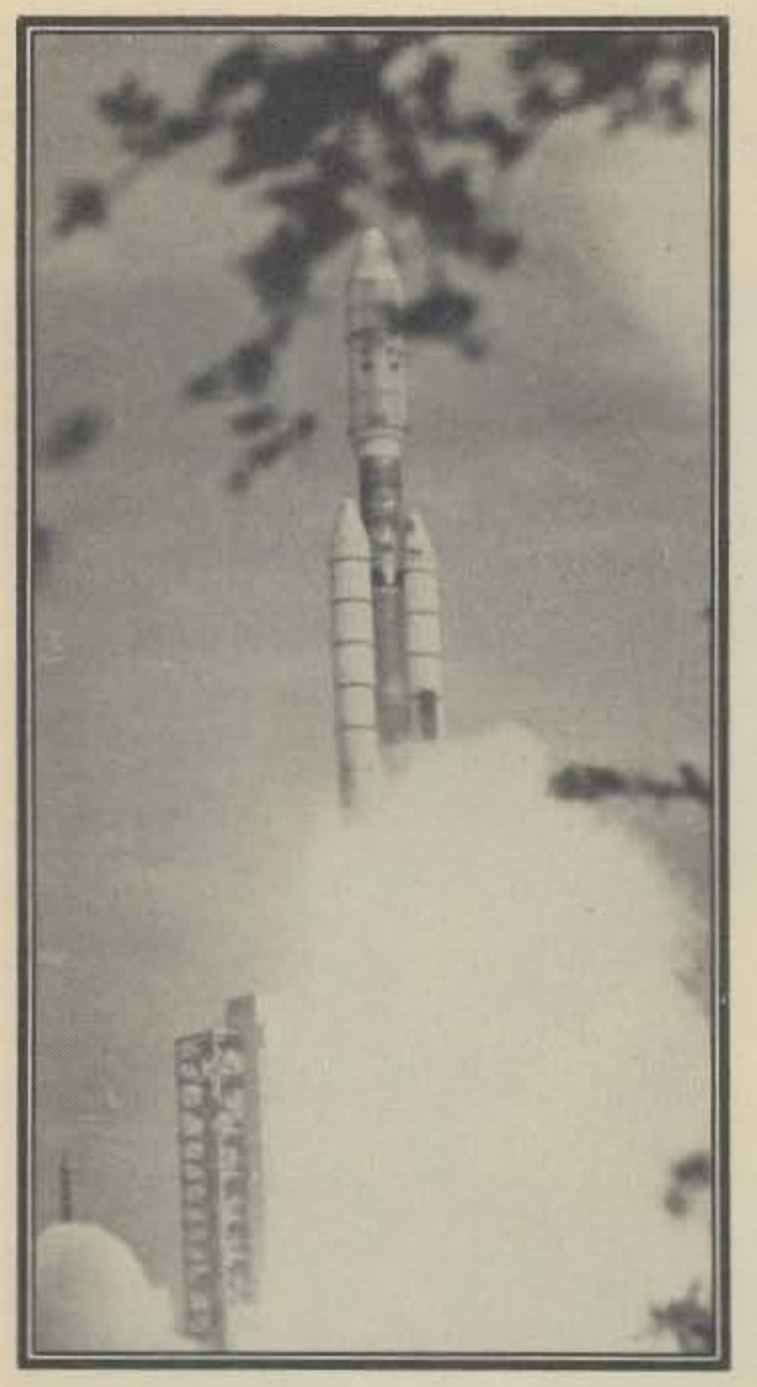
The members of the JPL Amateur Radio Club have engaged in commemorative communications fests such as the one planned for November ever since the club has been in existence. They have celebrated all of the Space firsts in which JPL has been involved. Some of the more recent

*c/o JPL Amateur Radio Club, M.S. 180-302, 4800 Oak Grove Drive, Pasadena, CA 91103.



This picture of Saturn taken by NASA's Voyager 1 on June 24, 1980 slightly exceeds the resolution of Earth-based photography of the planet. The picture was taken from a distance of 187,000,000 kilometers (116,000,000 miles). The photo resolves features 3,500 kilometers (2,200 miles) in diameter compared to some of the better photographs of Saturn taken from Earth that resolve features with a diameter of 5,000 kilometers (3,700 miles). The Sun crossed Saturn's ring plane last March 20, and has been moving steadily northward since then, providing a steady increase in ring brightness. On June 24, however, the Sun was only 1.9 degrees above the ring plane, and the rings are still unusually dim compared with their usual appearance from Earth. An oval just above the rings is caused by removal of a calibration mark on the camera lens. The satellite Tethys can be seen below and to the right of the disk of Saturn. The Voyager project is managed for NASA's Office of Space Science by the Jet Propulsion Laboratory.

The author, K6PGX, was operating 220 MHz when the SSTV gang pointed the camera at him.



Lift off of Voyager I from Cape Canaveral on Titon III.

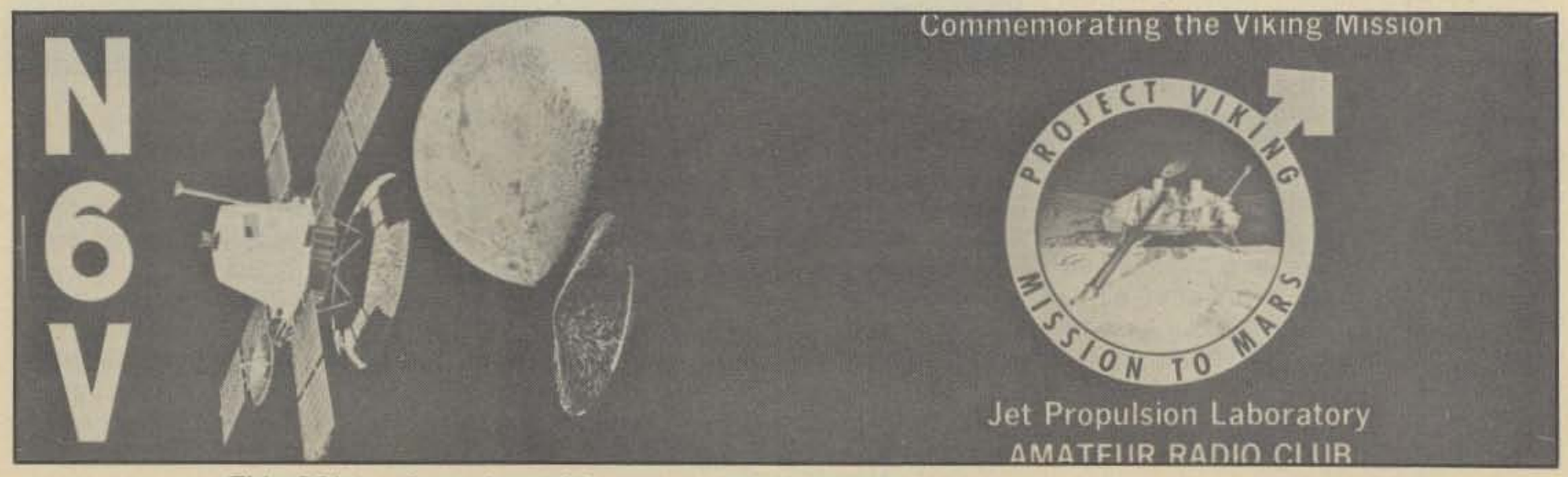
Dick Piety, K6SVP, setting up the W6VIO SSTV camera for the JPL/ARC Voyager Jupiter Flyby commemorative operation in the summer of 1979. The large monitor at the left is a direct line from Voyager mission control.

events include the Viking landings on Mars, The Mercury-Venus Flybys, and the Voyager close look at Jupiter and its Gallilean Satellites last year. For the Apollo 15 landing on the Moon the commemorative call was W6JPL. The call WS6MVM was assigned for the Mariner-Mercury-Venus Mission. The Viking Mars Lander mission was celebrated with N6V. Since then commemorative calls have not been issued by the FCC, so the club call was used for the Voyager I and II Jupiter flyby operations and will be used also for the upcoming event. W6VIO (*W*hiskey *6 V*oyager *I*n *O*uterspace) is in itself a special commemorative call, since it is in memory of Jack Blindbury who was president of the JPL club when it was rejuvenated in the early 60's. Jack was W6VIO.

The commemorative events of the JPL Amateur Radio Club have always been celebrated with an appropriate QSL card. The cards for N6V and the W6VIO Voyager celebrations were so popular that today they are collectors' items. The historical interest in them is enhanced by the beautiful pictures of the planets obtained with the JPL/NASA Spacecraft Cameras, which appear on the QSLs.

If you should make contact with JPL ARC's W6VIO during the commemorative period of November 1st to November 16th, GMT, send a request for a QSL card in an s.a.s.e. and be certain to include all of your logging information so that the contact can be identified in the JPL log. Send the s.a.s.e. to W6VIO, JPL Amateur Radio Club, 4800 Oak Grove Drive, Pasadena, CA 91103.

The Voyager/Saturn Commemorative event coordinator is Dick Piety, K6SVP. Merv MacMedan, N6NO, is the coordinator of operator assignment. The president of the JPL ARC for 1980 is George Morris, W6ABW.



This QSL card was issued in commemoration of the Viking Mission to Mars in 1975.

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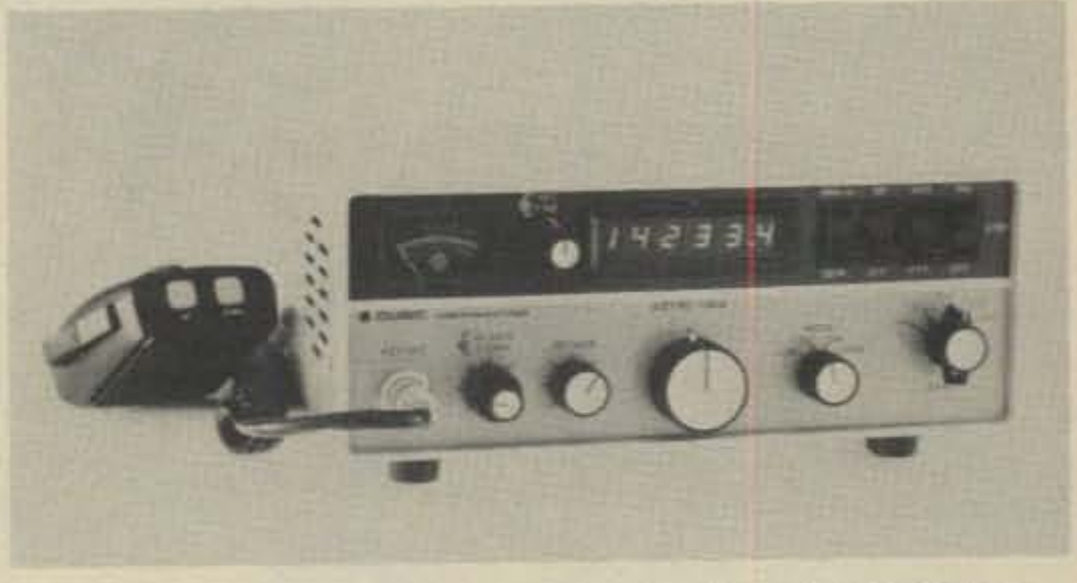

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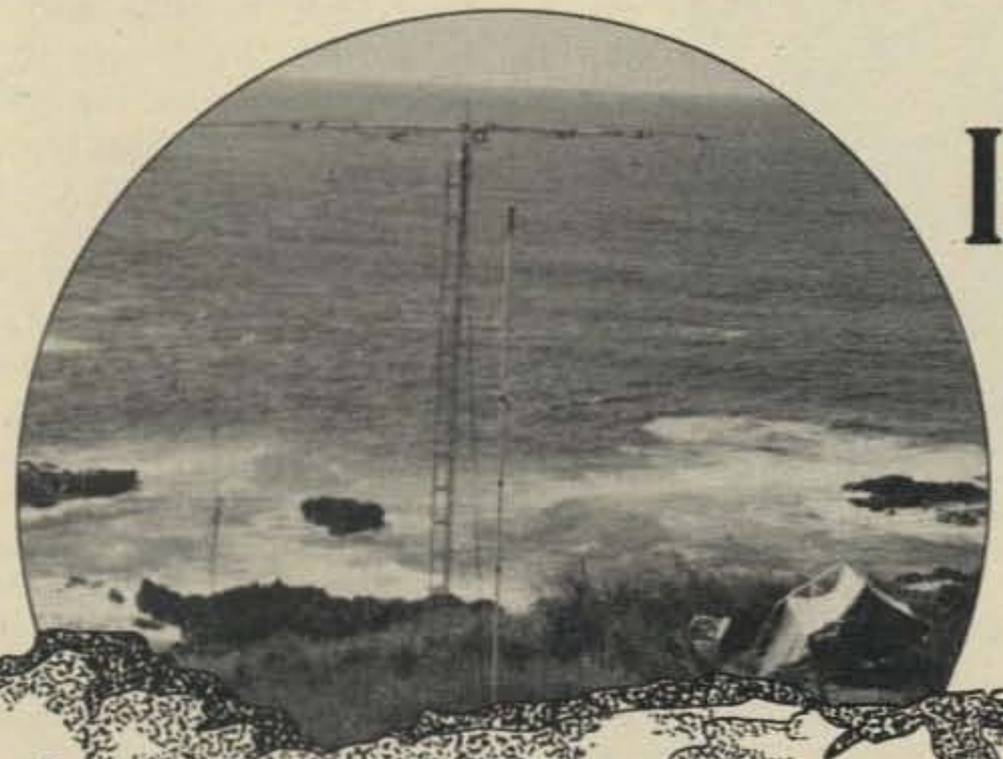
With all the pre-DXpedition plans plans accomplished, KP4AM was ready to operate on Desecheo Island. Three operating positions gave the group 21, 108 QSO's, but not without some equipment problems—an integral part of any DXpedition, as many DXers will attest to.

Desecheo Island DXpedition

Part II

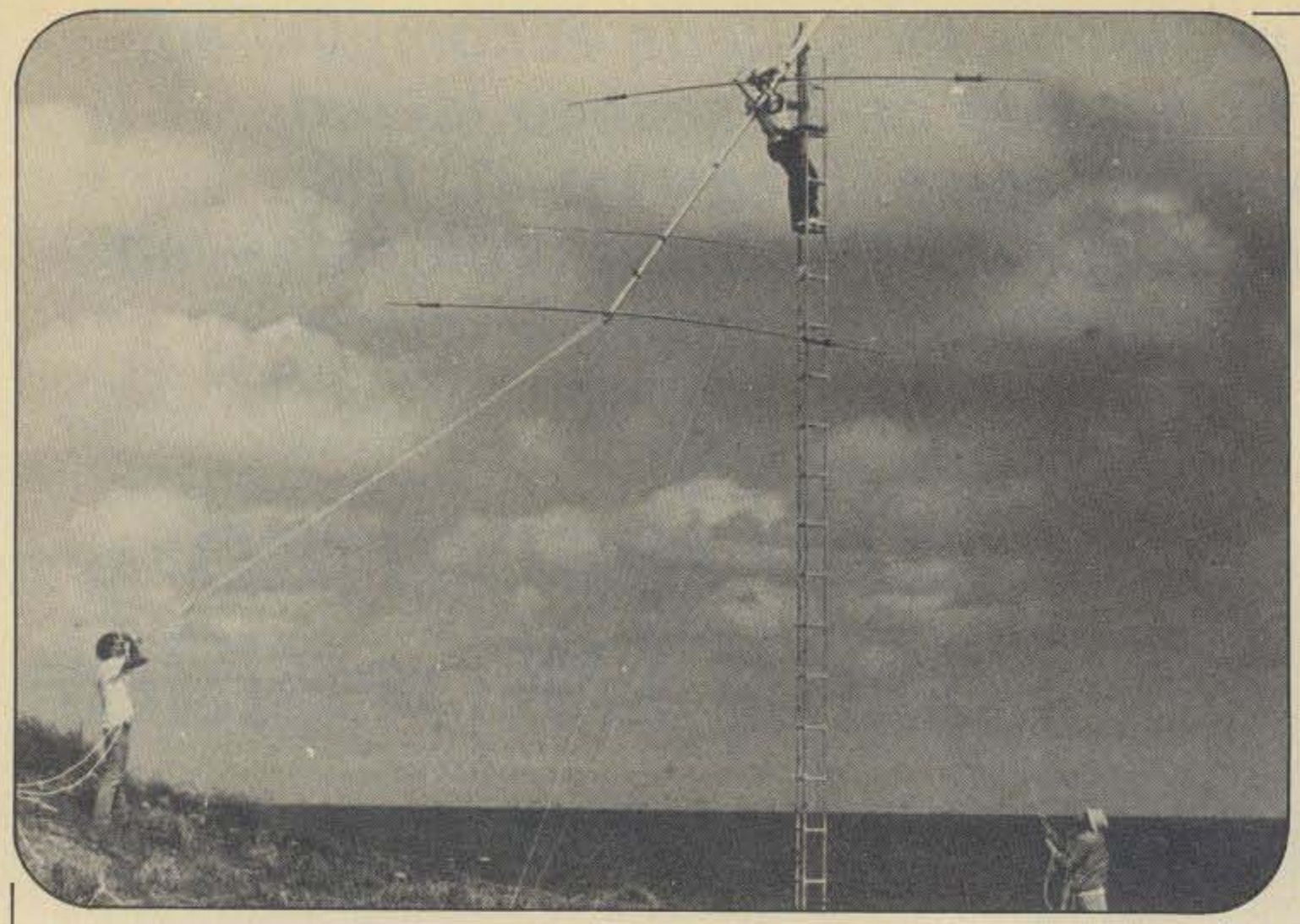
BY BILL KERBER*, KP4DSD/K4AQQ



Nearly two years of planning finally paid off for the KP4AM group. Desecheo Island was cleared as the site of a DXpedition that was to become both famous and controversial. On this remote, rugged, 360-acre island that lies in the Mona Passage between Puerto Rico and the Dominican Republic, KP4AM set up three operating positions. Despite some equipment problems, the group managed to rack up 21,108 QSO's with a country total of 131 in five days.

*213 Rhoden Cove Road, Tallahassee, FL 32312

The small, white object just visible in the early morning sky above the mountain tops east of the Mayaguez, Puerto Rico airport slowly grew larger and larger. N4EA was the first to spot it. "Here she comes," he shouted. The eyes of KP4Q, KV4KV and myself and the multitude of other KP4's at the airport to see us off quickly scanned the sky. It really was the chopper. After two long, frustrating years of delays we found ourselves on the morning of March 3, 1979 at the airport with two large truckloads of gear ready to be loaded on the helicopter for our trip to Desecheo. The chopper, which was based in San Juan some 70 miles to the north and east, was scheduled to arrive in Mayaguez with KP4AM and N4ZC, along with a load



Putting up the Wilson SY-2 Tribander at 30 feet. From left to right are Bill, KP4DSD, Pedro (on the tower), KP4Q and Don, N4EA.

of gear, at 9 a.m. It was now 10:30 and we were already an hour and a half behind schedule. Earlier at the San Juan airport, KP4WI had called via KP4Q's mountain-top 16-76 2-meter repeater to let us know there would be another delay. They were having problems getting the chopper started. The mechanic tinkered for a while and solved the problem. . . we hoped.

As the chopper slowly settled to the ground, all we could see through the open door were two tremendous smiles on the faces of KP4AM and N4ZC. I was particularly surprised to see the expression on KP4AM's face. A week earlier, Dave had mentioned to me that he hated to fly and that no one, but no one, would ever get him on a helicopter. Swim to Desecheo. . . yes; fly to Desecheo. . . absolutely not! While we were discussing the merits of flying versus swimming, I casually mentioned to Dave that if his 15 mile swim to Desecheo wasn't successful, we would be forced to use my call rather than his for the DXpedition. After all, the control operator needed to be on the premises according to FCC regulations. Dave thought for about one second and exclaimed that he had always wanted to fly in a helicopter!

Pictures were quickly taken, and then KP4AM, pulling a page out of the Clipperton DXpedition book, surprised us when he passed around Desecheo T-shirts with our calls printed on them. We all had to try them on and pose for more pictures. Before long, however, the chopper was loaded, and N4EA, KV4KV and I were in the air and making the approach for our long overdue landing on Desecheo.

The pilot had previously warned us that when he arrived on the island he would not shut the chopper off and that we should unload it as quickly as possible. He didn't want to be stuck on Desecheo with a chopper that had refused to start only a couple of hours earlier. He also didn't help our morale when he passed around life vests and gave us a five minute lecture on how to evacuate the chopper if it went down in the ocean. He estimated that it would float for about two minutes before it sunk!

Fortunately, the landing was easily accomplished, and within a few minutes we had finished unloading. On takeoff the downwash from the blades to the chopper was tremendous, and our light gear went flying in all directions. Suddenly it was quiet again and I had an incredibly good feeling. The island was beautiful; below the waves were crashing on the rocks and other than the noise of the wind there was nothing to be heard. . . or seen. No people, no cars, no roads, houses, or ringing telephones. It was going to be a good week!

Setting Up the Station

KV4KV quickly disappeared through the brush. He wanted to check out the waves in the small inlet to see if it would be feasible to bring his boat to the island later in the day. N4EA and I started the assembly of the two beams and verticles. The work went quickly and before long was completed. KV4KV returned with the good news that the waves looked okay and that he would return on the chopper's next trip and bring his boat out later in the day. Although never needed, the boat was an insurance policy for us. If someone had been seriously injured or if we needed emergency supplies, we had the boat to rely on.

Within an hour and a half the helicopter was back with another load of gear and KP4AM. KV4KV returned with the chopper to Mayaguez. N4EA, KP4AM and I set out to do a little exploring to find good areas to erect the towers and set up the tents. It was getting very hot, and we had forgotten to bring water with us on the trip over. A few cans of fruit juice were found at the bottom of a box, and we sought some shade where we could relax for a few minutes. It was nearly two hours later when the helicopter returned, and we discovered that it contained only 2,000 pounds of gas and water in steel drums. We had visions of KP4Q and N4ZC relaxing at Mayaguez airport sipping rum punches while we were doing all the work in the blistering heat on Desecheo. We were probably right.

Finally, at five in the afternoon, the helicopter again appeared around the corner of the island on its fourth and final trip. We could see the tower sections hanging out the door and two cameras attached to two pairs of hands. After a few "welcomes" to Desecheo, the five of us set about getting a station on the air.

A lot of work needed to be done. Tents were erected, towers assembled, and what seemed to be tons of gear dragged up a hill. But before we knew it the sun had set, it was dark,

The Wilson SY-2 at sunset on Desecheo Island.

and we had no station on the air. Several of us were exhausted, and all we wanted to do was have a cold beer, take a nice warm shower and crawl into bed. The beer was warm, we had no shower and erecting the sleeping tent had been at the bottom of our list of priorities. KP4Q insisted on raising a beam in the dark and in the face of the very strong winds that swept over the island. He was overruled by the rest of us, and within 30 minutes we had a Hustler 4BTV vertical up, and at 0148 GMT on March 4th, N4EA opened up on 20 meters c.w.

We're On the Air!

This was the weekend of the phone portion of the ARRL DX contest. Earlier, we had made a group decision to stay out of the contest and to concentrate our activities on c.w. until the end of the contest. We lost several thousand contacts sticking to this policy. However, our feeling was that when we came on phone the resulting pileups would occupy 20 kc of the phone spectrum, which on some bands, particularly 20, would have had an overall detrimental effect on the other contesters. Our estimates as to the bandwidth of the pileups turned out to be very conservative.

The first contact was with WB6RSE, followed quickly by W5LB, N4AR and YU3TLT. N4ZC and N4EA stayed on 20 c.w. the entire evening, fighting the never-ending pileups. The rest of us tried to get some much needed sleep. Sleep was hard to come by since we had, without thinking, erected our sleeping tent within 20 feet of the noisy generator.

At daylight, the operators switched to 15 c.w. and the rest of us set about setting up additional gear and tents. In spite of the strong winds, KP4Q soon had a SY-2 tribander on top of the 30 foot tower. We now had a complete station consisting of a TS-820 feeding either a 4BTV vertical or the SY-2 triband beam. It was located on top of a 150 foot hill directly to the east of the helicopter pad. Our intention was to add a larger generator and a linear at a later time. This was never done, and the station went the entire week running barefoot. Getting to the top of the hill meant struggling through chest-high grass mixed with intertwining vines and prickly pear cactus. It was not easy going, particularly at night. Later in the week we eventually got the extra gear to the top of the hill, but the large generator refused to run, and since the contacts were rolling in at 100 per hour, we gave up the idea of high power and the few extra dB it would have given us.

By early Sunday morning KV4KV had single-handedly set up a second station. It was located south of the helicopter pad behind some sea grape trees which protected the site from the terrific winds that we had experienced during the first three days of the DXpedition. The winds generated a lot of annoying dust, and in some cases caused so much noise that the constant flapping of the tents tripped the voxes. Although secured with extra guy rope and rocks placed on the floors, two of our tents were constantly blown over, and the operators had to temporarily go QRT while they made the necessary repairs.

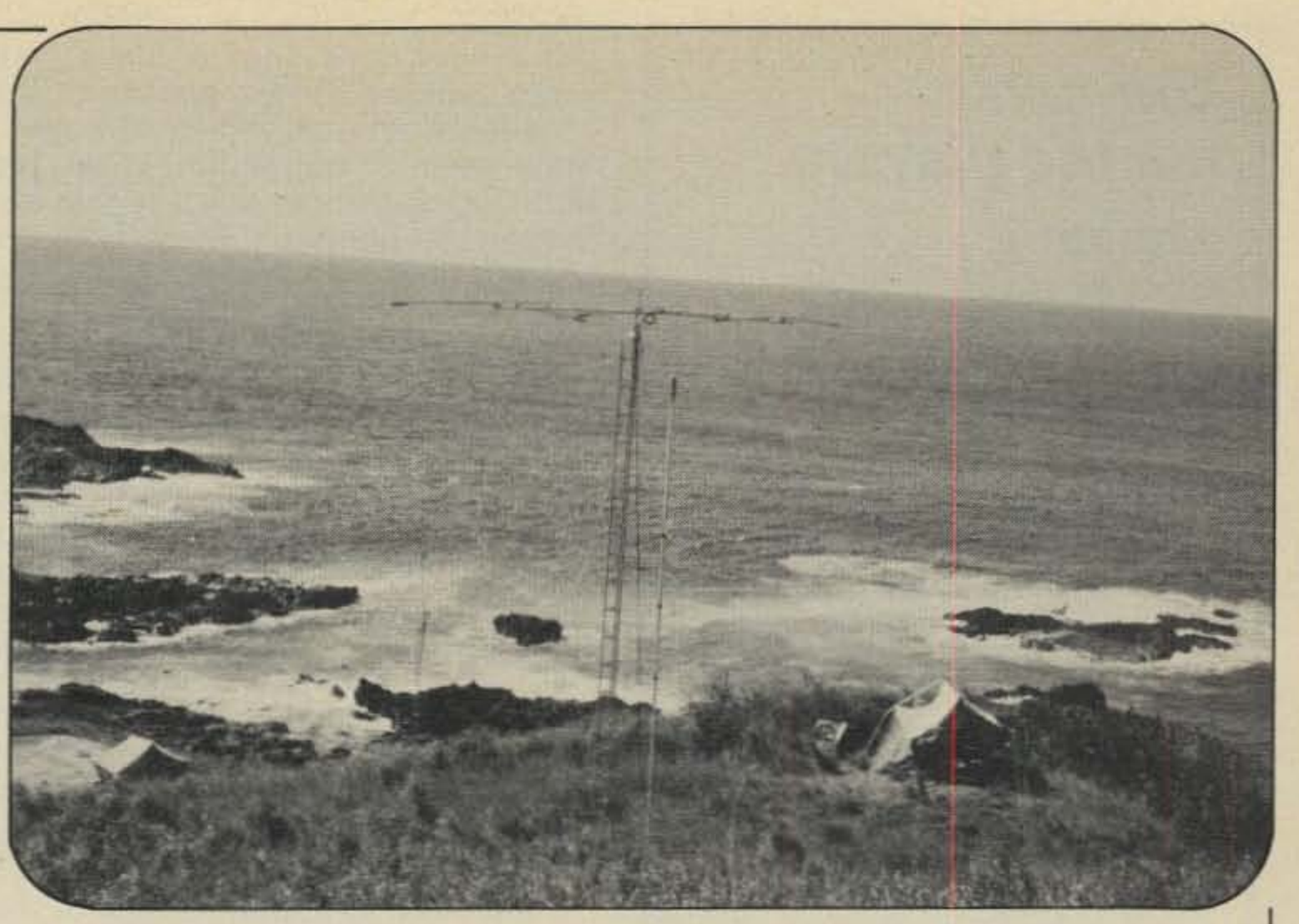
John's station was equipped with an FT901, a Kenwood TL922 linear, a 400 foot longwire for 160 and a 4BTV vertical. The supporting base of the vertical was placed directly in the ocean. Needless to say, we didn't worry about radials or providing a good ground system. The placement of the antenna later caused us problems. N4EA mentioned that one evening on 40 c.w. he was experiencing peculiar QSB. The band seemed to be wide open but would fade out every minute or so, then open up again. It took Don awhile to realize that the deep fades were occurring in sync with the waves. The tide had come in and the incoming waves were crashing over the base of the antenna, shorting it out for a brief period of time. Moving the antenna up to the beach solved the problem. KP4AM fired this station up at 1400 GMT on Sunday and spent an hour and half working a string of locals on 40 sideband. He had a prearranged schedule with them.

By late Sunday afternoon we had our third operating position set up. The antennas consisted of a SY-2 on top of another 30 foot tower, and a quarter wave sloper for 80. Since we were tired of climbing hills, this station was erected on the helicopter pad close to our sleeping tent and supplies. The rigs used were a KWM-2 and a Collins 30 L1, both from KP4Q's shack.

During the initial 24 hours of the DXpedition, 95% of our 2,804 contacts were on c.w. with N4EA, N4ZC and KV4KV doing the operating. The s.s.b. crew, KP4AM, and KP4Q and I, had completed the work of setting up the stations and had a few hours to kill before the end of the ARRL DX contest at 2400 GMT on Sunday evening. Following a leisurely supper, we did a lot of s.w.l.ing on the bands. It was frustrating listening in on the ARRL contest but not being involved. As the clock neared 2400 GMT we became excited knowing that in a few minutes it would be our turn to join in the fun.

Within minutes after the end of the contest, KP4AM opened up on 15 meters s.s.b. Don, K9ECE had been monitoring us on 40 c.w. just prior to the termination of the contest. He intuitively felt that we would begin our sideband operations on 15 meters, and at 0000 GMT he set his receiver on 21265 and transmitter on 21270. Soon he heard the Spanish hello (hola, hola, hola), indicating that someone was tuning up. Seconds later, a short CQ by KP4AM was heard by K9ECE, and he was in the log as the first of our 3,397 QSO's on 15 s.s.b.

Three minutes later, KP4Q tackled the screaming masses on 20 meters and logged W3AZD as his first con-



The hilltop operating position tent is on the right and the helicopter pad is on the left, with the Wilson SY-2 in the center.

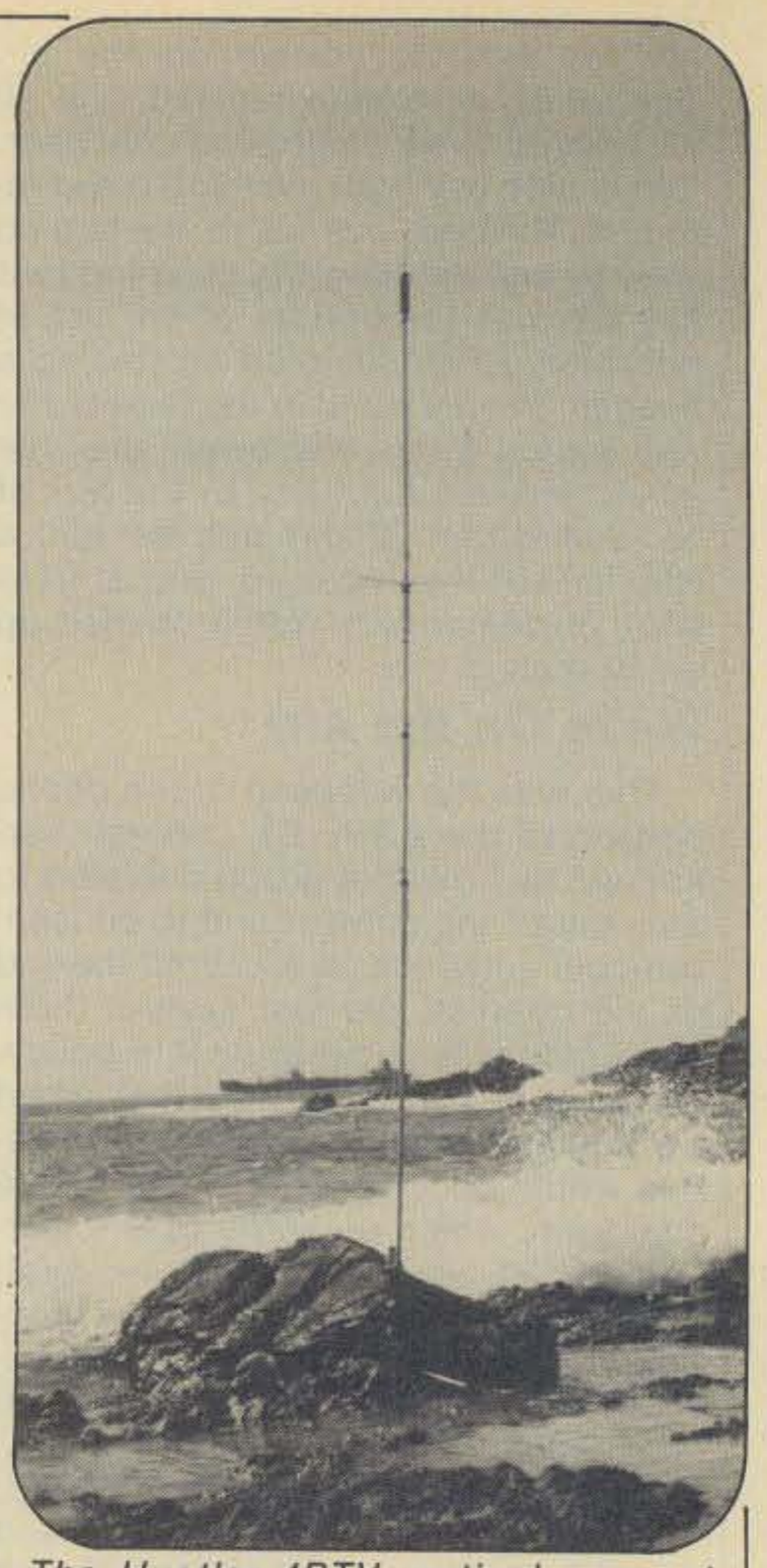
tact. I have never seen a pileup that Pedro couldn't handle, and this one, although 30 kc wide and equally deep, didn't seem to bother him at all. He kept logging them in at a rate that exceeded 200 per hour. Pedro talks so fast that I'm sure nobody understands him.

We stayed on 15 and 20 s.s.b. throughout the evening and also included some phone and c.w. activity on the low bands. At daylight Monday morning, we opened up on 10 s.s.b. and continued our efforts on 10, 15 and 20 meters throughout the daylight hours. The pileups remained very strong, which led us to believe that a lot of amateurs had taken vacations or called in sick that Monday. This turned out to be our big day with some 6,993 QSO's completed during the 24-hour period.

With two days under our belts, we settled down to a routine. Prior to the DXpedition we had established an operating schedule consisting of two-hour shifts during the day and three-hour shifts during the night with specific operators assigned to each shift. Station 1 was given priority over Station 2 which had priority over Station 3 as to choice of bands and interference problems. The schedule was never put into use. Somehow, there was always plenty of operating time available and little or no conflict arose without a schedule.

It was interesting that the locals, KP4AM, KP4Q, KV4KV and I, required considerably less operating time than our imported operators from the north, N4EA and N4ZC. They, of course, have less opportunity of being on the other side of DX pileups. Roger and Don seemed to be operating at all hours of the day and night. What kept them going is beyond our comprehension. After days of constant operation they obviously were exhausted, but they kept going and maintained a very high rate of contacts-per-hour throughout the entire DXpedition.

Monday evening KP4Q decided that he would work some real DX from Desecheo; Desecheo to Argentina via 2 meters! Pedro, his father, KP4ES and his uncle, KP4AAN had routinely been successful over this 3,900 mile path from their home QTH's in the weeks just prior to the DXpedition. KP4Q had brought along an exciter, 500 watt linear and 6 element 2 meter beam. He set up his station on various boxes and chairs. I hand-held the beam and in the darkness and teeth of a 30 mile an hour wind, tried to keep it pointed in the direction of LU land. An LU was heard in QSO with KP4ES. We were not successful in breaking through and establishing contact. KP4Q did, however, complete several contacts



The Hustler 4BTV vertical was set up in the ocean.

with HI8's and other KP4's on 2 meters.

During the same evening Pedro attempted QSO's via Oscar. KV4FZ (NØVA) gave us orbital information during the DXpedition. Since Pedro could not locate the proper crystal for his receiver for the 10 meter downlink, KV4KV in his tent relayed the downlink information to Pedro via a 2 meter hand-held. Only the beacons were heard that evening. By the next day Pedro had his receiver working on the proper segment of 10 and had the 2 meter beam up 40 feet in the air atop the tower. During the next two evenings the beacons were once again heard, but nothing else. It was also discouraging to be unable to complete a QSO on 2 meters with Argentina during these two nights.

In contrast to Pedro's interest in 2 meters, Don is a 160 meter fanatic. N4EA spent about five hours on 160 spread out over three evenings. He used a 400 foot longwire that in places nearly touched the ground. In spite of the small amount of operating time and poor antenna, he managed 35 QSO's on s.s.b. and 131 on c.w. The highlight was working EA8CR on 160 s.s.b. This made it a clear sweep for EA8CR. Fernando worked on all bands 10 through 160 meters plus several of the bands on c.w.

As the days passed, the searing heat, constant wind, terrible food, lack of sleep and frequent equipment breakdowns began to take their toll. I was beginning to wonder if we weren't all crazy. But if we were crazy, how about the multitude on the other end who were missing meals, neglecting their families, taking vacations or calling in sick all in the interest of snagging a new one?

The pile-ups remained strong through the first three days of the DXpedition. However, by Wednesday noon there were almost no takers to our CQ's on 10, 15 and 20 meters, and we went QRT for awhile. Playful whales sighted offshore gave us an interesting diversion until band activity picked up later in the day. A leisurely QSO pace was then maintained until we went QRT at 11:20 GMT on Thursday morning. The last station logged was KB4FO on 20 sideband.

Leaving the Island

The chopper arrived on schedule and first off the island was KP4Q and a load of gear. N4EA and I climbed aboard the helicopter for the second trip, and we found a place to strap ourselves in among the piles of boxes, generators, tables and drums. The chopper lifted about 30 feet off the ground and strained to get enough height to clear the trees lining the side of the pad. Unable to gain height, the pilot backed up and set down on the pad. The engine struggled a second time to provide the needed lift to get Don and I back to the mainland for a cold beer and a shower. Again, failure.

Two hundred pounds of gear were removed and on the third try up we went...to our usual 30 foot height! Sitting toward the front, I could see that we would never clear the trees. As the pilot again worked to back the chopper into position over the pad, Don's eyes widened and he hollered "Hang on, we're going in!" Don was facing the rear of the helicopter and all he could see was the rapidly approaching ocean and the steep cliff which fell off sharply to a rocky beach 50 feet below the pad. The pilot somehow managed to fight the tricky winds and set the chopper down with inches to spare.

After removing another 200 pounds of equipment, the helicopter easily lifted off, cleared the trees, swooped down dangerously low over the water and then gained height for the easy half-hour trip back to Puerto Rico. Don, who is in the submarine service of the US Navy, swears that his next trip to Desecheo will be by sub!

Over a very welcome, cold beer at the Mayaguez airport, Don and I calculated that the extra 20 minutes that it had taken the chopper to get off the pad had cost the group nearly $200 extra. At $575 per hour, flight time adds up. Who ever said DXpeditions were cheap?

John, KV4KV single-handedly set up the second of three stations. His station was equipped with an FT 901, a Kenwood TL922 linear, a 400-foot longwire for 160 and a 4BTV vertical.

After the second helicopter trip, KV4KV returned to Puerto Rico on his boat and KP4AM loaded gear for the third trip and then returned to San Juan on the fourth and final trip. Although glad to be back to civilization we were all sad to see the DXpedition come to an end.

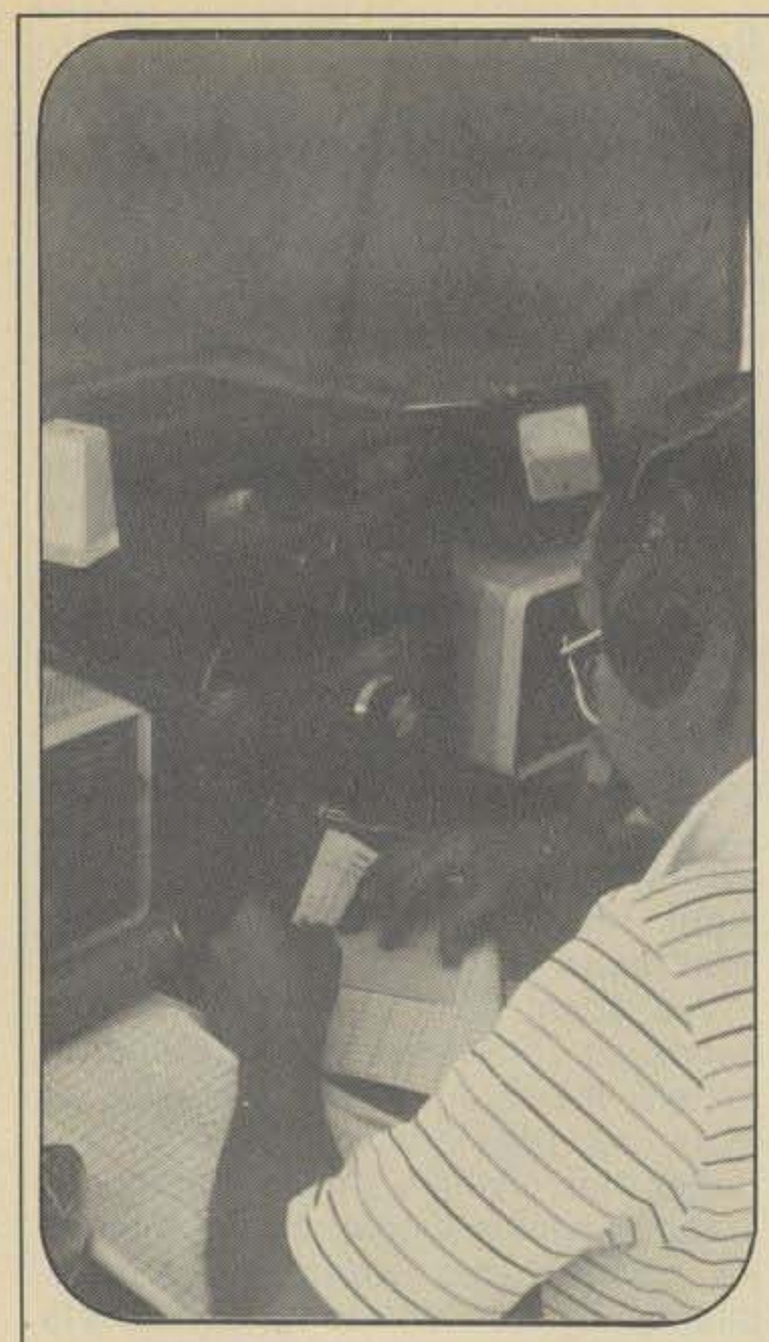
Summary

In general, the band conditions were very good during our DXpedition. We completed 21,108 QSO's with a country total of 131. As expected from a Caribbean operation, the majority of our contacts were with stations from the United States. However, about one-third were with stations located elsewhere. The Asian-Caribbean path is a difficult one, and we were pleased to have 1,304 JA contacts in our logs.

Twenty meters was open 24 hours a day and like clockwork, the JA's would peak at 0800-0900 GMT and fade out an hour or two later. Fifteen was also good for the entire day, but the contacts-per-hour rate would fall off somewhat during the middle of the night. Ten was terrific during the daylight hours but of little use after dark.

We spent less time on the low bands as compared to 10, 15 and 20 meters. It was our intent to provide as many as possible with a new one rather than giving a smaller number of stations contacts on all five of the major bands. This was best accomplished by concentrating our efforts on the high bands.

I know of no DXpedition that didn't suffer from problems, and ours was no exception. We had greatly underestimated the amount of physical labor required to set up, maintain and



Three minutes after the ARRL DX Contest, Pedro, KP4Q opened up in the middle of a pileup on 20 meters s.s.b. He logged them in at a rate that exceeded 200 per hour.

take down the three operating positions. At least two and often three stations were in use during the five-day DXpedition. There were times, however, when only one or two operators were available. The others may have been occupied with repairing gear or sleeping, being too exhausted to operate. It would have been desirable to have taken a couple of additional people with us.

Equipment problems are, of course, an integral part of any DXpedition. KP4Q's nearly new KWM-2 gave up early in the week and was replaced by a very "contest worn" Drake C Line. A voltage surge took the filter condensers out of the C Line power supply and the 30L-1 linear a day later. The C Line was resurrected with new condensers, and the linear was replaced with an SB-200.

The generators seemed to consistantly produce too much voltage or no voltage at all. Although we had taken five generators with us, there was one two-hour period when all five were sick. I was in the middle of a pileup on 20 one afternoon when, looking very depressed, N4ZC came down the hill. He announced that our little 1.5 kw generator, which had performed flawlessly for 72 continuous hours, had quit running. It turned out that KP4AM had decided the unit needed an oil change. He drained it and then proceeded down the hill to our supply area to get a quart of oil. Meanwhile, Roger, not realizing what had happened, went up the hill and found the generator not running. He pulled the starter cord and went on 20 c.w. Within a few minutes the pileup died, as did the generator. Scratch one generator!

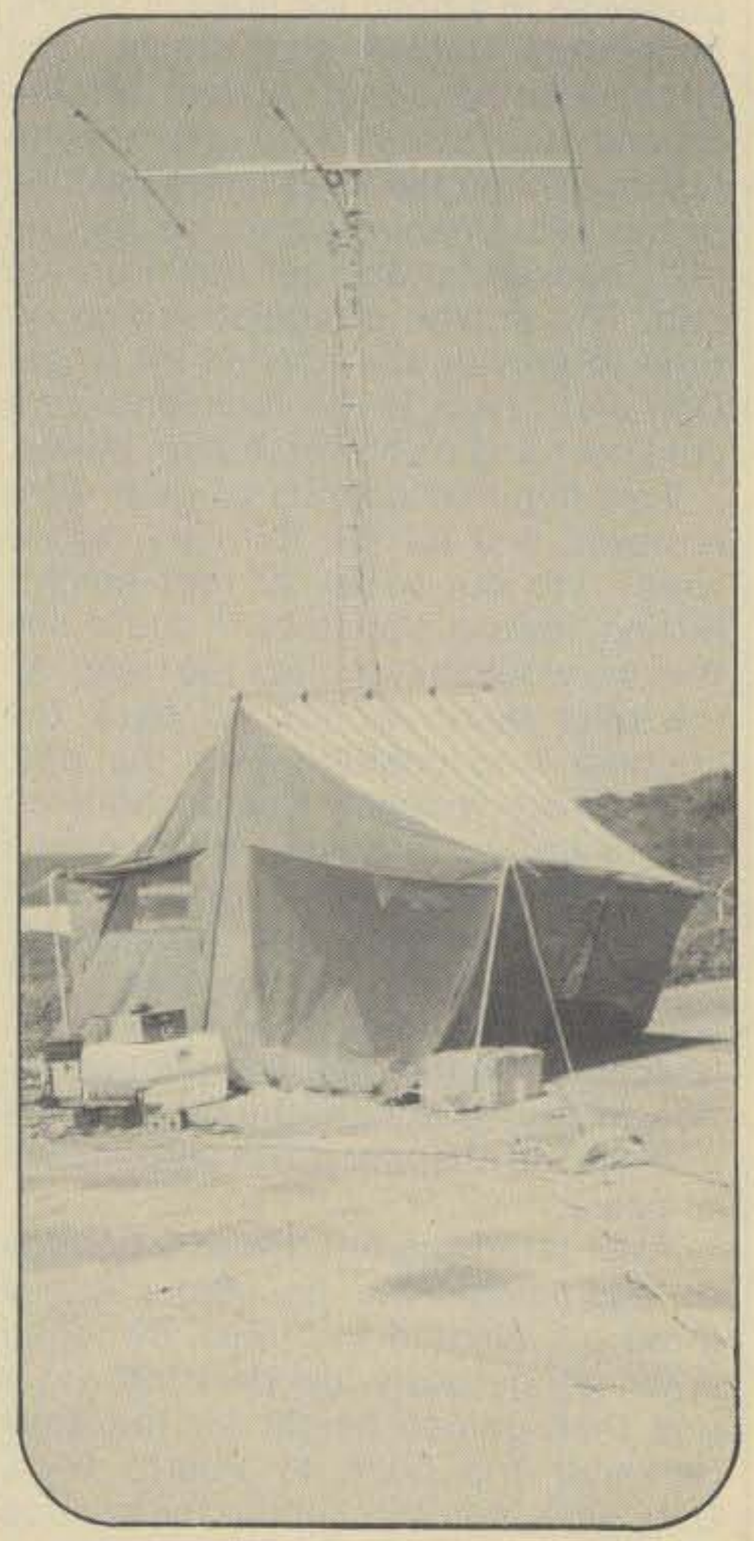
KP4Q brought along a large, 5 kw unit that ran beautifully for two days. After the second day, it would run for an hour and stop, run another hour and stop, ad nauseum. Each time, Pedro would twist a screw or two, check the gas line, say some magic words and give it a good kick to bring it to life again. Near the end of the DXpedition he found a loose wire in the ignition circuit!

We had taken four linears and five transceivers to Desecheo. No two units were of the same model and manufacturers. This presented some interesting problems as the units broke down or when the operators in the middle of the night wanted to change bands and had problems tuning up rigs they were unfamiliar with. The solution to this problem is obvious. Now we look back and laugh at the problems we had. At the time they didn't seem so funny.

It is frequently said that triband beams and all-band trap verticals should not be used for DXpedition or field-day type operations. Since they are designed to receive and radiate on several bands, interference from adjacent stations operating on different frequencies could be a problem. This problem can be minimized using monoband antennas. Although our stations were located within 100 yards of each other, we experienced virtually no interference problems. In fact, the antennas were the only pieces of gear that didn't give us problems during the DXpedition.

Acknowledgements

We would very much like to thank the Northern California DX Foundation for their help in covering a large part of our transportation costs and for supplying and assuming the responsibility of distributing QSL cards. We also acknowledge the donation of the two SY-2 triband beams from the Wilson Electronics Corporation and the two Hustler 4BTV verticals from the Newtronics Corporation. Our thanks also to the 21,108 fellows on the other end of the pile-ups. They are the ones who made it all possible.



A tent set up to the side of the helicopter pad provided the operating position for KP4AM.

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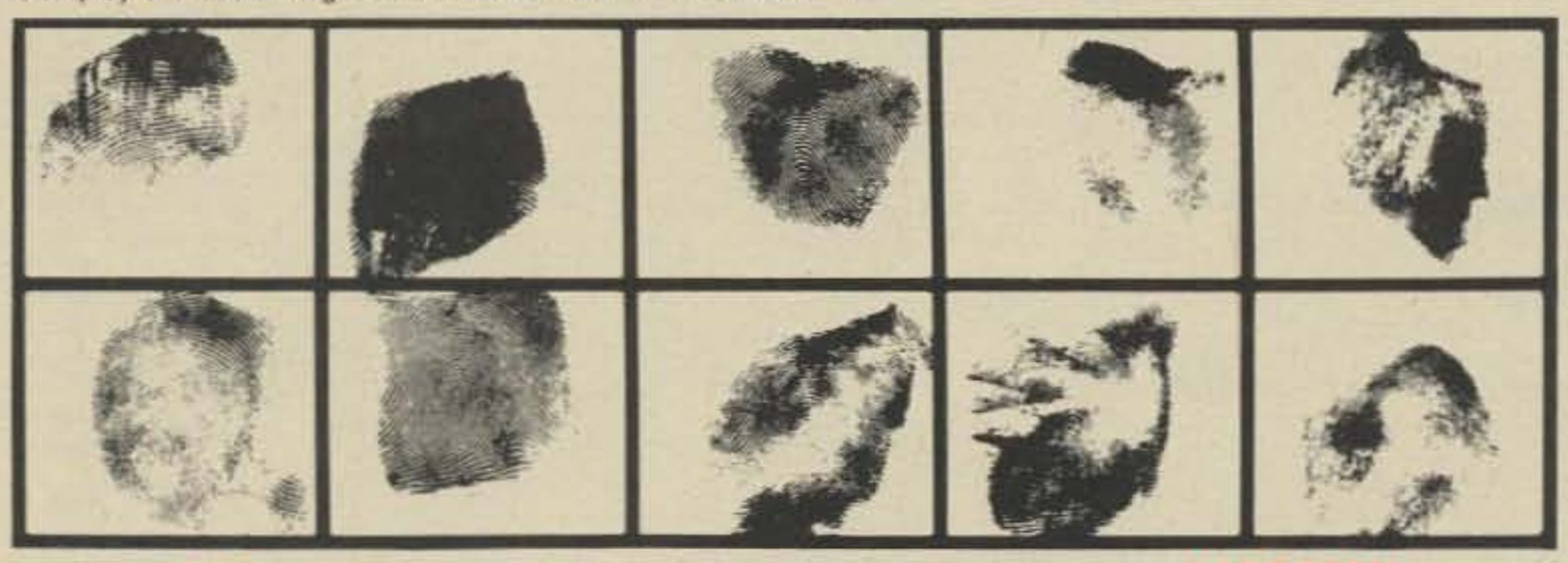

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Yes, women do get involved in amateur radio, and many are darn good at it. So the next time you address someone as OM, be careful—the he may be a she!

Conversation With An XYL

BY ELLEN MARKS SAWYER*, WA9ACO

The landline conversation you are about to retroactively eavesdrop upon occurred early one evening. The call was inspired by an ad I placed on the bulletin board at a local amateur radio dealership.

Six p.m. The telephone rings.
Me: "Hello."
Him: "Uh...hello. I'm calling about the radio for sale."
Me: "Yes, can I help you?"
Him: "Are YOU the seller?"
Me: "Yes. Can I help you?"
Him: "Who are you?"
Me: "WA9ACO. Who are you?"
Him: "My name is Bob."
Me: "Great. Mine is Ellen. Do you have a callsign?"
Him (sound of pages turning in the background): "WA9XXX. Are YOU really the seller? What class license do you have?"
Me: "'Yes' to question A. 'Advanced' to Question B. What would you like to know about the rig?"
Him: "You sound very young."
Me: "Thank you. I'm not all that young."
Him: "How much power does that SBE run?"
Me: "Ten watts."
Him: "What simplex frequencies does it have?"
Me: "94, 52, 34, 65 and 82."
Him: "You really sound young. Like maybe 21."

Me: "Thanks. That's the nicest thing I've heard today."
Him: "What repeaters does it have?"
Me: "SARA, CFMC, CFAR, Joliet, Kankakee and 37-97."
Him (more sounds of pages being turned): "What's your CFAR membership number?"
Me: "Hmmmm....554 or 558....one of the two. You REALLY don't believe I'm a ham!"
Him (guilty laughter): "Ha, ha. Well, you do sound so young."
Me: "You sound like you're looking me up in the Callbook or CFAR roster."
Him (more guilty laughter): Ha, ha. I can tell by your phone number that you live in Downers Grove. How long have you been there?"
Me: "I live just outside Downers. Been here several months."
Him: "Is your husband a ham?"
Me: "Yes. We met through ham radio."
Him (pause): "You still sound like a teen-ager."
Me: "Thank you. Do you need any more info on the rig?"
Him: "How much are you asking for it?"
Me: "One hundred twenty-five. It works great, and even has an outboard PL. I don't know how that works, though. I don't really care for PL repeaters."
Him: "That's more money than I expected. I'm gonna check around some more. I'll call ya again if I'm still interested."
Me: "Very good, Bob. Take care now."

End of phone conversation. I guess I'll let my ad keep hanging, you never know...

* *4711 St. Joseph Creek Rd., Lisle, IL 60532*

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No-29-30

a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

If your state QSO Party announcement did not appear in the Contest Calendar it was not an intentional omission. It's probably because your new secretary or activities manager didn't get the information to me in time. He probably was never told about it by the previous officer.

Organizations that make it a practice of electing new officers each year should keep this in mind. Personally I do not subscribe to a yearly change of officers, especially those that are designated as Contest managers. By the time they get the feel of things the year is up and someone unfamiliar with the routine is expected to pick up the ball.

In order to keep an up to date and informative Calendar I find it necessary to write and request information on coming events. But when there has been a change in personnel the request sometimes goes unanswered or gets kicked around and received too late.

Why do I go to all this trouble? Not that I am concerned about the clubs getting publicity but more for you fellows who are interested in contests and look for that information in this Column.

Again a reminder, the deadline for all material is the 10th of the 3rd month prior to the month of your activity. (Nov. 10th for the February issue.)

Another reminder, mailing deadline for your WW DX Phone Contest logs is December 1st and this year they can be mailed to K3EST, Bob Cox, 5801 Huntland Road, Temple Hills, MD 20031, as well as to the *CQ* office, 76 N. Broadway, Hicksville, NY 11801. And be sure to indicate Phone Contest on the envelope. (Your logs will be processed more quickly if they are sent directly to K3EST.)

73 for now, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

	Nov. 1-3	ARRL C.W. Swpstks.
†	Nov. 5-6	YLRL Anniv. Phone Pty.
	Nov. 8-9	European RTTY Contest
	Nov. 8-9	Int. Police Assn. Contest
	Nov. 8-9	Delaware QSO Party
	Nov. 8-9	Esperanto Phone
	Nov. 9	Czech. DX Contest
	Nov. 15	DARC 10 Meter RTTY
	Nov. 15-16	Austrian 160 M. Contest
	Nov. 15-17	ARRL Phone Swpstks.
	Nov. 29-30	**CQ WW DX CW**
	Dec. 6-7	Spanish Phone Contest
	Dec. 6-8	ARRL 160 Meter Contest
	Dec. 6-8	Connecticut QSO Party
	Dec. 8-9	VU Garden City Contest
	Dec. 13-14	Spanish C.W. Contest
	Dec. 13-14	Hungarian DX Contest
	Dec. 13-14	ARRL 10 Meter Contest

†Covered last month.

ARRL Sweepstakes

C.W.: Nov. 1-3 Phone: Nov. 15-17
Starts: 2100 GMT Saturday
Ends: 0300 GMT Monday

This one has been around a long time and really stirs up a lot of activity. Operation is between stations in ARRL sections, which also includes U.S. possessions in the Pacific which are part of the Pacific section, and KP4, KV4, etc., which are part of the West Indies section.

Operating time is limited to 24 out of the 30 hour contest period. Times off may not be less than 30 mins. and must be clearly indicated in your log.

In order to minimize QRM to non-contesters it is recommended that operation be confined to certain portions of the bands. This is outlined in *QST* and it is recommended that you check *QST* for this and other information.

There are several other operating regulations, including a cross-check sheet if you make 200 or more contacts. It is recommended that you send for the "SS Package" which includes Operating Aid #6, log and summary sheets. A large s.a.s.e. (28¢ postage) will get you enough forms for an average outing.

Exchange: QSO no., power class, call, last two digits of year first licensed, and ARRL section.

Stations using 200 watts d.c. or less are classed as "A" and over 200 watts as "B".

The same station may be worked once only regardless of band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections (plus VE8) contacted (max. of 74).

Awards: The usual certificates in each class and each mode for single operator stations in each section.

Mailing is December 10th to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

European RTTY Contest

Starts: 0000 GMT Sat., November 8
Ends: 2400 GMT Sun., November 9

Rules for the RTTY contest are the same as the European c.w. and phone contests held in August and September, and were fully covered in the August issue. Since they are quite lengthy they will not be covered here.

There is one major exception however. In the RTTY contest, contest exchanges are not limited to between Europeans and non-Europeans but stations in other continents may also be worked, as well as stations in one's own continent, but not between stations in the same country.

Multipliers will be counted according to the ARRL and DARC country list. (See August issue.) The multiplier point value per band is the same as shown for c.w. and phone except for stations in the same continent, which are counted as one per band only regardless of the band.

Mailing deadline for logs is December 15th and they go to: DARC RTTY Traffic Mgr., Klaus K. Zielski, DF7FB, P.O. Box 1147, D-6455, Erlensee, West Germany.

Int. Police Assn. Contest

Sat. Nov. 8 and Sun. Nov. 9
0700-1000 & 1400-1800 each day

The British Section of the International Police Assn. Radio Club is sponsoring this year's contest. It's open to all, non-members as well as IPA members and s.w.l.s. too.

Exchange: RS(T) and QSO number. Members will identify by sending IPA before their report (IPA 57001). U.S. members will also include a two letter state identity (IPA VA 57001).

Multiplier: Number of IPA countries and states worked on each band determines the multiplier. An IPA country and state is only counted if the station worked is an IPA member.

The same station may be worked once on each band for QSO and multiplier credit.

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

Frequencies: C.W.—3575, 7025, 14075, 21075, 28075. S.S.B.—3650, 7075, 14295, 28650. DX—3775-3800.

Awards: Certificates to the top scoring IPA member, non-member and S.W.L. Also credits for other awards.

A large s.a.s.e. (28¢ in stamps or 2 IRCs) to Vince Gambino, WB4QJO, 7606 Kingsbury Road, Alexandria, VA 22310 will get you all the details and information about the Sherlock Holmes Award, also log forms, membership list, etc.

Mailing deadline for logs is December 31st and they go to: Richard A. Ridley, G3UTX/G4IPA, 23 Greenacre, Worlebury, Weston-Sup-Mare, BS22-9SL Great Britain.

Delaware QSO Party

Starts: 1700Z Sat., November 8
Ends: 2300Z Sun., November 9

The Delaware A.R.C. is again sponsoring this party with rules the same as they were last year.

Stations may be worked once per band and per mode for QSO and multiplier credit.

Exchange: QSO no., RS(T) amd QTH. County for DE stations, ARRL section or country for others.

Scoring: DE stations score 1 point per QSO. Multiply total by number of ARRL sections and DX countries worked.

Others get 5 points for each DE station worked. Multiplty total by number of DE counties worked on each band and each mode (max. of 36 multiplier possible). There are three DE counties, Kent, New Castle and Sussex.

Frequencies: CW—1805, 3560, 7060, 14060, 21060, 28160. S.S.B.—1815, 3975, 7275, 14325, 21425, 28650. Novice—3710, 7120, 21120, 28160.

Awards: Appropriate awards will be given to the top scorers. In addition a certificate to all stations working all three Delaware counties. Include two 15¢ stamps and your address label with your application for the "WDEL" award.

Mailing deadline for logs is December 15th to: Charles Sculley, AE3H, 103 E. Van Buren Ave., New Castle, DE 19720. Include a s.a.s.e. for a copy of the results.

Esperanto Phone Contest

Starts: 1200Z Sat., November 8
Ends: 2400Z Sun., November 9

Aim of this contest is to promote the Esperanto language on the amateur bands.

Exchange: RS plus the usual three figure contact number starting with 001.

Scoring: Contacts between stations in the same continent are 1 point, with other continents 2 points. Final score is the sum of QSO points.

Only contacts in which at least the report was exchanged in Esperanto have any point value.

As an example: 0-nulo, 1-uno, 2-du, 3-tri, 4-kvar, 5-kvin, 6-ses, 7-sepen, 8-ok, 9-nau.

Frequencies: 3766, 7066, 14266, 21255, 28766 MHz. These are the Esperanto suggested frequencies but contacts may be made on other frequencies, especially on 80 and 40.

There was no mention of any awards but your log should be received no later than December 15th by: Hans B. Welling, DJ4PG, Arnumer Kirchstr. 5d, 3005 Arnum, Federal Republic of Germany.

Czechoslovakian Contest

0000 to 2400Z Sun. November 9

This is a world wide type contest so activity is not confined to Czechs only.

All bands 1.8 through 28 MHz, phone and c.w. The same station may be worked once on each band, phone or c.w., for QSO and multiplier credit.

Classes: Single operator, both single and all band, and multi-operator all band only. Club stations are considered multi-operator.

Exchange: RS(T) plus two figures indicating your ITU zone. List and map are available from C.R.C. (s.a.s.e. and 3 IRCs).

Scoring: One point per QSO, 3 points if it's with a Czech station. Multiply total QSO points by sum of ITU zones worked on each band for final score. (Own country may be worked for multiplier credit but no QSO points.)

Awards: Certificates to the top scoring station in each class in each country. (The Czechs are looking for more stateside participation before making awards by districts.)

The "100 OK" and "S6S" awards are available for contest contacts in leiu of QSL cards upon including a written application with your contest logs.

Use a separate log sheet for each band, include a summary sheet showing the scoring, and the usual signed declaration that all rules and regulations have been observed.

Mailing deadline for all entries is December 31st to: The Central Radio Club, P.O. Box 69, 113 27 Praha 1, Czechoslovakia.

DARC 10 Meter RTTY Contest

Saturday, Nov. 15, 1100 to 1700 GMT

This is the fourth and last of a series of the DARC "Corona" 10 Meter RTTY Contest. Rules were given last May for the first of the series but will be repeated for your convenience.

Operation of course will be in that portion of the 10 meter band reserved for RTTY operation.

Exchange: RST, QSO no., and name.

Points: One point for each completed contact.

Multiplier: (a) Each country worked, as determined by the DXCC and WAE country lists, and each W, VE and VK call district. (b) Each different prefix. (The last WAE country list appeared in the August Contest Calendar.)

Final Score: Total QSO points times the total multiplier as indicated above.

Awards: Plaques to the leading station in each of two classes: Single Operator or Multi-Operator and S.W.L.

Mailing deadline for entries is December 15th to: Klaus K. Zielski, DF7FB, P.O. Box 1147, D-6455, Erlensee, West Germany.

CQ WW DX C.W. Contest

Starts: 0000Z Sat., November 29
Ends: 2400Z Sun., November 30

Complete rules were in the September issue and additional information was repeated in last month's Calendar so it would serve no useful purpose to repeat it again here. Deadline for mailing the c.w. logs is January 15th and they can be sent to either N6AR, Larry Brockman, 7164 Rock Ridge Terrace, Canoga Park, CA 91307, or to the *CQ* office. (Your logs will be processed more quickly if they are sent directly to N6AR.)

Austrian 160 C.W. Contest

Starts: 1900 GMT Sat., November 15
Ends: 0600 GMT Sun., November 16

Not much has been heard about this Top Band contest since the activity is geared for the Europeans. However, it is possible to work the OE's and other Europeans under favorable conditions.

Exchange: RST plus a progressive QSO number starting with 001.

Scoring: Each completed QSO counts 1 point. Score a multiplier of 1 for each different country/numeral prefix worked, 2 multiplier points if it's an OE prefix (OE1-OE9). Final score, total QSOs times the sum of multiplier points.

Frequencies: Austrian stations are authorized to use 1823-1838, 1854-1873, 1879-1900 kHz. Others according to frequencies authorized in their country.

There is also a s.w.l. division with scoring same as above.

Awards: Certificate and pennant to top scorer in each country. A Trophy to top score in the contest, and certificates and pennants to the 2nd through 5th places. There are also awards for s.w.l.'s. All participants will receive results of the contest.

A summary sheet and the usual signed declaration are also required.

Mailing deadline for logs is December 15th to: OVSV "AOEC 1980," Postfach 999, A-1014 Wien, Osterreich, Austria.

Need food for thought? WB8LBV presents an entire meal for your mind when you consider the possibilities.

The Next Amateur Communications Mode:

Narrow Band Synthetic Speech

BY MARTIN BRADLEY WEINSTEIN*, WB8LBV

Both proposal and prediction, this prolific reporter of trends in technology now tells of a possible upcoming communications mode that transmits data in about the same bandwidth as RTTY and uses exciting new speech synthesis technology to do the talking at the receiver. —*K2EEK*

By early 1981, a number of manufacturers of entertainment electronic products will begin incorporating an intriguing new IC in their products. For somewhere between $6 and $15 their cost (in huge OEM quantities), the new SC-01 phonetic speech synthesizer offers an unlimited English language vocabulary in a 22-pin CMOS IC.

The SC-01 is a product of Votrax (R) Division of Federal Screw Works, a leader in speech synthesis; for now, it's only available to manufacturers with a substantial minimum order requirement, but it's certain to reach hobbyists in a year or so.

Unlike other approaches to speech synthesis (like Linear Predictive Coding, or LPC, used by Texas Instruments and others) which reproduce a limited, previously-analyzed group of words, phonetic synthesizers generate *phonemes,* the basic elements of speech. These phonemes can be combined to produce every word in the English language. The SC-01 uses 64 total phonemes, variations on phonemes (in duration) and pauses.

Its eight-bit input data word includes six bits to specify an average pitch, meaning you can make it go up to ask a question or down to finish a sentence.

Inflection, phoneme timing and all the little smoothing and housekeeping chores that have been major bugaboos of earlier synthesizers are all handled automatically, on-chip. It doesn't even need a microprocessor, as some synthesizers do.

It's fair to assume the Votrax SC-01 is the first of many such devices that will be appearing in the next several years. And that's terrific news for amateur radio.

Here's why. Phonetic communications can provide real-time speech at data rates of 70 to 100 bits per second, corresponding to RTTY data rates. 10-12 characters of an 8-level code could do the whole job (per second). The transmission bandwidth requirements for this are very modest.

Reception of this kind of communications is technically easy; the same techniques used for RTTY demodulation (FSK or AFSK) could decode the transmitted data into a serial bit stream, and a couple of dollars worth of CMOS ICs can convert that to the parallel data needed by the SC-01. After that, everything up to the speaker is already on-chip.

Transmission involves only one challenge: converting plain English into data code and using the data to modulate the signal. Here, too, Votrax has helped by developing an algorithm (set of rules for a computer to follow) that converts plain English text into phonemes. A small computer can be developed to do the whole job of converting plain English into a Baudot-like or ASCII-like code and even into the proper AFSK tones. This is likely to be more expensive than the RTTY computer button boards now available, but not so much so that it's out of reach for an interested amateur.

And here, dear friends, is where the old Amateur Spirit gets invoked once more. This new frontier is going to need pioneers, both to experiment and to document, plus people to propose standards, secure the necessary FCC clearance and so on.

CQ stands ready to provide a forum for discussion of this upcoming communications mode, to report developments in it and more. If you have information or an opinion to share, write us. Don't call, though. These days we can't be sure who or what we're talking to.

**c/o CQ Magazine*

Here's a great gadget for the tinkerer, experimenter and cautious builder.

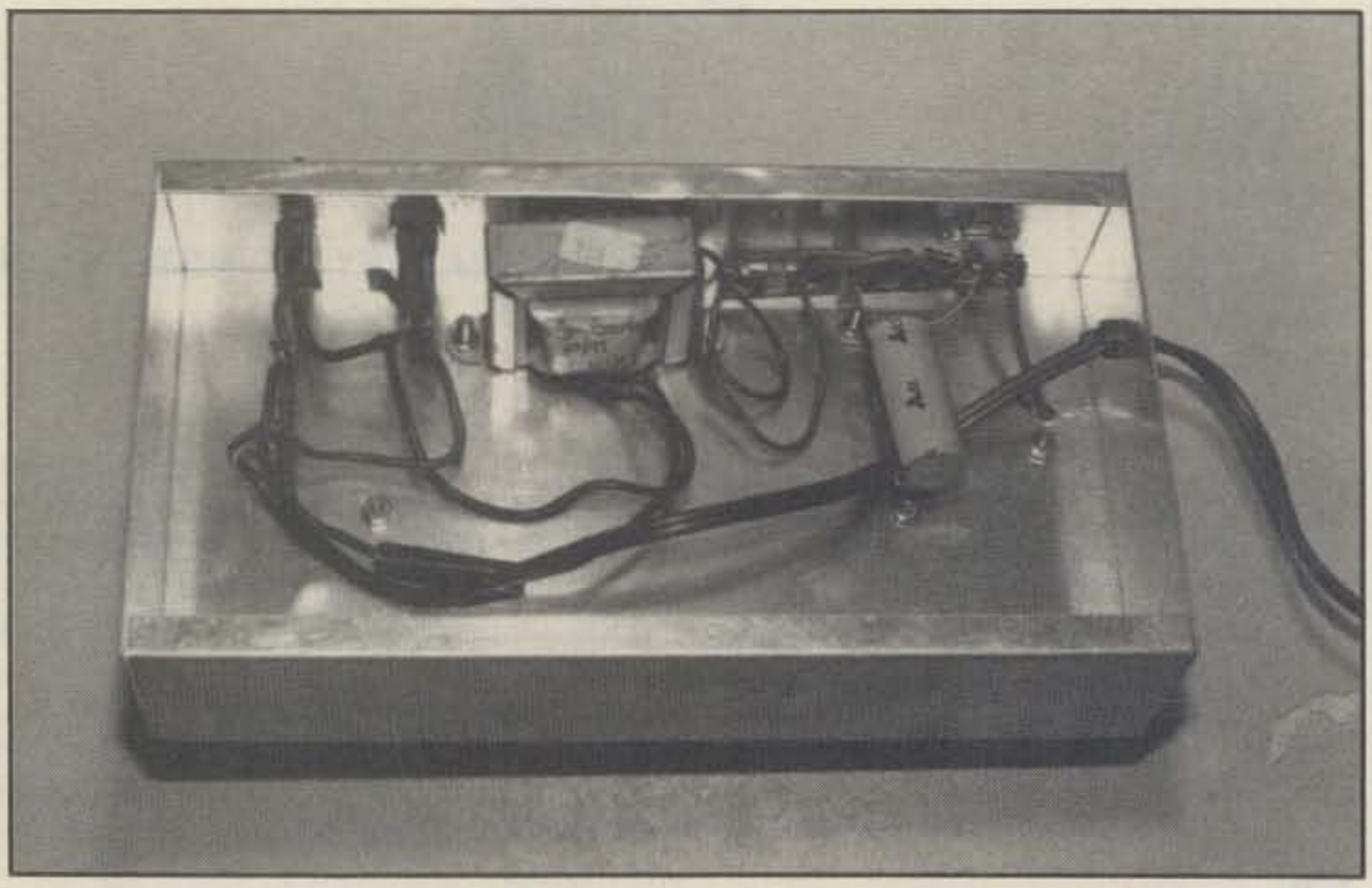
Instant Circuits, The Breadboard Technique

BY STEPHEN J. SWEETKO*, AA4BG

Building up circuits using the various solderless breadboards on the market today is as easy as plugging a tube into a socket. (You do remember tubes?) And, since most of the projects today use integrated circuit chips, solderless breadboarding is the practical way to build and debug these circuits.

I first became interested in solderless breadboards a few years ago when I was designing active filters for a RTTY terminal unit. I found by using the breadboard, I was able to spend more time designing and less time soldering the circuits up. Since that time I have built hundreds of circuits using the breadboard and find it an experimenter's blessing.

There are numerous breadboards available to fit just about any size of project, as well as the size of your pocketbook. And, if you take a look through this magazine, I am sure you will find the breadboard of your needs.



This underside view shows the location of all the power supply parts less the regulator which is mounted at the side.

The only additional item that I recommend is a built-in power supply to accommodate the voltages you plan to use. In my prototype version, I chose a +5 volt regulated supply to handle the power requirements of TTL circuitry.

*1643 South Prospect St., Wheaton, Ill. 60187

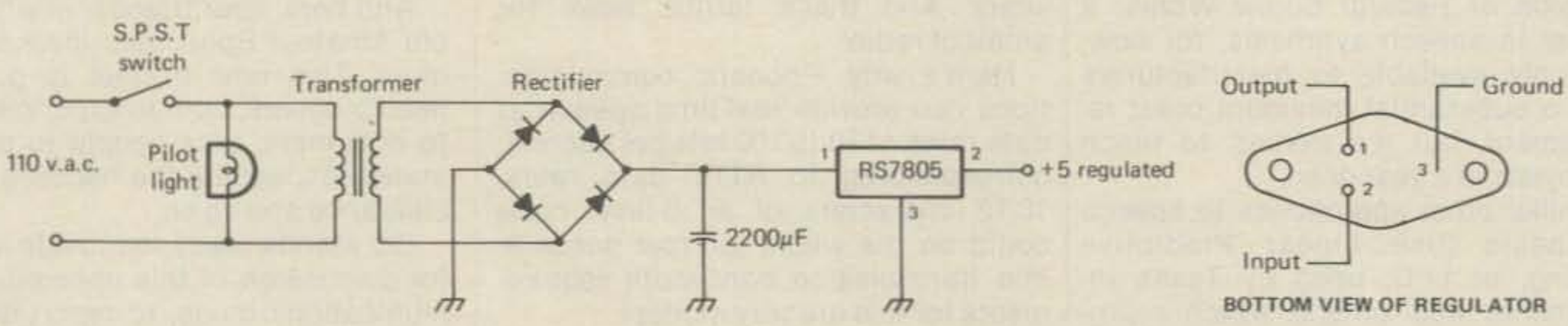
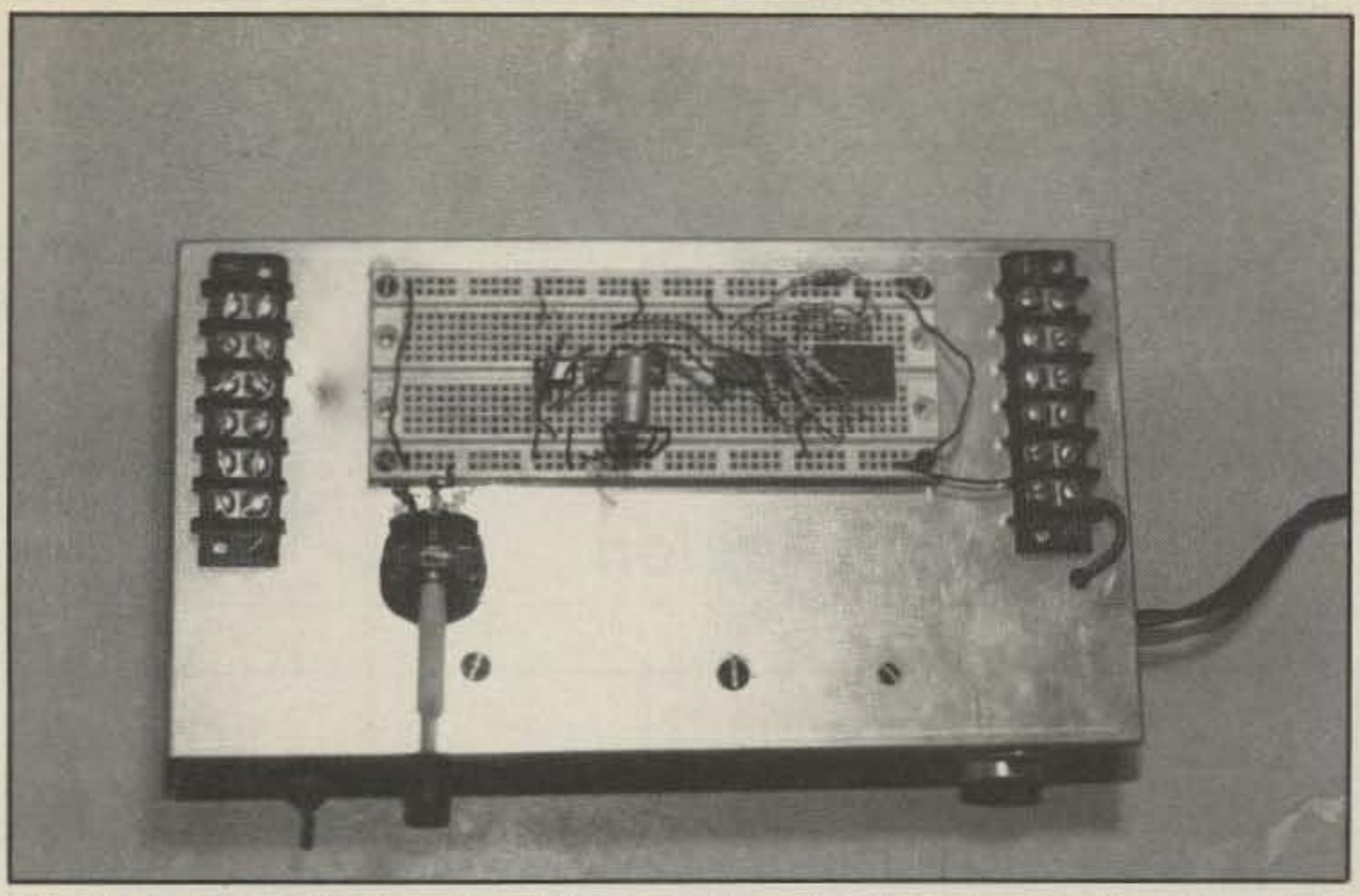


Fig. 1-The circuit for the +5 volt regulated power supply used with the solderless breadboard.



This photo shows the location of the breadboard and the two barrier strips. Note that the parts are mounted to one side of the chassis to facilitate expansion.

capacitor, and a 5 volt regulator. An eight-terminal tie strip holds the bulk of the rectifier components. I mounted the tie strip close to the side of the chassis to enable me to solder the leads from the voltage regulator directly to the tie strip. The photos are self-explanatory as to the location of all the components.

After completion, check the power supply for proper operation. Then, connect a wire from the positive side of the supply to the bus bar on the breadboard and connect a wire from the negative side of the supply to the common side of the bus bar.

Well, there you have it, a solderless breadboard complete with built in power supply ready for you to put it to work in designing circuits. After you ues it for awhile, you too will say, how did I ever get along without it. ▣

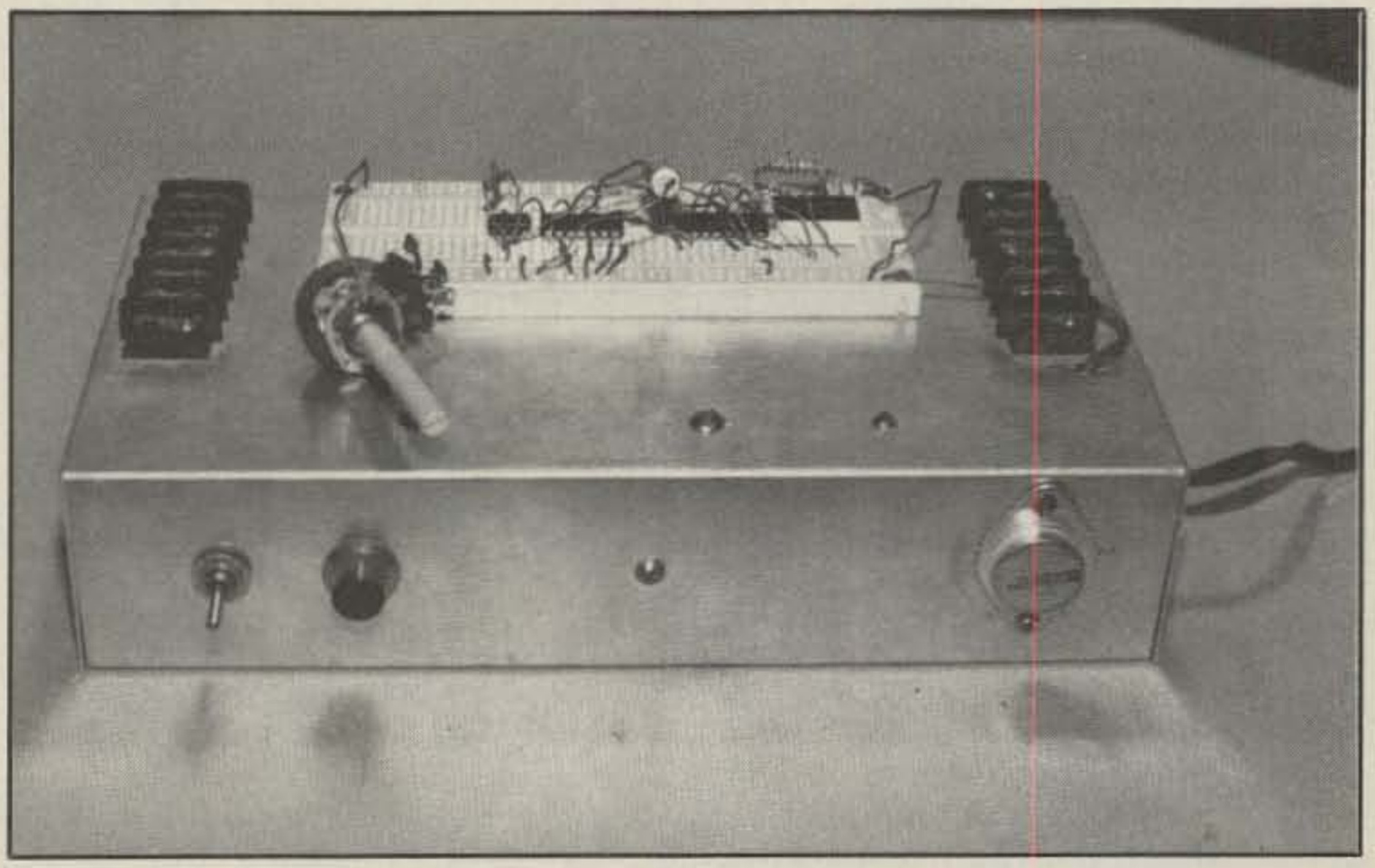
The breadboard I have measures 5 5/16″ × 1 5/16″ and is divided into two sections, electronically separated by a non-conductive bridge. Each section consists of 470 connection points. Also, I am using a bus strip which measures 5 5/16″ × 23/64″. It is divided into two parallel contact strips, each of which has 40 tie points, for a total of 80 individual tie points. Both the bus strip and the breadboard have little snap clips to permit them to be tied together. This particular configuration will accept up to five 16-pin DIP IC's, six 14-pin DIP IC's, or eleven 8-pin mini DIP IC's.

A 2″ × 5″ × 9″ aluminum chassis will house the breadboard and power supply very nicely, with ample room for other components. In addition to the breadboard, I mounted two barrier terminal strips, one on each end of the breadboard, to the top of the chassis. These barrier strips are where the outside world gets connected to the circuit being built or tested.

As the photo illustrates, mounting the breadboard and terminal strip to the chassis consists of drilling a few holes and fastening them with 8-32 machine screws and nuts. The breadboard is mounted to one side of the chassis to allow additional room for either auxiliary components, such as coils or switches, or adding another breadboard if the need for circuit expansion arises.

Except for the power switch, pilot lamp, and voltage regulator, which is mounted on the side of the chassis, the power supply is mounted inside the chassis.

The power supply is a simple full-wave bridge rectifier, consisting of a 110 volt to 6.3 volt transformer, four rectifier diodes, a 2200 uf filter



In this front photo from left to right are the on-off switch, pilot light and the 5 volt regulator. The circuit being built is a counting circuit with led display.

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

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

H.F. Verticals: Conclusion

Nontrap verticals are inexpensive antennas, whether purchased commercially or homebrewed from available materials. On the other hand, they are inconvenient to use if operation on several bands is desired, since the loading coil must be adjusted each time a band change is made. This makes rapid bandswitching impractical, especially if the antenna loading and matching network is buried under a foot of snow, or if the antenna is mounted high atop one's roof.

Parallel-tuned circuits, popularly known as traps, can be inserted in series with the radiating element at appropriate points to make each section work as a quarter-wavelength vertical or an "odd" multiple of a quarter wavelength. The traps work to effectively "cut" the antenna, electrically speaking, at the proper quarter-wavelength points. The traps present a very high impedance at or near resonance, acting as insulators at the end of each quarter-wavelength point on the appropriate bands.

For example, using the illustration of fig. 1, which shows a five-band trap vertical, the lowest section (that below the 10-meter trap) is physically a quarter-wavelength on 10 meters. The 10-meter trap effectively disconnects the upper section of the antenna so that they have no effect on 10-meter operation. To make the antenna work on 15, the lowest section, the 10-meter trap, and the section just below the 15-meter trap combine to form a quarter-wavelength on 15.

The traps and antenna sections continue in the same fashion to resonate on all bands down to 80 (or in some cases, 160) meters. For five-band operation, only *four* traps are required; a trap isn't required for the lowest band. On 80, the entire antenna and all the traps act to form an electrical quarter-wavelength.

As with base loaded multiband ver-

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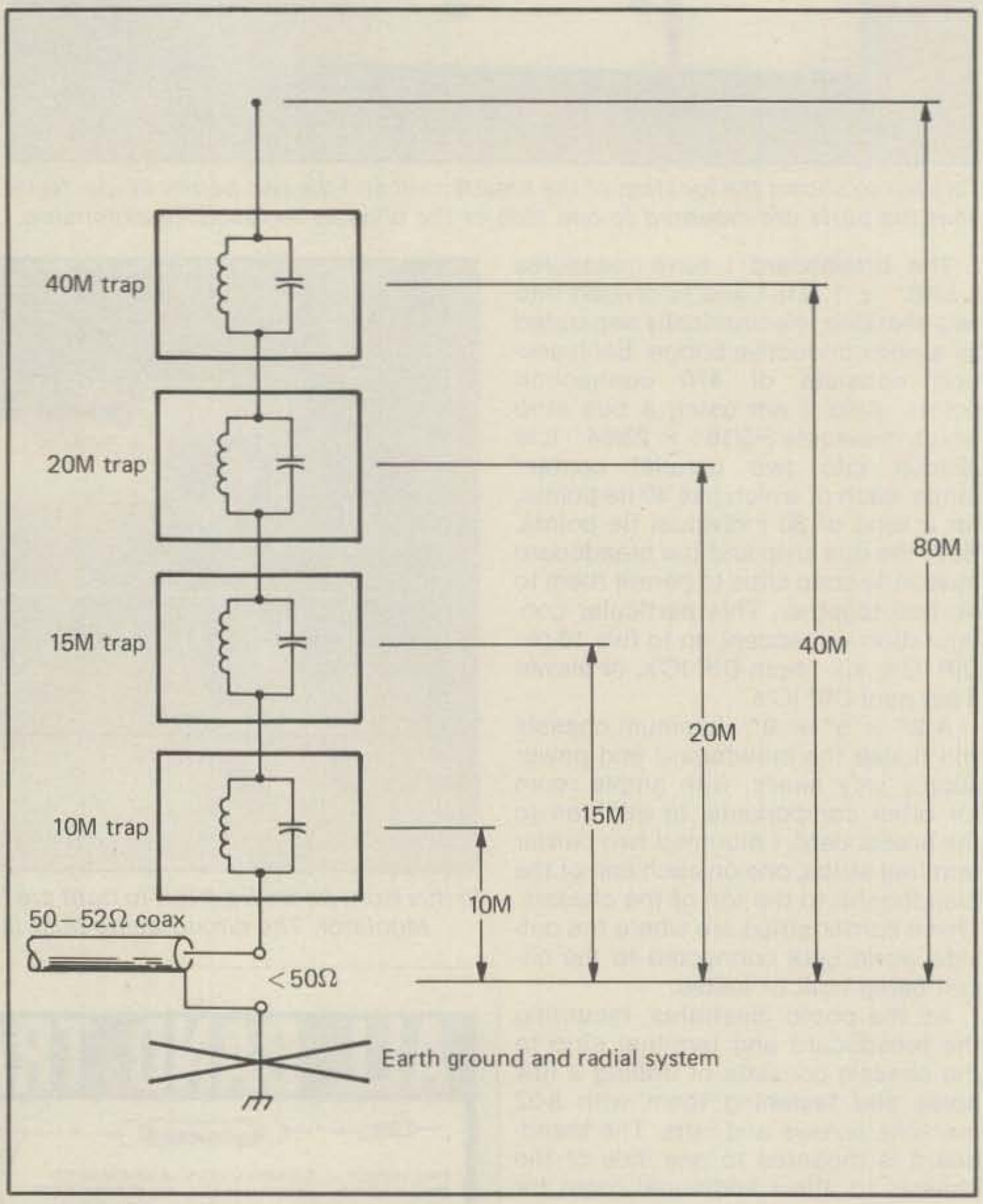


Fig. 1- A trap vertical antenna. The diagram represents a five-band multiband trap antenna.

In the diagram above, the electrical length is adjusted by installing parallel-resonant traps at the proper points to effectively "cut" the antenna, electrically speaking, to quarter-wavelength dimensions. The traps offer high impedance at or near resonance, and therefore act as insulators for operation on a given band. The objective is to come up with an acceptable (not necessarily *perfect*) match to coax on all bands. In some cases, a base matching network or r.f. transformer is needed to effect a good match. Normally the antenna is ground mounted, unless radial sets are prepared for each band for above-ground installation.

ticals, trap antennas are usually much smaller than full-size verticals, typically about 18-25' in length. To a large extent, the size is scaled down due to the loading effect of the traps, and the top-hats that are sometimes used.

The most efficient trap verticals use high-Q traps with large diameter coils for a favorable inductance-to-capacitance ratio. Many commercial five-band trap verticals have provision for using an optional 160-meter loading coil to allow operation on that band.

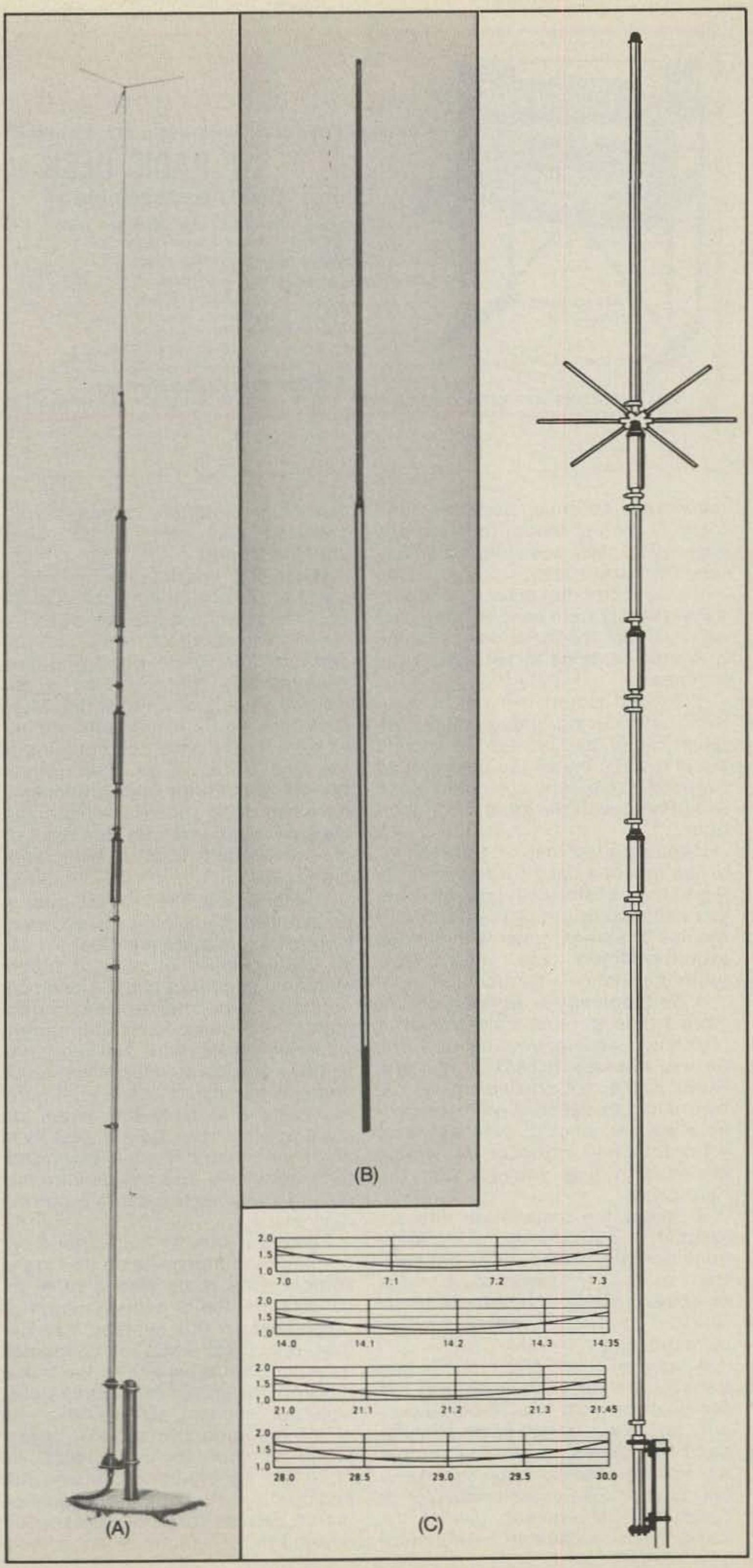
With short, high-Q trap verticals, the higher bands such as 10, 15, and 20 meters can be covered nicely from band edge to band edge. But usable bandwidth on the lower bands suffers so that either the 'phone or c.w. band segments must be selected for operation. A 100 kHz wide segment is about all one can expect on 80; 160 bandwidth will be especially narrow.

The purpose of the traps, of course, is to come up with an antenna that presents a resonant, matched load to the feedline. As is the case with all multiband antennas with which the author is familiar, the trap vertical represents a compromise; there is a great deal of interaction between the

(A) Hy-Gain 14AVQ/WB antenna covers 40-10 meters using three high-Q traps. The 18-lb. antenna shows SWR of 1.5:1 at resonance (or less) on all bands, if installed in accordance with the manufacturer's instructions. Antenna can be mounted on a mast up to 1-5/8" in diameter. (Photo courtesy Hy-Gain Electronics)

(B) Half-wave coaxial antenna is essentially a dipole stood on its end. The omnidirectional antenna requires no radials and is independent of mounting location. The Radio Shack 27 MHz CB antenna is shown here; the author has used this low-angle radiator on 10 meters with good DX results. (Photo courtesy Radio Shack)

(C) Representative compact trap vertical is this Hustler 4-BTV that covers 10 through 40 meters with an option or adding a 75-meter resonator. The 21'5" antenna weighs 15 lbs., boasts 1.15 to 1 s.w.r. at resonance (or better) and 1.6 to 1 (or better) at band edges. Antenna is fed with 50-ohm coax and handles full legal power levels. Wind loading is specified as 29 lbs. at 70 mph. Antenna may be ground or tower mounted. Manufacturer's typical s.w.r. curves are shown below.



individual antenna sections and traps. A perfect match on each and every band isn't possible, especially near the band edges.

It's no secret that antenna performance will vary from band to band. You can minimize the variations by taking a few precautions in setting up the antenna:

1. Ground mount it if possible, to avoid introducing unpredictable effects cause by the use of ground plane radials. Install the best ground system you can. And don't hesitate to experiment with the ground configuration.

2. Install a low-loss r.f. transformer at the antenna base for easy matching to the transmission line. After all, you can't easily get to the traps, and the use of a transformer with various switch-selected taps allows fine-tooth impedance adjustment.

3. Be prepared for at least one or more bands to stubbornly present a high s.w.r., despite your best efforts. So use low-loss RG-8/U or the new RG-8X cable, not small-diameter cables such as RG-58/U. With reasonable feedline lengths, even s.w.r.s of 4:1 or 5:1 won't introduce intolerable losses providing you're using the right cable.

4. Follow the installation and adjustment instructions. Anticipate considerable interaction between trap sections, and use an s.w.r. bridge or antenna noise bridge for antenna tuneup. Trap adjustment is an iterative process.

A special point: Many solid-state transceivers and transmitters are designed to work into 50-ohm loads *only*, so if s.w.r. is high on a particular band or bands, achieving proper transmitter loading may become a real problem. An antenna coupler or tuner may be required. Use of the tuner is also desirable to minimize harmonic radiation, which is aggravated whenever a multi-band antenna is used.

While it's possible to build your own trap vertical, the mechanical difficulties occasioned by the traps are beyond the reach of many, and perhaps most amateurs. For this reason, commercially manufactured antennas are usually one's best bet. Many amateurs who are fortunate enough to have a very high tree standing at the right location on their property—one with sturdy, high branches—have had good success using homebrew *wire* trap verticals that are simply suspended from a sufficiently high branch.

Matchmaking. The vertical, even in its simplest single-band, ¼-wave version, presents a problem that the basic dipole does not: that of proper matching to coaxial cable. The dipole normally presents a near-perfect match to popular 70-75 ohm cables, whereas the vertical typically presents a feedpoint impedance of 35 ohms, sometimes much less. If nothing is done to ease the match, an s.w.r. of other than 1:1 will exist even at resonance, and if cable lengths are long, additional loss will be introduced and transmitter loading problems may ensue.

There are several traditional ways to match the transmission line to the vertical. One is by means of a so-called shunt-fed or gamma match arrangement. In this system, a rod of 0.04 to 0.05-wavelength is connected in series with a capacitor; the transmission line center conductor is connected at one end, and the other end of the rod is connected at an appropriate point on the mast, which is grounded. By adjusting the capacitor and/or the rod length, an impedance match can be obtained. (Details are covered in the various antenna handbooks and won't be repeated here.)

Another method is to use a series of coax cable section to perform the impedance transformation. One possibility is to insert a short length of 70-ohm cable a formula-determined distance back from the feedpoint of a vertical fed with 50-ohm coax. Another is to use 70-75 ohm coax as the transmission line, inserting a ¼-wavelength segment of 50-ohm cable at the feedpoint to bring the 35-ohm impedance up to about 75 ohms. More alternatives are possible using series sections: refer to Frank Regier's excellent article on series impedance matching in July 78 *QST* (see bibliography). If you go the series-matching route, realize that when working with coax sections, you must use their *equivalent* electrical length, which works out to less that the free-space wavelength calculations. Be sure the formulas you use to determine the length of the coax section take into account the cable's *velocity factor*.

We get into trouble when we want to use the antenna on more than one band, since the gamma match and series line dimensions hold for but *one* band. It's especially difficult when the antenna is considerably shortened, since the radiation resistance can be quite low and difficult to match to any available transmission line.

An alternative is to use an **r.f. transformer.** Although it will not "tune out" reactance (the antenna should be resonant), it will readily transform the low feedpoint radiation resistance to work into 50-ohm cables. Several firms market low-loss r.f. transformers, including SST, Swan, and Palomar Engineers; these have a number of impedance taps which cover the range of impedances likely to be encountered, from about 5 ohms up. Once initial tap adjustment is set, little further attention is required, providing the antenna is kept at or near resonance. Shortened, loaded or trap-type verticals may require coil readjustment to keep the system close to resonance and the feedpoint impedance under control.

Summary

What can we conclude? The judgment on h.f. verticals is left up to you. In my book, however, if their basic characteristics and operating limitations are understood, they can make excellent, relatively low cost antennas for the DX'er. The vertical is especially attractive as an unobtrusive, easily installed and portable antenna that allows effective multiband operation on a small lot.

Next month, we will break with ver-

ticals to cover a somewhat neglected though simple and effective all-band antenna: the horizontal flattop fed with tuned feeders. See you then.

73, Karl, W8FX

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CQ DX Tip

—If you called CQ-DX and more than one station replied, you called too long. —*W4MB*

Here's a great up-to-date addition for that slightly older rig you're using.

An Improved Crystal Calibrator, 1980 Style

BY GEORGE MOYNAHAN*, W6AXT

Some time ago I became dissatisfied with the factory-built crystal calibrator used in my transceiver, a National NCX-5 Mark II, and so I decided to design and build a better one. My principal objection to the commercial model was that the wide spacing between the frequency marker calibration points (100 kHz), combined with some departure of the tuning mechanism from strict linearity, resulted in considerable loss of accuracy in determination of the operating frequency. The replacement unit that I designed, and which was described in *CQ* May 1972 under the title "An Improved Crystal Calibrator Using Solid-State Techniques"[1], proved considerably better than the one built by the manufacturer. It provided reference markers at 25 kHz instead of 100 kHz intervals, and since it was an all solid-state device, it used less energy, dissipated less heat and so drifted less. However, at best this improved device represented application of solid-state technology of the early 1970's, and a great deal has changed since then.

Inexpensive integrated circuits that make it easy to put together a still better calibrator are now readily available. Consequently, I decided to up-date the design of my device, and so I built the unit described in the following paragraphs.

Admittedly, a very small percentage of the high-frequency transceivers, in use today, is represented by National NCX-5's, and so it might seem that my time could have been spent better than in designing a unit intended to improve the calibration accuracy of such a vintage piece of gear. However, many otherwise excellent pieces of older equipment of various makes share the calibration deficiency of my NCX-5, and this calibrator can be used to upgrade them to modern standards. Consequently, although I have applied the calibrator to the NCX-5, this is simply because that is the piece of equipment I happen to own. The new calibrator is, by no means, limited to use with this particular set, but it is applicable, with no more than minor changes, to most of the older sets. Best of all, improvement ordinarily can be effected using the unit as a plug-in add-on without any possibly damaging modification of the old equipment itself.

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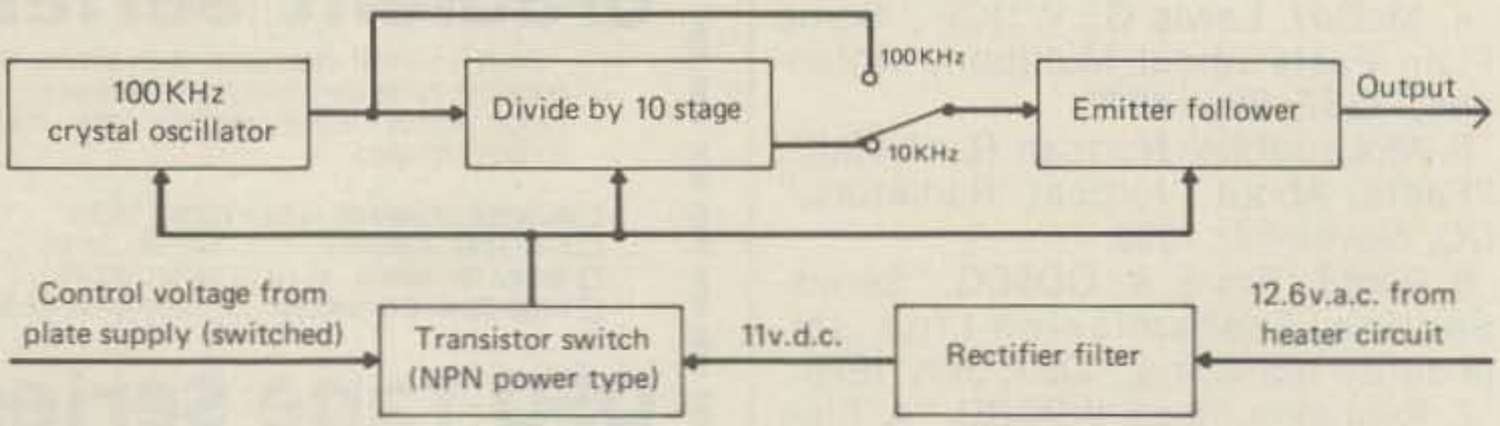


Fig. 1- Block diagram of the crystal calibrator.

Basically, the new calibrator consists of two IC's, a 100 kHz crystal and a few outboard components, resistors and capacitors. Two common type NPN transistors have been added to adapt the calibrator to my particular make of transceiver. These may or may not be desirable or necessary when the device is used with another make or type of equipment. To be specific about the arrangement, a block diagram of the system is shown in fig. 1 and a circuit diagram in fig. 2. Referring to these, it will be seen that a type CD4001 Quadruple 2-Input NOR Gate is used to provide the active part of the 100 kHz crystal oscillator. Its output is applied to drive an MM 74C160 Decade Counter which divides the 100 kHz output by 10 to produce calibration marker points at 10 kHz intervals throughout the high-frequency spectrum. Provision is made to switch to 100 kHz points in order to avoid any possibility of confusion. In any event, after the failure of a Decade Divider, I elected to use Q2, a 2N2222 NPN transistor, as an emitter follower and to obtain the output from it rather than from the IC's directly. This seems to isolate the rather delicate MOS IC's from excess voltage which they probably experienced when the transceiver was operated in the transmit mode. There has been no trouble with component failure since the emitter-follower was added.

Following the same scheme used in my earlier calibrator, I obtained the bias voltage for the IC's and transistors of this unit by rectifying and filtering the a.c. of the 12.6 volt filament line. This requires only a single diode, one filter capacitor, on Zener and a small resistor and is considerably more efficient than taking power from the plate supply through a large dropping resistor. In the case of using the calibrator with a unit using a 6.3 volt filament supply, a voltage doubling bridge rectifier could be used.

Transistor Q1 is a small power type and is simply used as a switch. My transceiver, like many of the tube-type sets, was designed to turn its calibrator off and on with a panel

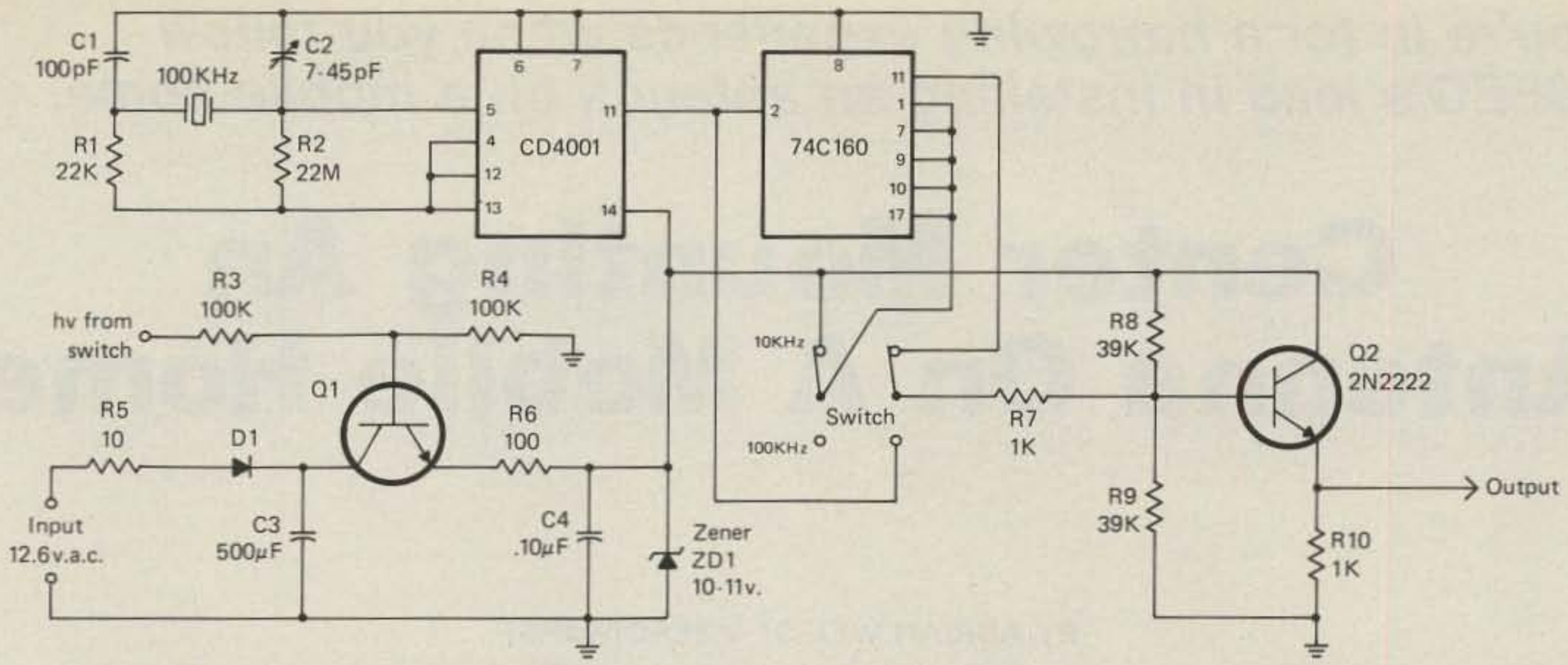


Fig. 2- Schematic diagram of the crystal calibrator. Note: Q1 is any small NPN power transistor, and the switch is shown in the 10 kHz position.

mounted switch in series with the plate supply and the calibrator. By applying this through a high resistance current limiting resistor to the base of Q1, the solid-state calibrator can be controlled by the same switch without any internal modification of the transceiver.

For the individual who would like to use the calibrator with several pieces of equipment rather than to tie it to a single transceiver or receiver, the solution is simple. Power it with a 9 volt transistor battery. It works fine with such a power source and takes so little current that a single battery, in normal use, will last for months. In that case, of course, transistor Q1 would be unnecessary, and a simple toggle or slide switch would be satisfactory to control the device.

Fig. 3 represents the foil side of the circuit board that I used for the calibrator, and fig. 4 shows the placement of parts on the component side of the board.

Since I added the emitter follower output transistor after the rest of the calibrator had been assembled, a separate board shown in figs. 5 and 6 was added for that part of the circuit.

Construction of this unit should be interesting to old-timer and new-comer alike. The device is quite easy to build and will permit the former to upgrade and extend the useful life of some of his cherished old equipment, without the necessity of mutilating it, and will help the latter to get started in amateur radio using some of the inexpensive used and surplus gear that is widely available and that would be highly satisfactory if only they were capable of more precise calibration.

[1]*Moynahan, G.F. "An Improved Crystal Calibrator Using Solid-State Techniques." CQ, May 1972.*

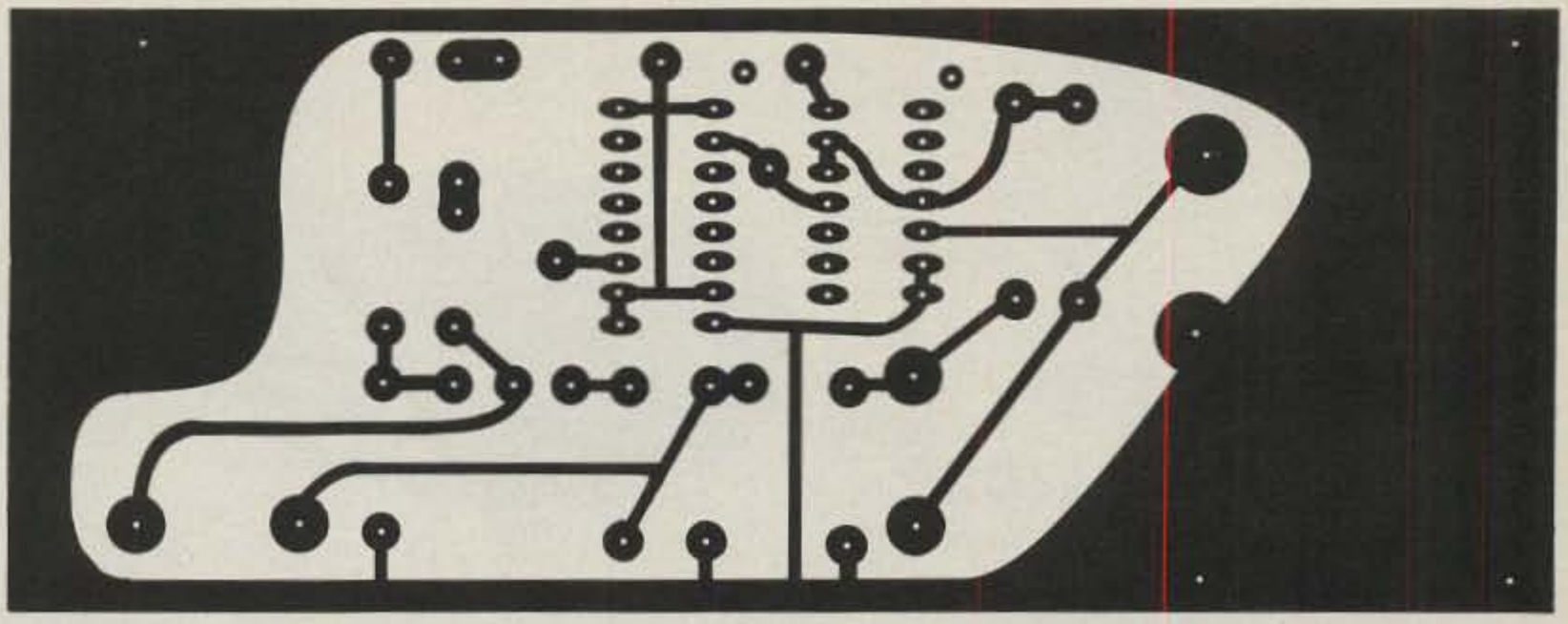


Fig. 3- The main circuit board shown from the foil side.

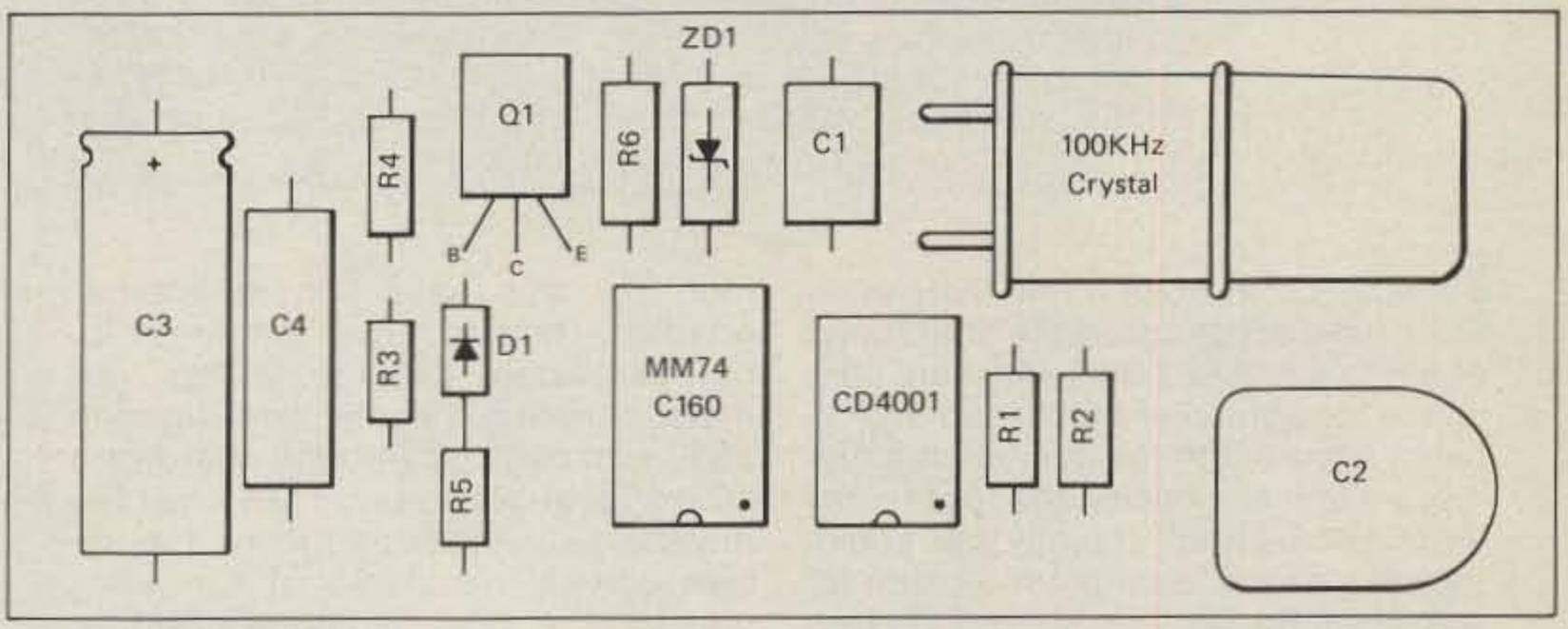


Fig. 4- Component layout for the calibrator board.

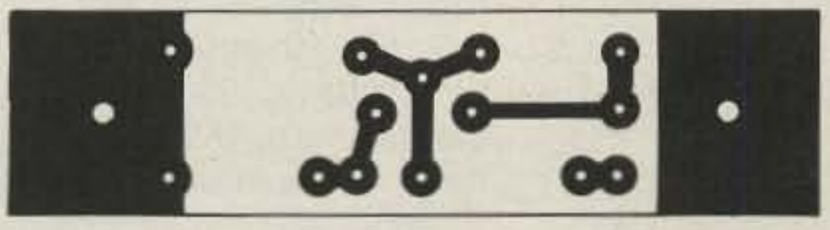


Fig. 5- The circuit board for the emitter-follower as seen from the copper side.

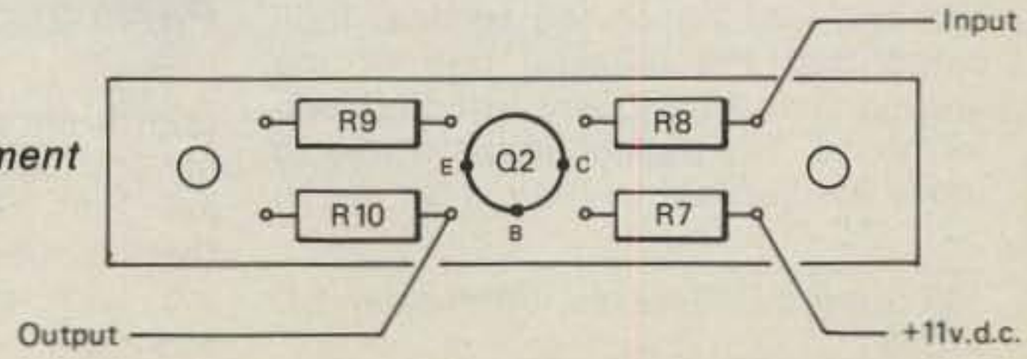
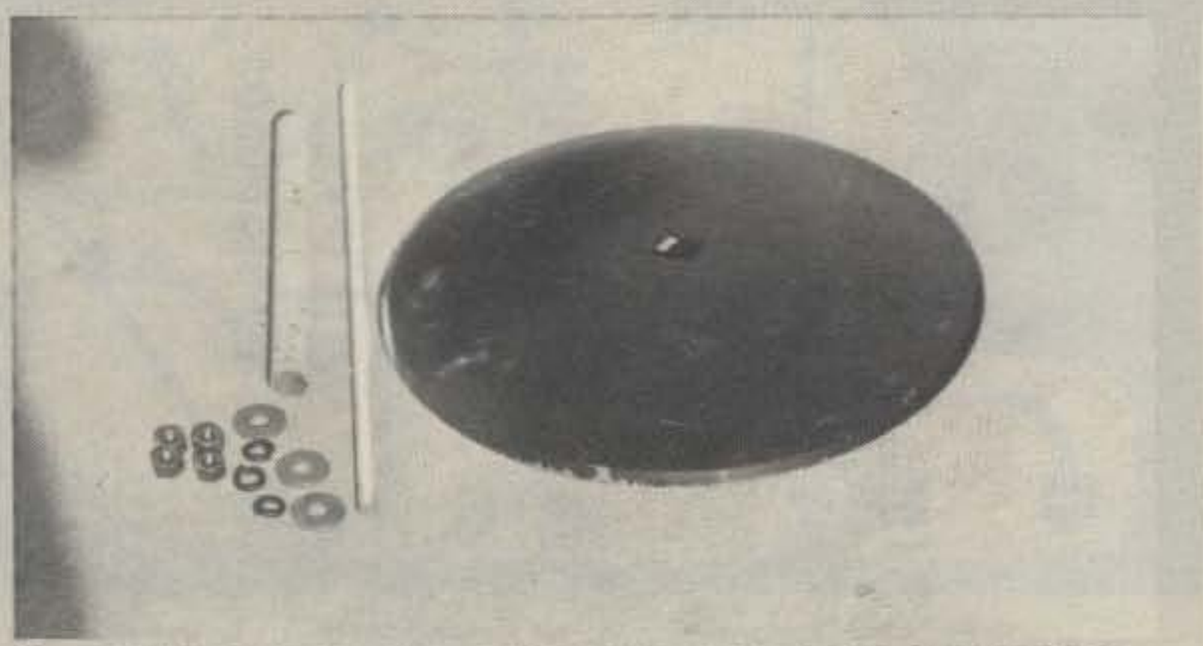


Fig. 6- The component placement for the emitter-follower.

You're in for a harrowing experience when you follow K8EEG's lead in installing an antenna on a mobile home.

Center Mounting An Antenna On A Mobile Home

BY ADRIAN WEISS*, K8EEG/WØRSP



Complete parts for the vertical mounting base. The 22 inch harrowing disc, a 2 ft. universal threaded 5/8 inch bolt, 4 nuts, three washers, and three lockwashers to fit the bolt. The scavenged 18 inch hunk of TV mast is beside the universal bolt.

I suspect that quite a few radio amateurs have experienced the limitations of life in a mobile home with very little space for antennas other than a vertical. It occurred to me one hot summer day while I was tarring the roof on my mobile home that I actually was standing on a nearly ideal ground plane for a vertical. Rather than lament the loss of my Gem Quad at 48 ft, I ought to capitalize on that field of sheet metal measuring 12 × 70 ft. At first, I mounted the vertical (a Hy-Gain 18AVQ) at the edge of the roof on a TV mast, with a few radials to extend the ground plane beyond the roof. However, this system was very marginal, and the loading of the vertical indicated that the missing half of the ground plane seriously affected performance. The logical solution was to move the vertical to the center of the roof, but this gave rise to another problem—how to mount it there without permanent damage to the roof metal sheeting. Finally, after figuring and rummaging through hardware stores for about a year in search of the materials for the base mount, I stumbled across five stacks of harrowing discs in the local Campbell's Supply, which caters to the agricultural community. Eureka! Recognition was instantaneous. Price was excellent too—under $15! Within 10 minutes, I walked out with everything that was needed. Fig. 1 shows the basic parts and assembly details of the mount.

Parts and Assembly

Fig. 1 and the accompanying photos show the parts and the assembly approach. A 2 ft. threaded universal bolt 5/8 inch in diameter (or thereabouts—a 1/4 inch would do the job with respect to the structural strength needed) is inserted and

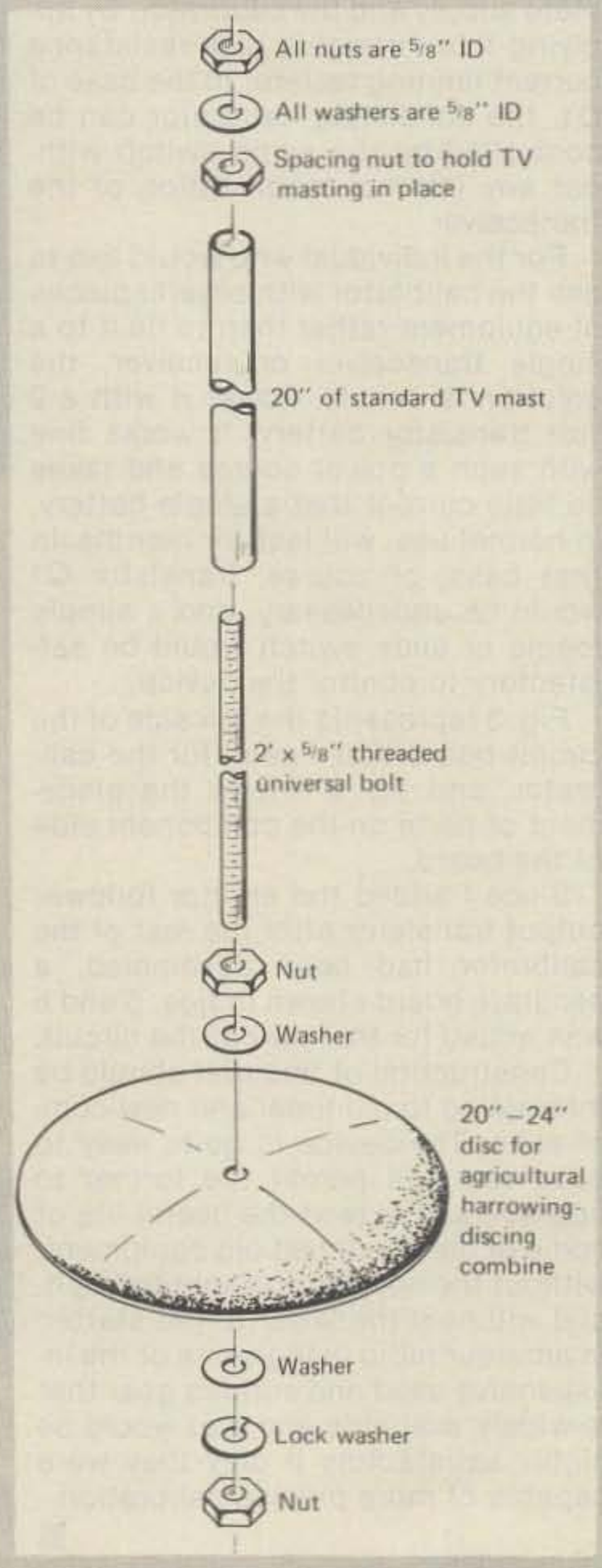


Fig. 1- Parts assembly for the vertical antenna base mount.

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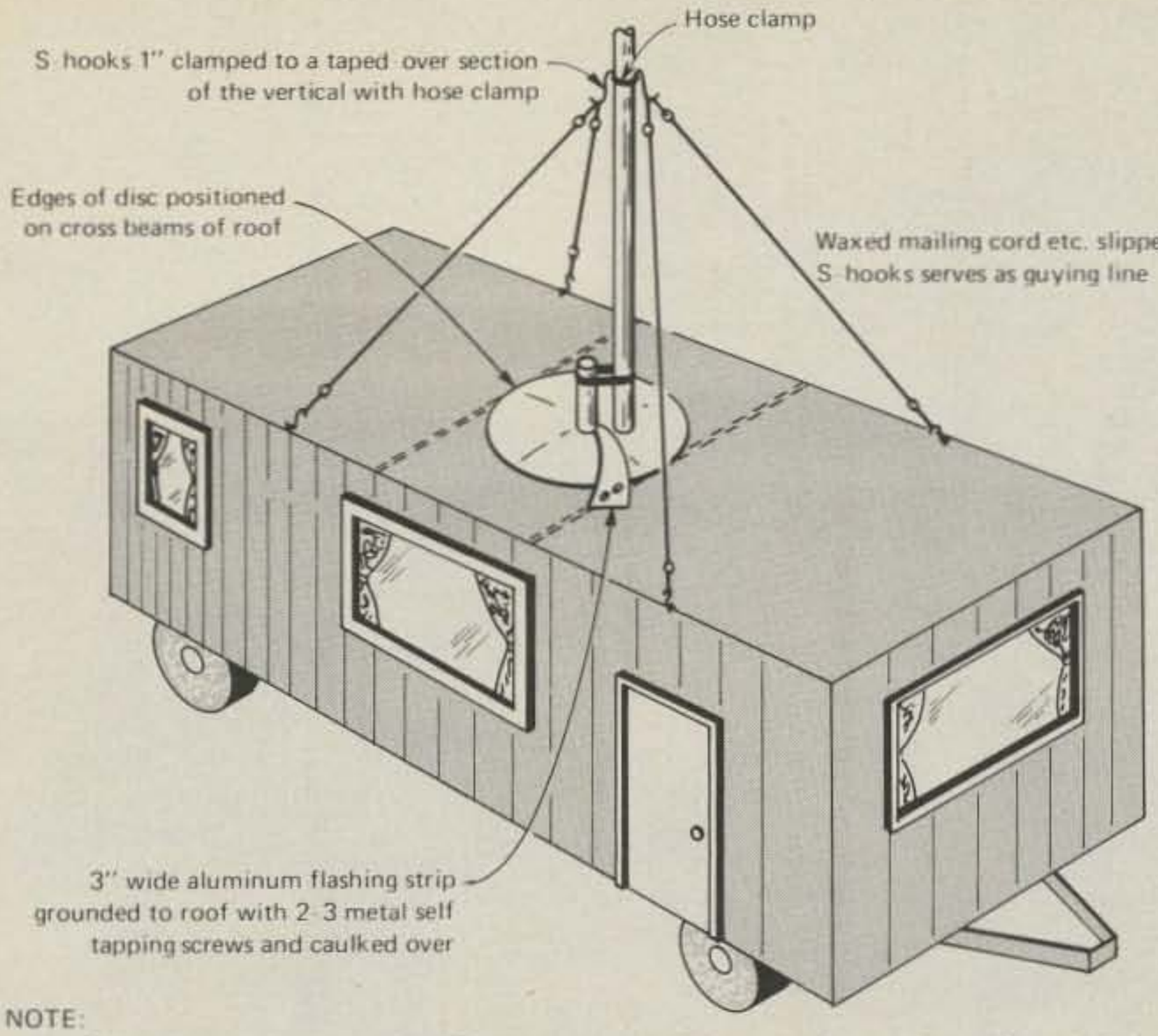
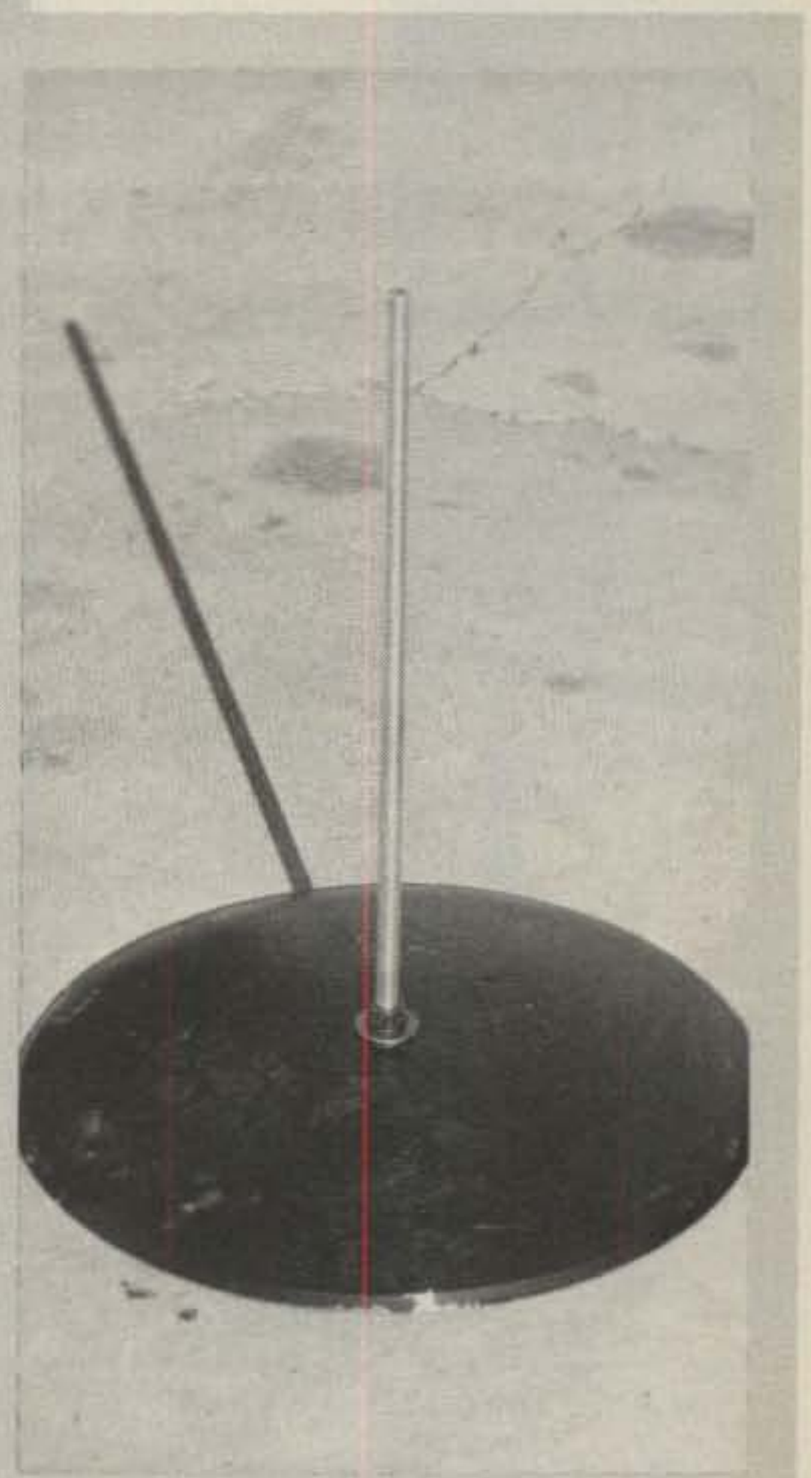


NOTE:
Use Ohmmeter to insure that all roof sheets are electrically connected, as well as roof to side joints. If not connected, use strips of flashing scross each seam to establish connection. Trailer can be grounded at each corner and middle if desired. Doesn't really seem to make any difference though.

Fig. 2- Mounting the vertical antenna at the center of the mobile home roof.



Step 1 of assembly. The universal bolt is mounted on the disc with two washers and two lockwashers and nuts.

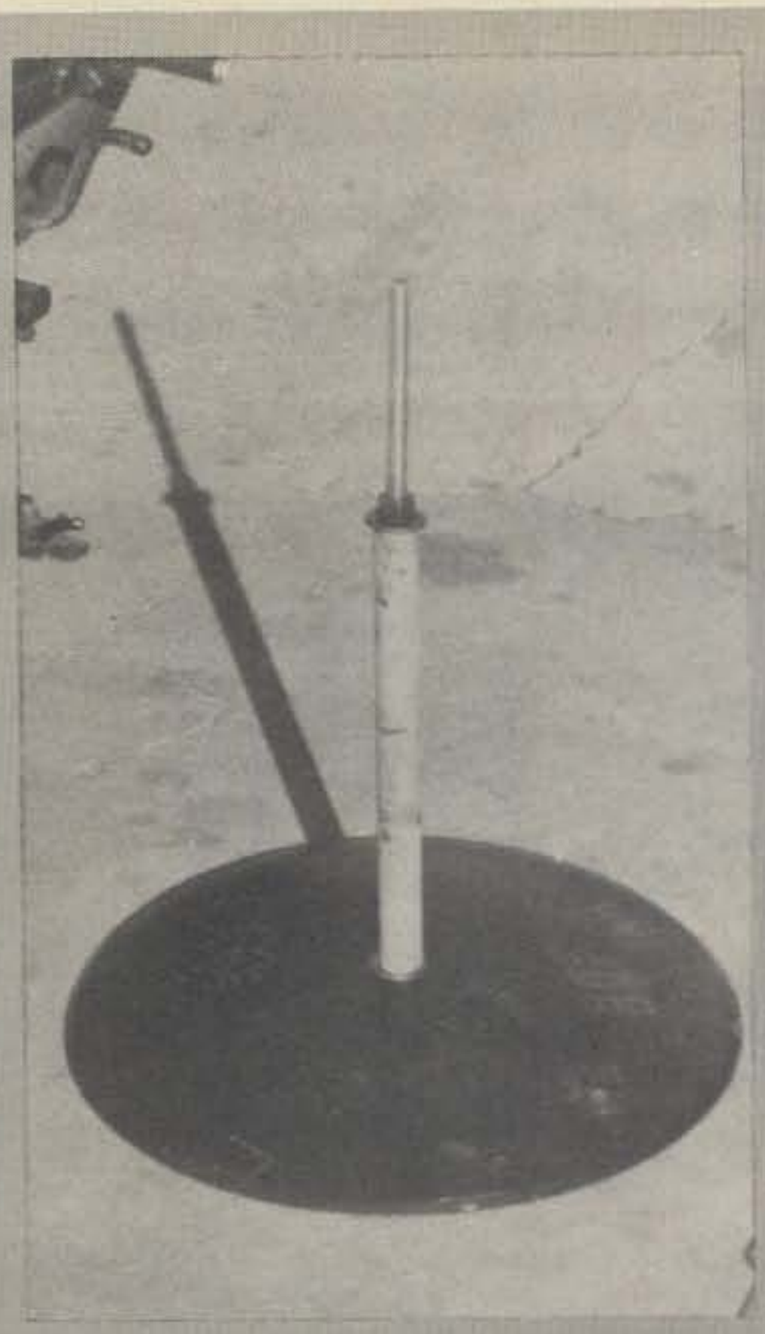
bolted into the mounting hole of the harrowing disc. The discs come in sizes ranging from about 16 inches to 24 inches. I believe that a 24 inch disc would hold a 16 ft. vertical in winds up to about 25 m.p.h. without guying. I selected a 22 inch disc, on sale for about $11. Once the universal bolt is centered and mounted, an 18 inch hunk is cut from a standard TV mast. A nut is then threaded on the universal bolt down to a point that will place it just inside the top of the TV mast. This bolt will ensure that the mast section remains securely centered. Another nut-bolt-lockwasher then secures the section of mast in place. Simple as can be!

The section of mast becomes the vertical mount. The 18AVQ uses two U-bolts to mount to the mast. In order to ensure a low-loss ground connection to the metal roof, a 3 inch wide piece of aluminum flashing is bent around the TV mast, and clamped to it securely by the U-bolts which attach the vertical to the mast. The other end of the flashing is then screwed to the roof metal with self-tapping 1/8-1/4 inch screws. Position the vertical so that the outer edges of the disc rest on roof crossbeams. The flashing grounding screws then are screwed into the roof at a crossbeam point. Be sure to steelwool the roof metal and flashing contact surfaces clean. Once the ground connection is completed, seal the area where the flashing joins the roof with caulking. This will prevent any leakage, and more importantly, it will retard oxidation of the metals. If the roofing is made of steel rather than aluminum sheeting, dissimilar metals corrosion can occur, and caulking will retard this also. In six months time, corrosion has been unnoticeable as far as the effect on vertical loading is concerned. Should loading conditions change over a period of time, suspect corrosion. The simple remedy is to clean the flashing-roof contact points again.

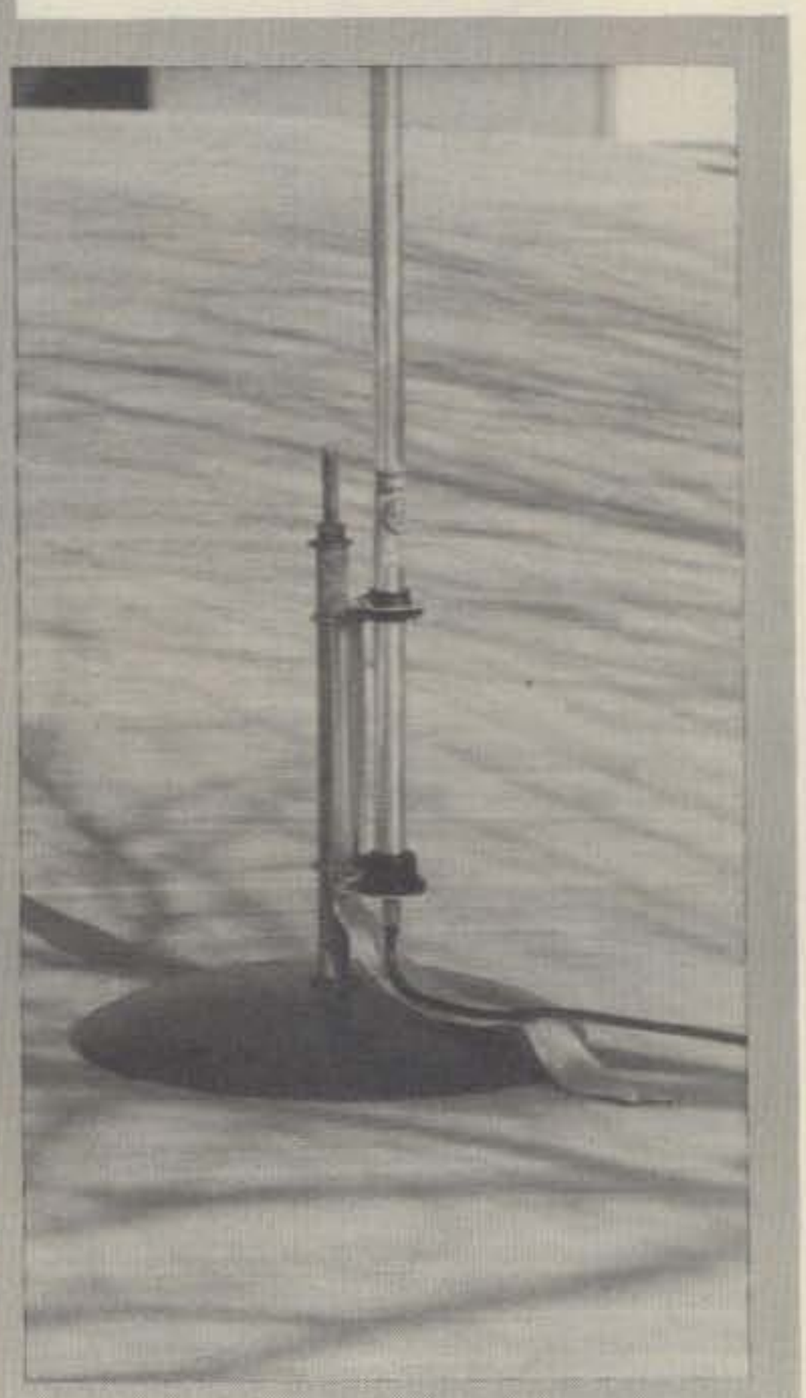
Guying is necessary because the weight of the disc is insufficient to support the vertical against wind thrust. The simplest method of guying is to secure two S-hooks to the vertical with a hose clamp at about the 6 ft. level. Heavy waxed mailing cord or nylon line is then looped over the S-hook, and run to a set of S-hooks at the guying points at the roof edges. An advantage of using the S-hooks is that the guylines can be slipped off quite easily during adjustment of the vertical. One other alternative for the ambitious, provided your roof is strong, is to mount the disc on a slab of concrete wide enough to reach across two crossbeams, and extending about 3 inches below the disc. This would support the weight of a 30 ft. vertical in high winds. The only problem is getting the base up onto the roof without a crane!

Results

Moving the vertical to the center of the roof had a dramatic effect upon the input impedance of the vertical. The Hy-Gain verticals have an internal base coil designed to present a 50 ohm impedance to the feedline on all bands. While mounted at the side of the roof, measured input impedance to the 18AVQ was in the range of 24-38 ohms, depending upon the band being tested. Further, it was not possible to bring the s.w.r. to within specified range as shown in the accompanying s.w.r. charts provided with the antenna. With the vertical mounted at the roof center, input impedance on 10-15-20 meters shifted to just above 50 ohms, while on 40-80 meters, it was in the 45 ohm range. With respect to



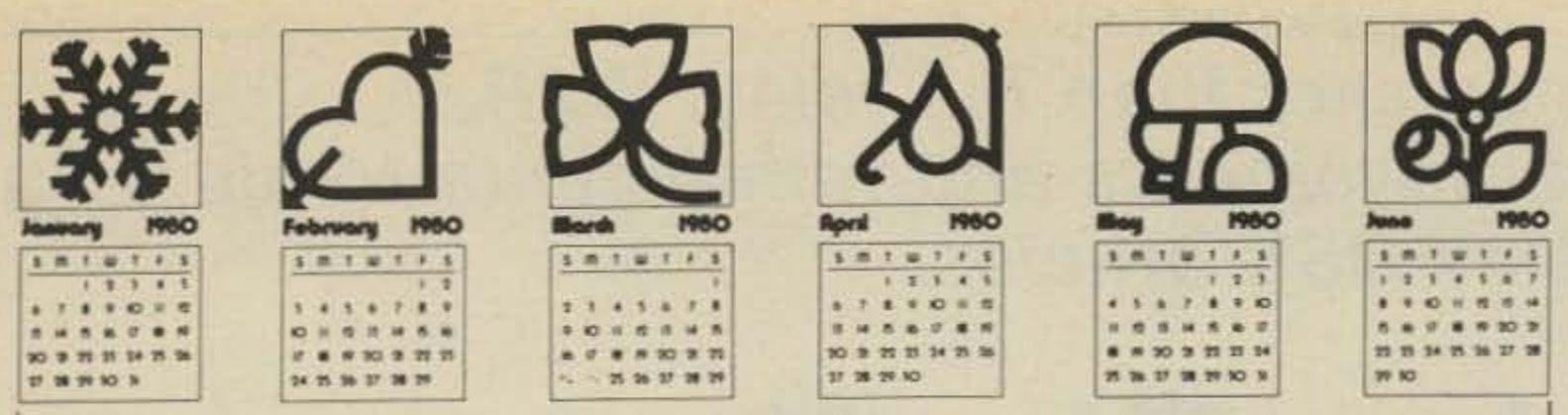
Step 2. 18 inch TV mast bolted on. Not seen is the extra nut that is threaded on the bolt down to the level of the top of the mast section. It serves to center the mast section securely.



The completed assembly with the 18AVQ attached. The base of the vertical is about 4 inches above the disc, allowing sufficient clearance for the RG-8U feedline. The 3 inch wide piece of aluminum flashing is bent around the TV mast and inserted between the mast section and the vertical mounting bracket. Then the vertical mounting U-bolt is tightened, ensuring firm ground connection between the base of the vertical and the strip of flashing. Opposite end of the flashing is connected to the cleaned spot of the roof sheeting with self-tapping metal screws at a point under which one of the crossbeams passes. The entire background of the picture is metal sheeting that comprises the roof and the nearly ideal groundplane. Not seen is the method of attaching the guying lines (see text and illustration).

s.w.r. at the end of a half-wave of RG-8U (cut and resonated for 20 meters), 10-15-20 meters all showed a 1.1:1 at center frequency, with a greater bandwidth than attained with side-mounting. Forty meters showed a 1.5:1 at center frequency, with about a 2.5:1 bandwidth of 250 kHz. Eighty meters showed a 1.8:1, with a bandwidth of about 100 kHz. The next step in the project is to phase a pair of similar verticals, and an improvement is anticipated as above vs. the side-mounting case. The deterioration of performance on 40 is probably due to the narrowness of the roof (12 ft.), which is about 1/10 wavelength. Performance on the air has improved noticeably, although no field-strength comparisons have been made. For $15 and a little effort, the full advantages of living in a mobile can be had.

Probably the most difficult aspect of the project is acquisition of a suitable disc. I suppose that, as a last resort, you could contact Campbell's Supply here. Shipping weight is around 30 lbs for the 22 inch disc. Or, find an agricultural implement dealer in the yellow pages of the nearest rural area community in your state. It's worth the effort!



Holi-DX

BY LEWIS H. STRAUSS*, AH6I/W3

When you are home on a holiday or taking a day off for golf, deer hunting, or your birthday and it rains, what do you do? You work a little DX at a time of day when normally you would be at work, right? The bands are so crowded on weekends that quite a few of us catch a rare country under holiday conditions.

Of course, we all know what the worldwide holidays are—New Year's Day, Easter, May Day, and Christmas being some of the obvious ones. Then there are our national holidays. But what about the other fellow? He has his national holiday, too, and he is at his rig looking for you and you don't even know it.

So, if you can finagle a day away from your boss now and then, why not pick the day when the country you are looking for is also on holiday. A simple idea isn't it? But where have you seen a list of the other amateurs' national holidays? Here it is, and when you reach him, don't forget to wish him a happy holiday.

January
1 HH, ST
4 XZ
26 VK, VU

February
4 4S
6 ZL
7 J3
18 C5
23 8R
25 9K
27 HI

March
3 CN
6 9G
12 TR, 3B
17 EI
23 AP
25 SV
26 S2

April
4 HA/HG, GW
13 TT
16 OZ
17 YK
19 9L
26 5H
27 5V
29 J
30 PA, SM

May
2 4X4/4Z4
9 OK, OL
14 ZP
17 LA
20 TJ
25 LU, JY
31 ZR/ZS

June
1 3V, 5W
2 I
4 A3
5 S7
10 CT
12 DU
17 TF
19 G
23 LX
26 5R

July
1 9U, VE, 9X
5 YV, D4
6 7Q
10 C6
14 F
20 HK
21 ON
22 SP
23 SU
26 EL
28 OA

August
1 HB
6 CP, 6Y
9 9V
10 HC
15 HL, HM, TN
17 YB
19 YA
23 YO
25 CX
31 9Y, 9M

September
1 5A
3 A7X
6 3D6
7 PY
9 LZ
12 ET, CR3
15 TI, YS, TG, HR, YN
16 XE, P2
18 CE
22 TZ
23 HZ/7Z
26 4W
30 A2

October
1 5B, 5N, BV
2 3X
4 7P
7 DM
9 5X
10 3D2
12 EA
21 60
24 9J
26 OE
29 TA

November
1 7X
3 HP
7 U
8 U
18 A4X
22 OD
24 9Q
25 PZ
28 5T
29 YU
30 8P

December
2 A6X
4 TL
5 HS
6 OH
7 TU
11 XT
12 5Z
13 9H
16 A9X
18 5U
28 9N

*1015 Eighteenth St., N.W., Washington, D.C. 20036

The mouth can be quicker than the relay. W3RJ discusses some improvements and refinements to his popular vacuum relay QSK articles.

Improving The Vacuum Relay QSK In S.S.B.-VOX Operation

BY RICHARD KLINMAN*, W3RJ

Since the original articles on the TTL Vacuum Relay QSK appeared in *CQ*[1,2] many of these units have been built and successfully put into service. Comments from around the world have more than justified the time and effort spent in making this station accessory. Although there have been no reports of malfunction of this accessory in the s.s.b. mode brought to my attention, I have been informed that the QSK timing is not quite correct for fool-proof operation in the s.s.b.-VOX mode.

Let's examine the VOX operation of a typical commercial transmitter and linear amplifier conventionally connected. The sequence of events in switching from receive to transmit are presented in the timing diagram, fig. 1. At time "t_0" an audio signal is generated by speaking into the microphone. This signal is amplified by the VOX circuit and is used to energize the VOX relay coil. After a time delay of T, all of the exciter VOX contacts have stopped bouncing and are firmly connected in the transmit position. During this bounce period the antenna relay contacts in the exciter actually "hot switch" the full exciter r.f. output power. This is because no precaution has been taken to suppress the output until the relay has securely closed. VOX relays usually survive this use if the contacts are of sufficient power switching capacity. While the exciter is delivering its full power to the linear amplifier input cable, the linear amplifier itself is not yet fully activated. This is because the antenna relay and bias control relay in the amplifier are themselves controlled

*RFD 1, Flint Hill Rd., Coopersburg, PA 18036

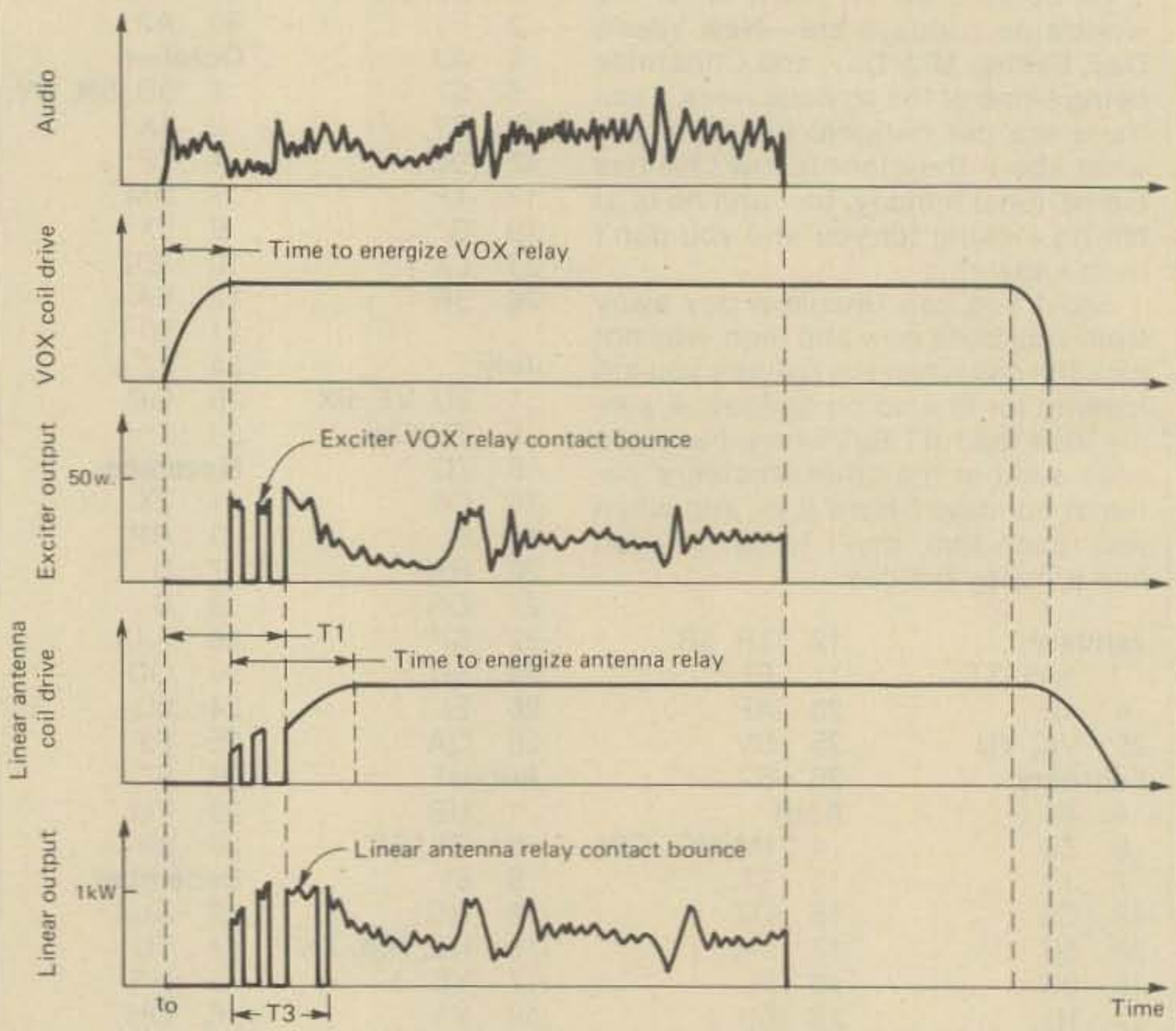


Fig. 1- The timing diagram for a conventionally connected exciter and amplifier in VOX operation. The time delays are not to scale.

from a set of exciter VOX relay contacts. In addition, the linear amplifier antenna relay is usually a slow power relay. The amplifier has full drive applied simultaneously with its antenna relay connecting the antenna to the amplifier output during time interval T_3. During this period contact bounce in the antenna relay will repeatedly hot switch the antenna connection. As in the case of the exciter, the amplifier antenna relay may survive if it has sufficiently large contacts. However, during contest style operation with its resulting rapid and repeated operation, many an antenna change-over relay has died as a result of VOX operation.

Assuming that the exciter VOX and linear antenna relays do hold up, the effect of poor VOX operation on those listening on the band is devastating. On s.s.b., nearby listeners will hear a pulse of noise across the band each time the VOX relay is energized, and on c.w. in the standard VOX semi-breakin mode a distinct and sometimes ear shattering "pop" or key-

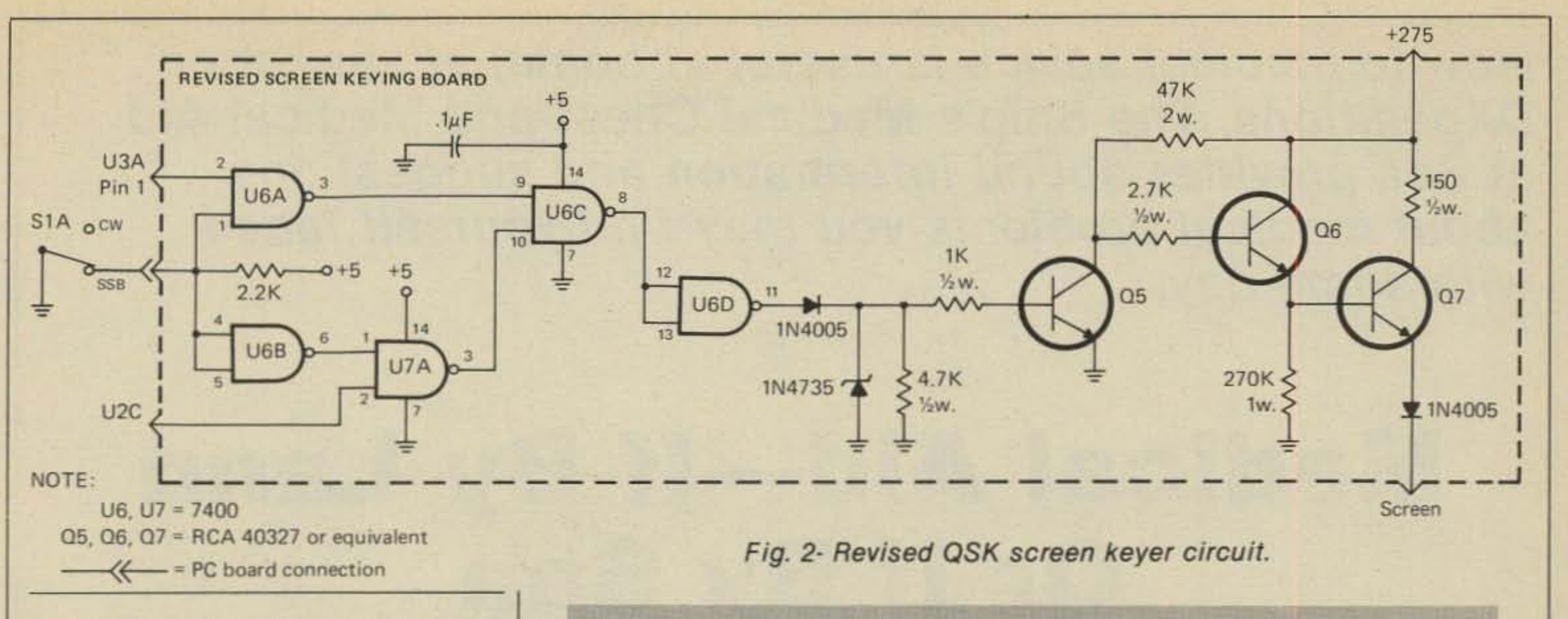


Fig. 2- Revised QSK screen keyer circuit.

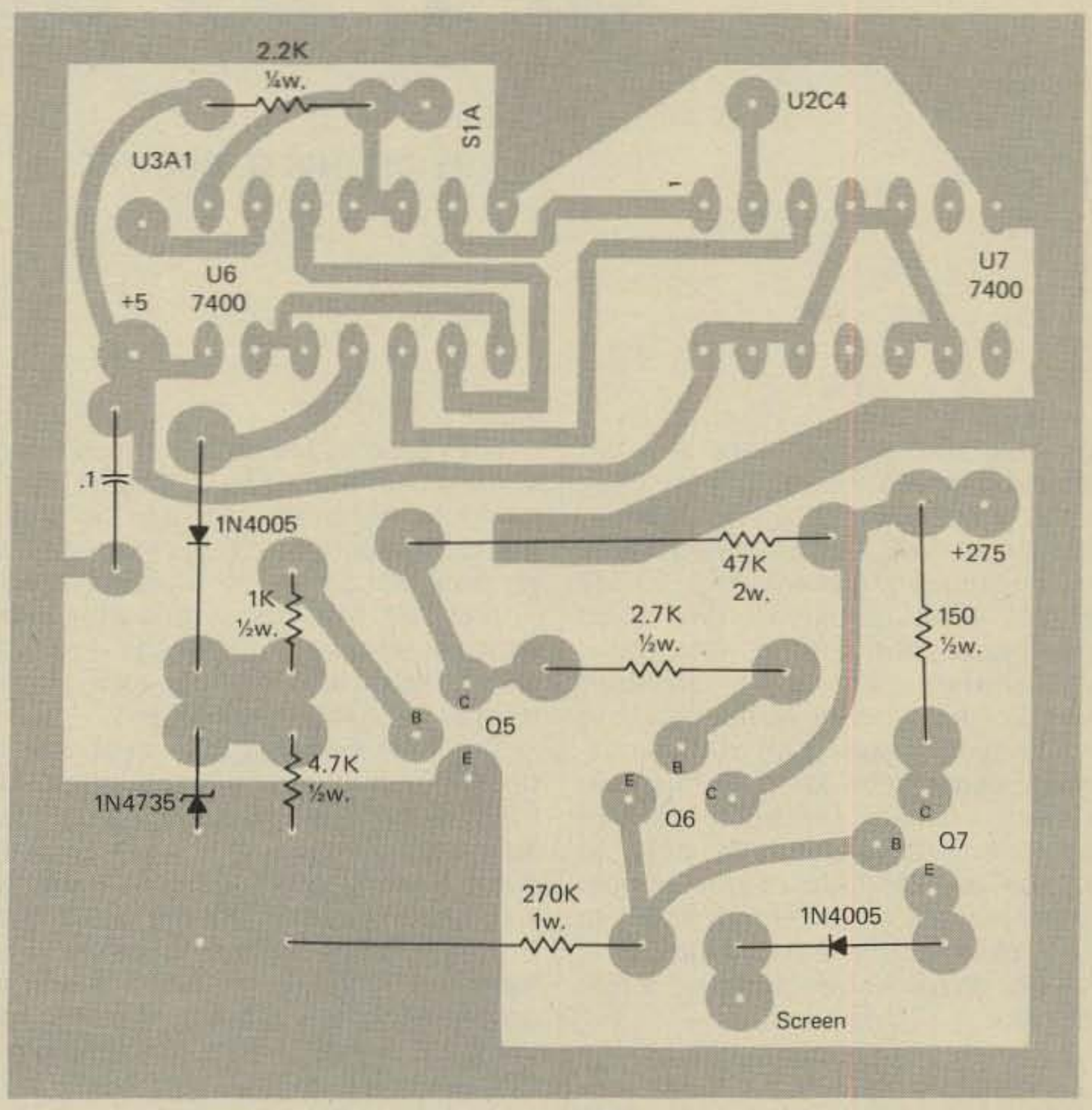


Fig. 3- Full sized PC board template parts placement for the revised screen keying board. The PC boards are shown foil side up.

click will be heard across the band each time the first character in a group is sent.

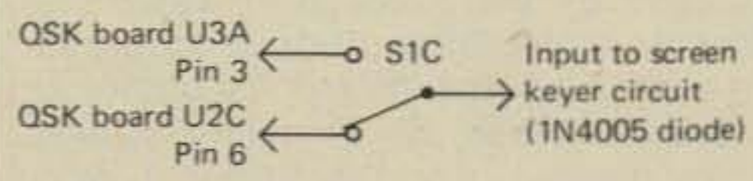
Operation in the less convenient push-to-talk mode reduces the problem because of the time the push to talk is actuated before talking begins. There are operators, however, whose mouths are quicker than their hands, or feet, causing problems similar to those described with VOX operation.

This problem exists to a lesser degree with the QSK. The race between the exciter output and closure of the exciter VOX relay contacts is altered by the screen keying circuit, while the race between the linear output and closure of the vacuum antenna relay is altered by the bias control relay in the QSK. Examination of the QSK timing diagram will show that nothing absolutely guarantees that in VOX operation the vacuum relay will close before any r.f. output appears.

A simple modification to the QSK will achieve the desired result. During s.s.b.-VOX operation it is necessary to inhibit the exciter from delivering output until after the vacuum relay has closed. This may be accomplished by inserting a delay in the exciter screen keying timing. Controlling the screen keyer with the signal used to key the transmitter, instead of the signal used to drive the vacuum relay, will produce the desired result. During c.w. operation the screen keyer must be controlled as originally described for the QSK.

The changeover in screen keyer drive signal is not complicated. Signals needed to drive the screen keyer are a) U3A pin 1 on c.w., and b) U2C pin 4 on s.s.b. Using two additional 7400 chips, the selection can be made by using the contact of S1A, the c.w.-s.s.b. switch in the QSK that is grounded during s.s.b., to drive the additional logic. The additional logic circuit has been incorporated in a revised screen keying printed circuit board. This board and the schematic of the logic circuit are shown in figures 2 and 3.

For those not wishing to install the new screen keying board, the same result can be achieved by replacing S1A and S1B with a three pole double throw, no center off, switch. The circuit using this approach is



S1 (A,B,C) - Alco MST-315D, Cutler-Hammer SF32SCW191, or equal, where contacts S1A and S1B are wired as shown in the original QSK article.[2]

This detail completes a most worthwhile and rewarding project. Thanks to N3LR, who brought the VOX problem to my attention and suggested the solution.

---

[1] *R. Klinman, "Vacuum Relay TTL QSK Antenna Switch," CQ, Vol. 32, No. 7 (July 1976).*

[2] *R. Klinman, "Vacuum Relay QSK in a Commercially Equipped Station, Part I," CQ, Vol. 33, No. 12 (December 1977).*

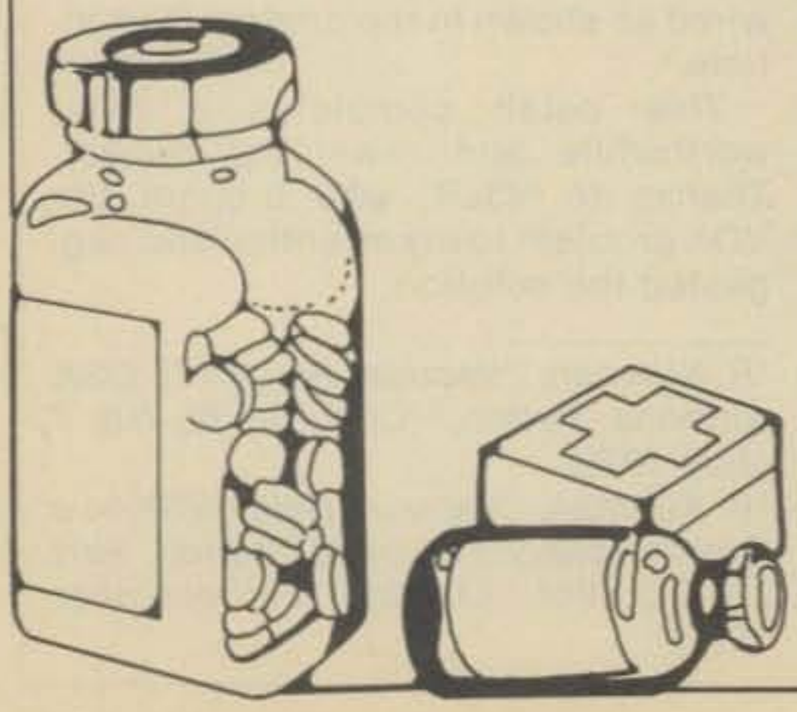
How-to medical advice is useful at home, at sea, or on DXpeditions.* The Ship's Medical Chest and Medical Aid at Sea *provides sound information and suggestions about medical problems you may find yourself faced with some day.

Medical Aid—If By Land Or If By Sea

BY DENNIS G. BREWER*

Amateur radio operators are an unusually adventuresome lot. They go on DXpeditions, climb towers, wander around in the mountains seeking hidden transmitters. They frequent disaster areas, work on transmitters, and attend field days. Unfortunately, amateurs or their friends or families have managed to get sick or hurt during all of these activities, sometimes far from medical facilities or advice. (Amateur radio, of course, *should* always be able to summon instant help or get advice, but sometimes it just won't work.) In times of immediate need, a good "how-to" medical book can be a real lifesaver.

Voice of America, APO New York 09155



The Ship's Medicine Chest and Medical Aid at Sea is, of course, written for maritime use and at first glance appears just a bit esoteric for an amateur's library. Closer inspection shows that it's surprisingly relevant to an amateur's needs—particularly those who wander away from readily available medical aid.

The book begins with a description of the human body, explaining the functions of the various components, subassemblies, and systems. Next come a few pages on how to examine a patient. Here are the things to look for and the questions to ask if you have the occasion to call for medical advice by radio. About 70 pages of the book are devoted to the emergency treatment of injuries: what you need to know about burns (heat and chemical), sprains, frostbite, heat exhaustion, shock, pressure points, and bandaging, to name a few. A review of cardiopulmonary resuscitation (CPR) techniques is included as a refresher for those already trained in CPR. (*Learn* it from your local fire department or Red Cross; you can't learn it from a book.)

A large section deals with the treatment of diseases; it's probably not needed by the average amateur unless he's on a DXpedition or stranded in a midwestern blizzard. It's useful to know, however, about diseases and their causes. For the amateur who really is going away from civilization, there's a chapter on pharmaceutical preparations to take along, how to use them, and things to be careful of.

Parts of the book are of interest to seamen only. Fumigation with hydrogen cyanide is fairly rare in ham shacks but is sometimes used to rid ships of pests. (However, if you do encounter a victim of this toxic gas, *do not* render mouth-to-mouth resuscitation; you could poison yourself! Instead, use another technique.) There is a chapter on birth and death at sea. The "how-to-deliver-a-baby" instructions could be very useful.

Amateurs who eavesdrop on maritime radio frequencies may find the AMVER (Automated Mutual-Assistance Vessel Rescue System) and Deadhead Medico service information interesting.

While the book may be a bit too heavy (around three pounds) to carry on a hike, it should be comfortable on sailboats, in cars, suitcases, and amateur library shelves. It's one of the U.S. Government's good products.

The Ship's Medicine Chest and Medical Aid at Sea, by the U.S. Public Health Service, is distributed by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. The book, stock number 017-029-00026-6, is 474 pages, 8¼" × 10½", hardcover, and sells for $10.95.

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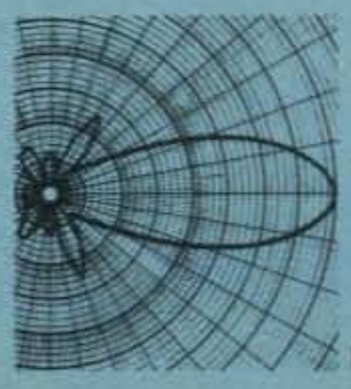

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K3WBH comes up with another multi-purpose antenna guaranteed to impress your neighbors.

A Multi-Band, Multi-Purpose Helix Antenna

BY T.E. WHITE*, K3WBH

Recently, I received a request from a reader. He asked, "Can you come up with a multi-purpose antenna I can use not only for 3/4 meter hamming, but also to monitor public service stations in the 450-512 band, and receive some of those upper u.h.f. TV channels out here in California?"

Yes, I thought to myself, it is possible to build an antenna that will cover all bases. And furthermore, some TV broadcasters are converting even now to circular polarization.

Cross-polarized yagis are rather cumbersome and require an awful lot of hole-drilling. Why not a helix? Wind it for right-hand circularity and make it easily constructible using fiberglass quad spreaders as supports.

The helix can cover a bandwidth of about 1.8 × its base design frequency. Make the latter 420 MHz and it

*36 Lake Ave., Fair Haven, N.J. 07701

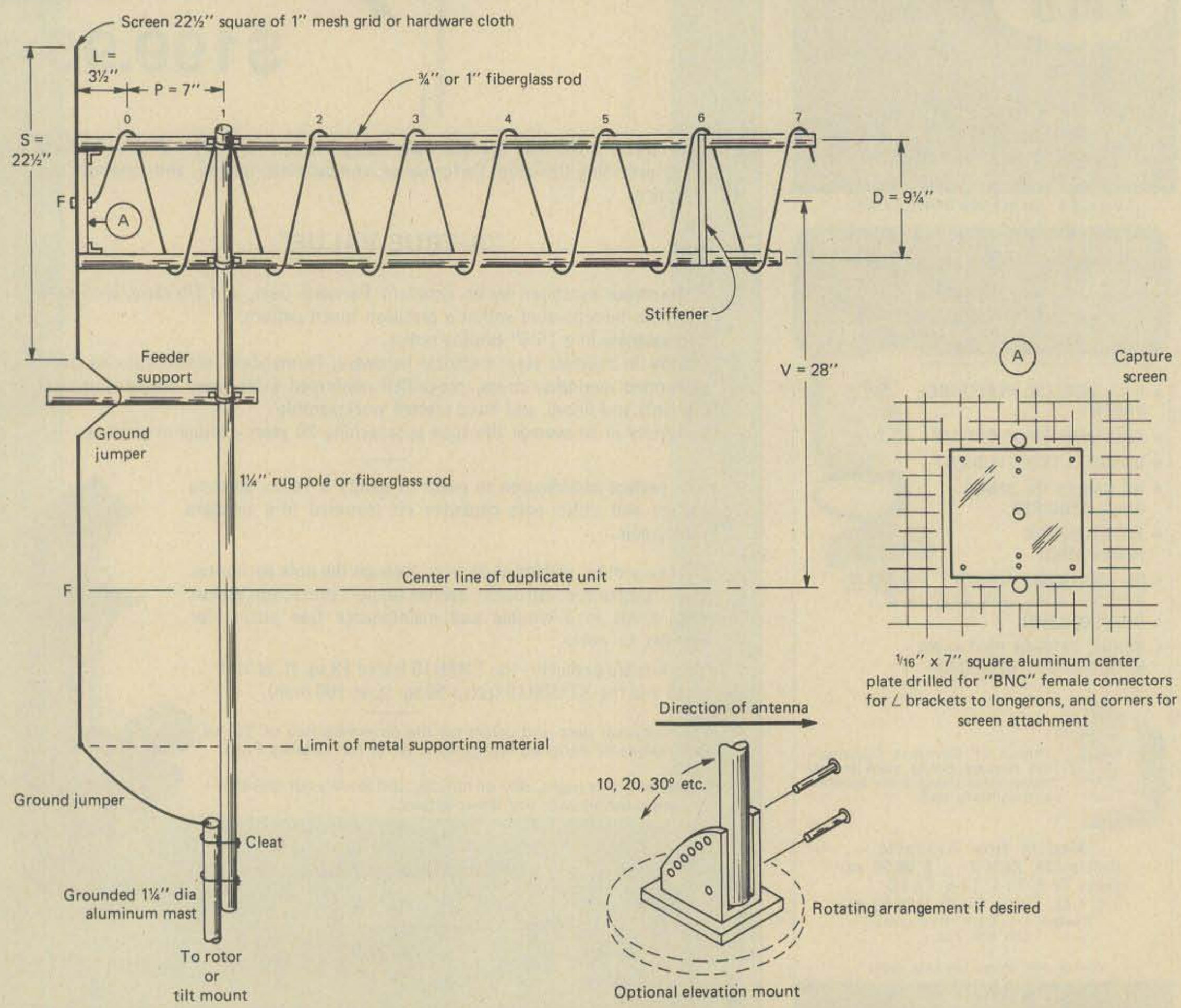
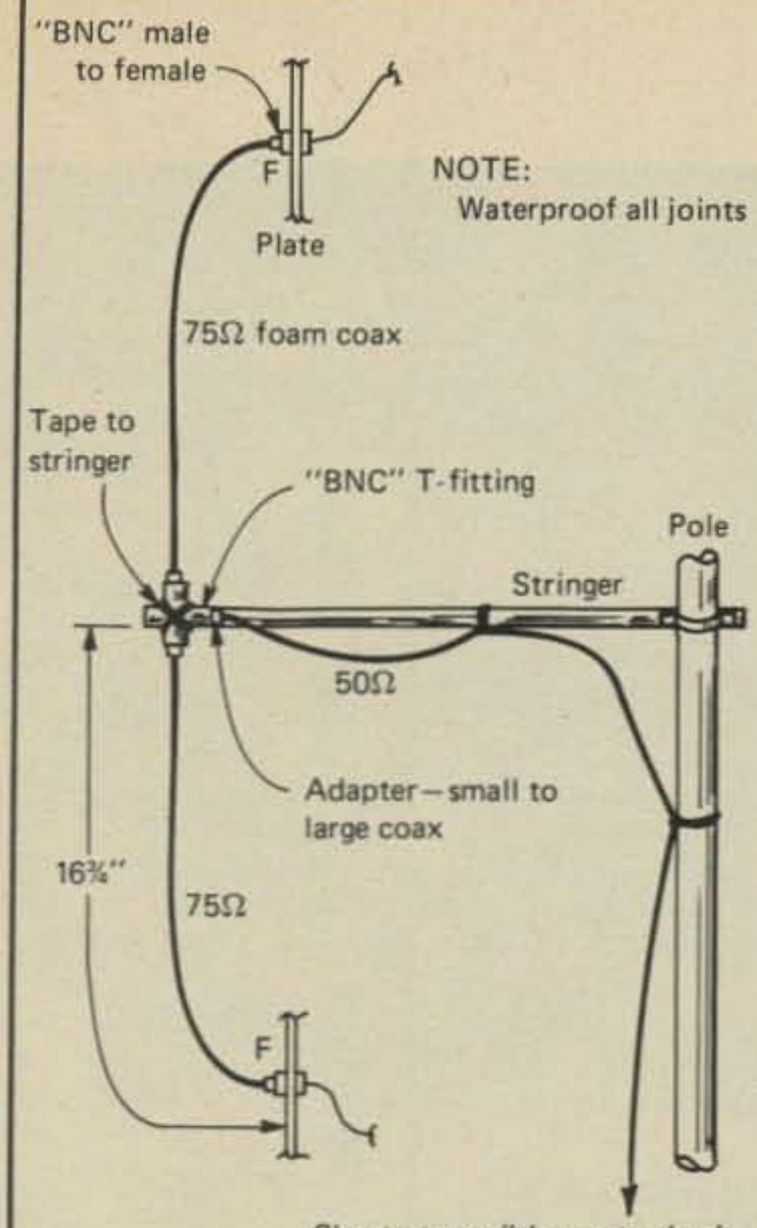


Fig. 1- Mechanical diagram for the helix antenna. It should be noted that it bears no relation to the other double helix by Watson and Crick.



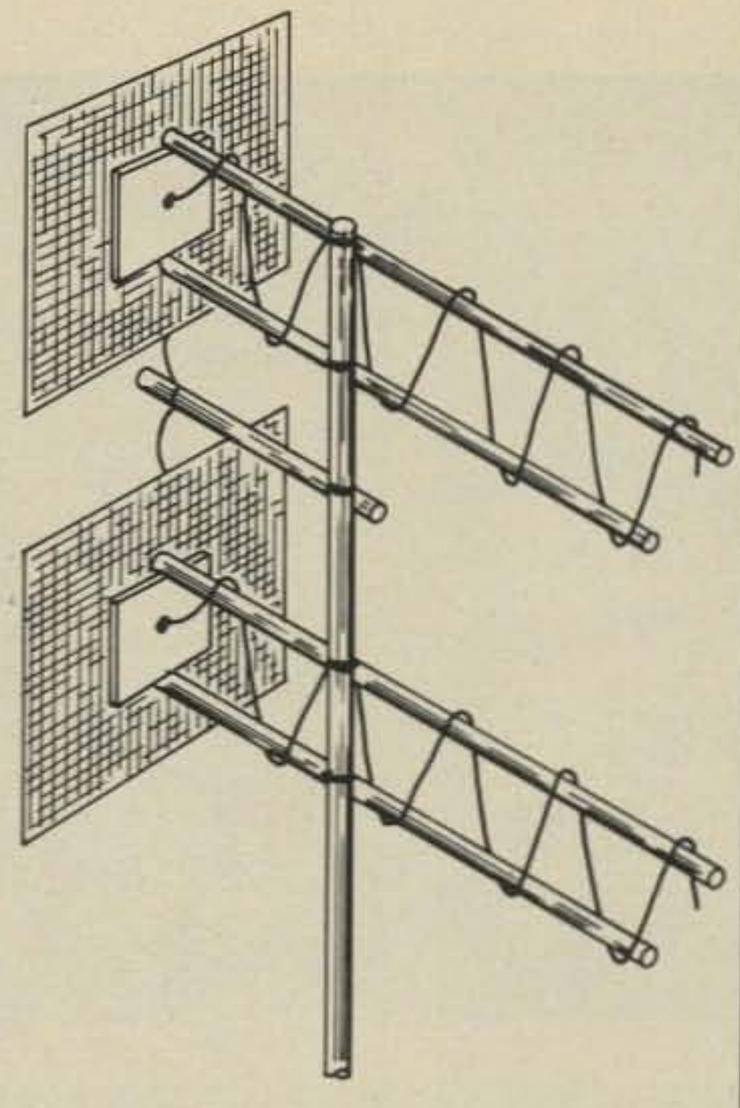


Fig. 2- The feed system for the helix antenna.

will perform well up to 750. A pair of 7-turners will show 16 dB (40 × power) gain when receiving the same-hand circular emissions, and 13 dB (20 ×) on either vertical or horizontal signals. No dimension need be greater than 50″, so it will be easy to support. Fading and Faraday rotation effects will be minimized.

Fig. 1 shows the basic parameters of the helix. Frequency coverage may be altered if the following factors are observed:

P Pitch (dist. btwn. turns) = 1/4 λ
D Diameter of coil = 1/3 λ
S Sides of screen = 4/5 λ
L Screen to turn zero = 1/8 λ
V Stacking, coil c to c′ = 1 λ

. . . at the lowest desired frequency Coil material is #12 copper (don't try "Copperweld"). Screen is 1″ mesh hardware cloth. All structural pieces within area of antenna must be non-metallic. This includes the mast.

The helix is shown mounted parallel to earth. For low angle terrestrial "band opening" type work it should be left this way. For "sat-trak" or extra-terrestrial work, an elevation mount having settings at 10, 20, and 30 degrees can be made as shown. This requires mounting the antenna on a flat or slight-peak roof for easy access. There are, of course, commercial remote elevation drives available.

Great height is not important for the antenna. What is important is a clear "take-off" field out in front of the array for many wavelengths in any desired direction—no foliage, no metal or even non-metal objects. 73

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- Built-in digital display (six digits, fluorescent tubes), analog subdial, and display hold (DH) switch.
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OPTIONAL ACCESSORIES:
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(VFOs for TS-830S, TS-130 Series, and TS-120S are compatible with all three series of transceivers.)

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OPTIONAL ACCESSORIES:
- PS-30 base-station power supply.
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Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Four memories and digital display. (Also operates with TS-120 and TS-830S.)

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- Digital frequency display. Five, four, or three digits, depending on selected tuning step.
- Covers 143.9000-148.9999 MHz.
- Band scan . . . automatic busy stop and free scan.
- SSB/CW search of selectable 9.9-kHz bandwidth segments.
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- RIT (receiver incremental tuning) for SSB and CW.
- RF gain control.
- CW sidetone.
- Selectable RF power outputs . . . 10 W (HI)/1 W (LO).
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- LED indicators . . . ON AIR, BUSY, and VFO.

OPTIONAL ACCESSORIES:

- PS-20 fixed-station power supply.
- SP-120 fixed-station external speaker.
- BO-9 System Base . . . with power switch, SEND/RECEIVE switch (for CW), memory-backup power supply, and headphone jack.

PS-20 TR-9000 BO-9 SP-120

TR-2400

"Hand-shack"...synthesized, big LCD, scan, 10 memories, DTMF (Touch-Tone®)

CONVENIENT TOP CONTROLS

The TR-2400 has the most convenient operating features desired in a 2-meter FM hand-held transceiver.

TR-2400 FEATURES:

- Large LCD digital readout. Readable in direct sunlight (virtually no current drain) and in the dark (lamp switch). Shows receive and transmit frequencies and memory channel. "Arrow" indicators show "ON AIR," "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- Keyboard selection of 144.000-147.995 MHz in 5-kHz increments. No "5-UP" switch needed.
- UP/DOWN manual scan in 5-kHz steps from 143.900 to 148.495 MHz.
- 10 memories. Retained with battery backup. "M0" memory may be used to shift transmitter to any frequency for nonstandard-split repeaters.
- Built-in autopatch DTMF (Touch-Tone®) encoder, using all 16 keyboard buttons.
- Automatic memory scan.
- Repeater or simplex operation. Transmit frequency shifts ±600 kHz or to "M0" memory frequency.
- Reverse switch. Transposes receive and transmit frequencies.
- Subtone switch (tone encoder not Kenwood-supplied).
- Two lock switches to prevent accidental frequency change and accidental transmission.
- External PTT microphone and earphone connectors.
- Rubberized antenna with BNC connector, NiCd battery pack, AC charger, PTT and mic plugs, handstrap, and earphone included.
- Extended operating time with LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output).
- High-impact case and zinc die-cast frame.
- Compact and lightweight. Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

OPTIONAL ACCESSORIES:

- ST-1 Base Stand (provides 1.5-hour-quick, trickle, and floating charges, 4-pin microphone connector, and SO-239 antenna connector).
- BC-5 DC quick charger.
- LH-1 leather case.
- BH-1 belt hook.
- PB-24 extra NiCd battery pack.
- SMC-24 speaker/microphone.

Ubiquity personified! Here's a nifty gem from out of the past that seems to do everything.

The George W. Walker "Multi-Unit"

BY FLOYD A. PAUL*, W6THU

By 1929 higher frequencies were progressively being used for communications, and in addition to the radio amateur interest in high frequencies, the radio public too was developing an interest in these communications. The typical receiver built in the mid and late twenties was manufactured to receive the broadcast frequencies 550 kHz to 1500 kHz. To enable the public to listen to short wave on their broadcast sets, converters were developed. Many of the lower priced, economical converters were one tube units, some were kits, and sold in the $8 to $20 class. The typical converter was somewhat smaller than a shoe box, had a tuning control, volume control and an adapter plug with cable. An adapter plug (four- or five-pin) was plugged into the detector tube socket to obtain voltages for the converter and to provide a coupling into the audio stages of the set. Thus, one used the power source from a conventional radio and used the audio stages for amplification and the converter furnished the signal. The converters generally came with two to three coils for wide frequency coverage of from 20 to 550 meters.

Radio News of January 1929 had an article on the AC Dayton Co. converter which could be used in the parlor with the owner's broadcast receiver. The converter did essentially what the paragraph above describes. The one tube converter could be laid on a table or on the receiver cabinet. It contained three coils to cover 17 to 84 meters. It could be used with the typical receiver with little or no change in wiring. It employed the conventional regenerative circuit, a fixed tickler coil with capacity tuning. It could be used with any receiver using a UX socket in the first r.f. stage or detector stage.

Many companies began making one tube converters or kits in 1929. The Barawik Co. Catalog (Chicago) of Spring & Summer 1929 advertised seven different manufacturers of converters. One such manufacturer, Work-Rite Radio Corp., advertised a George W. Walker Multi-Unit, which was described as the most versatile convertible device available. In addition to being a converter, the multi-unit device could perform many other functions. Among those advertised were short wave receiver, short wave adapter, regular broadcast receiver, screen grid pre-amplifier, remote control adapter, extra stage or booster, single dial converter, audio oscillator, wave trap and wave meter. Some of these tasks are redundant, but the message in the ad

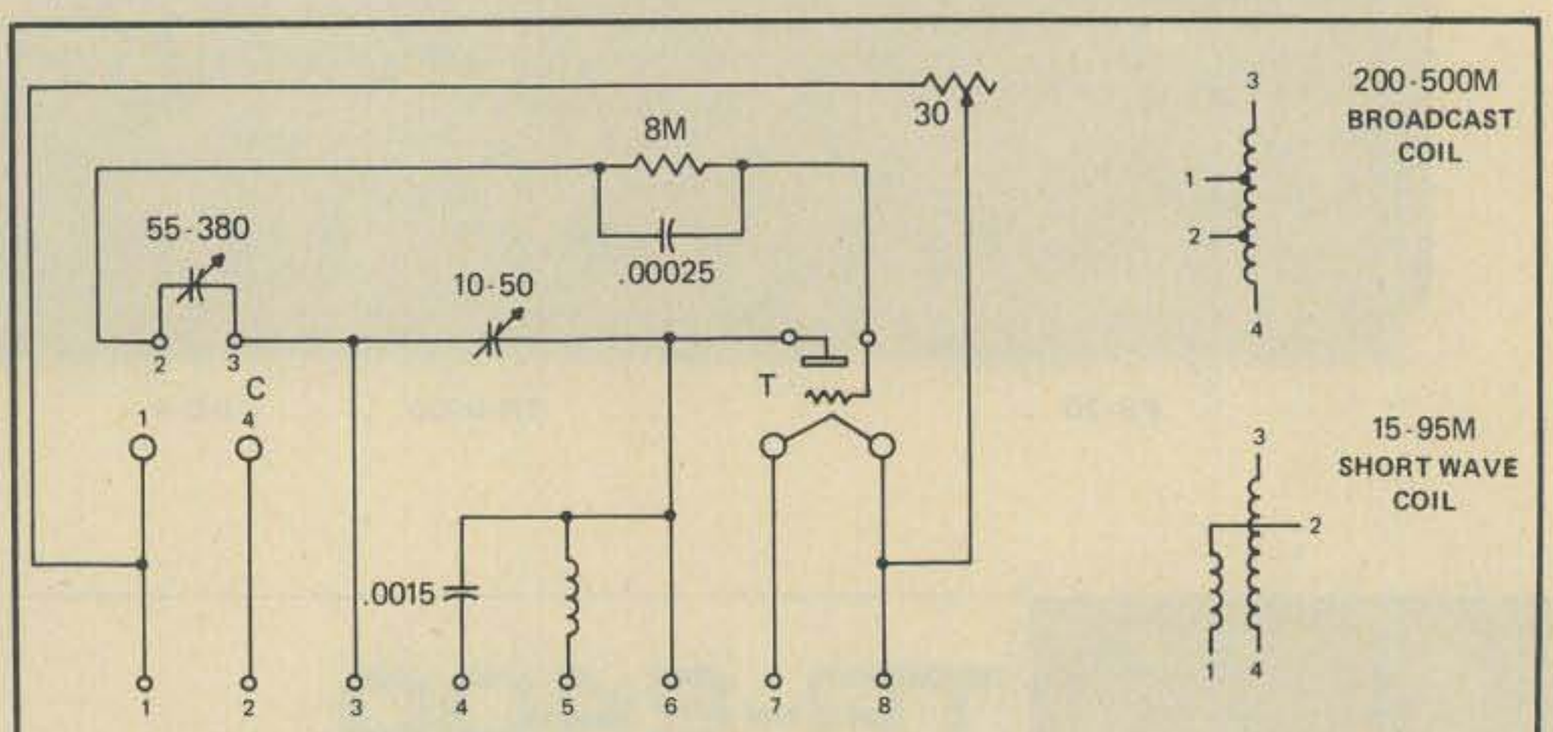
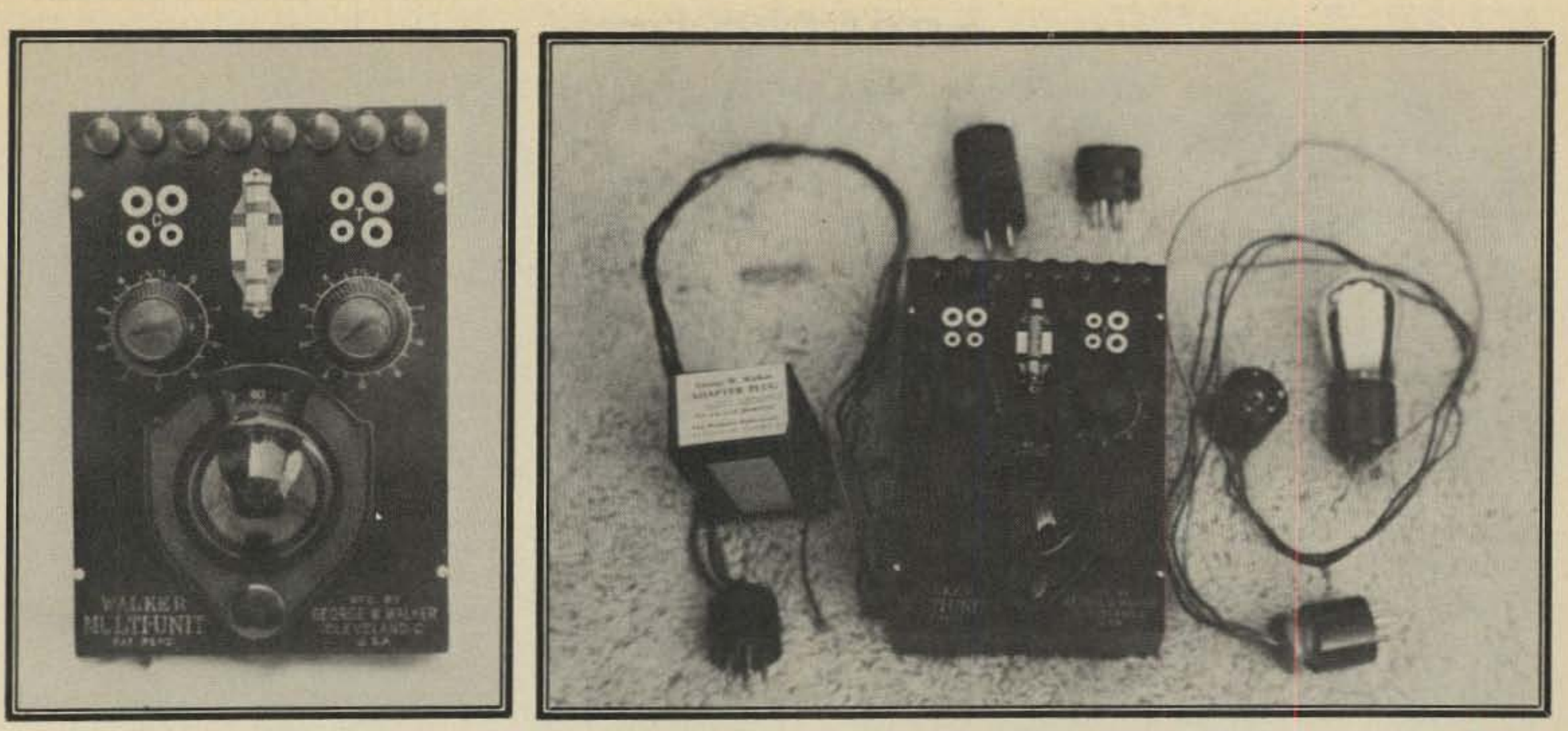


Fig. 1- Schematic diagram for the Walker Multi-Unit.

1. Shorting Bars (for terminal posts).
2. Five-pin tube adapter plug wired to a four-pin plug stradled by a five-pin socket (the four-pin plug inserts into Walker Multi-Unit socket marked "T"; tube inserts into the five-pin socket for a five-pin tube).
3. Four-pin plug tube adapter stradled by a four-pin socket. Four-pin tube (22, 26, UX 199, O1A, etc.) can be plugged into adapter for straight-through operation or left unplugged, and 4 wires coming out of adapter can be tied to terminal posts 7 and 8 (fil.), 4, 5 or 6 (plate) and grid wire left open.
4. Two coils: Broadcast 200-550 meters. Shortwave 15-95 meters.

Table 1- Accessories for the Walker Multi-Unit.

*1545 Raymond, Glendale, CA 91201



Two views of the Walker Multi-Unit.

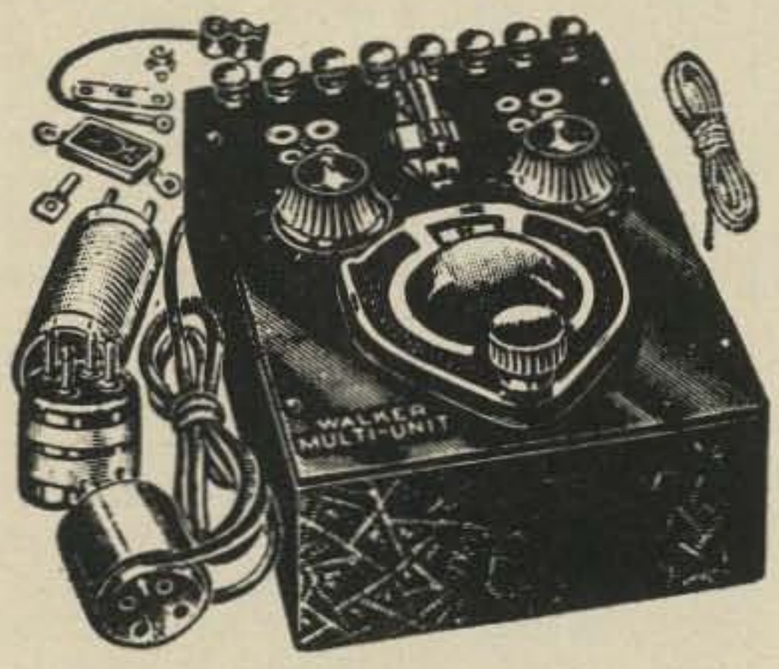
A Familiar Name WORKRITE Since 1909

A Radio Utility and Entertainer

George W. Walker "MULTI-UNIT"

A Device with a Dozen Uses

SHORT WAVE RECEIVER — **SHORT WAVE ADAPTER**
REGULAR BROADCAST RECEIVER
SCREEN-GRID PRE-AMPLIFIER — **R. F. OSCILLATOR**
EXTRA STAGE OF R. F. OR "BOOSTER"
RADIO "EXPERIMENTAL" UNIT
CRYSTAL RECEIVER — **WAVE TRAP** — **WAVEMETER**



One of the most unusual radio instruments ever devised. Will perform any individual function of a complete receiver, and in addition may be used for calibrating, testing or checking. Makes a wonderful broadcast receiver, short-wave receiver or transmitter. Oscillates violently over the entire scale range from 550 meters down to 15. Uses all tubes 199 to 210 and all voltages, A.C., D.C., or rectified. Nothing like it ever placed on the market before.

The Radio Fan has at his disposal a device which will provide him with something to tinker with for an entire season without performing the same experiment twice. Become acquainted with all the circuits and the way tubes perform under particular conditions.

The Dealer and the service man require this most valuable instrument for adjusting radio-frequency circuits to resonance, providing a beat note or constant frequency oscillation for determining wavelength of a particular condenser setting, calibrating a receiver disposing of trade-ins and obsolete sets by making them up to date by the addition of an R. F. amplifier.

NO ANTENNA-GROUND NEEDED

When using the Multi-Unit with most any receiver as an R. F. Booster (extra stage T. R. F.), the sensitivity increase is sufficient to make unnecessary the use of outside antenna. Tone quality is immediately improved. Less external electrical interference assured.

SHORT-WAVE CONVERTER
(15-95 Meters)

Enjoy the novelty of short-wave experiments by converting your present receiver to tune to the low waves. Utilizing the audio amplifier in your own receiver serves a dual purpose and increases volume and range. Plug the unit adapter into the detector socket of your set. No change in wiring or extra tube required. The Multi-Unit will function with either A. C. or D. C. receivers.

R. F. PRE-AMPLIFIER

Uses same type tube as in the R. F. stages of your present receiver. 199, 201-A, 222, 224, 226 or 227 tubes may be used. Either A. C. or D. C. Extreme selectivity, if you prefer. Tune in stations you never heard before. This efficient circuit reduces static and other interference. Greater clarity results as the additional volume makes over-loading of tube filaments unnecessary.

SCREEN-GRID R. F. BOOSTER

Increase the range and volume of your present receiver to equal the latest improved Screen-Grid Receiver. Merely insert unit adapter plug in socket of your receiver. No change in receiver wiring. Adaptable to either A. C. or D. C. receivers.

SHORT-WAVE RECEIVER
(15-95 Meters)

Experiment with the fascinating short waves. Tune to stations thousands of miles distant. Reception of short-wave Foreign stations has been verified. Ideal all-year-around reception. Warm weather in Australia and New Zealand is winter in this country. Hundreds of short-wave stations thruout the world are listed.

SINGLE TUBE RECEIVER

Ideal for either short-wave or regular broadcast band.

SHORT-WAVE R. F. BOOSTER

Connect the unit ahead of your short-wave set and hear stations with greater volume. Uses screen grid or 201-A type tube.

R. F. OSCILLATOR

Check your receiver for wavelength and calibration. Determine resonance of circuits, test tubes for oscillation and regeneration, neutralizing receivers, balancing condensers, laboratory measurements, short distance transmission and generating a beat frequency for superheterodyne.

There are numerous additional uses, a few of which are wavemeter, Loop R. F. Amplifier and growler for measuring efficiency of shielding material. By the time an experimenter has exhausted the possibilities of this instrument he will be qualified for a radio engineer.

Consists of the essential parts of an oscillatory circuit, and in addition are plug-in coils, adapter cord and plug, bridging connections, and extra wires along with well detailed instructions for many major experiments. Entire unit contained in box 7½ inches by 5 inches by 3½ inches. **Price** **$16.00**

THE WORKRITE RADIO CORP., 1836 E. 30th Street, CLEVELAND, OHIO
SERVICE MEN—DEALERS—JOBBERS—AGENTS WANTED

The ad that appeared in the November 1929 issue of Radio News *describing the ubiquitous nature of the Walker Multi-Unit.*

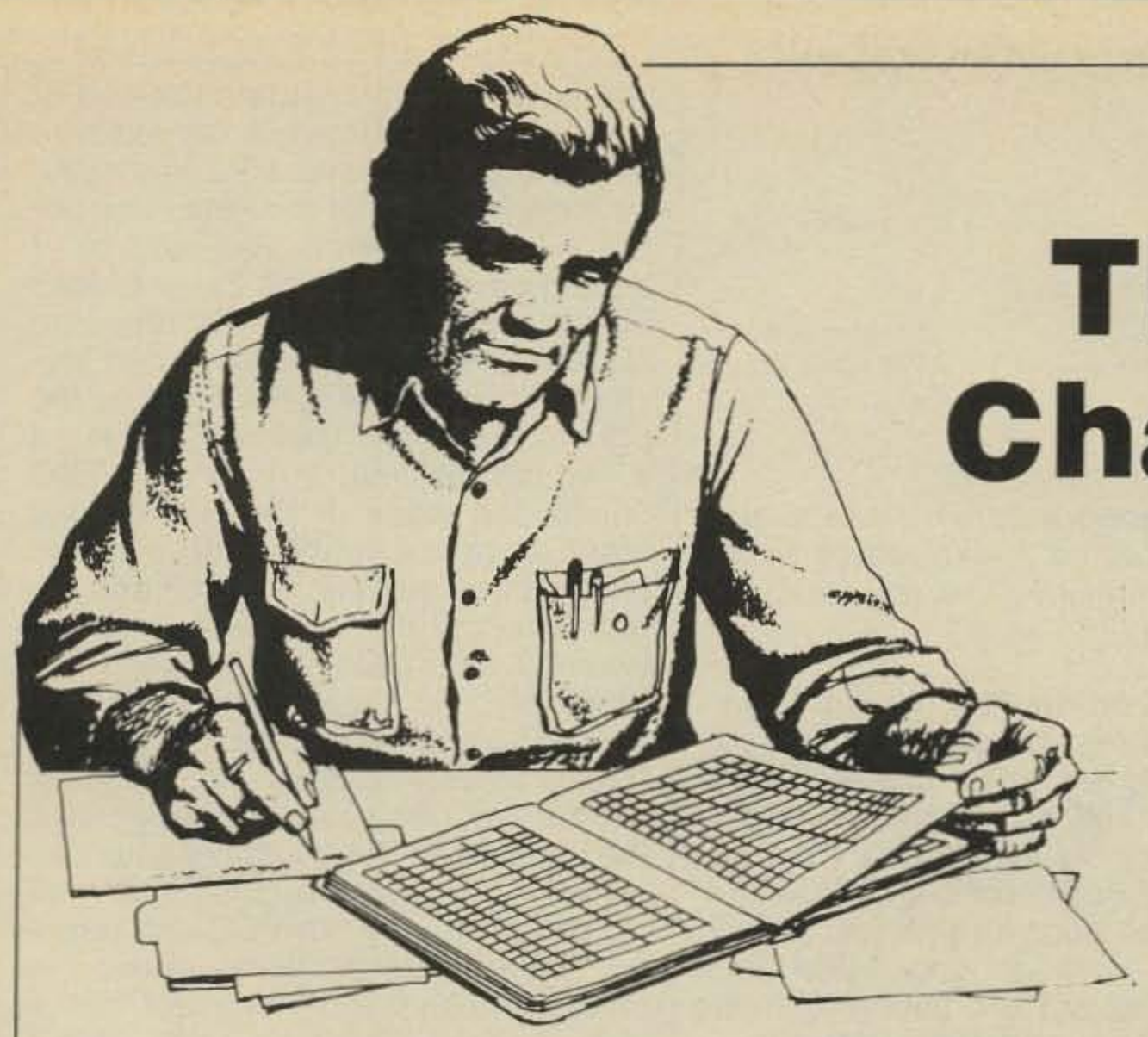
was that this was a very versatile unit. Further advertisement features mentioned were "Oscillates violently over the entire range 550 to 20 meters, uses all tubes from 199 to 210 and all voltages a.c., d.c. or rectified. The radio fan has at his disposal a device that will provide him with something to tinker with for an entire season without performing the same experiment twice."

Let's explore what the George W. Walker unit is and what it is capable of doing. The schematic is shown in fig. 1. The accessories to the unit are described in Table 1 and shown in the pictures. It is a one tube circuit with plug-in coil, grid leak detection, feedback in the plate to grid coil as to regenerate, including oscillation. It therefore could amplify signals through regeneration, oscillate by plate/grid capacitive coupling, detect, or function as a wave trap. An article on page 338 of *Radio News*, October 1929, entitled "This Laboratory Instrument Has Many Uses" by George W. Walker describes this unit and its capabilities. Mr. Walker was previously a designer with the Victoreen Company.

The Walker Multi-Unit's physical components are as follows: a socket for a four-pin tube mounted in a box with eight terminal posts, a variable capacitor connected across the plug-in inductor coil socket, a choke coil, a grid leak resistor in parallel with a small .00025 ufd. capacitor, a plate inductance coil, a plate capacitor, a variable feed-back capacitor from plate to grid circuit and a rheostat in the filament lead. All parts are so mounted and connected to the eight terminal posts such that a great deal of flexibility of circuit connection is provided. However, in providing flexibility by making each tube element easy to tap onto, the Multi-Unit becomes a spread out spider web with many stray capacities working against the basic circuit. The experimenter is cautioned to try and keep all interconnecting leads as short as possible. The author got his unit to amplify, oscillate and work as a tuner and wave trap. The drawback to its usefulness is in the amounts of gain available in a typical battery receiver of the '20's. Most receivers were built for local broadcast signals and had relatively little audio gain. For example, two O1A tubes with two 1:3 audio transformers interconnecting them provide about a 500 gain. If the detected signal from the Multi-Unit is in the uV region, the 500 gain is insufficient to give a readable volume, even in earphones. ▣

CQ DX Tip

—All good DXers listen a lot. You can't hear DX when you are transmitting. —*W4MB*



Converting The Sears 40 Channel S.S.B. CB Rig to 10 Meters

BY JOHN E. CARTER*, WB4HLZ

Here's a chance to get on 10 meters while the getting is good. WB4HLZ takes one of the Sears 40 channel s.s.b. CB rigs, which are around fairly cheap, and fires it up on 10. It's not that hard to do and well worth the effort.

Have you ever wondered what goes on in the mind of one of those genius types who gets an article published in one of the ham magazines? Does he look at a piece of gear and have an article spring from his mind full grown, typewritten and double spaced, ready for sale to an eager publisher?

Well, I can't answer for the genius types, but I can tell you about one would-be writer, me. The following story is more or less sequential, from the finding of an s.s.b. CB unit at a reasonable price to deciding to try my hand as a writer.

Whether you plan to do a CB to 10 conversion or not, you may find the ideas interesting. You may even know an easier or better way of doing something than the way I used. (If so, write the editor and let the world know.)

Place: Orlando, Fla. Date January, 1979

"Hi, Tom, This is John. I'm calling from Orlando. The Sears store here has 40 channel s.s.b. CB units for $90. Are you interested?

"I thought you would be. They are probably PLL, but the salesman I talked to last night wasn't interested in walking to the storeroom to get a copy of the manual. Maybe he didn't need to make the sale.

"I'll be out that way again today and I'll check with one of the other salesmen. If it looks good I'll get one for you, too.

"If it survived the trip from Japan, it should survive the flight to Atlanta. I'll see you Friday."

Later, at the store:

"Can I help you, sir?"

"Yes, I would like to see the manual for one of these CB units."

"Yes sir. Sit here at the desk and I'll get you one."

(He sure is a change from the guy last night.)

"Here you are sir. I'll check back with you in a few minutes."

"Thank you."

Hm, let's see. Separate a.m. and s.s.b. i.f. strips, lots of diode switching, modulation limiting, high s.w.r. indicator and shut down circuit, noise blanker. Looks good so far, wonder how difficult it will be to put it on 10 meters?

X701 and X702 provide the reference frequencies to the PLL mixer for a.m./u.s.b. and l.s.b., respectively. If they were changed to raise the reference frequency by about 1.5 MHz we would be in the 10 meter phone band. The channel selector switch connects to six pins of the PLL IC which would be the divide-by inputs, and the weighting is probably 1-2-4-8-16-32 which adds up to 63.[1] At 10 kHz per step that gives a range of 630 kHz if external access is provided to the divide-by inputs; that would cover from 28.5 to 29.1.

Maybe some BCD switches to select frequency by using their outputs to address a PROM whose outputs control the PLL divide-by circuit and a digital readout. . . .

"Is it what you wanted, sir?"

"Yes. I'll take two of them."

Well, now that I have it home, I need some crystals. The phone band starts at 28.500 MHz and since I want to modify the *Fine Tune* circuit to work on transmit as well as receive, I think I'll leave a little room for adjustment. 28.505 MHz looks like a good choice for channel 1.

The original reference crystals X701

*2622 Rolling View Dr., Smyrna, GA. 30080

[1]*The pins are 15, 14, 13, 12, 11, 10, respectively.*

and X702 are at 1/3 the reference frequency and are multiplied to the desired frequency by diode tripler, D705. That means the frequencies of the new X701 and X702 need to be higher by 1/3 of the difference between the old and new channel 1 frequencies.[2] Let's see, 28.505 minus 26.965 equals 1.54 and divide that by 3 equals .513333 MHz as the difference in crystal frequencies. The original X701 is 12.320 MHz plus .513333 gives 12.833333 MHz for the new X701. The original X702 is 12.319 MHz (1 kHz lower) so the new X702 is 12.832333 MHz. International Crystals catalog lists crystals in this frequency range in the HC 18 holder for $8.75 each, plus postage. I don't know the load capacitance but they can determine that from the circuit and a sample crystal.

Before I take this thing apart to remove a crystal, I really should get a service manual. If it takes two weeks to get the crystals back I may not remember where all the wires go. (The 1979 *Photofact Index* did not list this model, but a call to Sams in Indianapolis proved fruitful—it's in CB254, and the part designations are the same as those stenciled on the circuit board.)

Now to spend an hour or so familiarizing myself with the pictorials, charts, and diagrams in the service manual. That just might reduce the incidence of cockpit trouble, and should make any changes go a little smoother. First the location of X701 and X702 so I can remove one to send as a reference. Looks like they're in the shielded box behind the channel selector switch.

This will be fun. The bottom of the shield assembly has to be removed to get to the foil side of the PC board and it is soldered to the sides in six places. Oh well, careful use of a small, hot, clean soldering iron and a knife blade will remove the solder so the shields can be separated. With the foil side of the board exposed, I can use the iron and the solder sipper to remove X702. Now that I have a sample crystal I can send the order off to International. I probably only need the a.m./u.s.b. crystal since I've never heard any l.s.b. on 10, but may as well go first class.

It might be a good idea to check the chassis for any potential problems before I start changing things. I think I see several. Most of the small coils have square holes in their cores and all my tuning wands are either hex or triangle, and some of the adjustments are sealed with gop. I can file a hex tool to fit the square hole, as long as it engages the full length of the core. As small as these are they are probably brittle. A dental pick will be useful in cleaning the threads and a warm

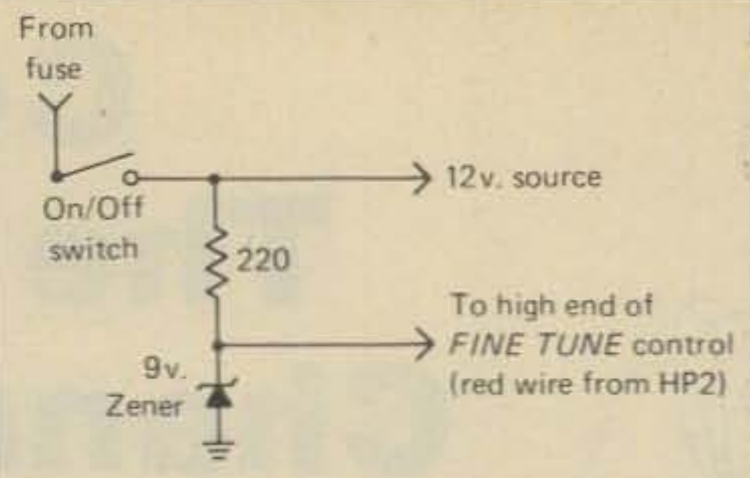


Fig. 1- Adding a Zener diode to provide a regulated 9 volt source to the pot on receive and transmit.

soldering iron may be helpful when I start adjusting. The pick is also good for clearing solder from holes in the PC board. The top of the driver coil (T405) looks melted, maybe from hot sealer, and couple of coils in the output have the slugs an eighth of an inch above the windings. Looks like I'll be pulling those out and taking off some turns. Maybe a half-turn to start?

Wonder if I should check the r.f. voltages around the synthesizer before I try to retune it to cover 10 meters? The r.f. probe on the v.t.v.m. shows 1 volt at the collector of Q701, the PLL crystal oscillator, and the output of the tripler is too low to read. (Maybe a hot carrier diode, or a tunnel diode, in the r.f. probe would work at lower levels?) Let's also check the VCO output. Better do that at the collector of Q708, the buffer amp. OK, half a volt.

Seems there was something else I wanted to check. Oh yes, the range of the *Fine Tune* circuit and whether it can be made to work on transmit. With the counter connected to the output of the buffer amp, turn the *Fine Tune* control from end to end—3.6 kHz total range. Could be better; wonder if another varicap across D702 would change the range very much? (No.) First let's get it working on transmit, then the range can be adjusted.

The schematic shows 8 volts to the *Fine Tune* pot from regulator IC501 on receive, and 8 volts to the R702/R703 voltage divider on transmit. If R702 is disconnected from the transmit 8 volt source, and the *Fine Tune* pot is disconnected from the 8 volt receive source, the pot could then be fed by a constant source and would affect both transmit and receive. (Wonder how much f.m. deviation I could get by feeding audio in at the junction of R702 and R703? Move the frequency up around 29.6 and use slope detection, or maybe a PLL detector, or one of the sound i.f. IC's—sounds like a future article for *CQ* on 10 meter f.m.) Back to this conversion. If I cut the orange wire on pin 4 of connector HP1, the transmit voltage will be removed from R702. A piece of heat-shrink tubing will insulate the end of the wire nicely. Now cut the red wire on pin 3 of connector HP2 to disconnect the high end of the *Fine Tune* pot from the receive 8 volt source. I should have some 9 volt Zener diodes in the junk box.[3] With a dropping resistor of about 220 ohms I can provide a regulated 9 volt source to the pot on receive and transmit. If I mount a two-lug terminal strip on the VCO shield, the leads of the resistor will reach from the terminal strip to the terminals of the on/off switch and the red wire I cut from HP2 will reach the terminal strip. (See fig. 1.) Everything fits nicely, and it clears the cover. Success! The counter shows the transmit frequency varying as the pot is turned.

Well, my original guess was close, the crystals are here and it's been two weeks. There are a couple of ways to go about moving the VCO and retuning the transmitter, and I guess the choice depends on what test equipment I want to use. I could feed 5 volts through a 1 K resistor to the

---

The birdie near channel 25 is the 4th harmonic of the PLL reference oscillator crystal, being received as an image.

```
  12.8333 MHz
      × 4
  51.3332 MHz
- 40.0600
  11.2732 MHz   which is in the i.f.
                passband.

  28.785 MHz (ch. 25)
+ 11.275 MHz (i.f.)
  40.060 MHz (1st mixer injection frequency)
```

The birdie near channel 13 is the 5th harmonic of the 10.24 MHz oscillator, again being received as an image.

```
  10.240 MHz
      × 5
  51.200 MHz
- 39.930
  11.270 MHz which is in the range
             of the Fine Tune
             control.

  28.655 MHz (ch. 13)
+ 11.275 MHz (i.f.)
  39.930 MHz (1st mixer injection frequency)
```

Table I—Source of birdies mentioned in the text.

[2]*See Table III*

[3]*A 7808 8 volt regulator would work nicely here.*

D707 end of R731 to hold the VCO at the low end of its range and tune T702 in small steps, maybe 300 kHz—have to monitor that with the counter—then key the mike and tune the transmitter stages all the way through each time until it gets to 10 meters. This would also require supplying 5 volts through a 1 K resistor to the base of Q708 to keep it turned on while the PLL is unlocked.

The second method would be to use a grid-dip oscillator as a signal source at about 28 MHz and work backward from the output stage. This will require a one or two turn link with a .001 or so capacitor in series to inject a signal into the stages that have shielded coils. Then the VCO can be tuned to lock by monitoring the voltage at the base of Q708. Then the VCO buffer amp coils can be tweaked and all the others touched up for maximum output.[4]

Think I'll use method two so I can try out my new g.d.o. Mode switch to a.m., g.d.o. injection loop to the T404 end of the R405 (point 172 on the Sams board layout), power on. Key the mike and tune the g.d.o. for an indication on the wattmeter. Now raise the g.d.o. frequency and tune T404 through T408 for a maximum output. Well, if the cores in T406 and T407 could be supported a quarter inch above the forms they might tune to 28 MHz. Looks like I need to trim both coils. I may need to change some capacitor values also, but first let's try removing a half turn from each coil.

Channel	Frequency	Channel	Frequency
1	28.505	21	28.755
2	28.515	22	28.765
3	28.525	23	28.795
4	28.545	24	28.775
5	28.555	25	28.785
6	28.565	26	28.805
7	28.575	27	28.815
8	28.595	28	28.825
9	28.605	29	28.835
10	28.615	30	28.845
11	28.625	31	28.855
12	28.645	32	28.865
13	28.655	33	28.875
14	28.665	34	28.885
15	28.675	35	28.895
16	28.695	36	28.905
17	28.705	37	28.915
18	28.715	38	28.925
19	28.725	39	28.935
20	28.745	40	28.945

Table II—Channel number/ frequency chart.

Hey, it works. Now to tune T402 thru T404 by feeding the g.d.o. output to the base of Q401. Now tune the g.d.o. to about 40 MHz to check the mixing action of Q401 and adjust T401 for maximum output.

The VCO and PLL circuits are next. With the new crystals installed, tune T701 for maximum r.f. at the collector of Q703, since I can't read the level at TP 12. Now to adjust the VCO to lock by tuning T702 until the voltage at the base of Q708 goes to about 4 volts. Oops! Better make that by s-l-o-w-l-y tuning T702. Nw to T703 and T704 and tune for maximumn r.f. at TP16.

All the pieces have been tweaked, time for an overall line up. Channel selector to 20, key the mike and tune everything for maximum. Hm, the meter lamps dim with modulation; I think it needs a bigger power supply. Time to get the 12 volt battery out from under the bench and put it to work. That's much better!

The transmitter works, now for the receiver. My 11 meter ground plane is close enough in frequency to be worth trying, so...Tune T101, T102, and T705 for maximum noise and I can touch them up with an off the air signal. Mode switch to u.s.b. and let's tune (switch?) around the band and see if anyone is one.

Hm, there seems to be a birdie on channel 25. Channel 25? I need a fre-

[4]*This is the easiest method and the one I would recommend for a first conversion attempt.*

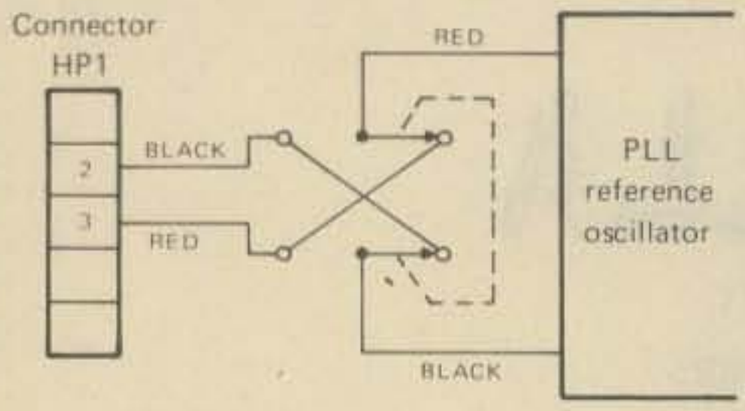


Fig. 2- Doubling the number of spot frequencies by adding d.p.d.t. switch. The switch is mounted next to the microphone connector.

quency chart. Let's see, 27.245 + 1.54 = 28.785 MHz. I'll have to find that later. Right now I want to go to the low end and see if anyone is there.

Boy, he is really booming in. Wonder where he is? 9Y4CR? Well, the band conditions and/or the receiver must be pretty good. This little peanut whistle can't compete with that pileup, though. Maybe a little further up the band I'll find someone. Ahah! A WD8 calling CQ. Think I'll give him a call.

I'm 5 7 in Euclid, Ohio, and he is using a vertical. I think it works!

"Hey, Tom, do you think anyone would be interested in an article on that CB to 10 conversion?"

"I mean anyone besides you! I know you want all that good info I slaved over a hot soldering iron to find."

"You think so? OK, I'll try *CQ* or somebody."

Notes on the Conversion

A frequency counter, a watt meter/dummyload, a v.o.m./v.t.v.m., and an r.f. probe are not absolutely necessary to do a conversion like this, but trying to do it without them is like trying to eat soup with a fork. A g.d.o. and an r.f. signal generator are helpful, as is a general coverage receiver.

A service manual for the unit to be converted is required reading. Study the schematic and layouts until you are sure of the changes required to put the unit on 10 meters. Read over the alignment procedures to be sure you understand the purpose and sequence of the adjustments.

You may find that your conversion has one or more birdies. This one has two, one (about S1) at 28.785 (channel 25) and the other, very weak, near 28.655 (channel 13). The sources of these birdies are shown in Table I. The channel number/frequency chart is in Table II and the crystal formulas and specifications are in Table III.

Pin 9 of the PLL IC is the divide-by-64 input (not used in this unit) which can be supplied with 5 volts to move all frequencies up by 640 kHz. The only restrictions here are the bandwidth of the r.f. stages and the lock range of the VCO. The lock range in the unit I converted was 640 kHz, so I did not pursue using pin 9 to get twice the frequency coverage. Maybe the VCO in your unit will have more range, or maybe you can modify the VCO. I doubled the number of spot frequencies by using a separate d.p.d.t. switch, mounted next to the mike connector, to switch between the PLL reference crystals. (See fig. 2) With the crystal frequencies set 1.2 kHz apart, the output frequencies are spaced 3.6 kHz apart (the range of the *Fine Tune* control) when switching between the two crystals. This covers 7.2 kHz up from each 10 kHz step. Using the d.p.d.t. switch gives greater frequency coverage and retains the l.s.b. capability. If you can increase the range of the fine tune circuit to say 5 kHz, then you can offset the crystal frequencies by that amount.

Other possibilities include an f.m. conversion, a scanner (using a 6-bit binary counter), or a 100 to 200 watt linear amplifier—especially one that could be powered from a mobile supply for one of the Heath, EICO, etc., transceivers. These could be springboards to fame, if not fortune. Do the work and sell the article to *CQ*, I did.

I'll be glad to answer any questions accompanied by an s.a.s.e. Good luck, and see you on 10.

P.S.

Unauthorized modifications usually void warranties, but if you are comfortable with a v.o.m. and soldering iron you probably aren't too concerned about this.

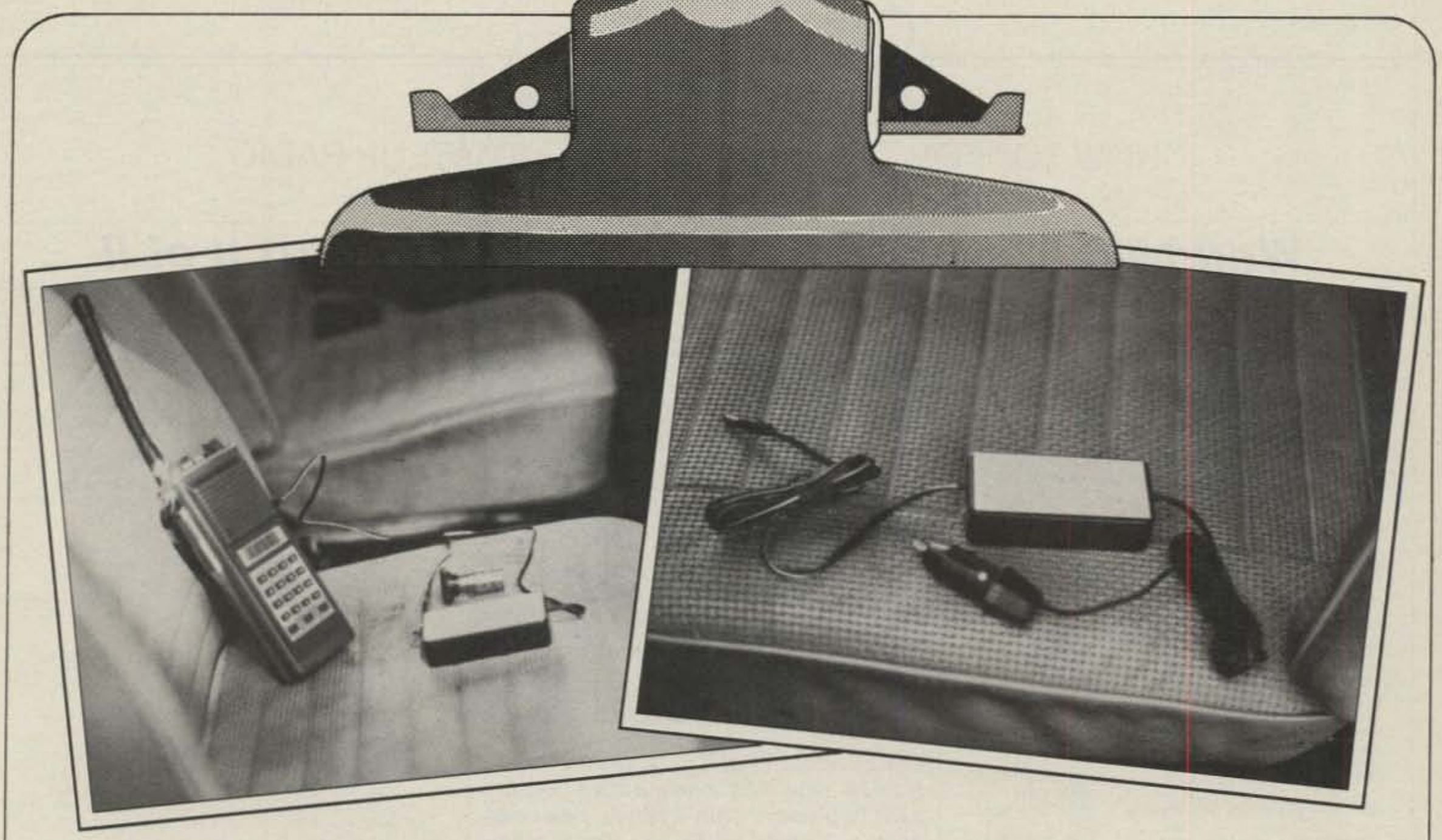
In five weeks I worked Oregon, Nevada, Arizona, New York, Quebec, New Jersey, Pennsylvania, Ohio, Maine, France, Germany, the Netherlands, and the Canal Zone. Not bad for about 15 watts (single tone) input and a vertical antenna 10 feet off the ground.

$$12.320\ \text{MHz} + \left(\frac{\text{new channel 1 frequency} - 26.965\ \text{MHz}}{3}\right)$$

X702 is 1 kHz lower, but see conversion notes for other possibilities.

The crystals I used were commercial standard (.0025%), 24 pf load, HC 18 holder, International Crystal catalog number 434264. Be sure to specify the frequencies you want when you order.

Table III — The formula for determining the frequency of X701.



The Debco Rapid Mobile Charger

BY ALAN M. DORHOFFER*, K2EEK

The Debco rapid mobile charger is about as simple a device to use as possible. It's a little black plastic box with power leads coming off both ends. One lead has a standard cigarette lighter plug, and the other end's plug is plugged directly into the HT charger jack. Nothing moves, lights up or switches. The only apparent indication of functioning is a very slight amount of heat (to the touch) coming from the little black box.

The RMC is designed to operate from 12 v.d.c. (negative ground) and be a constant voltage charger. It can be left connected to the HT continuously during mobile operation and will operate in receive, transmit and off positions on the HT. You cannot "overcharge" the batteries, as the charger itself will automatically cut back to trickle charge as a full charge status approaches.

The estimated time for a full charge is from 4 to 6 hours. From a dead state, however, you can use your HT in far less time. The other weekend I planned to go to a local hamfest/fleamarket. I turned on my HT at breakfast and found the batteries had run out as a result of being left on "memory". When I left my home, I plugged the HT/charger combination into the cigarette lighter in my van. I tried the HT in about 40 minutes and found that the receiver worked perfectly and that I could trip the repeater on the fleamarket "talk-in" frequency. It was an action test that I hadn't planned for the charger, but one which worked out very well. In case you're caught short in an emergency, you can definitely get some power radiating from your HT in less than an hour, much less the 4 to 6 hours needed for a full charge.

Currently (no pun intended) Debco produces chargers for the Kenwood TR2400, Yeasu 207R, Tempo S1, S2, S5 and the Wilson Mark II and Mark IV. They do have chargers for other models available. The Debco rapid mobile charger sells for $34.95 and is available from Debco Electronics, P.O. Box 9169, Cincinnati, Ohio 45209.

*Editor, CQ

a monthly feature by
BILL WELSH, W6DDB

Novice

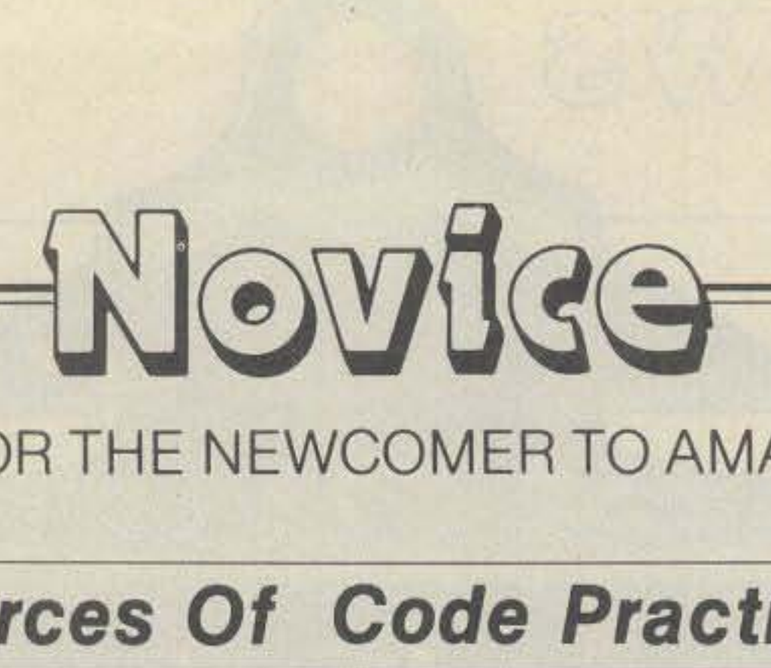
"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Sources Of Code Practice - Part II of II

Last month's Novice column provided the introduction to the following list of code transmissions, plus a list of time and frequency standards for radio stations throughout the world.

UTC	Station	Broadcast	kHz
0000	EAD Aranjuez	TFC	4269 6400 8618 12887 17064 22533
00	JCS Choshi	TFC	418.5 4349 6467 8653.6 12826.5 17112.6 22419
00	JMC Tokyo	WX	91 4298 6397 12840
00	NSS Washington	TFC	122 4390 5870 9425 12804 17050 22491
00	VWM Madras	TFC	4301 12718 16975
00	WLO Mobile	TFC	438 6446 8474 12704 17172
00	WNU New Orleans	PX	4695 6495 8570 12827 17178
00	W8CAM Saginaw, MI	Practice	1804.5 (Mon. thru Fri.)
00	YUR Rijeka	TFC	8700 12780 16942 22443
05	WOE Lake Worth	TFC	472 6411 8486 12971 17161
18	VPS Cape D'Aguilar	WX	435 3842 8619 13031
18	WPA Port Arthur	TFC	416 8550 12839 16918
20	DZG Manila	TFC	483 6441 8588 12882 17176
20	ICB Genoa	TFC	482
0030	CKN Vancouver	WX	4497 6946 12125 15982
30	FFL St. Lyse	TFC	4328 6421 8522 12912 17027 22509
30	KHK Honolulu	TFC	484 8542 13029 16978
30	KLB Seattle	TFC	488 8582 12907 17007
30	XSQ Canton	WX	445 6390 8514
30	9VG Singapore	TFC	4322 6412 8476 12724 16966 22428
35	NSS Washington	WX	122 4390 5870 9425 12804 17050 22491
35	WNU New Orleans	TFC	478 4310 6326 8570 12826 17117 22431
50	IQH Naples	TFC	435 8350 13011 17161
50	KOK Los Angeles	TFC	464 8591 12993 17065
50	NMF Boston	HX	472
50	WCC Chatham	TFC	436 2036 4331 6376 8586 13033 16972
55	NMO Honolulu	TX	4525 9050 13655 16457 22472
0100	CFH Halifax	WX	4255 6430 8697 12726 16926 22397
00	DZG Las Pinas	TFC	448 483 4294 6441 8588 12882 17176 22502
00	DZR Manila	TFC	474 6446 8568 12852 17136
00	GKA Portishead	TFC	4286 6369 8546 12822 17098 22467
00	KPH Bolinas	TFC	426 2045 4247 8618 12808 17016 22479
00	NBA Balboa	TFC	4222 8614 12883 17137
00	NMO Honolulu	WX	4525 9050 13655 16457 22472
0100	NPN Guam	HX	4955 8150 13380 17530

2814 Empire Ave., Burbank, CA 91520



Les Simons, VK2NLE, is an Australian Novice who has been active for the past two years from Sydney. Les operates a Kenwood TS-820 Transceiver (that has been modified to reduce power to the Australian Novice requirement) and a Hy-Gain TH-3 triband Yagi-Uda beam antenna. His home is just 50 yards from the harbor, and it is surrounded by water on 3 sides. Listen for Les on the Australian Novice bands, which are 28.1 to 28.6, 21.125 to 21.2, and 3.525 to 3.775 MHz. Les subscribes to CQ and advises that he particularly enjoys the Novice column.

UTC	Station	Broadcast	kHz
00	TAH Istanbul	TFC	4253 6491 8662 12736 17021
00	VPS Cape D'Aguilar	TFC	3842 8539 13020 17096 22536
00	WLO see 0000		
00	YUR see 0000		
00	4PB Colombo	TFC	482 8473
00	9MG Pinang	TFC	8698 12678 (continues until 1430)
05	WOE Lake Worth	WX	472 6411 8486 12971 17161
05	ZEN Hong Kong	PX	17905
10	SUH Alexandria	TFC	8575 12970
10	VPW Singapore	WX	9075 13425
18	VPS Cape D'Aguilar	WX	435 3842 8619 13031
18	VWM Madras	WX	158 3201 8674
20	DZR Manila	WX	6446 8568 12852 17136
20	JJC Tokyo	HX	4316 8467 12745 17069
20	9VG Singapore	WX	516 4322 6412
30	C6N Nassau	WX	426 6376 8441
30	IAR Rome	TFC	519 6409 8530 13011 17161 22372
30	JOS Nagasaki	TFC	483 4328 6491.5 8437 13069.5 16933.2 22396
30	KFS San Francisco	TFC	476 4274 6365 8558 12844 17026 22425
30	KLC Galveston	TFC	484 8666 13038 16871
30	K1PNB Townsend, MA	Practice	3720 (Mon. & Wed.)
30	NSS Washington	WX	8090 12135
30	VWC Calcutta	TFC	434 8526
0130	WMH Baltimore	TFC/WX	428 4346 6351 8686 12952
30	W1NJM Newington, CT	Practice	3636 7085 (Mon.)
30	YUR see 0000		
50	WSL Amagansett	TFC	418 6416 8514 12660 12997 13024
0200	See 0000 listings for JCS, NSS, VWM, WLO, YUR		
00	KCBR	PX	15095
00	SVA Athens	TFC	4343 6479 8687 13047 17095 22417
00	4PB see 0100		
05	WOE see 0005		
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK		
54	XSG Shanghai	TX	458 6414 8502 12871
55	NMO see 0055		
0300	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS, 4PB		
00	DZG Manila	WX	448 6417 8556 12834 17112
00	WCC Chatham	PX	4331 6376 8586 12925.5 13033.5
00	WLO see 0000		
00	WSC Tuckerton	PX	6340 8430
00	WSL Amagansett	PX	4343 6418 8514 12997 (25 wpm)
00	W6ZRJ Cupertino, Ca	Practice	3590 (first & third Tues.)
0300	YUR see 0000		
06	XSG Shanghai	WX	458 6414 8502 12871
10	SUH see 0110		
18	JMC Tokyo	WX	122.65 4298 6397 8526 12840 17029
18	WMM	PX	11037 15607 (Mon. only)
20	DZG Manila	WX	483 6441 8588 12882 17176
20	JMC see 0000		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	K6DYX Monterey, Ca	Practice	3690 7025 (Mon.)
30	NMC	HX	420
30	YUR see 0000		
48	WAX Hialeah	WX	488 6390 8526 13011 17199
0400	See 0000 listings for EAD, JCS, NSS, VWM, YUR		
00	IAR Rome	TFC	519 4392 6409 8530 13011 17160 22372
00	JAO Tokyo	PX	15945
00	J2A Djibouti	TFC	464 8682
00	KLC Galveston	WX	484 2063 4256 6369 8666 13038 17209
00	NMO see 0100		
00	NPN Guam	WX	4955 8150 13380 17530 21760
00	NPO San Miguel	WX	4445 10440 12200
00	W6QIE San Francisco	Practice	3590 (Wed. thru Mon.)
00	4PB see 0100		
05	WOE see 0005		
18	WPA see 0018		
18	WSC see 0300		
0418	WSL Amagansett	PX	476 4343 6414 8514 12997
20	See 0020 listings for DZG, ICB		
20	KFS San Francisco	WX	436 8444 12695 17185 22515

UTC	Station	Broadcast	kHz
30	See 0030 listings for CKN, FFL, KHK, KLB, 9VG		
30	CFH see 0100		
30	J2A Djibouti	WX	464 8682
30	NPO San Miguel	HX	159 3377 6460 10966 15930
30	WNU New Orleans	WX	478 4310 6326 8570 12826 17117 22431
30	XSX Keelung	WX	420 8445 12695
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, WCC		
50	KOK Los Angeles	TFC/WX	464 6463 8591 12933 17065 22413
50	WHD New York	PX	6512 8052 13020 16968
55	NSS Washington	TX	135 8090 12135
0500	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	JAO see 0400		
00	KPH Bolinas	TFC/WX	426 2045 4247 8618 12808 17016 22479
00	WSL Amagansett	WX	418 8514 13025
00	W6ZF Napa, Ca	Practice	3540 (first & third Mon.)
00	WA7GCE Oregon	Practice	3710 (Tues. & Thurs.)
00	XSV Kao-Hsiung	WX	460 8582
00	YUR see 0000		
00	7OA	TFC	8441
10	SUH see 0110		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	NBA see 0100		
0530	NOJ Kodiak	WX	470
30	YUR see 0000		
30	4PB Colombo	TFC	482 8473 12925
35	NSS see 0035		
50	WSL see 0150		
55	4PB Colombo	TX	482 8473
0600	See 0000 listings for JCS, JMC, VWM, YUR		
00	J2A see 0400		
00	SVA see 0200		
00	4PB Colombo	WX	482 8473
05	WOE see 0005		
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
20	9VG see 0120		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	NOJ see 0530		
30	ODR Lebanon	TFC	4221 8702 12682
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK		
55	NMO see 0055		
0700	See 0100 listings for CFH, DZG, DZR, GKA, KPH, NBA, NMO, TAH, VPS		
00	IAR Rome	WX	519 4292 8530 13011 17160
00	YUR see 0000		
00	7OA	TFC	17175
10	SUH see 0110		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	ODR see 0630		
07030	YUR see 0000		
30	ZNR Aden	PX	8710
50	WSL see 0150		
0800	See 0000 listings for EAD, JCS, NSS, VWM, YUR		
00	CTV Monsanto	WX	418 4235 8526 13002
00	J2A see 0400		
00	NPN see 0100		
00	VWB Bombay	TFC	476 8514 12966 16935 22351
00	VWC Calcutta	TFC	12745
05	WOE see 0005		
18	KPH Bolinas	PX	4247 6488 8618 17016 22557
18	VWC see 0130		
20	See 0020 listings for DZG, ICB		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	ASK Karachi	WX	484 13024
30	BAV Taipeh	PX	14475
30	BBC Taipeh	PX	7600
30	ODR see 0630		
30	YUR see 0000		
30	4PB see 0530		
30	9HD Malta	TFC	8441
35	WNU see 0035		
48	VWB Bombay	WX	8630
50	See 0050 listings for IQH, KOK, WCC		
54	XSG see 0254		
0900	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	IAR see 0130		

Gary Hills, KA4KJI, of Burlington, North Carolina, lives in an upstairs apartment where he runs a Ten-Tec Century 21 Transceiver into a 108-foot trap dipole in the attic. He usually operates on 80 meters and occasionally on 15 and 10 meters. During his first six months on the air, Gary worked 37 states and 4 countries. He is a commercial printer. Gary advises that he looks forward to reading the Novice column and has extracted a lot of useful information from it.

UTC	Station	Broadcast	kHz
00	J2A see 0430		
0900	NSS Washington	PX	9425
00	XYR Rangoon	WX	460 8710
00	YUR see 0000		
00	7OA	TFC	13060
06	XSG see 0306		
10	SUH see 0110		
18	JMC see 0318		
18	KFS San Francisco	PX	4247 6366 8558 12845
18	VWC Calcutta	WX	470 4286 8526 12745
18	VWM see 0118		
20	JMC see 0000		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	CTH Horta	WX	429 3621 7352 10981
30	GKA Portishead	WX	4286 6369 8546 12822 17098 22467
30	NBA see 0100		
30	ODR see 0630		
30	VWM Madras	WX	515 8674
30	YUR see 0000		
1000	See 0000 listings for JCS, NSS, VWM, YUR		
00	JAO Tokyo	PX	12275
00	J2A Djibouti	TFC	12728
00	KLC see 0400		
00	SVA see 0200		
00	VWB see 0800		
05	WOE see 0005		
20	See 0020 listings for DZG, ICB		
20	DZR see 0120		
1030	See 0030 listings for FFL, KHK, KLB, 9VG		
30	CNP Casablanca	TFC	12695
30	ODR see 0630		
30	XSX see 0430		
30	YUR see 0000		
30	4PB see 0530		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK, WCC		
55	NSS see 0455		
1100	See 0100 listings for DZG, DZR, GKA, KPH NBA, TAH, VPS		
00	See 0500 listings for WSL, XSV, 7OA		

UTC	Station	Broadcast	kHz
00	DZG see 0300		
00	J2A see 1000		
00	YUR see 0000		
10	SUH see 0110		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	CNP Casablanca	TFC	17170
30	ODR see 0630		
30	YUR see 0000		
50	WSL see 0150		
1200	See 0000 listings for EAD, JCS, JMC, NSS, VWM, WLO, YUR		
00	IAR see 0130		
00	J2A see 0400		
00	VIS Sydney	PX	8482 (with punctuation marks)
00	VWB see 0800		
00	5YE Nairobi	WX	9043 17365
00	9HD see 0830		
1205	WOE see 0005		
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
20	JJC see 0120		
30	See 0030 listings for FFL, KHK, KLB, XSQ, 9VG		
30	ASK see 0830		
30	NSS see 0130		
30	ODR see 0630		
30	YUR see 0000		
35	See 0035 listings for NSS, WNU		
50	See 0050 listings for IQH, KOK, WCC		
1300	See 0000 listings for WLO, YUR		
00	See 0100 listings for CFH, DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	See 0400 listings for NPN, NPO		
00	7OA see 0900		
10	See 0110 listings for SUH, VPW		
18	VPS see 0118		
20	See 0120 listings for DZR, 9VG		
20	WPD Tampa	TFC	420 4274 8473 8615
25	4PB see 0555		
30	See 0130 listings for C6N, JOS, KFS, KLC, VWC, WMH		
30	CKN see 0030		
30	ODR see 0630		
30	YUR see 0000		
30	4PB see 0530		
50	WSL see 0150		
1400	See 0000 listings for JCS, NSS, VWM, WLO, YUR		
00	See 0200 listings for KCBR, SVA		
1400	See 0800 listings for VWB, VWC		
00	J2A see 0400		
05	WOE see 0005		
05	WSF New York	TFC/WX	442
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
20	WPD Tampa	WX	420 8615 13051
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	CNP see 1030		
30	K6RAU Merced, Ca	Practice	3780 (Mon. thru Fri.)
30	ODR see 0630		
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK, WCC		
1500	See 0000 listings for WLO, YUR		
00	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	JAO Tokyo	PX	8175
00	W6ODX Los Angeles	Practice	7295 (Sat. & Sun.)
10	SUH see 0110		
18	JMC see 0318		
18	WNU see 0000		
20	DZG see 0320		
20	JMC see 0000		
20	WPD see 1320		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	ODR see 0630		
30	YUR see 0000		
30	9HD see 0830		
1548	WAX see 0348		
50	WSL see 0150		
1600	See 0000 listings for EAD, JCS, NSS, VWM, WLO, YUR		
00	See 0100 listings for CFH, 4PB		
00	See 0400 listings for IAR, J2A, KLC		
00	CNP Casablanca	TFC	8686
00	VWB see 0800		
00	7OA see 0500		
05	WOE see 0005 0105		
18	WPA see 0018		

UTC	Station	Broadcast	kHz
20	See 0020 listings for DZG, ICB		
20	KFS see 0420		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	See 0430 listings for NPO, WNU, XSX		
30	ASK see 0630		
30	ODR see 0630		
30	YUR see 0000		
35	WNU see 0035		
48	VWB see 0848		
50	See 0050 listings for IQH, NMF, WCC		
50	KOK see 0450		
55	NSS see 0455		
1700	See 0000 listings for WLO, YUR		
00	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS, 4PB		
00	See 0400 listings for NPN, NPO		
00	See 0500 listings for KPH, WSL, XSV		
00	DZM	PX	8670
00	J2A see 0430		
00	XYR see 0900		
1710	SUH see 0110		
18	VWM see 0118		
20	WPD see 1320		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	NMC see 0330		
30	NOJ see 0530		
30	ODR see 0630		
30	WER-21 New York	PX	11525 (Europe Bulletin, Mon-Fri)
30	WER-25 New York	PX	15983 (Europe Bulletin, Mon-Fri)
30	WES-37 New York	PX	17648 (Middle East Bulletin, Mon-Fri)
30	YUR see 0000		
50	WSL see 0150		
1800	See 0000 listings for JCS, JMC, NSS, VWM, WLO, YUR		
00	CNP see 1600		
00	SVA see 0200		
00	VWB see 0800		
00	WES-25 New York	PX	15983 (Europe/ Middle East Bulletin, Sun.)
00	WWRN	PX	18525 (Latin America Bulletin, Mon-Fri)
00	WWRP	PX	12023 (Latin America Bulletin, Mon-Fri)
00	4PB see 0100		
05	WOE see 0005		
18	NPO San Miguel	PX	3378 6460 10966
1818	VWC see 0918		
18	WCO New York	PX	13020 16968 22407 (Sun.)
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
20	JJC see 0120		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	ODR see 0630		
30	VWM se 0936		
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK, WCC		

Betty Moody, KA5HZM, of Childress, Texas, has been a Novice since April 1980. Betty contacted her son (Jim, NL7C) and his wife (Cathi, WL7ABO) in Eagle River, Alaska the first day she received her license and she really enjoyed the long chat about her grandson, Bobby. Betty worked 214 contacts during her first 3 months on the air, including 52 contacts with amateurs in 28 countries. She earned the Worked All States (WAS) and Worked All Continents (WAC) awards within 82 days. She particularly enjoys contacts with Japanese stations since she spent 3 years in Misana when her husband (Jim, N5CAN) served there as an Officer in the U. S. Air Force. Her station includes a Kenwood TS-52OS Transceiver, multiband dipole, and a Swan TB-3HA Beam. Betty thanks Jack Cox, N5OX, for helping her get on the air.

UTC	Station	Broadcast	kHz
1900	See 0000 listings for WLO, YUR		
00	See 0100 listings for CFH, DZG, DZR, GKA, KPH, NBA, TAH, VPS, 4PB		
00	IAR see 0700		
00	WHD see 0450		
10	SUH see 0110		
20	WPD see 1320		
30	See 0130 listings for JOS, KFS, VWC, WMH		
30	KLC Galveston	PX	13038
30	NOJ see 0530		
30	ODR see 0630		
30	YUR see 0000		
50	WSL see 0150		
2000	See 0000 listings for EAD, JCS, NSS, VWM, WLO, YUR		
00	CNP see 1600		
00	CTV see 0800		
00	J2A see 0400		
00	NMO see 0100		
2000	VWB see 0800		
05	WOE see 0005		
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
20	WPD see 1420		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	See 1730 listings for WER-21, WER-25, WES-37		
30	ODR see 0630		
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK, WCC		
2100	See 0000 listings for WLO, YUR		
00	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	CKN Vancouver	PX	131 6446 12921 17288
00	IAR see 0400		
10	SUH see 0110		
18	JMC see 0318		
20	WPD see 1320		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	See 0930 listings for CTH, GKA		
30	ODR see 0630		
30	YUR see 0000		
50	WSL see 0150		
55	NMO see 0055		
2200	See 0000 listings for JCS, NSS, VWM, WLO, YUR		
00	See 0400 listings for JAO, KLC		
00	CNP see 1600		
00	DZP Manila	PX	9390 15440 17910 19885 22185 (Far East Bulletin, Mon-Fri)
2200	KFS San Francisco	WX	436 8444 12695 17185 22515
00	SVA see 0200		
00	VWB see 0800		
05	WOE see 0005		
05	WSF see 1405		
18	WPA see 0018		
20	See 0020 listings for DZG, ICB		
30	See 0030 listings for FFL, KHK, KLB, 9VG		
30	XSX see 0430		
30	YUR see 0000		
35	WNU see 0035		
50	See 0050 listings for IQH, KOK, WCC		
55	NSS see 0455		
2300	See 0000 listings for WLO, YUR		
00	See 0100 listings for DZG, DZR, GKA, KPH, NBA, TAH, VPS		
00	See 0400 listings for NPN, NPO		
00	See 0500 listings for WSL, XSV		
00	KFS see 0420		
10	SUH see 0110		
20	WPD see 1420		
30	See 0130 listings for JOS, KFS, KLC, VWC, WMH		
30	ODR see 0630		
30	YUR see 0000		
50	WSL see 0150		

Summary

I hope this discussion about code practice has helped you. This type of information is subject to rapid change, and it is assumed that some listings will be incorrect by the time you read this article. However, most of the station activities included in this list have held constant for many years and you can expect to hear them if you listen for them. I will, of course, be glad to receive written comments about changes. I will check out received information and make appropriate modifications to the master list.

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

73, Bill, W6DDB

Here's an old "solution" to a current problem, and a new meaning for the salt of the earth.

TVI Woes With A Happy Conclusion

BY SAM T. PECK,* W6CQR

Having been inactive for a considerable period of time, I decided to upgrade my station equipment and get back on the air to enjoy the very promising current sunspot cycle trend. The first priority was to install a crank-up and tilt-over mast and a triband quad. Second priority was procurement of a TS-820s transceiver.

Once on the air all seemed serene until complaints started coming from the living room advising that the RCA XL-100 color TV set was disturbed to one degree or another on all bands 10 through 40 when I was on the air. Installation of a low-pass filter on the TS-820 and then a high-pass filter on the TV set provided very slight improvement. The ground system in the radio room consisted of a 6 foot run of #10 copper wire to an 8 foot galvanized pipe driven in the ground directly outside the radio room and bonded to a close by a cold water main entering the house. Though the ground system seemed logical, there were no other known variables, so an improvement on the system seemed to be worth a try. Consequently, the 8 foot galvanized pipe was removed and a 5/8 inch by 10 foot copper pipe was driven into the ground with frequent periods of watering the soil to make the going easier. The bond to the water main was not reinstalled to isolate the system from the house pipes that were overhead in the attic. A heavy copper braid replaced the #10 wire to the radio room. On the air tests happily revealed no TVI on any channel when operating 10 through 40 meters. 80 and 160 meters are not used so they were not tested.

However, in about two weeks a mild case of TVI reappeared, and no changes had been made in any part of the system, except the ground had dried out in the vicinity of the ground rod. A trench was dug around the rod, and soaking was started with a light flow from the garden hose. In 24 hours the situation had improved, leaving a barely observable amount of TVI. At this point rock salt was added in the trench, and an additional 8 hours of soaking completely eliminated the TVI. Frequent watering of the ground system seemed like an unnecessary chore, so a 5 foot by 4 inch diameter plastic tube was obtained, and several holes were drilled 1 foot from the bottom end, so when in place the soil drainage would not adversely affect the shrubbery on the surface. The plastic tube was then placed 4½ feet down next to the ground rod. Five pounds of rock salt was poured into the tube, and then the tube was filled with water.

This arrangement proved very effective in preventing TVI by filling the tube with water twice a week. This system was later improved by installing a tee joint on the exhaust of a nearby automatic water softener that recycled every 48 hours. A plastic hose containing a valve was installed from the tee joint to the ground tube, and the valve was adjusted to permit just enough salt brine flow to fill the tube on each cycle of the water softener. The system is now completely automatic and maintenance free.

I, like many amateurs, once took ground for granted. However, after studying the subject I found that just driving a rod in the ground does not necessarily constitute a ground. Actually, the resistance of a ground is made up of the ground lead, the resistance of the rod, the rod to earth contact, and the resistance of the earth surrounding the rod. Bureau of Standards tests indicate an average ground in soil composed of brine waste, ashes, and cinders to be 14 ohms; Clay, gumbo, loam, and adobe to be 24 ohms; and sand gravel and rock to be 550 ohms. However, they note moisture content of the soil can have a considerable impact on these figures if the soil is dry. For example a given sample of soil with 10 percent moisture has a resistance of 350,000 ohms per cubic centimeter. Increasing the moisture to 20 percent brings the resistance down to 10,000 ohms per cubic centimeter. Of course, moisture content of soil depends on the season and depth of measurement.

It was further noted in a Bureau of Standards study that a ground rod 1 inch in diameter compared to a rod ½ inch in diameter decreased the resistance only 7 percent.

One can conclude from this experience with a ground system along with the Bureau of Standards data that one of the most important factors in the elimination of TVI is the grounding system at the transmitter. The low-pass filter on the output of the transmitter, or in the case of a driver, an additional low-pass filter on the output of the amplifier, is considered good assurance.

*1350 Fuchsia Street, Oxnard, CA 93030.

This month by

ROD LINKOUS, W7OM

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

Over the last year this column has given several lines to DX meetings. The Fresno gathering has brought many DXers together and has generated a lot of newsworthy items. Recently I have given our local DX crew a hand with announcing the pending DX meeting held here in Seattle. Now it's time for a report on the DX activities from that event, not just a matter of record, but in hopes of informing the other DX clubs who have written asking for details on what a DX gathering is like.

The Big DX Meeting

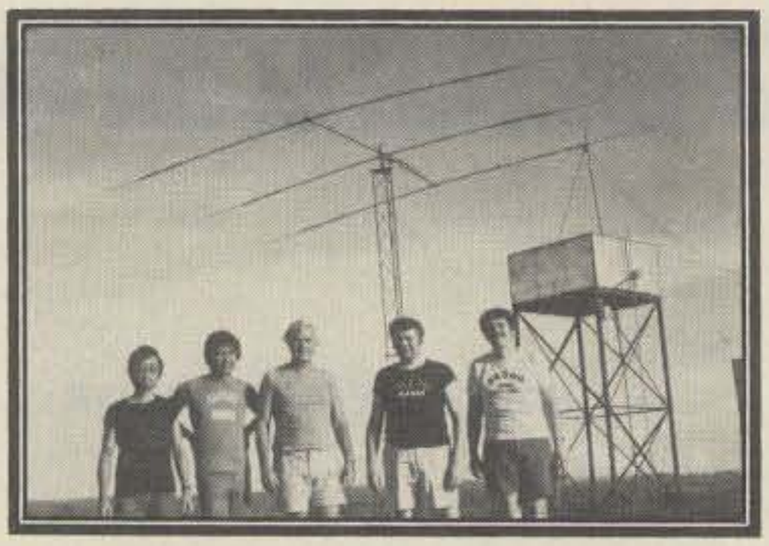
In 1952, the three DX clubs from the Pacific Northwest originated the annual Northwest DX Convention. Every three years, one of the clubs hosts the convention in their city.

The Western Washington DX Club of Seattle decided to take their turn as host and make the DX convention part of the 1980 National ARRL Convention. Since the ARRL convention was being held the last weekend of July, no major adjustment was required to the normal early August regime. With a major event in mind the DX club chose the simple title of "The Big DX Meeting" for their advertising.

Almost a year before the meeting, invitations were sent to several foreign DXers of note. This was to liven the interest. Most DXers seem to be more inclined to go on a DXpedition than to travel afar to attend a DX bash. Yet, several were planning to travel to the U.S.A., so they oriented their plans for a stopover in Seattle. Many of the local DXers talked it up on 20 meters and before long an impressive attendance list grew and was publicized via the DX bulletins.

We were fortunate to have several DXers with rare calls in attendance. Tim Chen, BV2B, from Taipei, Formosa (Taiwan) was a big hit, even with the taller DXers. Since most of the locals have a great chance to work Tim, most were elated to have an opportunity to meet him in person. Thanks to the "Family Hour", a lot of the west coast DX gang knew he would be there and showed for the event.

Again thanks to the "Family Hour", a lot of the west coast had a chance to work Cris Gondard, FB8XV, of Kerguelen fame. Cris on his return from the island stopped in his tour of the Northwest to meet many of his friends at the convention. Cris also had his QSL manager Jean Brunner, F5VU, along. This gave us a chance to thank Cris for the contact and Jean for the QSL card.



IDXF and the group pictured here helped make the East Malaysia DXpedition possible. Left to right: VS5TX, 9M6MU, KP2A, N2CW, and N2OO. (Photo via W2LZX)

Mike Smedahl visited the Northwest DXers. Mike (second from the left) is best known for his active operation as EP2LI in Iran. He is now A7XD in Qatar. The dinner group includes (left to right) Bill Bennett, W7PHO, Willis Propst, K7RS, Bob Fuller, WA7MPW, A7XD, and Bob Hudson, K7LAY. (Photo via K7RS)

Peter Strauss, A22PS, from Botswana was busy with his camera. He was the South African Radio League representative. He will make sure the African DXers know what the W6 and W7 gang look like when the pictures appear in the *DARC* magazine and several African publications.

Brian Otter, 9J2BO, from Zambia, elated the attendees along with another African from ZS-land. Considering the distance, they easily (along with Peter and Cris) walked away with the furthest travelled to attend record.

Len Kaufer, KH0AC (ex KG6SW) chose late July to come back to Seattle to visit with his family. As a local lad and a very active DXer, he spent three days shaking hands.

The KH6 Hawaiian group and the KL7 Alaskan crew were out in large numbers. They just barely out numbered the JA attendees. Also among the attendees were DXers from Australia, England, Germany, Guam, Hong Kong, Indonesia, the Marshalls, and New Zealand.

The DX list included many from all over the U.S. who have had DX calls. Dale Jones, K5MM, who worked many from his last assignment as GU5CIA in Guernsey, was very popular. The two DXers who epitomize DXpeditions were part of the DX program and delighted many with an eyeball QSO. They needed no introduction as most recognized their voices and their faces from the DX columns. Lloyd, W6KG, and Iris, W6QL, Colvin were a big hit. News of their pending Middle East and Eastern Asia DXpedition plans and the new YASME award caught everyone's attention.

The DX club set up a meeting place for DXers to gather while they were not in one of the many DX forums, seminars and panels. To recognize one of our own, the place was called, what else, "The 14225 QRM Room". The only complaint received about the whole convention was the absence of Bill Bennett, W7PHO, from time to time. It turned out that Bill only spent his time out periods there. Bill was busy showing the visitors around and attending many of the locally hosted side events.

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

The WAZ Program

10 Meter Phone

65...SM4CAN
66...N4KE
67...WB6PSY
68...WA8KEM
69...AF2O

15 Meter Phone

58...KA2K
59...N4KE
60...N8II
61...VE7BTV
62...K8LJG
63...JE2FTC

20 Meter Phone

315...N4PN
316...VK5OU
317...VE7KL
318...W0ULO
319...AJ6A

40 Meter Phone

4...VK3OT

80 Meter Phone

7...ON5NT

10 Meter C.W.

7...N4PN
8...JA2TK
9...DL7AA
10...JH1IFS

15 Meter C.W.

33...N4PN
34...SM3EVR
35...DL1PM
36...JR1EBE

20 Meter C.W

115...JR2IEG
116...WB0YUI
117...K0LST
118...K1UO

Application and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the QSL Manager or to a check point should include sufficient postage for the safe return of their QSL cards. The processing fee for all C.Q. Awards is $5.00.

The success of The Big DX Meeting can best be judged at the DX breakfast on Sunday morning. This annual affair at the Northwest DX Convention was always well attended. Most wanted to see who survived the night before. Over 400 DXers including their guests showed for the big event. The program was to be informal and comfortable. But the main program item turned out to be so professional that DX clubs stood in line to ask how they could get it for their clubs. Chip, K7JA, and Janet, WA7WMB, Margelli just returned form their stay in Japan where they operated as JR1ZZC. Many know Chip from his DX contesting. Yet his skill with photography and program narration vie with his supreme operating ability. The program took us on a tour of amateur radio in Japan and the Pacific. It gave us an insight into the high density of amateurs in a small area. We also got a tour of a Japanese amateur equipment manufacturer. It was a 35 mm slide and tape presentation with music and DX pileups in the background. If it is shown locally, *see it*!!

Part of the show was the stand up of all DXCC members at the breakfast. Most of the room stood when called. When "all with 200 or less countries...be seated" was called about eighty to a hundred remained. At 250 or more level only forty or so remained. Yet at 300 plus, 25 to 30 remained. The most striking sight was to see 24 still on their feet at the 325 level. It was truly a group of real DXers with familiar calls recognized by most.

The breakfast also gave us a chance to pass out some awards along with the prizes. (The awards recipients will be note elsewhere.) Ray Stone, W5RBO, from the *QRZ DX* bulletin personally met with the subscription winners. Jay, W6GO, and Jan, K6HHD, O'Brien met with the winners for the QSL managers list. It was especially nice to see the faces behind the services we use. Unfortunately, Jim from The *DX Bulletin* couldn't make it, but his free subscriptions did.

Success of a big event is probably in the eye of the beholder and the attendee. Sometimes it is best judged by the good times had by all. If you missed this one, try Fresno next year, Portland next year or Vancouver in 1982. If that is too far, make sure you get to the next local big DX meeting for it is well worth the effort.

CQ DX Awards Checkpoints

Three new checkpoints can now verify your QSL cards:

Chuck Sappah, KL7PJ
1711 Logan Street
Anchorage, Alaska 99504

Luis Casals Rojasn, EA3AOC
Soledad 102
Igualada, Barcelona, Spain

W. R. Mattill, WB6SHL
9310 McFadden
Westminster, California 92683

DX Extras

DE VK2AIR BT in the May 1980 issue of *CQ*.....it was reported to QSL 9L1K to OE3KD. 9L1K has also been using me as QSL manager since December, 1979 and now I have hundreds of cards for him but still no logs.

I recently received a letter for the Secretary of the Sierra Leone Amateur Radio Society (9L1YL) to say that here is *no* licensed amateur in Sierra Leone with the call sign 9L1K. I would be very much interested to know if OE3KD QSLs and better still whether any person knows his QTH.

9L1YL further reports all licensed amateurs in Sierra Leone now appear in the DX Call Book. AR

DE WD9GSO BT In the July 80 column I was listed as the manager for HH2*B*W. That should have HH2*P*W, Butch Daniels in Port-au-Prince. I have been his manager for over a year. Butch is 19 and I am 17 so we have a lot in common. Those s.a.s.e.s get faster results. AR (ed - See what a typo can do.)

DE WA4QMQ BT Steve, WA4UAZ (HD1A) will be in Hong Kong for approximately two years. Steve has received the call VS6JR and plans on be-

The WPX Program

Mixed

854...WB3DNA
855...PA3AEB
856...K9DAF
857...WA4EMA
858...WB9TIY

S.S.B.

1299...WB9VVX
1300...OE1KJW
1301...G4GEE
1302...W5SGT
1303...JA4LAZ
1304...JA2CXH

C.W.

1988...WD9DCL
1989...YU7OQL
1990...WB8TRW
1991...WB8TUQ
1992...WD4RAF
1993...ZB2EO
1994...N2AGM
1995...JA3DBD
1996...W1WKP
1997...WA4OML

WPNX

182...KA7ADE

Endorsements

Mixed: 400 WB3DNA, WA4EMA, WB9TIY. 450 PA3AEB. 500 K5PR. 550 WD9DCL, UA6AJG, K9DAF. 950 SM3EVR. 1000 K9BG. 1100 JH1VRQ, N4UH. 1350 N2AC. 1600 W4BQY. 1700 VE3GCO.

SSB: 300 WB9VVX, OE1KJW, W5SGT, JA4LAZ. 350 JA2CXH. 400 WB6CDM, AC2J, N0AJZ. 450 W0ULU, WD0EPE. 500 WA4DPU, W3GXK, 600 G4GEE, I6ICD. 650 KB8JF. 800 WD8MGQ. 850 CX9CO. 950 JH1VRQ, I6SF.

CW: 300 YU7OQL, SV1EX, WB8TUQ, WD4RAF, W1WKP, WA4OML. 350 WD9DCL, UA3PBY, UA3TAE, JA3DBD. 400 UA3IBX. 450 UA9SCH, K9DAF, SM6INC, ZB2EO, WA4QMQ. 500 UW1AE, W6YMH. 550 UA9YAQ, UB5KAK, UK3R, KL7AF. 650 SM6AYM. 700 N4YB, K8LJG. 750 DL7MQ. 900 UK4WAB. 950 W1WLW. 1150 UA3HI. 1300 G2GM.

10 meters:	UA3HI, UA3GO, WA4QMQ, WD9DCL.
15 meters:	UA3HI, WA4QMQ.
20 meters:	UA3HI, UA9FAR, UA9SCH, UB5KAK, WD8TRW, ZB2EO, WA4QMQ.
40 meters:	UA3HI.
80 meters:	UA3HI, W1WLW.
Africa:	UA3HI.
Asia:	UA3HI, UA3PAW, UA9SCH, UB5KAK, UW1AE, KB8JF, JA3DBD.
Europe:	N4IB, WD9DCL, UA3HI, YU7OQL, PA3AEB, UA3IBX, UA3PBY, UA9SCH, UW1AE, ZB2EO.
No. America:	UA3HI, UW1AE, KB8JF.
Oceania:	VE3DMC, UA3HI, KB8JF.
So. America:	UA3HI.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope to "CQ WPX AWARDS", 5014 Mindora Dr., Torrance, Calif. 90505. U.S.A.

This foursome got together at SEANARC 80 to chat about the wide world of what else—DX. (Left to right) from the DX desk, Don Search, W3AZD; from Botswanna, Peter Strauss, AZ2PS; the president of the Western Washington DX Club, The SEANARC 80 DX host, Merle Cox, W7YOZ; and Rod Linkous, W7OM. This was the wrap up of the DX breakfast. (Photo via Bob Barton, WB7OHA)

The proud guy in the middle is the recipient of the 1978 CQ World-Wide Phone Plaque for his winning operation as VP2MBA in Montseratt. Normally, Charles Clayton and his XYL (also an amateur) operate from their Oregon QTH where Charles is better known as W7FP. This fall they will travel to Saipan for the CQ WW Phone Contest. He will operate KH0AC, who is his host. W7OM presented the plaque. (Photo by Bob Barton, W7OHA)

ing active as he was from Quito, Ecuador. I will handle his cards. AR

DE WD9EJE BT Thanks for announcing the Novice DX net. The National DX Net will meet at 1430 UTC on 28103 kHz.

As a Novice with DXCC and 122 countries confirmed it is not often that you find rare countries in the Novice band and I would like to encourage more of these rare stations into this part of the band. AR

DE KA3B/DA2AL BT The Wiesbaden Amateur Radio Club of Wiesbaden, West Germany held their 5th Annual DXpedition to the Principality of Liechtenstein in May. With 11 operators on 6 bands we worked over 10,000 stations in 144 countries and all 50 states. QSL manager for DX contacts is DJ0LC and for stateside is Steve Hutchins, PSC Box 4573, APO New York 09109. AR

DE P29JS BT Progress toward the activation of Heard Island is being made and the current status is:

a. The license has been issued, call sign VK0JS.

b. The government department has advised that "there is no objection in principle" to the activation of Heard, although they have rightly stipulated a number of conditions.....mainly safety.

c. Negotiations are underway regarding the charter of a suitable vessel....the main expense.

d. Donations are being received.... small....more are required to insure the trip.

We anticipate a 14 day minimum stay by six experienced operators. We can still use help in many areas. AR

DE FR0FLO BT I have not been receiving QSL cards sent to Reunion, as IRCs and other enclosures are being taken out when the mail passes through Madagascar. Please use the following address:

Herick Vandersteen
Box 200
Tampan, 97430, FRANCE

DO NOT use the words "Reunion Island" or "Indian Ocean" on the envelope. And leave amateur calls off the envelope. Not even a call in the return address. AR

QSL Manager List

Over the years many have tried their hand at putting together a good QSL manager list. Undertaking this job is massive. Errors in lists are hard to minimize, let alone eliminate entirely.

Hope in lower error rates in the list came with computer prepared, camera ready copy. Now the error is in the input. We have written on several occasions to give the list editor/manager inputs as soon as an error is found.

A new QSL manager list is now available from a DXing pair. The O'Briens - Jay, W6GO and Jan, K6HHD have a monthly list named simply *The W6GO/K6HHD List*. The lists given out at the SEANARC 80 convention contained 4,755 listings. Jay and Jan as active DXers know what a DXer needs to get that valuable card. For further details write to them at: 6606 Fifth Street, Rio Linda, CA 95673.

From the Pileup

Boy was the XYL right.....it is a pile this month. The bands have been hot and many wrote. Note: (source of information).

The group that brought you the Neutral Zone plan to provide 50,000 QSOs from Iraq. However, it will be a few months before the operation takes place. Suggest look around JY1's birthday in November. (JY3ZH) David Schoen, N2KK leaves in October on another trip which will include Sri Lanka in the *CQ* WW Phone contest, followed by Maldives 8Q7. David is especially interested in 80 meter operation and may operate the *CQ* Phone Contest on 80 only. Other plans include Djibouti, J28, during the ARRL 10-meter contest. (TDXB) Went down to VP5 in June and made about 3,000 QSOs. (KC4BH/JA3ODC) D68AS is reported to be QRV Monday thru Friday on 21,320 from 0650 UTC and on 14, 175 from 1930 UTC. (RSGB) Rodriquez, 3B9AE still found very regularly on 14, 240; and 14,130 after 1500/1600 UTC. (DXPRESS) FH8CL mostly Tuesdays and Saturdays at 0300 on 14,220. Lists are made by his QSL manager I1KFB and he also announces the next scheduled operation. (DARC) CR9A operated by KP2A made 9,000 contacts in 17 days while K1MM made a thousand in 3 days. The Call CR9B has been issued to Bill Hatcher KP4KK/DU2 who plans to go there in late October. (RSGB) CE0X, San Felix, is not imminent despite some optimistic promises from various DXpeditioners. The senior officer in charge of San Felix has stated that no U.S. citizens will be given permission to land there, but it's hoped that perhaps a Chilean effort will be successful. (W4ZR via HRR) Jim Hewitt, W8LMB/4 (ex A9XCC) is enroute to Africa and will be QRV where practicable from the following countries: ET3, S79, TJ, TL, TN, TT, TY, 5N, 6O1, 9Q5, 9U5 and 9X5. (LIDXB) Only the following are active from Chagos: VQ9CI, VQ9DM, VQ9JP, VQ9JW, VQ9TT and VQ9WE. (VQ9DM) TI9PN, sometime active from Cocos Island, may not be properly licensed for amateur operation. Reports are

CQ DX Awards Program

S.S.B.

891 ..... XE1NI	897 ..... WB9VVX
892 ..... K0MOL	898 ..... WB7TFT
893 ..... KB8DC	899 ..... WD4RCO
894 ..... JF1SEK	900 ..... G4DBX
895 ..... WB6CDM	901 ..... WA4LOF
896 ..... 8P6IB	

C.W.

450 ..... JH7BRG

S.S.B. Endorsements

310 ..... DL9OH/318	275 .. W8ILC/QRPp/275
310 ..... YV1KZ/314	250 ..... WA4LOF/273
310 ..... K5OVC/311	200 ..... KB8JF/249
300 ..... K8LJG/309	200 ..... JF1SEK/216
300 ... LU1BAR/W3/305	200 ..... W1CRL/200
300 ..... K8PYD/302	150 ..... WA6OUA/161
275 ..... WA4JTI/297	150 ..... K0SE/151
275 ..... K5DUT/294	150 ..... WB4FOT/150
275 ..... AI8S/287	28 MHz WB4VQO
28 MHz I5EFO	28 MHz K0SE

C.W. Endorsements

310 ..... N4PN/315	200 ..... WA2ORX/200
310 ..... W6ID/315	

The total number of active countries as of deadline was 319. Complete rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope...self-addressed and stamped to CQ DX Awards Manager, Billy Williams, N4UF; 911 Rio St. Johns Dr., Jacksonville, FL 32211 USA.

that the rig was left on Cocos only for communications back to Costa Rica by the personnel who are stationed there. (Long Skip via HRR) SM0AGD during his recent J5AG *et al* operations, Erik made over 9,500 QSOs, 90% c.w. Since 1972 his duties have taken him to 80 countries, 20 of which he operated from. Though now permanently posted in Sweden, Erik plans some DXpeditions with SM3CXS and the Sundsvall DX Group, one member of which (SM3BHY) is stationed in Peking. (RSGB) A4XIH is active on 80 c.w. (DARC) Dick, K1OJH, reports that if you are planning a trip to FP St Pierre and Miquelon, you can no longer get a license on arrival. Your application must go to Paris and it usually takes five or more months to get a reply. All call signs have three letters. (Long Skip) A group of JT DXers is trying for a DXpedition to South Yemen, 7O. (DARC) Dick McKercher, W0MLY is the custodian for the new YASME award for confirmation with 30 different YASME DXpeditions and/or YASME officers or directors. (QRM) Ted, W6BJH, handed over the gavel to the new Northern California DX Club president, Bruno, AA6AD. (The DXer) The Jersey Island DX group meets Monday thru Friday 14,210 at 0500Z. (TDXB) First USA 5BWAZ has been awarded to K4MQG. Gary is only the second in the world to earn this most difficult DX award. The old master, John, ON4UN, has number 1 and 3 went recently to SM4CAN. (K4IIF) The J73 calls replace the J7 calls since June 1. ITU says that where a letter + numeral prefix is allocated to a country, a second numeral plus suffix letters constitute a call sign. (RSGB) KC6CV, Western Carolines, is actively nearly daily after 1000Z above 14,300 in QSO with his manager KB0AJ. (DARC) It is reported that Larry may sign KS6DV/KH1 and T3PA from Canton Island. This will probably be the last /KH1 operation before the USA relinquishes full control of Canton Island to Kiribati. (RSGB) G3JKI/5A is back. He is limited to transceiving on battery power, thus Arthur now prefers "list" schedules with his QSL manager F6CYL. Check 21,275 at 1230 UTC and 14,220/226 between 0630 and 1000 UTC. (LIDXB) I1AGC has been taking a list on an erratic basis for LU1ZA, So. Orkneys, on 14,260 at 1600Z and the list is later run that day on 14,290 at 2100. VP8ML is also operating from the islands and has been worked on 80 s.s.b. and on 40 and 15 c.w. (Long Skip) Okino Torishima will lose its DXCC country status effective December 1....also the African "homelands" are still politically part of South Africa for DXCC credit. (DXCC desk via HRR) VK0KH works Europe or USA stations on alternate Thursdays on 14,120 from

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. Total number of countries on the list as of deadline is 319. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the *CQ* DX Honor Roll, annual updates are required. Honor Roll updates may be submitted at any time, in any number. Updates indicating no change will be accepted to meet the annual requirement. The fee for endorsements involving the issuance of a sticker is $1. Other updates require an SASE for confirmation of total. The basic award fee is $5.

C.W.

W6PT	319	DL7AA	314	W4BQY	307	DL3RK	299	DJ7CX	287
ON4QX	318	W3GRS	314	K4CEB	307	N6FX	298	JA1GTF	286
K6EC	316	N6AV	312	N6CW	305	W1NG	293	W4OEL	284
W9DWQ	315	K6JG	310	W2GT	304	WA8DXA	289	K3FN	283
W6ID	315	W8KPL	308	K9MM	304	N4MM	289	JH1VRQ	275
N4PN	315								

S.S.B.

WA2RAU	319	WA2EOQ	316	W0SD	312	N2SS	302	VE7CE	289
W6EUF	319	K6YRA	316	DJ9ZB	312	W6FET	302	OK1MP	289
W9DWQ	318	W4SSU	316	W6RKP	311	W0YDB	302	VE7HP	289
DL9OH	318	W3CWG	316	W3GG	311	K8PYD	302	G4CHP	289
K8DYZ	318	W4UG	316	K6XP	311	WB6DXU	301	AI8S	287
W3NKM	318	K6JG	316	K5OVC	311	W0SR	301	YS1O	285
W6REH	318	ZL3NS	315	VE2WY	310	DL6KG	300	N5FG	285
XE1AE	318	VE3GMT	315	F2MO	310	HP1JC	300	LA7JO	284
W4EEE	318	K4MQG	315	I4ZSQ	309	WA4WTG	300	JA5PUL	284
W2TP	318	K9LKA	315	N4MM	309	OE3WWB	300	K1UO	282
I0AMU	318	SM6CWK	315	K8LJG	309	I5WT	299	VK4VC	281
K6WR	318	K6EC	315	W9SS	309	WA4JTI	297	W6DN	281
K2FL	318	I8YRK	315	K9RF	309	I6PLN	296	K9HQM	278
VE3MR	317	SM6CKS	314	N6AV	309	DJ7CX	295	K3MWV	277
TI2HP	317	OZ3SK	314	W0SFU	308	F9MS	294	W4BQY	277
I0ZV	317	ZS6LW	314	YV5AIP	308	W9DQ	294	JA6GDG	276
W3GRS	317	EA4LH	314	XE1KS	306	VE3FJE	294	ZL1BIL	276
W9JT	317	N4WF	314	YV5DFI	305	K5DUT	294	I8KNT	276
VE3MJ	317	YV1KZ	314	LU1BAR/W3	305	W1NG	293	YU2RTW	276
I8AA	317	K9MM	313	N6AW	305	JH1VRQ	292	XE1CI	276
W9KRU	317	G3FKM	313	W8ILC	304	W7OM	292	AA4A	275
I8KDB	317	W4DPS	313	DL6KG	304	K4LSP	291	DJ2AA	275
W3AZD	317	W6YMV	313	VE7WJ	303	I0MBX	290	K9PPY	275
W9QLD	316	OE2EGL	313	I3LLD	303	K9RF	290	W8ILC/QRPp	275
F9RM	316	ZL1AGO	312	DK2BL	302	9H4G	290		

Jan, K6HHD, and Jay, W6GO, present free one-year subscriptions for the W6GO/K6HHD list to two Washington DXers. (Photo by Bob Barton, WB7OHA)

Four new subscribers to the "QRZ DX" Bulletin flank Ray Stone, W5RBO (second from right). (Photo by Bob Barton, WB7OHA)

0630 UTC. (RSGB) JA8BMK visited Laos in May and noticed that there is no chance of anyone getting an XW8 license at present. (DARC) Thailand's HS5AID fields the multitudes daily near 14,029 from 1000 to 1230 UTC. (LIDXB) TA1AC, Turkey...look for Jo daily around 21,295 from 2300Z. He says he hangs out there and he asks for cards direct. *Make no mention of the callsign on your envelope.* (Long Skip) Rob VS5DD is the son of VS5PP and is active on 15 c.w. (RSGB) 5N0DOG is now active on RTTY too. (DARC) A DXpedition to ZD9 is planned for 6 days in January or February 1981 by ZD7HH and ZD7SE. (LIDXB) 5N0KUY (JH8FCB) and 5N0MAS (JH1MQS) are reported to be working on getting permission to operate from Guinea, 3X. There is no timetable on the plan. (Long Skip) QSL manager W5RBO advises that the station who signed T3KC after 4 February 1980 was a pirate. (LIDXB) Fernando, ex CO2FA, had to leave all of his logs in Cuba and his gear was confiscated prior to his hasty departure to Miami. He is unable to confirm any CO2FA QSOs. (Long Skip).

Thanks to the following for the inputs: HRR - Ham Radio Report; DARC -DL3RK; LIDXB - Long Island DX Bulletin, Box 173, Huntington, NY 11743; TDXB - The DX Bulletin; and RSGB - Geoff Watt.

Answers October DX Quiz

1. 21
2. 26
3. 22
4. 23
5. GM, Shetland
6. JW, Baer Island
7. IT
8. TA, Eu Turkey
9. EA
10. UR2
11. HB
12. XE
13. FP, FG, FM, FS, FY, FO
14. EA6
15. FC
16. IS
17. 9H
18. SV, Crete
19. SV, Dodecanese
20. ZC4
21. DU
22. HR
23. CP
24. ZS3
25. 60
26. P29
27. HZ
28. ZA
29. HK0
30. KH5 or KP6
31. PY0
32. ZS2
33. FW
34. ZD9
35. FP

QSL Information

A4XIU to G4GIR
A6XJC to PE0MGM
A7XE to DF4NW
A7XGI to DL2MY
A7XM to DJ9ZB
A7XZ to DF3NW
C5AAS to G3LQP
C5ACC to KB4GQ
C31HD to F6DII
C31IR to F6AUS
C31LY to DJ9ZB
C31MK to EA3WZ
C31MS to EA3MS
C31TI to F6DLO
C31UI to K7VAY*
C31UN to EA3AOC
CE1BLL to WB4LFM
CR9A to WB2KXA
CR9B to WA3HUP
CT2DE to WB3IFD
D68AS to DK9KD
DA2AA to K7VAY*
DU1MELto K9MD
EA6AR to DL7FT
EA9GT to WA2JOC
EL6A to K4SE
EL7I to DL2GA
EL8A to DL2GA
FB8XV to F5VU
FG0FOR/FS to W1XK
FG2FVB to WA7IRD
FH8CL to I1KFB
FK8DO to N4TN
FM7AV to F6BFH
FM7WS to F2BS
FM0FJE to F5VU
FO8DP to N7RO
FP0FON to W1IHN
FP0NN *NOT* to WA3KCO
FW0DD to ZL1BCG
G3JKI/5A to F6CYL
G5DKH to KB6AA
GD4JUN to VE3BXY
GJ4JPZ to DJ0ZF
GJ4JVO to GJ2LU
GJ5DGF to DF1XW
HC7EE to K8LJG
HD1A to WA4QMQ
HH2VP to N4XR
HL9UG to N4CPR
HM2JN to JA1HBC
HS5AID to AG6D
HZ1AB to K8PYD
J6LOU to KA4BOT
J28AS to I8JN
J73CB to J7DAO
JY5MB to WA4HNL
K7CA/HC1 *NOT* to WA4QMQ
KC6CV to KB0AJ
KC6MJ to W7PHO
KC6MM *NOT* to W7OM
KG4KK to N6AWD
KG4WC to K4EXA
KG4WM to WB1COR
OD5JP to DJ9ZB
OD5MR to HB9ARV
OX3CO to WB3KGY
P29LB to WB2FLB
ST2FF/ST0 to OH2MM
SV0AO to KA2FRP
SV0BC to WB7NCF
T3LA to W7OK
TG9XGV to K4CLA
TL8JM to W5RU
TU2IN to K3HBP
TU4AT to HB9BTQ
TU4AW to K5TC
TU4FOC to F3OA
TU4RV to G5RV
TZ4AQS to ON6BC
TZ6ET to DL7SS
UR2LH to N6HR
UR2QD to N6HR
UR2SQ to N6HR
VP2AK to K4PJ
VP2EAL to WA7IRD
VP2JAX to JA2VUP
VP2KAQ to N0TG
VP2MFI to K1RIF
VP2MEZ to WD0FAZ
VP2MFU to N7ADY
VP2SAH to WB2AMO
VP2VFM to WA7IRD
VP8QG to WA4JQS
VQ9DM to K1BZ
VQ9JP to WB0OEF
VQ9JW to KB5MZ
VQ9TT to K5SMZ
VQ9WE to WA6IJZ
VS5KV to N2OO
VS6JR to WA4QMQ
W1DDV/C6A to N7YL
WA4UAZ/HC1 to WA4QMQ
WA4ETT/HC1 to WA4QMQ
WA4ETT/HC7 to WA4QMQ
WD4RCO/VP2K to WA7IRD
WD4RCO/8R1 to WA7IRD
XT2AW to W2HAZ
YB1ADU to DK4XJ
YB7ACZ to AG5X
ZD8TC to N2CW
ZK1BD to ZL1SZ
ZK1CF to ZL2AQF
ZL3MA/c to WB8WMS
ZL3QN to W4KGH
ZS3HL to WA1ZXF
3A0NY to ON5NY
3B6CD to 3B8CF
3D2ER to W5RBO
4A4MDX to XE1OX
4K1A to UQ2OC
4L3Z to UK3AAO
5N0RMJ to W4FRU
5W1CR *NOT* to K1JDJ
5W1CR to ZL1BCG
5W1CS to K5YY
6O0DX to I2YAE
6T1YP to OH2BH
9G1HZ to WA2MRZ
9G1RF to WA1ZFS
9M6MU to N2CW
9Q5DD to W0CIK
9Q5GB to W7KTI
9X5MH to DL8OA
9Y4NP to W3HNK
9Y4XX to N6AA
*K7VAY - Box 76, APO New York 09611

QSL Manager Volunteers

AA4NC
KA2EYH
N7RO
W7BUN

Dave Gardner, K6LPL, visited the shack of Willis Propst, K7RS. From left to right are: K6LPL; Joe Iwakura, N2AIR/7; Bill Bennett, W7PHO; and K7RS. Dave's operation from the South Pacific gave many another one while generating a lot of news. (Photo via K7RS)

Tip

Don't miss John's column next month as it contains an important DX announcement.

73 and good DX, Rod, W7OM

Here's a glimpse at some new technology that will make our shrinking equipment even smaller while doing more and more.

Touch Tone® Decoding With A Single IC

BY MARTIN BRADLEY WEINSTEIN*, WB8LBV

Now there's a single 22-pin CMOS IC that does the full job of separating out, recognizing and decoding DTMF signals in the presence of other communications (talking, other tones, etc.). This chip alone can do the whole job (assisted by a standard 3.579545 MHz color burst crystal, a 10 Meg resistor, 2 or 3 .01 caps and a *clean,* noise-free 12 v.d.c. power source) thanks to some unique technology. A sophisticated trick called *switched-capacitor filtering* allows this monolithic IC to provide active filters with highly accurate and stable center frequency, Q, gain and bandwidth. As CMOS ICs go it isn't cheap—but at around $100 it's quite an excellent value.

This marvelous IC is the SSI 201 Integrated DTMF Receiver from Silicon Systems Incorporated (14351 Myford Road, Tustin, California 92680), a young West Coast manufacturer of custom ICs using this advanced CMOS switched-capacitor analog and digital technology. The SSI-201 is the first and most exciting of their openly available products. (This is the company, by the way, that manufactures a revolutionary new unlimited-vocabulary phonetic speech synthesizer IC for Votrax (R) Division Federal Screw Works, and we look to them for many new and upcoming breakthroughs in

*c/o CQ Magazine

® Touch-Tone is a registered trademark of AT&T for its dual-tone multi-frequency (DTMF) signaling system.

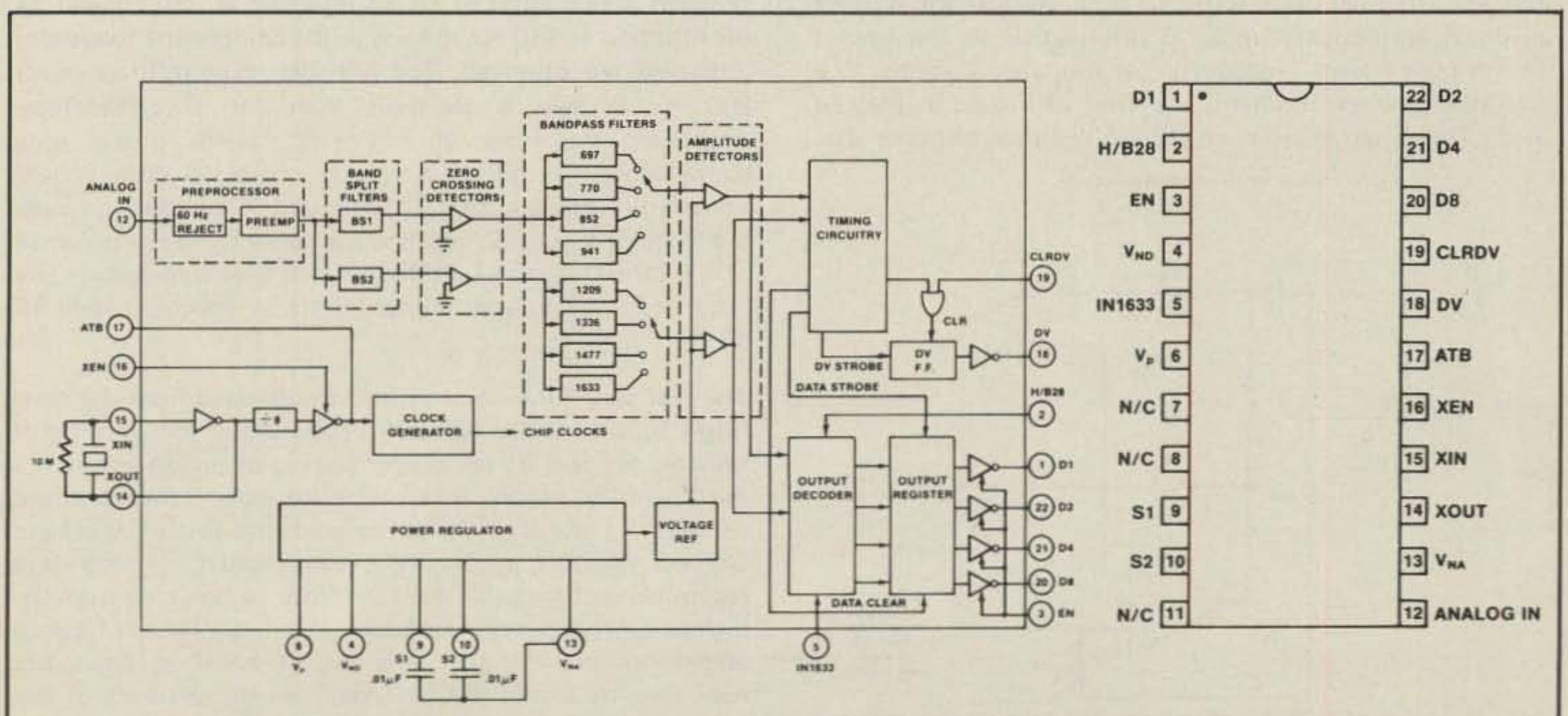


Fig. 1-The SSI 210 block diagram on the left and the top view of the 210 pin out on the right.

what electronics can perform).

Follow us through the block diagram for an idea of how this amazing IC does its thing.

The analog input is designed for direct connection in most telephone applications, but for foolproof use in amateur applications a .01 cap in series with it provides both a.c. signal coupling and d.c. isolation. The *pre-processor* section rejects power hum (60 Hz) and dial tone (350 Hz and 440 Hz) frequencies and provides pre-emphasis to the higher part of the audio spectrum (typically attenuated

	Hexadecimal				Binary Coded 2 of 8			
Digit	D8	D4	D2	D1	D8	D4	D2	D1
1	0	0	0	1	0	0	0	0
2	0	0	1	0	0	0	0	1
3	0	0	1	1	0	0	1	0
4	0	1	0	0	0	1	0	0
5	0	1	0	1	0	1	0	1
6	0	1	1	0	0	1	1	0
7	0	1	1	1	1	0	0	0
8	1	0	0	0	1	0	0	1
9	1	0	0	1	1	0	1	0
0	1	0	1	0	1	1	0	1
*	1	0	1	1	1	1	0	0
#	1	1	0	0	1	1	1	0
A	1	1	0	1	0	0	1	1
B	1	1	1	0	0	1	1	1
C	1	1	1	1	1	0	1	1
D	0	0	0	0	1	1	1	1

Fig. 2- The Hex/Bin of 8 code.

	Col 0	Col 1	Col 2	Col 3
Row 0	1	2	3	A
Row 1	4	5	6	B
Row 2	7	8	9	C
Row 3	*	0	#	D

Note: Column 3 is for special applications and is not normally used in telephone dialing.

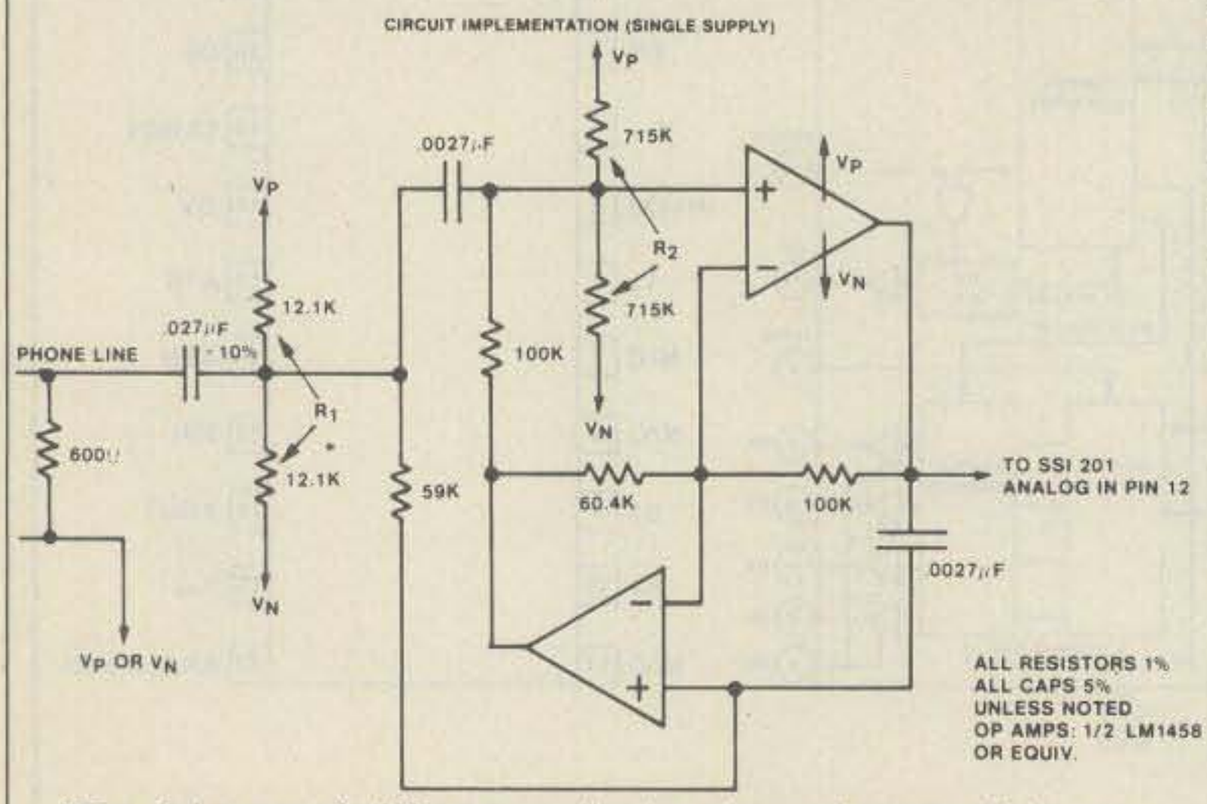
Fig. 3- The DTMF dialing matrix.

Low Group f_o	High Group f_o
Row 0 = 697 Hz	Column 0 = 1209 Hz
Row 1 = 770 Hz	Column 1 = 1336 Hz
Row 2 = 852 Hz	Column 2 = 1477 Hz
Row 3 = 941 Hz	Column 3 = 1633 Hz

Fig. 4- Detection frequencies.

Dial Tone Rejection Requirements

The SSI 201 tolerates precise dial tone (350 Hz and 440 Hz at equal amplitudes) up to 0 dB relative to the lowest Touch-Tone® level*—adequate for most applications. In a high dial tone environment, the filter of Figure 5 may be used. This filter exhibits an elliptic highpass response that provides a minimum of 18 dB rejection at 350 Hz and 24 dB rejection at 440 Hz so long as the component tolerances indicated are observed. The SSI 201 on-chip filters reject 350 Hz at least 6 dB more than 440 Hz. Therefore, employing the filter of Figure 5 yields a dial tone tolerance of +24 dB. In a system where -24 dBm Touch-Tones® are present, the SSI 201 used in conjunction with the filter of Figure 5 will operate correctly in the presence of a 0 dBm dial tone (-3 dBm per dial tone frequency). The filter of Figure 5 also rejects 60 Hz by approximately 30 dB.



*For dial tones of different amplitudes, the total power of the two dial tone frequencies must be no more than 0 dB relative to the lowest amplitude Touch-Tone.

Fig. 5- The dial tone rejection filter.

The dial tone filter circuit is shown operated from the same single supply as the SSI 201 necessitating the splitting of resistors R_1 and R_2 for proper biasing of the op amps. If a dual polarity supply is available to power the op amps, resistors R_1 and R_2 may be replaced with single 5.9 kΩ and 357 kΩ resistors, respectively, connected to ground. It is recommended that the dial tone filter be powered from the highest voltage supply available (within the limits of the op amps) to provide the large signal handling capability necessary to accept Touch-Tones® in the presence of dial tone, 60 Hz, and any interference. Input coupling requirements to the SSI 201 must be observed as mentioned earlier in this application note.

by telephone circuits); signals above 6000 Hz are filtered out.

The preprocessor output goes to bandstop (not bandpass, as you might expect) filters that separate the two tone groups. In DTMF, you see, one of four tones in each of two groups must be present for a valid output. The Low Group, referred to as *Rows* 0, 1, 2 and 3, consists of tones at 697, 770, 852 and 941 Hertz; the High Group, Columns 0, 1, 2 and 3, includes tones at 1209, 1336, 1477 and 1633 Hz. Column 3 (1633 Hz) combination tones, which are usually labelled A, B, C and D, are not normally used in dialing, but are used in a number of special applications, and are available for various amateur uses, such as repeater autopatch control.

A portion of the opposite tone group is purposely permitted through the band splitting filters to help establish in *vs* out of band tone-*vs*-signal levels. The band-split signals then go to zero crossing detectors. These have very high gain for signals above a specified minimum level, and perform an a.g.c. function of sorts to deliver a constant amplitude output whenever at least this minimum signal level is present.

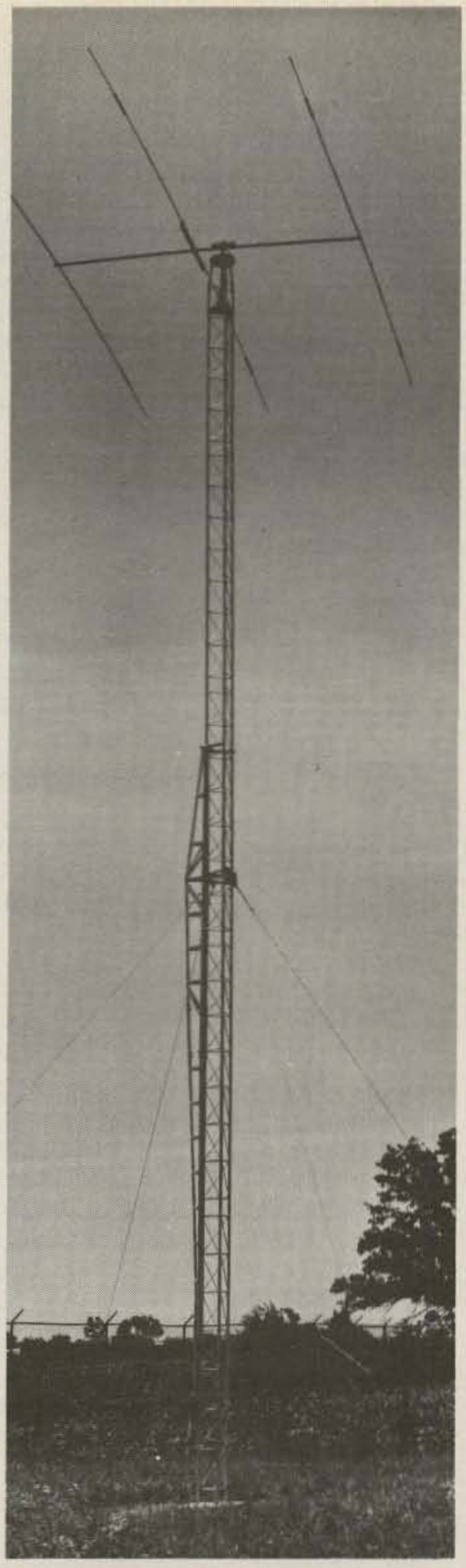
This squared signal in each tone group is simultaneously inputted to four bandpass filters in each group, their responses tailored to produce sufficient amplitude to trigger the following amplitude detector only when the zero-crossing frequency is withing the tone frequency tolerance. On-chip timing circuitry clocks each of two amplitude detectors through its corresponding group of four tone filters sequentially, with "hits" driving the output decoder circuitry.

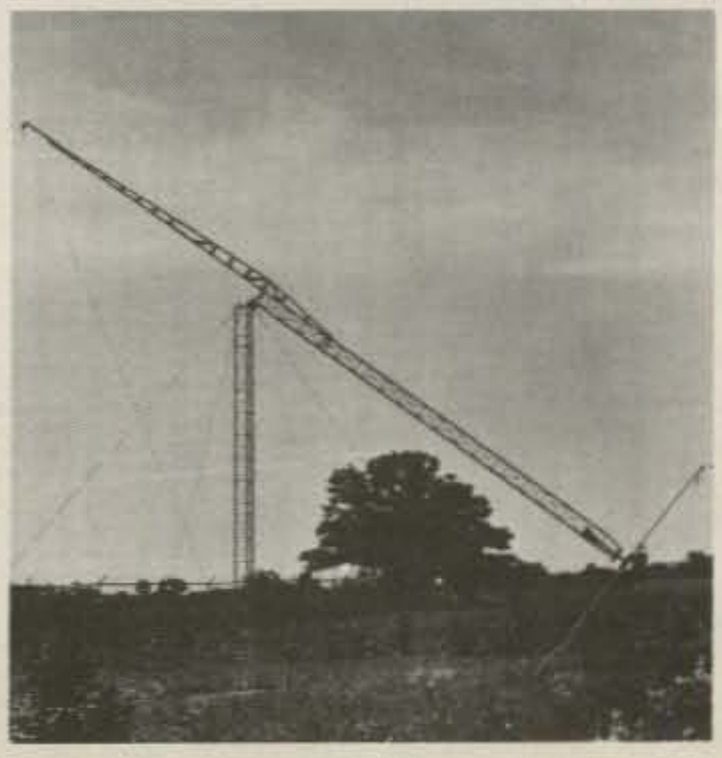
A "data valid" (DV) output pin provides a high-going strobe whenever a valid tone group has been detected. An "enable" pin (EN) provides for CMOS-compatible outputs when high, or Tri-States the outputs when it's driven low. The CMOS outputs can be interfaced through a 4049B or 4050B to drive 5V TTL or MOS logic.

The IN1633 pin (no, this is not a diode designation) inhibits detection of tone pairs containing the 1633 Hz (Column 3) tone when it's tied high; a low logic level at the IN1633 input permits full 16-digit decoding.

The H/B28 (more properly, H / $\overline{B28}$) input formats the output in Hexadecimal or in binary 2-of-8 codes—hex when driven high, binary 2-of-8 when driven low. See the table for how these coding schemes differ. Basically, the "B28" scheme uses the two high bits to address the dialing matrix *Row*, the two low bits to address the dialing matrix *Column*.

The CLRDV can be raised high by external logic to clear the DV flag





strobe, if desired, or the SSI-201 will do this automatically when a valid pause is detected.

The SSI-201 can detect a pause in 25-40 milliseconds, a valid tone (within 1½-3% of nominal frequency) pair in 20-40 milliseconds. That means an 11-digit long distance sequence can be decoded worst-case at a transmission length of about 4/5ths of a second. In data terms, that's 25 4-bit bytes per second.

There is additional information on this extraordinary IC direct from its manufacturer. Ask for the Data Sheet and Application Note on the SSI-201 Integrated Monolithic Dual-Tone Multifrequency (DTMF) Receiver. Write to: Literature Department, Silicon Systems Incorporated, 14351 Myford Road, Tustin, California 92680 (or circle number 100 on the reader service card and mention *CQ*. If you want to actually get your hands on one, you're

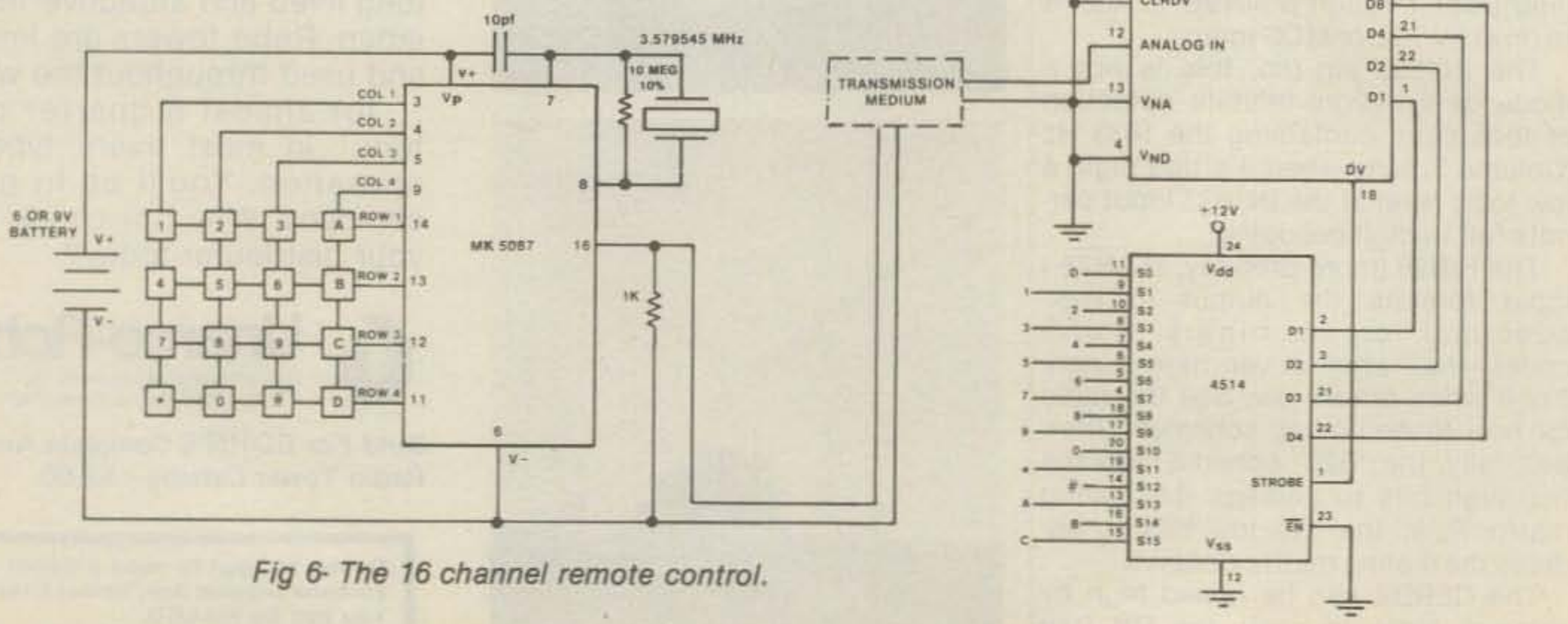


Fig 6- The 16 channel remote control.

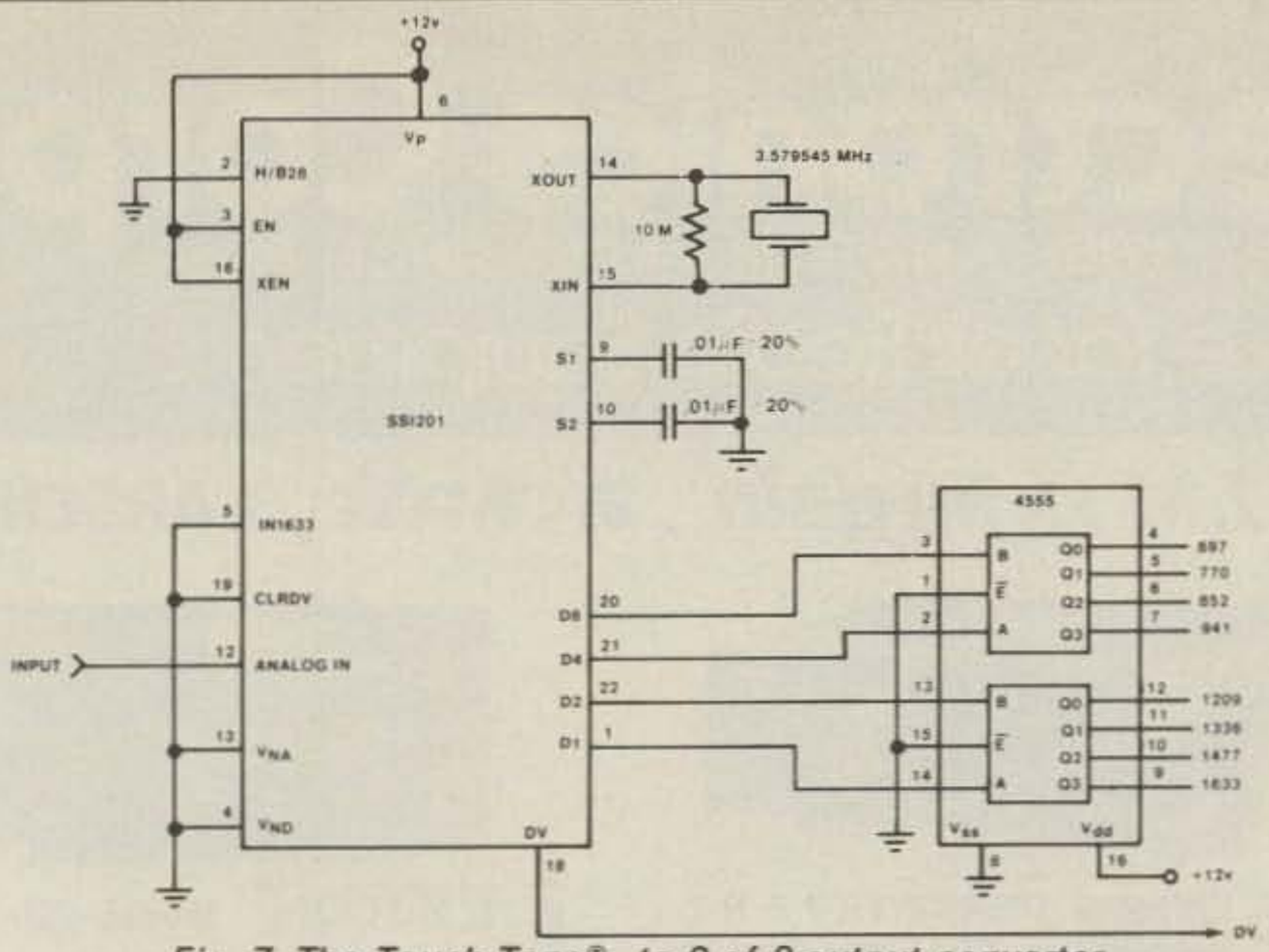


Fig. 7- The Touch-Tone® to 2 of 8 output converter.

going to have to realize that manufacturers find filling small orders expensive, and have to price small quantities to reflect that expense. The SSI-201 costs $95 each when you buy 1 or 2, $80 each when you buy 3 to 24, $61 dollars each when you buy 25 or more. Again, mention *CQ*. Repeater groups, for example, recognize that the SSI-201 can help yield simpler, more foolproof and less expensive DTMF decoding.

We've shown some of the application note circuits and other basic information on the chip here. If you do something with it, share it with other *CQ* readers by dropping us anything from a few words to the full story.

Acknowledgement

The illustrations used are from the SSI-201 application notes and data sheets.

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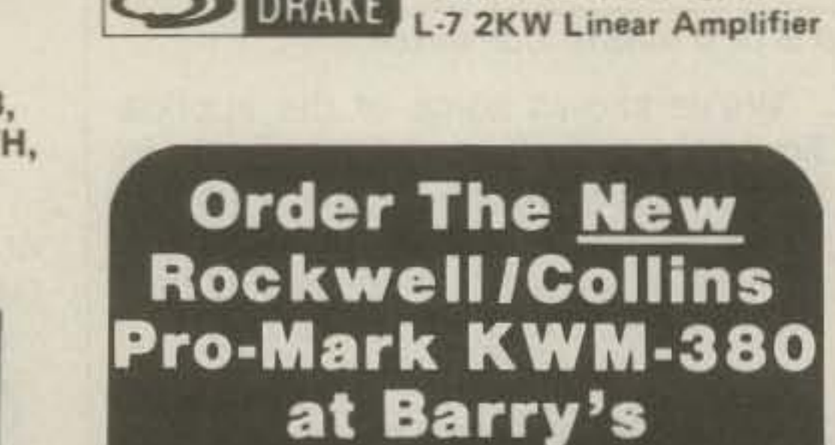

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Not everyone can afford the cost of putting together an amateur radio station. For those who can't, here's how to have a station for only $25, plus some junkbox parts and a little know-how.

How To Get A Start In Amateur Radio For Only $25

BY GERALD SAMKOFSKY, N4ZB

Florida, of course, is the nation's retirement state. Retirement for those who cannot find a hobby to occupy idle hours is often hell. Amateur radio has fulfilled the hobby needs of many elderly citizens (about 90% of the Suncoast A.R.C. is over 65 years old). This hobby with its many facets also allows many people to patch into their relatives in areas up "north," as well as find involvement in handling traffic, helping out during emergencies, and so forth. Many amateur shacks sport sophisticated gear, reflecting an affluent society. Yet there are those new to amateur radio who view today's equipment costs with dread. Even used modern gear can often be beyond the reach of some amateurs.

"Simon," a 69-year-old neighbor, moved to Florida four years ago. After three years of "idling," he visited the club shack one day and was fascinated listening to conversations from many areas. Although he was at first hesitant to join our ranks (because of age, lack of technical skills, and possible cost of equipment), I overruled all these objections and urged him to start studying. Recently he passed his Novice exam. But with this achievement also emerged one problem: Simon had practically no funds to purchase even a meager layout! Living largely on Social Security, his budget allowed little for other than life's staples—to be exact, $25 for amateur equipment!

Now back in the "good old days," $25 could well have covered the cost of a basic station. But in 1980?? Yet I urged Simon not to despair; somehow it could be done.

Early this year I attended the Orlando Hamfest. Checking the various flea-market tables, I spied a venerable Hallicrafter S-40 receiver. Its owner quickly assured me that this was not in working order. Price was $10. Now there was only $15 left.

The S40 was "laid bare" in the garage workshop. With Simon on hand to learn the mysteries of radio repair, I diagnosed the various event maladies. From my junkbox various bypass caps replaced dried-out units, ditto a speaker with crumbling cone, low-emission tubes, then I did a thorough alignment. Finally, I resprayed the cabinet with some black paint left over from an earlier job.

Next I asked all local amateurs if anyone had a transmitter. An equally venerable Eico 720 (90 watt c.w. transmitter) was located in another garage workshop. Priced at $5 it was a buy, but again the unit was sold as is. With Simon looking on, the transmitter was laid bare. Filter caps were leaking wax and were replaced with a pair taken from an amplifier chassis, poorly soldered joints (after all, this started as a kit) were cleaned up, an open r.f. choke was replaced, and finally, a serviceable 6146 emerged from my inexhaustible junkbox, along with 2 crystals, unused for 16 years in this age of v.f.o.'s. The entire unit was carefully cleaned with a solution of oil and kerosene and began to resemble its earlier look. $10 more to go, but still no antenna or accessories!!

An ad in our "Green Sheet" (flea-market offerings) indicated a CB groundplane antenna plus coax for $5 "to be removed from premises." This turned out to include an 18-foot vertical section as well as 50 feet of RG58U. But a CB groundplane for amateur use?

The radials were removed (to be used for a later project). We then purchased a used B&W #3029 loading coil, price $2. The vertical section of the CB antenna was fastened to a 5′ × 4″ × 1″ piece of scrap lumber with the coil base loading same. Taps were made in the loading coil so that we could achieve all band coverage. The antenna was then mounted atop Simon's XYL's clothespole about 6′ above ground (so Simon could adjust taps for band change easily). An efficient ground system used in conjunction with the vertical was easily installed in our damp Florida soil using some 50 feet of surplus wire from the junkbox. The last $3 went for a log and a Japanese key. A dummy load was made using a short piece of coax along with a 75-watt light bulb.

For $25 plus some junkbox parts we had accomplished what we had deemed impossible. True, I had added my repair know-how, but Simon's gratitude was worth every minute. Now, can someone better this record??

The author will gladly help anyone with a low budget to get started. S.a.s.e. please.

*1420 Mount Vernon Drive, Holiday, FL 33590

No - 79 - 80

Earlier this year CQ surveyed a statistically random selection of amateurs to determine the particular interests of amateurs at large. The results yield some interesting data.

BY DON WATERS

The technology and capabilities of amateur radio have made great advances in recent years. The equipment available to today's amateur and the things he can do with it would amaze the amateurs of an earlier time. Satellite communications, slow scan TV and two meter f.m. repeaters were all essentially unknown in the years before World War II. Modern amateurs are routinely using techniques yesterday's amateur could only dream of.

Yet the traditional amateur pursuits—a rag chew with a new or old friend, casual DX contacts, tinkering with gear, building projects—still are the principal interests of most hams. The special interests, like DX, contests, TV, radioteletype, Oscar satellites, all have their avid followers, but in every case they are a distinct minority.

That the traditional basics of amateur radio are indeed alive and well is perhaps the major conclusion to be drawn from the survey conducted among a cross section of all U.S. amateurs by *CQ* earlier this year. A comprehensive questionnaire was mailed to a statistically random selection of amateurs listed in the 1980 Call Book. More than 1200 responded—26% of those receiving questionnaires. The survey was conducted anonymously; that is, *CQ* was not identified as the sponsor in order to assure that the opinions expressed would be as objective as possible. The mailing was made in April 1980, and on June 15 all replies received were turned over to the Talcott Mountain Science Center in Avon, Connecticut for computer processing.

The survey was undertaken by *CQ* to profile today's radio amateur, to identify his (and her) present interests, activities and concerns, and to assess current readership patterns among the amateur magazines. The results will be of great help in editorial planning at *CQ*, helping the staff continue to make *CQ* the magazine for today's active amateur.

It was no surprise, of course, to discover that our survey respondents have very definite opinions about their hobby. They not only answered questions clearly and often forcefully, but many added sometimes lengthy comments to amplify their answers and to bring out additional points. These respondents represented all segments of the amateur population—Novices to Extras, teenagers to octogenarians, easterners, mid-westerners, southerners and westerners, electronic engineers, physicians, clergymen and students, men and women. The one thing they all have in common is a deep interest in amateur radio.

Today's amateurs' predominant interest in the traditional basics was overwhelmingly evident. Almost half of all respondents indicated that their number one interest in amateur radio is general rather than specific, and is in casual contacts and rag chewing. More than two thirds listed these among their interests even though their primary interest was one of the specialties. One fifth of the respondents said building, experimenting or working on gear is their number one interest; just under half said this is among their other interests. Almost two thirds use c.w. when they operate, almost as many as the three quarters who use phone. Half of those responding operate mobile

**Public Relations Consultant, CQ*

Results of the 1980 CQ Survey

rigs. More amateurs spend time just listening on the air—and they spend a lot more time at it—than any other activity except reading about amateur radio. Just over three quarters reported spending time actually operating on the air during the past seven days.

The number one interest of our respondents who pursue a specialty was as follows (in descending order): chasing DX (11%), public service (4%), handling traffic (2%), keeping schedules (2%), RTTY (2%), award hunting (1%), helping new amateurs (1%), SSTV, ATV or FAX (1%), contest operating (1%), and club affairs, Oscar satellites, collecting—all less than 1% of those responding.

Listing of these activities as other or secondary interests was as follows: helping new amateurs (28%), chasing DX (22%), public service (21%), club affairs (17%), contest operating (15%), handling traffic (13%), QRP (13%), RTTY (11%), keeping schedules (10%), Oscar satellites (10%), award hunting (8%), SSTV, ATV or FAX (8%), and collecting (4%).

Almost nine out of ten respondents (89%) said they spent some time during the past seven days reading about amateur radio—83% of them five hours or less. A slightly smaller number (86%) reported spending some time just listening—30% of them six hours or more. Three quarters (77%) spent some time actually operating on the air—60% of them five hours or less. Just over two thirds (68%) spent some time building, experimenting or working on gear—42% of them five hours or less. During the previous seven days, club meetings attracted 42% of those responding, hamfests or conventions 38%.

How do amateurs today operate? According to our survey, 74% use phone, 62% use c.w. and 61% two-meter f.m.; 61% operate in the h.f. bands, 27% in the v.h.f./u.h.f. bands; 74% operate from a home station, 8% from another fixed location, and 51% mobile. Most hams, of course, gave more than one answer to these questions. That is, they operate on both c.w. and phone, home station and mobile, etc.

Their first interest in amateur radio came from another ham according to 63% of our respondents, from a book or magazine article for 10%, from CB radio for 10%, from a radio club for 5% and from a news story for 2%.

One quarter of the amateurs surveyed reported another ham in the family—9% a wife or husband, 8% a son or daughter, and 13% another relative—parent, brother, sister or in-law.

CB has become both a springboard and an adjunct to amateur radio—44% of the amateurs responding to the survey reported that they presently own or operate a CB radio.

Amateurs also pursue other hobbies—41% of them photography, 34% hunting or fishing, 30% hiking or camping, 27% travel, 24% active sports, 21% computers, 19% spectator sports, 16% flying, and 14% collecting, according to survey responses.

The amateur market place is clearly active—nine out of ten respondents (92%) reported making some amateur radio related purchase during the past twelve months, most more than one purchase. Just about the same number (90%) expect to make purchases during the next twelve months. Actual purchases reported for the past year were books and magazines (87%), components and supplies (78%), accessories (71%), antennas and rotors (58%), h.f. equipment (57%), v.h.f. equipment (55%), and other (59%). For h.f. equipment, 17% spent between $100 and $500, 12% between $500 and $1000, and 7% more than $1000. For v.h.f. equipment, 28% spent between $100 and $500, 5% between $500 and $1000, and 1% more than $1000. For antennas and rotors, 25% spent less than $100, 19% between $100 and $500, 2% between $500 and $1000, and another 2% more than $1000.

Nine out of ten U.S. amateurs (90%), according to our survey, see at least one amateur publication regularly, many of them more than one. One in five (19%) is a regular *CQ* reader, and about half of these (46%) say *CQ* always has a lot or something of interest to them. A frequent comment about some of the amateur magazines was that they are too technical or too specialized; less than half of the readers in most cases reported that their favorite magazine impressed them as being aimed at their level of interest, knowledge or experience.

There are, it seems to us, some very clear conclusions to be drawn from this survey. A large segment of the amateur population does not feel that the amateur publications really address their needs and interests, the technical level is often too sophisticated, much of the editorial content seems addressed to those amateurs with specialized interests and too little to the generalists who in fact are a much larger audience. Most amateurs as we have seen are interested in the basics of amateur radio. They want to know about new technical developments, new equipment, new techniques, about DX contests, traffic and awards, but in terms with which they feel comfortable. Most of all they want more regular coverage of the basic and ordinary activities in which they are primarily interested. This assessment is very much in accord with what the new owners of *CQ* see as their mission and their opportunity.

CQ's editors are still in the process of analyzing the results of the 1980 Survey in greater detail and greater depth as the basis for future planning. These results will provide valuable guidance in pursuing *CQ*'s goal: to produce a magazine unique in the amateur radio field, a magazine that will truly continue to be the journal for today's active amateur, the magazine that every amateur will feel is created specifically for him and for her.

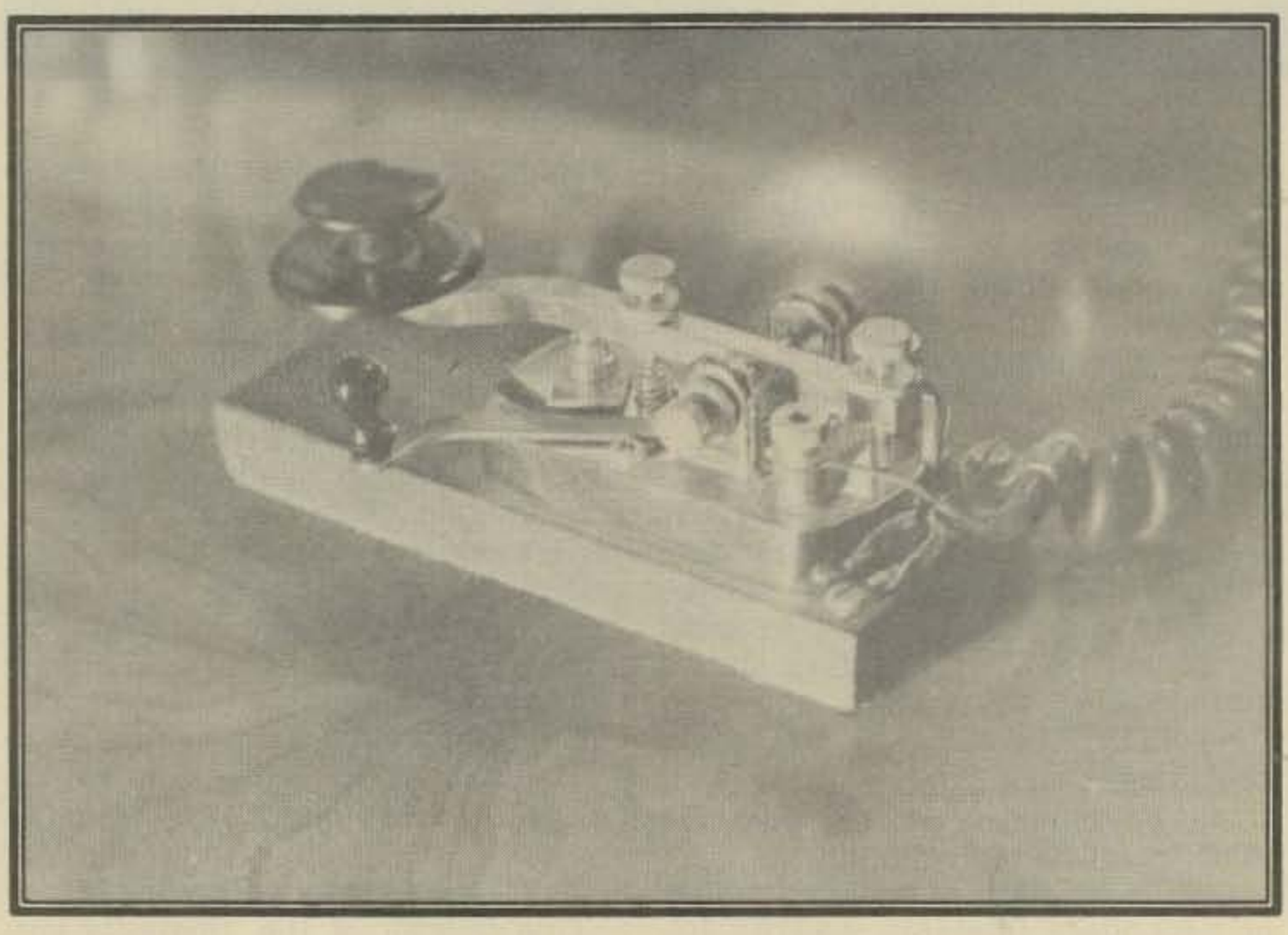
Sometimes there's an easy solution to a problem. WA2SLK offers a novel solution to a problem faced by the casual c.w. operator.

The Key To VOXless C.W.

BY CHARLES BURKE*, WA2SLK

While the general trend has been towards developing instant break-in for c.w. operation, it has been found that there are several very good reasons for working in the opposite direction. In many sets the c.w. break-in is an integral part of the VOX network. This is the case with my Yaesu FT 101B, as well as with many other makes and models. The integration of the phone VOX and the c.w. break-in can and does lead to problems for those who desire to work phone and c.w. alternately.

Specifically, the problems involve trying to do two things with the same circuit. To operate c.w. you must put the MOX/PTT/VOX switch into the VOX position. This then activates the send/receive relay the instant the key is closed. However, while the set is in the VOX mode the microphone is still attached to the rig. This being the case, any loud sounds in the shack cause the relay to be tripped, and this can happen at the most critical moments. Thus, it was necessary to unplug the microphone or install some type of external cutoff switch. Another problem was found in trying to select a VOX relay delay setting. Many of these circuits have a delay control which allows you the option of selecting a delay time that best fits your needs. When using VOX on phone, I found it was good to have a short time, but on c.w. it was found that a long delay was ideal. The reason for liking the long delay while working c.w. stems from the fact that the moment the set switched back into the receive mode the room was suddenly filled with all of the background noise, QRN, QRM, etc., that the set was picking up. This was very annoying and distracting, especially when trying to concentrate on a thought or sentence while transmitting.



The modified Nye telegraph key as described in the text.

After a great deal of thought, it occurred to me that the solution might be found in taking a giant step backward. Instead of seeking instant break-in, why not go for no break-in at all! After looking at the schematic of the rig, it was found that an external jack had been provided for tripping the send/receive relay. Further, both the relay and the key activated their respective circuits by completing their circuits to ground. This being the case, I could then set the MOX/PTT/VOX switch to PTT and ignore the VOX setting altogether. Now, the next problem was how to trip the relay. This, too, was resolved by taking a giant step backward.

Originally, a switch was placed on a key so that the simple circuit could be operated in either a send or receive mode. The key that I had purchased was equipped with such a switch. The key is a Nye model 114-321-003 that came with a switch and was chrome plated. The reason for buying it was not only because of its mechanical properties, but also because it looked fancy. Little did I realize that this fancy attachment would provide the solution to this problem.

After examining the key carefully, it was found that the entire thing easily could be taken apart. Further study revealed that with a few simple modifications the switch and the key could be isolated electrically from one another with a minimum of effort. Since both the relay and the key cir-

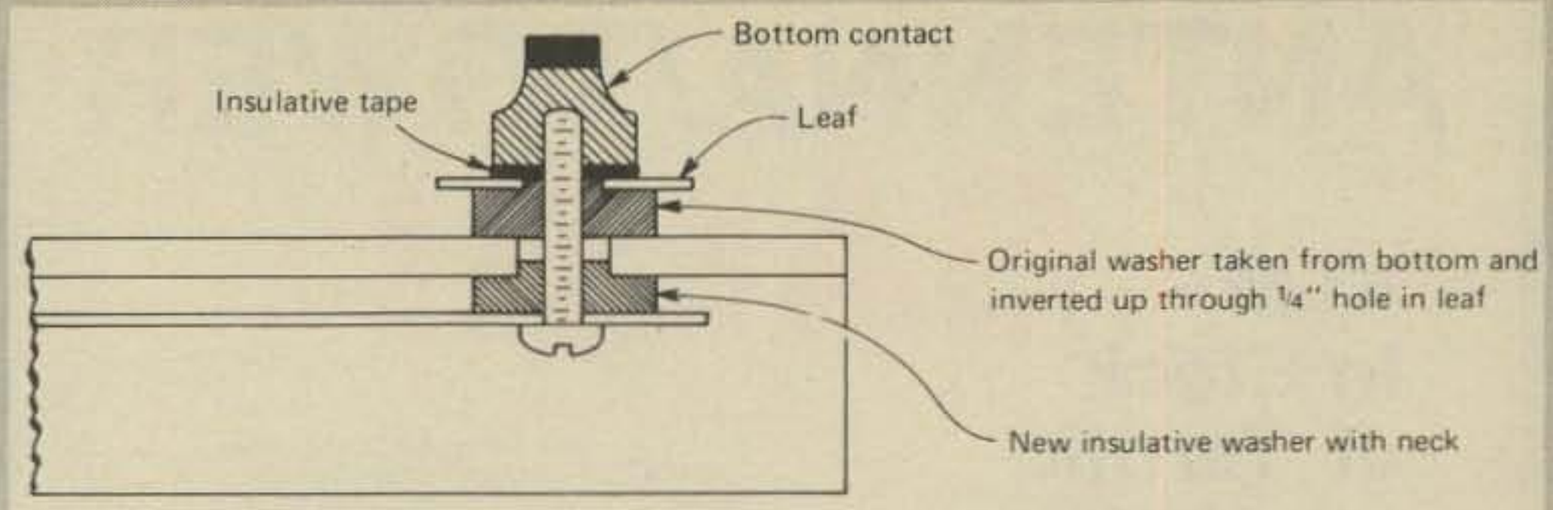
*RR1 Box 164A, Georgia-Tavern Rd., Farmingdale, N.J. 07727

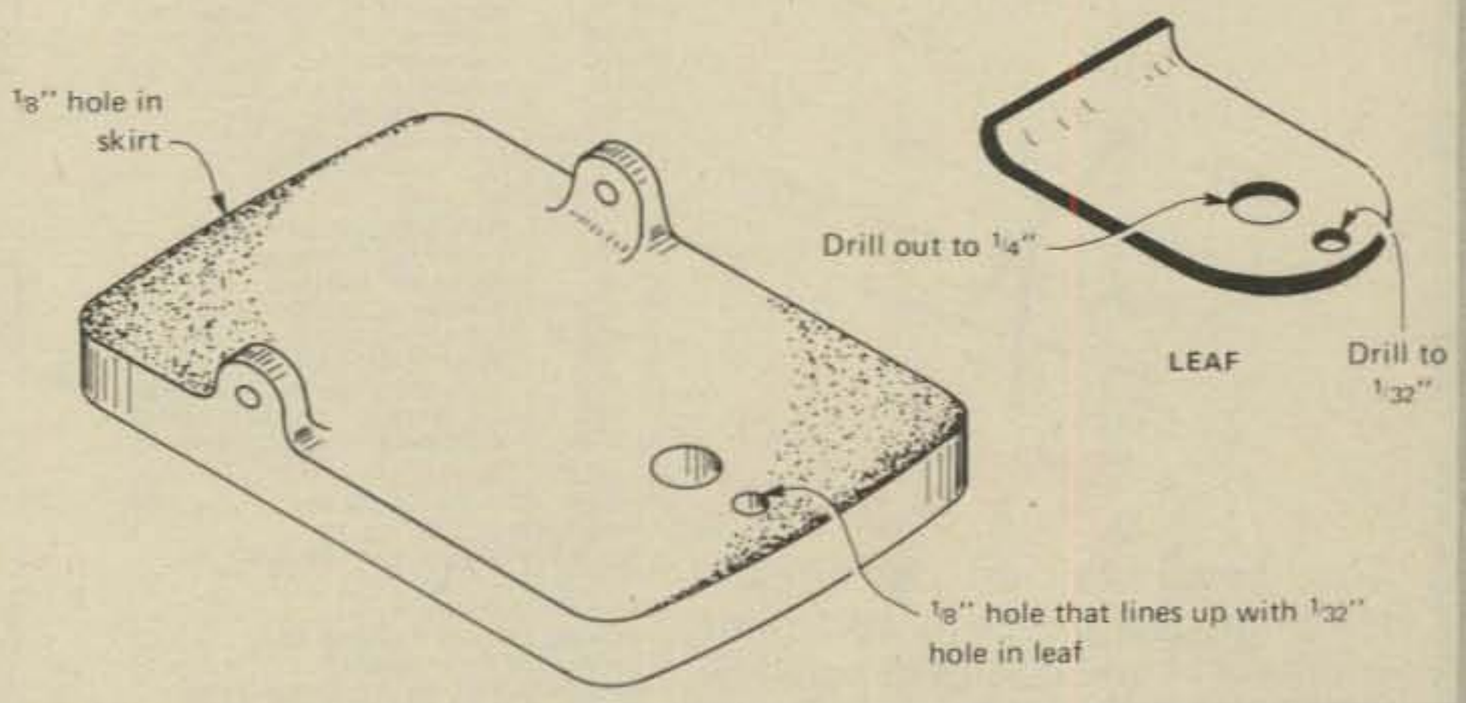
cuits required a common ground to activate them, the modifications were even easier to make. What it boiled down to was to simply isolate the two using a few pieces of insulative tape.

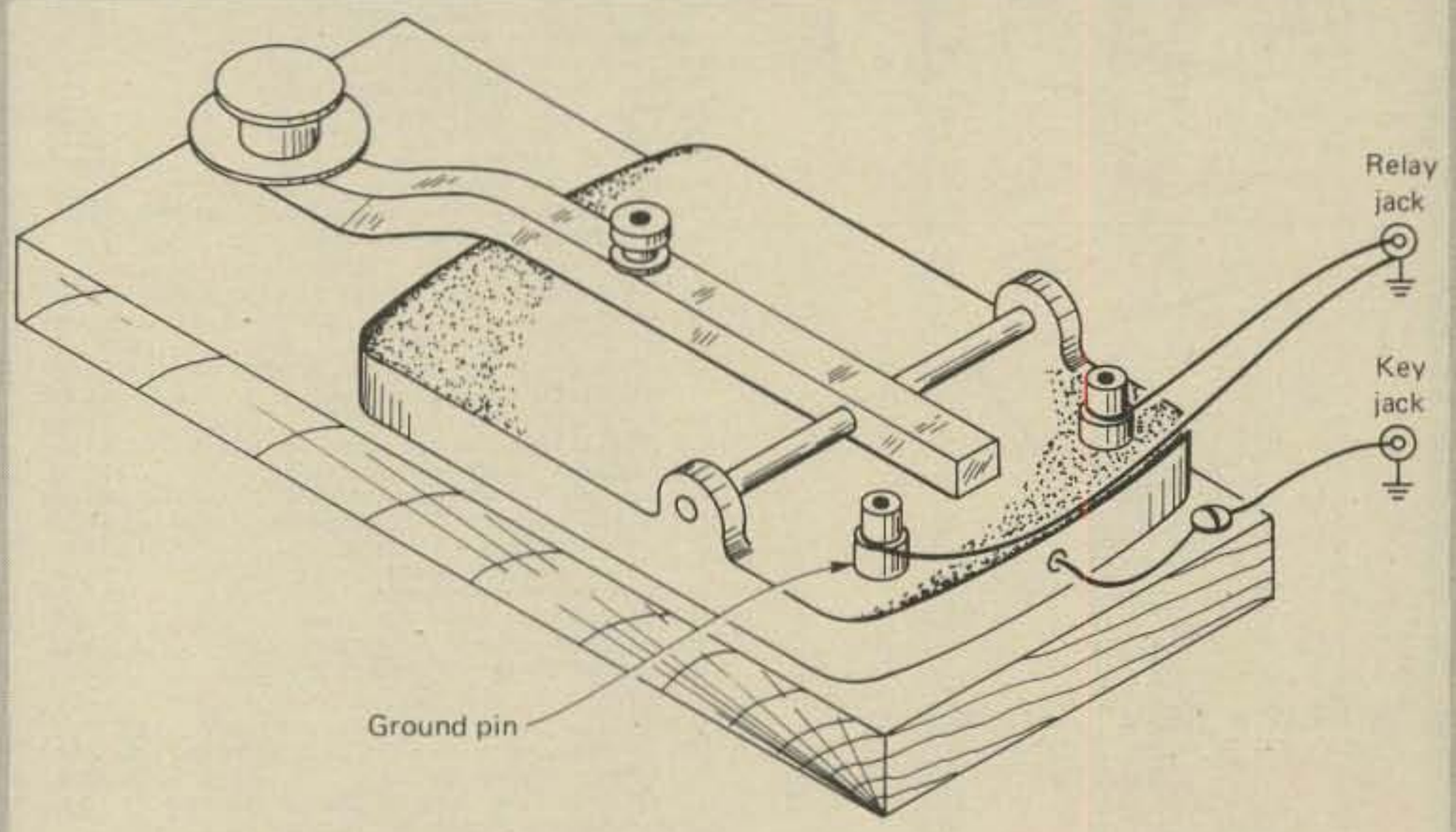
The exact steps involved in this procedure were the following:

1. Remove the screw from the bottom contact and separate the pieces.
2. Drill out the hole in the leaf to ¼" diameter.
3. Cut a piece of plastic insulative tape and press it to the bottom of the lower contact. The excess should be trimmed away and a hole cut for the screw to pass through.
4. Take the heavy insulative washer that was originally in the base and invert it up through the leaf. The spacing on this washer is close to that of the switch level and makes the modification that much easier.
5. Add a new insulative washer with a neck to the position where the original washer had been. The size is not critical, and you might find that you also will have to possibly obtain a different bolt to make up the difference in length. The entire lower contact can now be reassembled, and if done properly, the bottom contact and the leaf are isolated from one another.
6. Turn the leaf slightly so that it will face the switch lever at a 90° angle.
7. Drill a 1/32" dia. hole down through the leaf and base as shown in the sketch.
8. Remove the bottom contact and drill out the 1/32" dia. hole in the base to 1/8".
9. Drill another 1/8" dia. hole in the center front skirt of the base.
10. Take a piece of insulated wire and solder one end into the hole in the leaf, pass it down through the base and then out the hole in the front skirt.
11. Reassemble the entire key onto the base, but first notice which terminal is ground.
12. Reattach the key to the set and run a third wire from the "hot" terminal on the relay jack to the wire that is attached to the leaf.

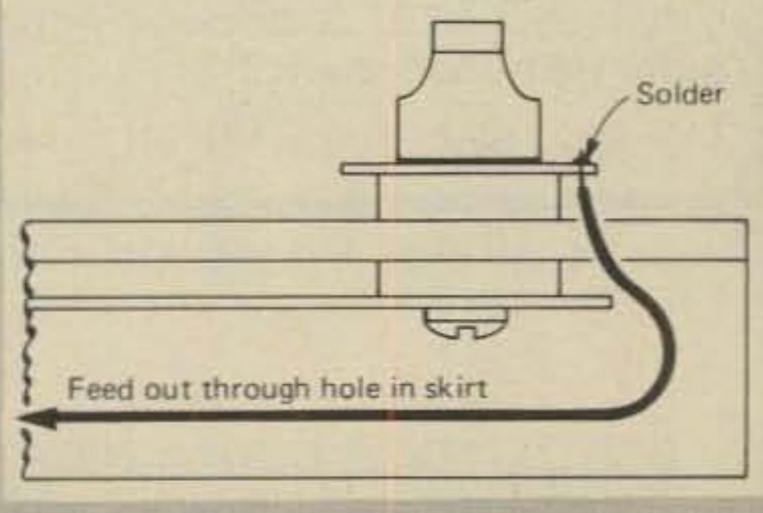
Once the alterations and wiring have been completed, you are ready for action. Just place the MOX/PTT/VOX switch into the PTT position and leave the microphone attached to the set. When you want to use phone, just key the microphone and away you go. When you want to use c.w., just flick the switch lever closed and the relay will close to the send mode. Not only will you find all of the aforementioned problem gone, but you also will have the fun of working c.w. the same way the old masters once did. Going backward can sometimes mean going forward and this is a good case in point.







The simple modifications to the Nye key for simple c.w. operation.



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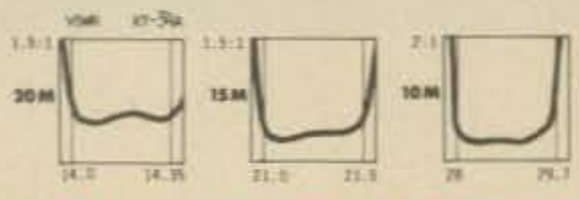

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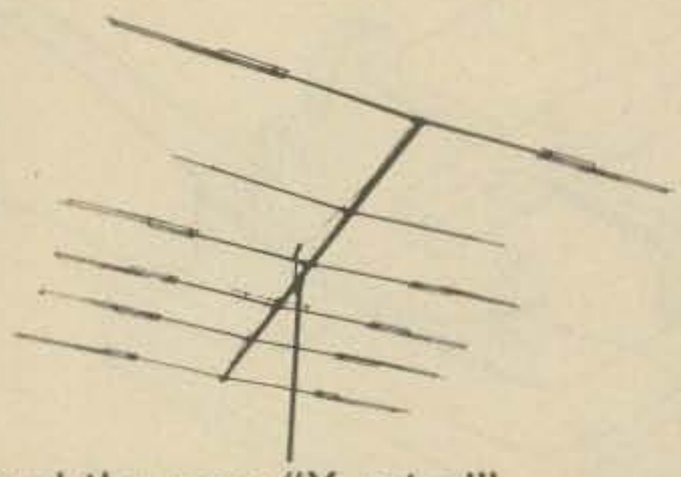

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a monthly feature by
A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

Here is the November "Story of the Month", courtesy of Ken:

Kenneth D. Walker, W1FAB
All Counties #266 1-22-80

"I was born a genuine Maine-iac June 27, 1909 in Kittery, Maine at a cost to my parents, so my mother has told me, of $15 in doctor's fees.

"My folks moved to Massachusetts while I was quite young, so I received my schooling in various places in Massachusetts, graduating from Chicopee High School in June 1928.

"I courted my wife Dorothy, whom I had known in school, for 5 years until we were married in Kittery, Maine at the home of my grandparents in September 1934 during the depression, and although things were rough at times, we managed to survive with no permanent scars.

"I first became interested in amateur radio in 1935, and I built a small transmitter and started studying the code. But in 1934 I had also become interested in Masonry and joined the local Masonic Lodge, becoming its Master in 1940.

"I had to make a choice between Masonic work, raising a family, including son Kenneth and daughter June, or amateur radio. I dropped amateur radio.

"My interest in amateur radio was not renewed until one day in 1955, when while purchasing some fishing tackle at a local sports store, I heard the owner in the rear of the store operating a c.w. transmitter. I immediately became interested again, and with his help I received my W1FAB call.

"I became very active in amateur radio, working DX, Net Control for the Western Massachusetts Phone Net, and also working for various certificates (CHC #166), until 1963 when I started County Hunting on 40 and 20. I had the pleasure and honor of working Cliff Corne, K9EAB, his dad, WA9DCQ, as well as Art, W0BK, when he was W0MCX, and many other old timers who are still active.

"I became inactive in County Hunting from 1968 to 1972. During that period, while working as an engineer at a local utility company, I built a home for my daughter, June, in Chicopee, which was completed in 1970. I then started building a retirement home for Dorothy and myself in Pittsburg, New Hampshire overlooking the First Connecticut Lake. Pittsburg is the largest *town* east of the Mississippi—297 square miles and a population of 805 (Coos County).

"My XYL, who is not an amateur, has been very patient, understanding, and cooperative during all my amateur radio activities and has often said she would rather have me at home operating the radio than frequenting a bar.

"I retired in 1973 after 32 years with Western Massachusetts Electric Company as a stationary engineer and electrical system dispatcher. Dorothy and I now spend most of the year in our home in New Hampshire, where I enjoy hunting, fishing, snow-mobiling, and amateur radio. Dorothy has her crocheting and local club activities to keep her busy. We, of course, have to return to Chicopee on holidays, etc., to be with our children and now eight grandchildren.

"I wish to thank all the Net members who made this Award possible to attain. Many of them went considerably out of their way to get me a needed county. I can't possibly list all who have helped me but I do wish to thank Buddy, WA7FID, who drove 5 hours one way through bad weather to give me my last county to make them *All.*

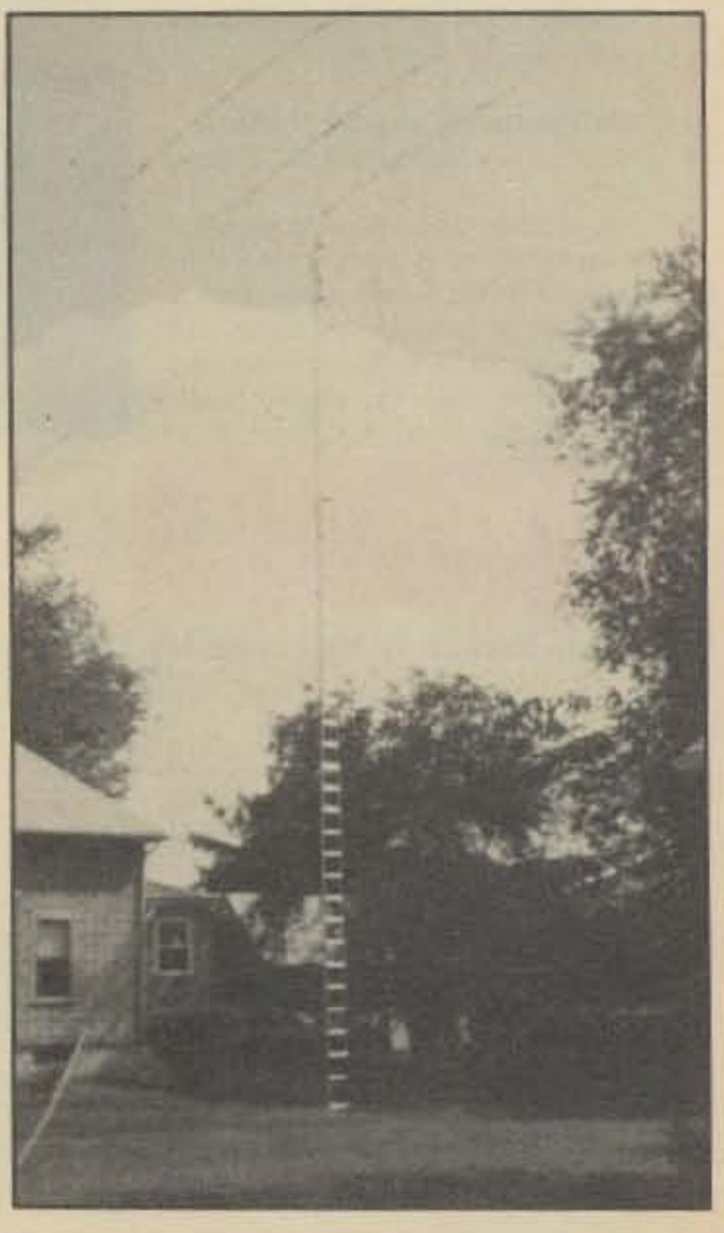
Thanks again to all the MARAC members, to you Ed, and to *CQ* magazine for making this fine Award possible."

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

Ken Walker, W1FAB, and FB layout.

A few of the many Awards at W1FAB.

The New Hampshire home that Jack build, I mean Ken built!



The nice antenna at W1FAB.

Special Honor Roll
All Counties

#290 Robert R. Woodford, W5VNW 7-5-80.
#291 Virgil T. Wright, WB4ZXP 7-7-80.
#292 Charles E. Schneider, III, WA3ZTY 7-25-80.
#293 Wally Karjalahti, WA0ODW 7-30-80.
#294 L. J. Olson, WA0RJJ 7-31-80.
#295 Jerry Skaife, W7ULC 7-31-80.
#296 Fred M. Kamp, W5UMD 8-1-80.

Awards Issued

Again, *seven,* yes, *seven* made All Counties.

Rex Woodford, W5VNW added All Counties, endorsed All S.S.B., to his fine collection.

Virgil Wright, WB4ZXP found time to add USA-CA-3000 and All Counties to his collection, endorsed All S.S.B.

Charley Schneider, WA3ZTY/WB5ZEJ collected All Counties, Mixed.

Wally Karjalahti, WA0ODW waited until he had them All and then sent for USA-CA-500 through All Counties, endorsed All S.S.B., All Mobiles.

Vern Olson, WA0RJJ also waited until he had them All and applied for USA-CA-500 through All Counties endorsed All A-3.

Jerry Skaife, W7ULC, who received USA-CA-500 in February 1965, rekindled his interest to want USA-CA-1000 through All Counties endorsed Mixed.

Fred Kamp, W5UMD found time to add USA-CA-3000 endorsed All S.S.B. and All Counties, endorsed Mixed, to his collection.

Dick Jenkins, WB3HPJ picked up USA-CA-1000 endorsed All S.S.B., All Mobiles and USA-CA-1500 and 2000 endorsed Mixed.

Bruno Stangnowski, DL7CS received USA-CA-1000 endorsed All A-1, #1 to West Germany.

USA-CA-500 Certificates were sent to:

Lars Wessel, SM5AKT, endorsed All 2× C.W.

John Levo, WA8KIW, endorsed Mixed.

Dick Allisette, GU4CHY, #1 to GU, endorsed All A-1.

Hiroshi Mano, JA2AJA, endorsed All A-1.

S. D. McNaughton, GM4FIW, endorsed All 2× S.S.B., #3 to GM.

Rick Kowalczyk, K8ZYK, endorsed All 40 meters.

Aldo Tallone, I1TLA, endorsed All 2× C.W.

Tord Julander, SM3EVR, endorsed Mixed.

Awards

ALGOA C.W. Merit Award: This award is sponsored by the Algoa Branch of S.A.R.L. The requirements are: Any radio amateur needs 250 c.w. QSO's. Stickers to be attached to the award will be given for each additional 250 c.w. QSO's up to a maximum of 1000, i.e. the complete certificate will bear stickers for 250, 500, 750 and 1000 contacts. All non ZS2 applicants must have had 5 c.w. QSO's with a ZS2 station. The holder of the complete certificate will have had 1000 c.w. QSO's of which 20 must be ZS2 QSO's. A log entry will be accepted as proof of con-

USA-CA Honor Roll

3000		1500		500	
WB4ZXP	317	WB3HPJ	491	SM5AKT	1491
WA0ODW	318	WA0ODW	492	WA8KIW	1492
WA0RJJ	319	WA0RJJ	493	GU4CHY	1493
W7ULC	320	W7ULC	494	JA2AJA	1494
W5UMD	321	1000		GM4FIW	1495
2500		WB3HPJ	613	K8ZYK	1496
WA0ODW	380	DL7CS	614	I1TLA	1497
WA0RJJ	381	WA0ODW	615	WA0ODW	1498
W7ULC	382	WA0RJJ	616	WA0RJJ	1499
2000		W7ULC	617	SM5EVR	1500
WB3HPJ	435				
WA0ODW	436				
WA0RJJ	437				
W7ULC	438				

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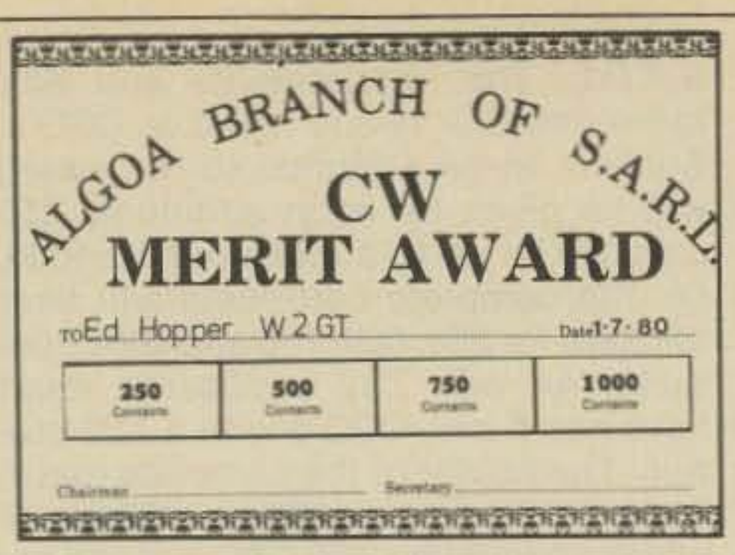


The ALGOA C.W. Merit Award.

Six Meter Crossband Award.

tact. Photostat copies of the log or a certificate signed by two amateurs or the secretary of a radio club will be accepted as proof. The fee is R1 to all ZS amateurs and $1.00 to a foreign amateur. After the initial application, additional stickers will cost 1 IRC to foreign amateurs and for ZS amateurs an s.a.s.e. Apply to: Algoa Awards Manager, P. O. Box 10050, Linton Grange, Port Elizabeth, Republic of South Africa. To date, the Algoa C.W. Merit has been awarded to: 250 contacts to DK7AU, DF2SX, DF1XC, ZS2DK, ZS2RN and ZS2MG. 500 contacts to S8AA7, DF2XJ, HB9BQL, DL8BAB and ZS2JS. 1000 contacts to DL1VT.

Six Meters Crossband Award: Offered by SPESM (Society for the Preservation and Encouragement of Six Meters) for crossband operation between 6 and 10 meters, and in acknowledgement of two or more DX contacts made via 6 to 10 meters. Cost is $1.00. Apply to: Armin Montavon, WB9QVC, Secretary, SPEM, P. O. Box 268, S. Elgin, Illinois 60177.

PARS Award.

PARS Award: The Poway Amateur Radio Society (PARS), which is located 20 miles northeast of San Diego, California, is pleased to issue this award. To qualify, operators must contact 5 PARS members (25 for San Diego County residents) and then submit their list of contacts in log form with a self-addressed stamped envelope to: Operations—PARS, P. O. Box 996, Poway, California 92064.

Notes

Last month in mentioning Awards Directories, in English, I failed to mention the fine booklet put out on all Canadian Awards (some 65). Cost is $5.00; send to Eric S. Walden, R. R. 1, Gowanstown, Ontario, Canada N0G 1Y0.

There has been no complete Directory of Certificates and Awards printed in the U.S. since the death of Clif Evans, K6BX. That Directory listed the hundreds of City, State, and County Awards. Anyone with ideas of taking up where K6BX left off, may I suggest you get in touch with Robert H. Knapp, W4OMW, who holds the copyright on it.

How was your month?

73, Ed, W2GT

K8BG now presents an alternative to tape based systems. In this installment we take up disk storage and disk based systems.

INTRODUCTION TO BASIC

A Computer Programming Language

Part XI—Disk Based Systems

BY BUZZ GORSKY*, K8BG

Anyone who has struggled with loading programs from tape or who has planned a program with lots of data manipulation has certainly considered the alternatives to a tape based system. In this installment I will describe disk storage and explore what kinds of things can be done with a disk based system. When I mention specifics, I will be talking about Radio Shack's disk equipment and operating system.

Let's consider two examples that will demonstrate the advantages of disk before we get down to specifics. Suppose that we have a very long program in BASIC. The program has many parts, each of which is used separately, but for convenience we would like to have the program exist as a single entity so that we can select which part we want to use while the program is running. On a tape system this is impossible to do. If we load one part and it is not the part we elect to use first, there is no BASIC command that will have the machine look through the tape to find the correct segment of program and then run it. And even if there were, it might take many minutes for the machine to find the correct program on tape, and it would never find a segment that previously had been passed, since tape cannot be rewound under program control. On disk, however, this would be no problem. We could have statements that let us enter a number to indicate which program we want run and then a series of statements of the form:

```
1000 IF X=1 THEN RUN "PARTONE"
1010 IF X=2 THEN RUN "PARTTWO"
```

The strings in quotes would be program names of programs that are on a disk in the disk drive. The current program would then find the right one in a matter of a second or so, then load it in a few seconds, and then run it. In this way the sum of all the parts could exceed the total storage room in our machine, and yet we would never be aware of the problem.

The same thing can be done with data. Suppose that we have a file of QSOs kept instead of a log, each entry being the complete record of a single contact. We have a program for entering new contacts and examining the file that already exists. In a tape based system it might take many minutes to load all of the data, but in a disk system the load would only take a few seconds. Furthermore, suppose that we have 80K of data! There would be no way to have all of the data in the machine at once. However, we could store the data and write our program in such a way that the machine could load parts of the data at a time and then see if the right part is loaded and if not try again. Such a search might take a minute or so, but would be nowhere near as slow as a similar search in a tape system.

In summary, disk helps in two ways. By having both programs and data on disk we achieve speed of entry and the appearance that our machine has more memory than it actually has. A disk based TRS80 with 4 drives will have nearly 320K of available disk storage, yet the machine itself can only have 48K of "real" memory.

Well what is a disk anyway? Magnetic tape has a continuous plastic strip imbedded with a magnetizable material. As this material runs by the tape recorder head impulses may be put on the tape

*712 Hillside Drive, Carlisle, PA 17013

or read from the tape. In the same way a disk is a plastic sheet about the size of a 45 r.p.m. record, impregnated with a magnetized substance. The disk rotates at a known speed, and a "head" is moved over the surface of the disk to read and write data to or from the disk. The disk is organized by the computer in a very specific way. It is divided into a number of "tracks," each of which is a narrow circular band. The tracks are arranged concentrically on the disk, and each is divided into segments. As the machine writes anything on the disk, it makes a notation on that disk's directory telling what it has written and where. In that way it can (hopefully) find that same material again when asked to do so. To accomplish this there is some hardware called a disk controller and software called **DOS** or **D**isk **O**perating **S**ystem. The details of what a particular disk system can do depends on the disk drive, the controller, and the particular software in use. That is why you see ads for different DOS packages; each has some advantages.

When I began this discussion of BASIC back in January, I mentioned that one advantage of a high level language is that the programmer does not have to worry much about what is going on in the machine. That is also true for disk operations. With **DISKBASIC** we can write statements requiring disk operations, but we do not have to know how the machine will do what we ask. However, we must be aware of just what the machine will do. Each disk system usually has three things of interest to programmers: 1) an expansion of BASIC with more commands and flexibility; 2) the disk operations; and 3) some utilities or programs that are helpful to the programmer while programming. We will examine each of these for a typical disk system—**TRSDOS 2.3** (Radio Shack's newest disk system).

DISKBASIC recognizes all of the level two BASIC commands and deals with them in the same way. In addition there are a few expansions of BASIC which can be quite helpful. In level two everything is done in decimal arithmetic. That is generally most useful, but when dealing with BASIC programs that call machine language routines, the machine routine has usually been written with attention to hexidecimal addresses. In DISKBASIC one can use hex or octal notation. So if one wants to **POKE** a value into location 3C**00**H at the beginning of the video memory one can write POKE & H3C**00**, & H**20**. This would put **20**Hex into location 3C**00**Hex. DISKBASIC also has **DEFUSR** commands which let a programmer identify the start locations of 10 different machine language routines, each of which can be called independently from the BASIC program. In level two only one such routine can be handled at a time.

DISKBASIC also lets the operator define functions. If you want to take the cosine of X you can write LET C = COS(X). You do that because COS is a function in the BASIC library of functions. Suppose, however, for whatever reason, you wish to define a value D as follows: LET D = SIN(A)*SIN(B) + COS(A)*COS(B) + TAN(A)*TAN(B). Well, a LET statement like that will take care of it. However, if you needed to write that statement 30 times in a program it would get tedious. You could, of course, use a subroutine and a **GOSUB** statement to take care of it. In a DISK system you can do it directly with a function defining statement. We would write: DEFFNDO(A,B) = SIN(A)*SIN(B) + COS(A)*COS(B) + TAN(A)*TAN(B). Then whenever we want such a value computed we write: LET X = DO(A,B) and that's all there is to it.

In addition, the disk system will also permit a real time clock to run while other programs are running. This clock can have day, month, hours, minutes, and seconds. BASIC can check the time and then use the time within the program. So house oriented programs to control heat, lights or alarms can be run according to the machine's clock.

The system also permits a few more string manipulations such as replacing a portion of one string with another. Such a statement is very helpful in a text editing program so that a text correction can be made. Sure we could do this in level two, but there we had to do a lot of the work. Now it can be done with a single statement. We can also find a string with another string. This statement is useful for searching for something. For example, it we wished to count the number of times a given word or phrase occurred in some text, this command would do the work for us.

Well, you say, those things are nice, but certainly not worth the price of a disk system. I agree, so let's get to the meat of things and see what the disk commands will do for us. These commands allow us to read from and write to disk "files". These files can be maintained as sequential access files, or as random access files. The former is very easy to use, while the latter allows for great flexibility. Statements for writing to or

reading from sequential access files are very similar to those for writing to and reading from tape. However, in the disk case we must make certain that delimiters appear to tell the system where each item begins and ends. For example, while storing a list of calls we might insert a comma between each call and the system would know where each call begins and ends. In a tape system it is wasteful to put PRINT or INPUT statements in loops, since several seconds of start-up are wasted each time a PRINT begins. On disk, however, there is no problem. With a sequential file, anytime we tell the system to put another value on disk, it puts it in the next place in sequence.

Random access files take a bit more thought to work with. Suppose we have a QSO file where we have stored call letters, operator's name, station location, and date of QSO. Let's call each set of information a sub-record. We will allow 6 characters for the call, 10 for the name, 10 for the location, and 6 for the date; that is a total of 32 characters. The disk system stores random access files as 256 character records, so we can fit 8 of our sub-records into each record. When the machine is going to put something on disk, it will first set it up in a data buffer in machine memory. This buffer is 256 bytes long and will contain the data just as it will go to memory on the disk. Similarly, when something is read from disk it will come into such a buffer and can then be used in a program. Let's take a look at the statements to do this sort of file work.

When your DISKBASIC comes on there is a **"HOW MANY FILES"** question in addition to the memory size question. This tells the machine how many data buffers to maintain in memory. If you will only be reading/writing with one file at a time, you only need one file, but if you have 10 going at a time, you need 10 different buffer areas in memory so that the data will not get confused. If we answer "1" there will be room for one 256 byte data buffer.

Let's call this file "QSO/DATA". Our program would have to OPEN this file with a statement: OPEN "R", 1,"QSO/DATA". This statement tells the machine that we will be using a file called "QSO/DATA" in a Random (that's what the "R" is for) access system in buffer number 1. We would then need a **FIELD** statement to tell the machine how we will address the data in the buffer. Here's where the work of a random file comes in. Each of our sub-records is 32 characters long, and we will have 8 in each machine record. All of the data in the file is referred to as string data. So let's call the call letters C$, the QTH Q$, the name N$, and the date D$. We will also have a dummy variable called J$ (for junk). We will also use two integers to help us with the files—R% which will be the machine record number and S% which will be the sub-record number. Our fielding will then be done as follows: 100 FIELD 1, 32*S% AS J$, 6 AS C$, 10 AS Q$, 10 AS N$, 6 AS D$

What does that tell the machine? It says that we will refer to the 256 bytes of data in buffer #1 with the first 32*S% bytes as J$, the next 6 as C$, the next 10 as Q$, the next 10 as N$, and the next 6 as D$. Now if we are interested in the first sub-record, S% will be 0 and we will be looking at the first 32 bytes of data. On the other hand, if we are looking at the 8th sub-record, S% would be equal to 7 and J$ would be assigned to the first 224 bytes (7*32) and C$,Q$,N$,D$ to the last 32 bytes. As you might have guessed, a given data buffer can be fielded as many times as you like without disturbing the actual data stored in the buffer. So if we were looking for a particular call, we might tell the machine to get the first record—we do that by saying GET 1, 1 (record #1 into buffer #1), and then we would first make S% 0 and see if C$ is the call we want. If not, we would re-field the data buffer with S% = 1 and see if C$ is the right call. If not we would then eventually get record #2, and so forth. The system includes a value to tell when the last record has been obtained, so that we would know when to stop and decide that the call in question is not in the file.

Once a file buffer has been fielded, we can also put new data in the buffer and then put the entire record into the disk file. We do this with **LSET** and **RSET** statements. Recall that we have allowed 6 spaces for C$. If we want to store a call that is 6 characters, there is only one way to put it into the 6 character space. But my call has only 4 characters, so how would we file it? Well, with **LSET**, we would put my call into the left-hand four spaces, and with **RSET** we would put it into the right 4 spaces. It makes no real difference, but we must be consistent in how we put the data in and how we read it out to get the correct data.

If all of this random access file business seems a bit fuzzy, don't despair. Everyone who has learned the system has felt the same way! Like anything else it take practice, but once you have it down you have a very flexible way of dealing with lots and lots of data. QSO files, check records, club membership rosters, and many other things that would be useless to try to manage with tape based systems become tractable with disk techniques.

Now we'll take a look at utilities to see what sorts of things come with a disk system. There will be little programs for maintaining the clock and setting it to correct time. There is usually a debugging program, something like **TBUG** (Radio Shack's monitor program) but often quite a bit more powerful and flexible. There are also programs to copy an entire disk or copy a particular file or program to another disk or tape. There may be some machine language tools like a disassembler to help decode a machine language program or an assembler to help write one. There are often little aids to make life easier, such as a system that will automatically run a particular program each time a given disk is started-up or a set of "magic" keys which when hit will perform a particular task such as printing out a copy of what is on the screen. Each of these "goodies" varies with the particular disk system; all are the type of thing that you say you would never use, but once tried become "necessary" tools.

The real power of a computer comes in the speed with which it can do something and the ease with which the programmer can get a job done. Disk comes a long way to make that power available to the BASIC programmer.

(to be continued)

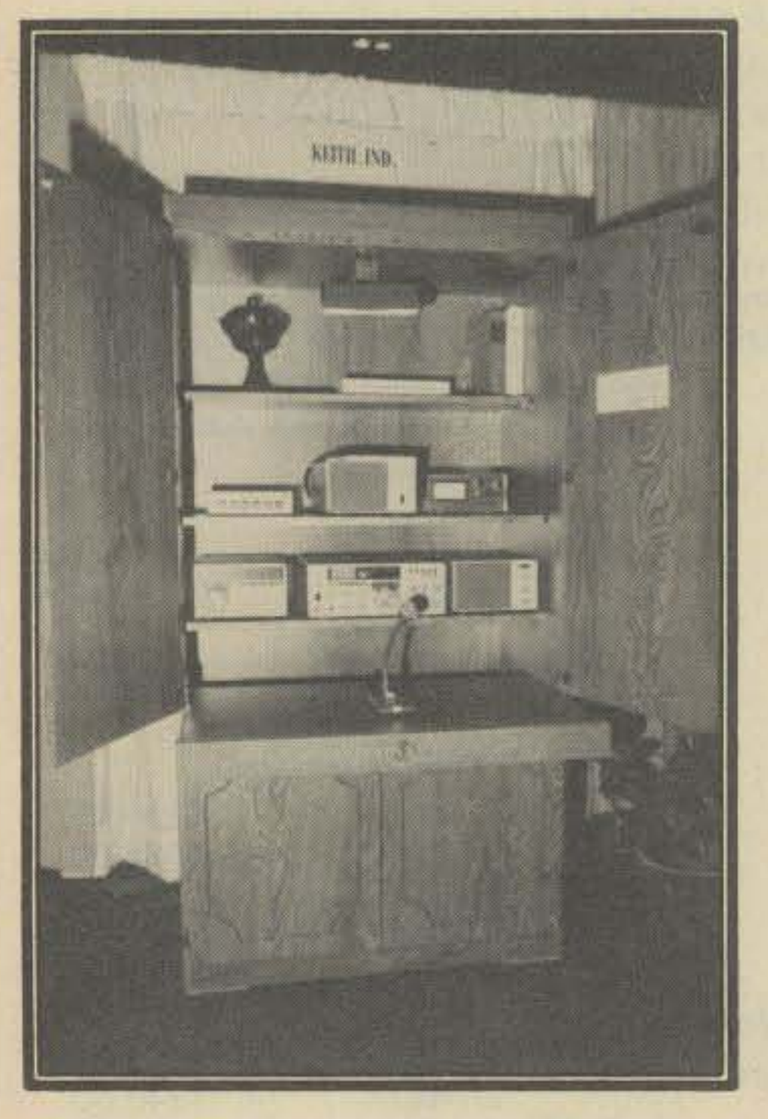
The Printed Word: new reading material

Federal Frequency Directory: 2-420 MHz Inclusive. Edited by Robert B. Grove, this book contains more than 100,000 listings of frequencies, agencies, and locations of active U.S. government communications stations operating in the 2-420 MHz portion of the spectrum. It contains only federal government frequencies, including departments like Justice, Air Force, Coast Guard, FAA, NASA, and more. The directory has been derived exclusively from U.S. government computer files and is officially authorized. This large bound book is available for $14.95 postpaid from Grove Enterprises, Inc., Route 1, Box 156W, Brasstown, NC 28902, or for more information circle number 115 on the reader service card.

Nuts & Volts. This new monthly publication serves amateur radio and computer enthusiasts across the country. It is devoted exclusively to classified and display advertising for new and used equipment. Items are categorized for easy reference and there are sections for business oportunities and wanted items as well. Classified ads are 10¢ per word with a minimum $2.00 charge. Typesetting and art services are available for display advertisers. *Nuts & Volts* is printed on newsprint with an 8½ × 11 format. It is available monthly for a one-time charge of $5.00 from *Nuts & Volts*, P.O. Box 1111, Placentia, CA 92670, or for more information circle number 112 on the reader service card.

RF Signal Generator and Source Selection Guide. This 8-page selection guide for RF Signal Generators and Sources describes Hewlett-Packard's signal generator capabilities in the frequency range from 10 kHz to 2600 MHz. Specification camparisons are made from the manually tuned 8654A L-C type to the high performance 8662A Synthesized Generator. The application selection chart compares critical parameters for 9 separate measurement applications ranging from local oscillator substitution to the out-of-channel radio test procedure. An s.s.b. phase noise comparison chart for five generators appears, and a glossary of terms is also included. "RF Signal Generators and Sources—A Selection Guide" is available from Hewlett-Packard, 1507 Page Mill Road, Palo Alto, CA 94304, or circle number 117 on the reader service card.

CQ SHOWCASE



Keith Engineering Radio/Computer Unit

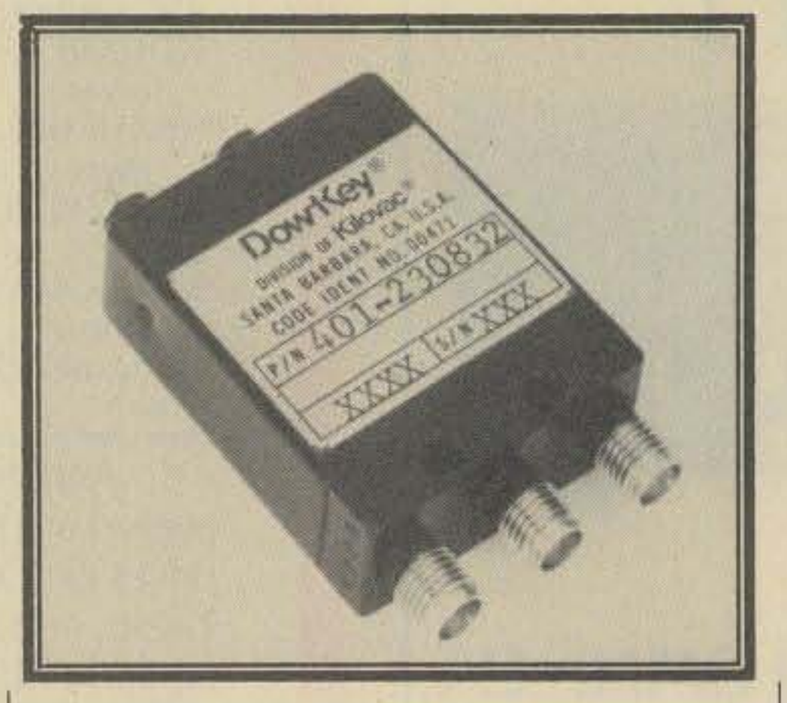
Available from Keith Engineering Corp., the Radio/Computer Console is 20″D × 36″W × 72″H, and is ideal for housing amateur radio or computer equipment. A work surface is located at optimum height for operator comfort and is mounted on 100 lb. capacity ball slide tracks. It can be locked in the closed position. The upper section contains a fixed shelf 15″ deep, two adjustable shelves 10″ deep, an adjustable, shielded light, and upper section doors with security locks. The lower section contains an adjustable shelf and room for bulky equipment. Leveling pads are provided with the unit.

The console comes in either Devonshire Oak or Chateau Pecan finish. For more information, contact Keith Engineering Corp., P.O. Box 16782, Clayton, MO 63105, or circle number 107 on the reader service card.

PC Board Imaging Process

RE-ZOLV® is a chemical process for making pc boards. Utilizing the visible light spectrum, the RE-ZOLV® process is photosensitive. The emulsion of the imaging process is non-toxic, non-corrosive, and non-flammable, making it environmentally safe. The sensitizer is specially modified ammonium bichromate. The developed image, dark colored against the copper background, allows easy detection of minor imperfections prior to the etchant bath. RE-ZOLV® is designed to be used in ambient temperature conditions. As a result, there is no need for temperature control devices.

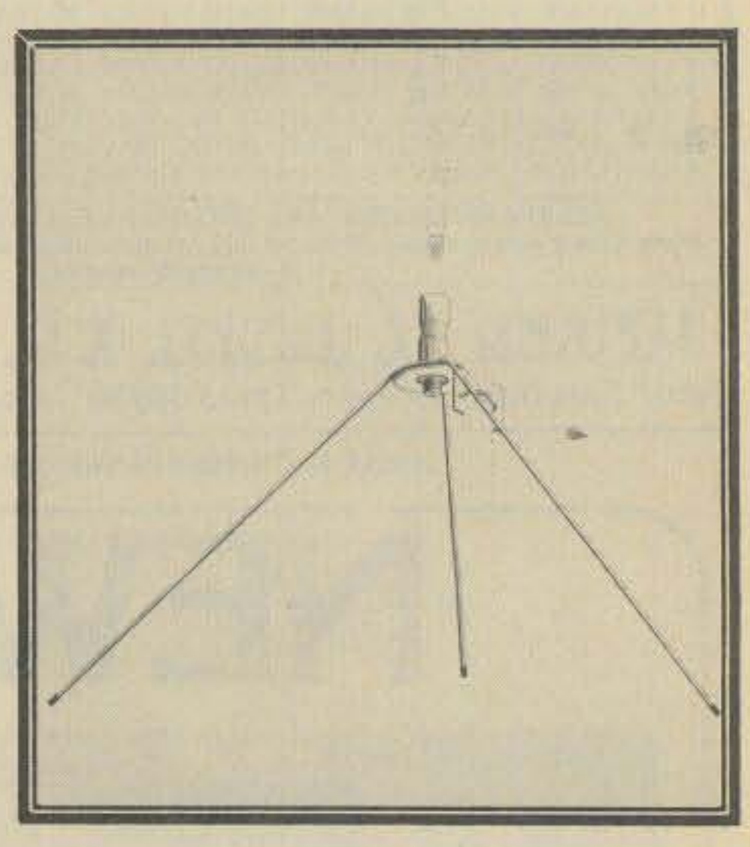
One quart will coat a minimum of 100 sq. ft. of copper board. Except for etchant and chlorine bleach, there are no other chemical costs. The process is made by Coval Industries, Inc., and is available through their representatives. For more information, contact Hal-Tronix, P.O. Box 1101, Southgate, MI 48195, or circle number 111 on the reader service card.



Dow-Key High Frequency Relay

Dow-Key division of Kilovac Corp. has made available the Model 401-230832 Single-Pole Double-Throw coaxial relay. The relay is designed for excellent r.f. performance in microwave systems to 18 GHz and for operation in severe environments. It is a failsafe relay remotely actuated by a 28 v.d.c., 475 ohm coil with a maximum operating time of 20 ms at 20°C. A balanced actuator mechanism provides tolerance to shock and vibration.

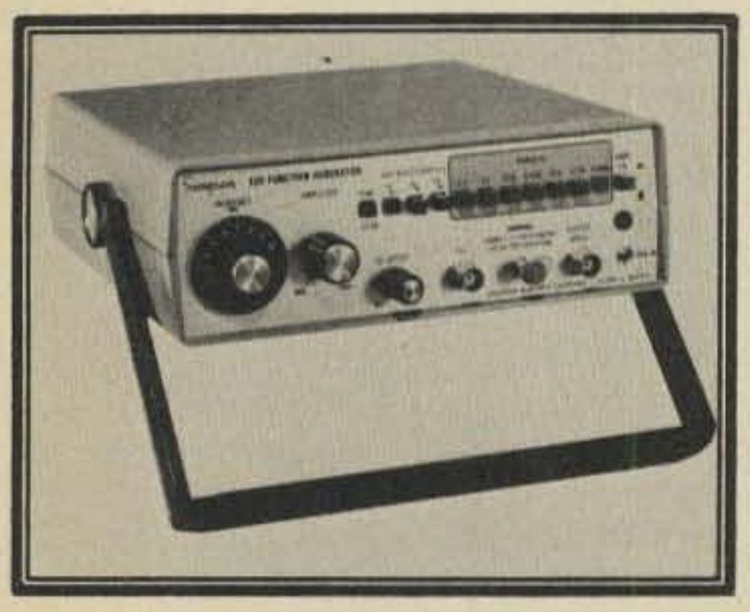
The relay can carry 10 watts of r.f. power at 18 GHz with isolation greater than −60 dB, insertion loss less than −0.5 dB, and v.s.w.r. 1.5:1 maximum. Typical applications include switching of antennas, components, receivers, and instruments in radar communications. Price is $140 each for quantities of 1-4 pieces. For more information, contact Dow-Key, P.O. Box 4422, Santa Barbara, CA 93103, or circle number 105 on the reader service card.



Hustler 2 Meter Mounting Kit

A new mounting kit, Model MKR-2, is now available for converting Hustler's line of series fed mobile v.h.f. antennas to fixed station operation. By utilizing the Hustler SF-2, 5/8 wave, 3.4 dB gain or CG-144, 5.2 dB gain collinear 2 meter antennas and the MKR-2 portable or fixed station radial kit, operation comparable to much higher priced base antennas is attained.

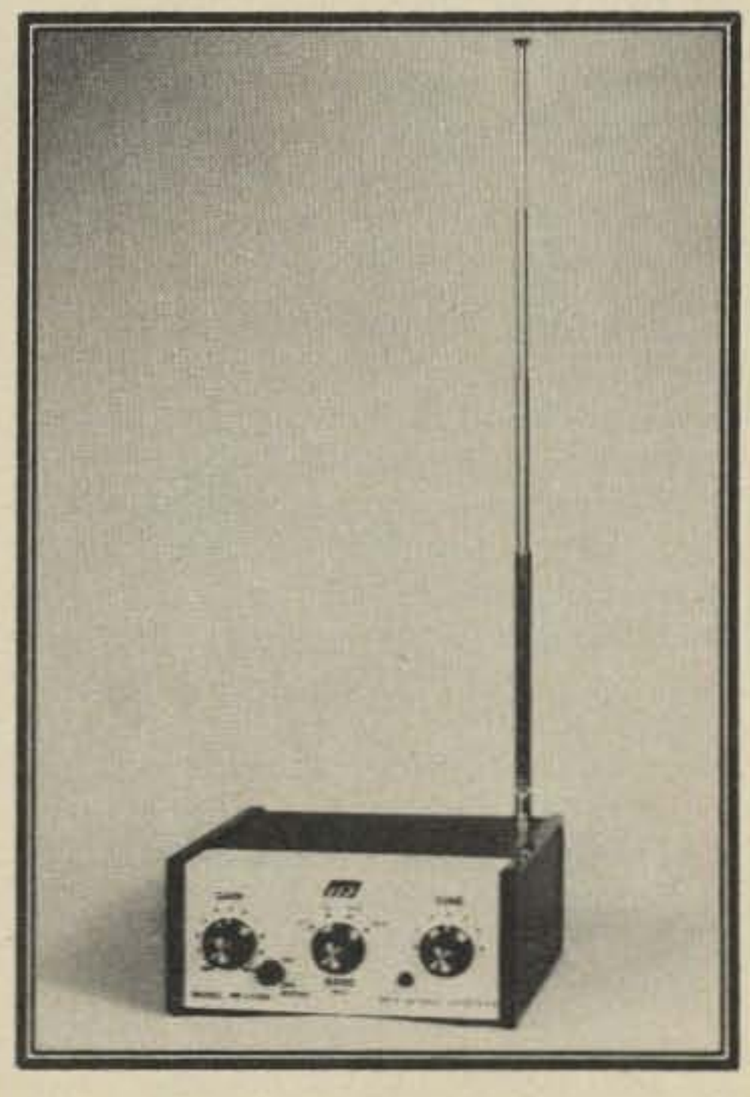
The kit consists of a heavy-duty zink-plated mast bracket and hardware with three 19″ decoupling radials for correct feedpoint impedance and accepts any v.h.f. antenna with a standard 3/8″ × 24 thread. The kit can also be used with the Hustler SF-220 1¼ meter antenna for 220 MHz operation. Suggested price is $19.95. For more information, contact Hustler, Inc., 3275 North B Ave., Kissimmee, FL 32741, or circle number 103 on the reader service card.



Simpson Electric Function Generator

Simpson Electric Company has introduced a new function generator for bench and portable applications. The Model 420 provides sine, triangle, and square wave output, plus DC and TTL logic output over a frequency range of 0.1 Hz to 1 MHz in seven ranges. Signal amplitude is 10 V p-p into a 600 ohm load, and is continuously variable more than 30 dB. In addition, a fixed attenuator selects 0 or −30 dB attenuation.

The Model 420A ($175) is designed for AC line operation only. The 420D ($210)is designed for AC line and battery operation. Size is 2.7″ × 8.4″ × 9″, and weight is 3 lbs. For more information, contact Simpson Electric Company, 853 Dundee Ave., Elgin, IL 60120, or circle number 106 on the reader service card.



MFJ Indoor Active Antenna

The MFJ-1020 indoor active antenna has a tuned circuit that helps reduce intermod, provide r.f. selectivity, and reduce noise outside the tuned band. It can also be used as a preselector for an external antenna. It covers 300 kHz to 30 MHz in four bands: .3-1 MHz, 1-3 MHz, 3-10 MHz, and 10-30 MHz. The 1020 comes with an adjustable telescoping antenna, and controls include tune, band selector, gain, and on-off/bypass. A 9-volt battery will provide portable power, or it may be used on 110 v.a.c. with the optional AC adapter ($7.95).

Size of the unit is 5″ × 2″ × 6″. Cost is $79.95 plus $3 shipping and handling. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 108 on the reader service card.

a regular feature by

THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

FCC Considers Digital Communication License

According to Carlos Roberts (Chief, Private Radio Bureau), the Commission is now looking into the possibility of issuing a public document which will request comments on a digital communication license. The license presumably would not require an applicant to pass a test in Morse Code, but it would require the successful completion of a sophisticated exam on digital communication techniques. Creation of the code-free digital license would be but one more step in the FCC's continuing efforts to encourage amateurs to experiment with such advanced communication techniques as spread spectrum and packet switching.

Action On New CB Service Moves Forward

Relative to the creation of a new CB service at 900 MHz (Docket No. PR 79-40), Carlos Roberts noted that all of the comments received in response to the Notice of Inquiry (NOI) have been read. Response was mixed, with respondents either enthusiastically in support of the new service or strongly opposed to it. One of the main concerns expressed by some who responded to the NOI was that the new CB service would take valuable spectrum space away from the Land Mobile service. With the NOI responses as background, the Private Radio Bureau is now looking into the possibility of issuing a Notice of Proposed Rule Making (NPRM) in this matter.

Broadcasters Move To Protect Signals

As reported in *The Washington Post* earlier this year, a group of the largest pay television companies in the U.S. have formed an industry trade association which will address, among other things, the problem of protecting signals from piracy. The new Subscription Television Association would promote the growth of pay TV and would represent the subscription TV industry before the FCC and the Congress. Subscription TV (STV) involves the transmission of a scrambled signal to subscribers who are provided with a special decoder which attaches to the TV set. With the STV industry on the verge of a "growth explosion," however, a number of firms are now manufacturing and selling unauthorized devices to those who would pirate STV signals. Thus, one of the first actions to be taken by the Subscription Television Association would be to lobby for a bill introduced into the House of Representatives by Richardson Preyer (D, N.C.) which would prohibit the unauthorized reception of so-called private communications.

Note that Preyer's bill (HR 7747) would extend Section 605 of the Communications Act of 1934 (as amended) by prohibiting *reception* of private radio communications. As it now reads, Section 605 ("Unauthorized publication or use of communications") says, in part:

> "No person having received any intercepted radio communication or having become acquainted with the contents, substance, purport, effect, or meaning of such communication (or any part thereof) shall . . . use such communication (or any information therein contained) for his own benefit or for the benefit of another not entitled thereto."

It has been argued (see, for example, Hopengarten, *CQ*, August 1980) that it is illegal to receive and devulge communications protected by Section 605, but that "mere reception is legal" (Hopengarten). However, Section 605 is quite clear in stating that an individual who intercepts radio communications that are protected may not use such communications for his own benefit (presumably, "benefit" includes "entertainment"). Thus, the unauthorized reception and beneficial use of addressed communications in the Multipoint Distribution Service (MDS; this includes Subscription TV) surely is going to attract a great deal of attention in the months ahead. That the issue is already on its way to the courts is evidenced by a case in California in which National Subscription Television is suing suppliers of allegedly illegal TV decoders (see *HR Report*, Number 312, 18 July 1980). Other actions of this nature are sure to follow as do-it-yourselfers, encouraged by some manufacturers, strive to intercept signals that are broadcast by licensees in the MDS and similar common-carrier services.

Radio Society Petitions FCC To Reconsider Decision On New Licenses To Club Stations

On 11 July 1980, the Capitol Hill Amateur Radio Society (W3USS) petitioned the FCC to reconsider its decision not to issue new licenses to club stations. The Society contends that the FCC procedures involved in its suspension of licensing new club stations violated the Administrative Procedure Act, and that the decision contravened the public interest standard of the Communications Act. The Capitol Hill Amateur Radio Society and

*8603 Conover Place, Alexandria, VA 22308

others had previously suggested a means by which the Commission could continue to issue club licenses at minimum expense to the Government. However, according to David Siddall (K3ZJ; President of the Society): "A very inexpensive proposal for continuing to license new club stations was ignored." This was the first time in the Society's eleven year history that it has taken such action. The Society is a club of licensed amateur radio operators who work on Capitol Hill, and who pool their own private resources to maintain and operate club station W3USS.

Amateur Operator First Blind Person To Pass Engineer-In-Training Exam

A 23-year-old radio amateur, Robert Barnes, became the first blind person in the U.S. to pass the engineer-in-training examination of the National Council of Engineering Examiners. As reported by *The Institute* (news supplement published by the IEEE; see Vol. 4, No. 8, August 1980), Barnes could become the first blind professional engineer (PE) in the U.S. if he successfully completes his training period. A recent graduate (magna cum laude) from Louisiana Tech University, Barnes is now starting his professional career as an electrical engineer with General Dynamics in Fort Worth, Texas. According to *The Institute*, Barnes, who received his amateur license at the age of 13, "has aspirations of making engineering a more accessible career for blind people by designing practical, reliable, and affordable equipment that will enable blind engineers to perform their jobs with the same degree of independence enjoyed by sighted engineers."

R.F.I. Complaints To Commission On The Rise

According to Jeffrey Young, Chief, Investigations Branch (Field Operations Bureau), RFI complaints to the Commission in the period April-June, 1980, inclusive, totaled 19,684, a 10% increase over the number of complaints received in the same period during 1979. Complaints involving home entertainment equipment totaled 15,781, with alleged interference to television receivers representing the major source of reported RFI cases. The operations of amateur radio stations were alleged to have caused 1,064 cases of RFI, a 25% increase in the corresponding number for the same period in 1979. In complaints citing amateur operations, 683 reports noted that the victim device was a piece of electronic home entertainment equipment; 350 reports cited co-channel (amateur/amateur) interference as the problem. By far, the greatest number of complaints (12,819 out of 19,684) were related to operations by users of the 27 MHz Citizens Band. Increased use of the 27 MHz CB and 28 MHz amateur bands during this peak period of the solar cycle is thought to be responsible for the increase in RFI complaints.

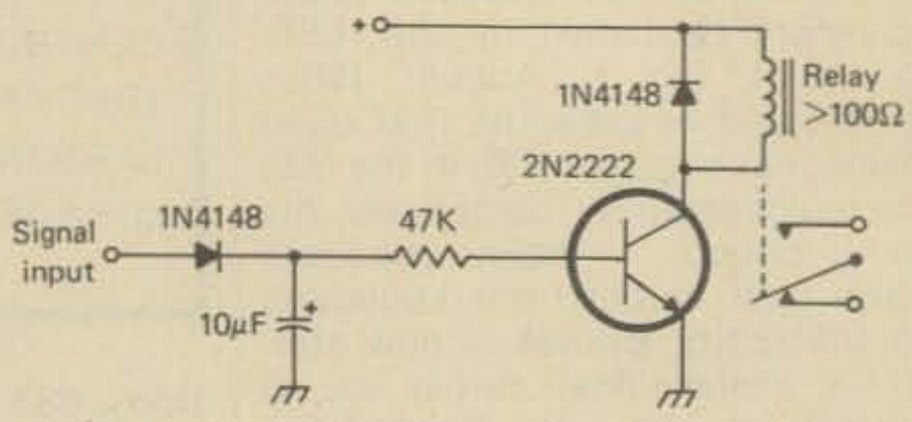
Stop Press

As this issue was going to press, it has been learned that a court ruling has gone against the pay television company which had brought suit against the manufacturer of television decoding devices. As reported in *The Los Angeles Times* (August 1980), U.S. District Judge L.T. Lydick ruled that National Subscription Television (a subsidiary of Oak Industries, and the largest subscription TV service in the Los Angeles area) did not have a monopoly on the decoding of its signals. National Subscription Television (also known as ON TV) and Oak Industries indicated that the ruling would be appealed to the Ninth Circuit Court of Appeals.

CRANIUM QUERIES

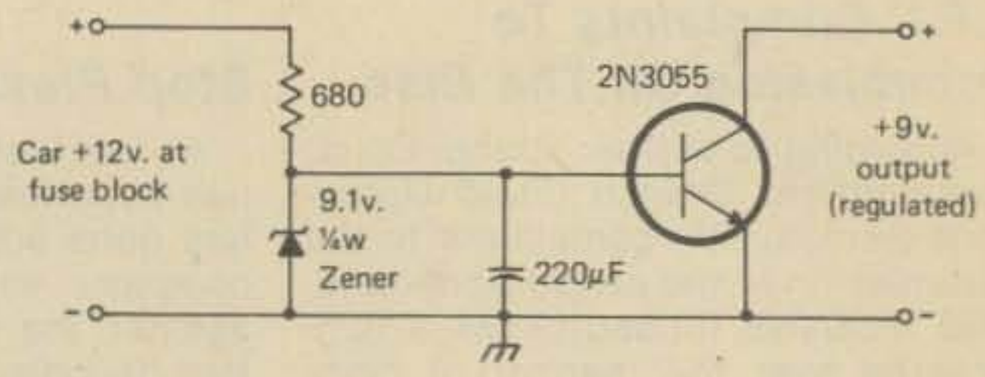
FIND THE ERROR

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
c/o CQ



Here's What Was Wrong

Of course the diode across the relay was backwards! It was supposed to short out back e.m.f., so it has to be installed the way it's shown here. But notice that the capacitor should come before the resistor, not after, or it will delay turn-on, not release. Happy v.o.x. and s.o.x.-ing.



What's Wrong?

The Mobile 9V Supply seemed like a bright way to power some portable equipment in the car. These are the right parts and values, and the base circuit is right. Isn't that a DC amplifier-type regulator?

a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The C.W. section of the 1980 *CQ* World Wide DX Contest will take place on the weekend of Nov. 29-30. Special *DX Propagation Charts* for use during the C.W. section of the Contest appeared in last month's column, along with some valuable tips and suggestions for piling up points. Be sure to refer to last month's column if you are planning to participate in the C.W. section of this year's Contest. Some additional tips are contained in this month's column.

Solar Flare Hot Line Service

Just in time for use during the *CQ* World Wide DX Contest, NASA has announced the establishment of a hotline service which provides updated information on solar flares, geomagnetic activity, solar flux levels and sunspot activity on a 24-hour basis. The reports will also include, when appropriate, an assessment of the impact of the sun's behavior on radio transmission. Solar flares, erupting on the sun's surface, often disrupt ionospheric propagation on all h.f. bands for up to an hour or so at a time.

The number to call for this service is Area Code 301-344-8129. You must pay for the call, but there is no charge for the service. The recorded announcement contains a good deal of scientific information given in very technical terms, but also contains solar geomagnetic assessments which should be very useful in determining day-to-day conditions on the h.f. amateur bands.[1]

Information used in the recorded announcements comes from satellite observations and from solar observatories throughout the world. The data is compiled at NASA's Goddard Space Flight Center in Greenbelt, Maryland by NASA scientists and by scientists with NOAA's Space Environment Services Center. Be sure to check the hotline for the latest updated solar data during the Contest period.

11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1980

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 2, 13, 29	A	A	B	C
High Normal: 1, 3, 9-10, 12, 14-15, 24-25, 28, 30	A	B	C	C-D
Low Normal: 4-5, 8, 11, 16-18,22-23, 27	A-B	B-C	C-D	D-E
Below Normal: 6-7, 19, 21, 26	B-C	C-D	D-E	E
Disturbed: 20	C-E	D-E	E	E

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

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Nov. 1st, excellent (A) on the 2nd, good again (B) on the 3rd, fair to good (B-C) on the 4th and 5th, etc.Conditions during the C.W. section of the CQ WW DX Contest are expected to be above normal on Nov. 29th and high normal on the 30th.

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

Sunspot Cycle Progress

The Swiss Solar Observatory at Zurich reports a monthly mean sunspot number of 135 for July, 1980. This results in a smoothed sunspot number of 164.1 centered on January, 1980. While this is a provisional number which is subject to slight change as additional information becomes available, it is a point under the provisional level of 165.3 recorded for December, 1979. This would indicate that the peak of Cycle 21, the second highest recorded since sunspot records have been kept, probably occurred during December, 1979 and that the present cycle is now slowly declining.

Solar activity during the 1980 Contest period is expected to be somewhat lower that the near peak solar level recorded during last year's Contest period. A level in the upper 130's is expected. This should produce excellent ionospheric conditions on the amateur h.f. bands, almost as good as the record breaking conditions of last year. Expect another great year for the C.W. Contest period, as long as nature doesn't pull a surprise radio storm to mar conditions.

C.W. Contest Tips

Look for excellent DX conditions on *10, 15* and *20* meters during the *daylight hours* from shortly after sunrise through sunset.

From *sundown to Midnight*, it should be a toss-up between *20* and *40* meters for DX honors. Openings on *20* meters should mainly be towards the quadrant extending from southeast through west to northwest, while *40* meters should open towards the north, east and south.

Some good openings can also be expected during this period on *15* meters, particularly towards southern and western areas, and on *80* and *160* meters where propagation patterns should be similar to those on *40* meters, but with somewhat weaker

[1] *For a do-it-yourself method of forecasting day-to-day conditions using solar flux and geomagnetic data see:*
"A Breakthrough in Simplifying Ionospheric Propagation Forecasts," by G. Jacobs and T.J. Cohen, CQ, March 1975.
"A Note On Ionospheric Propagation Forecasts," by G. Jacobs and T.J. Cohen, CQ, August 1979.
"The Shortwave Propagation Handbook," by G. Jacobs and T.J. Cohen, Cowan Pub. Corp., Port Washington, NY 11050. Personalized copies signed by the authors are available for $7.50 postpaid within the USA from MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902. Remittance from foreign countries should be made in US currency and should include $1 additional for surface mailing, $2.50 for airmail delivery.

CQ Short-Skip Propagation Charts
November & December, 1980
Local Standard Time at Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance From Transmitter (Miles)			
	50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	07-09 (0-1) 09-11 (0-2) 11-15 (0-3) 15-16 (0-2) 16-18 (0-1)	07-08 (1) 08-09 (1-2) 09-11 (2-3) 11-15 (3-4) 15-16 (2-4) 16-18 (1-4) 18-19 (0-3) 19-20 (0-2) 20-21 (0-1)
15	*Nil*	08-10 (0-1) 10-16 (0-3) 16-17 (0-2) 17-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (1-4) 10-16 (3-4) 16-17 (2-4) 17-19 (1-4) 19-20 (0-3) 20-21 (0-1)	07-08 (1) 08-09 (3-2) 09-19 (4) 19-20 (3) 20-21 (1-2) 21-00 (0-1)
20	09-11 (0-1) 11-15 (1-2) 15-17 (0-1)	07-09 (0-2) 09-11 (1-4) 11-15 (2-4) 15-17 (1-4) 17-18 (0-4) 18-19 (0-3) 19-20 (0-2) 20-07 (0-1)	07-09 (2-3) 09-18 (4) 18-19 (3-4) 19-20 (2-4) 20-21 (1-4) 21-23 (1-3) 23-02 (1-2) 02-07 (1)	07-09 (3) 09-12 (4) 12-15 (4-3) 15-21 (4) 21-23 (3-4) 23-02 (2-3) 02-06 (1-2) 06-07 (1)
40	07-08 (0-2) 08-09 (1-3) 09-19 (4) 19-21 (2-3) 21-00 (1-2) 00-07 (0-1)	07-08 (2-4) 08-09 (3) 09-15 (4-3) 15-19 (4) 19-21 (3-4) 21-00 (2-4) 00-02 (1-3) 02-06 (1-2) 06-07 (1-3)	07-08 (4) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-00 (4) 00-02 (3-4) 02-06 (2-4) 06-07 (3-4)	06-07 (4-3) 07-08 (4-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-06 (4)
80	08-15 (4-3) 15-02 (4) 02-04 (3-4) 04-07 (2-3) 07-08 (3-4)	08-09 (3-2) 09-15 (3-1) 15-18 (4-3) 18-04 (4) 04-07 (3-4) 07-08 (4-3)	08-09 (2-1) 09-15 (1-0) 15-18 (3-1) 18-06 (4) 06-07 (4-3) 07-08 (3-1)	08-09 (1-0) 09-15 (0) 15-18 (1-0) 18-20 (4-1) 20-05 (4) 05-06 (4-3) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (3-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-3) 04-06 (2-1) 06-07 (1-0)

ALASKA
November & December, 1980
Openings Given In GMT#

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	15-16 (1) 16-17 (2) 17-21 (3) 21-23 (4) 23-00 (3) 00-01 (2)	12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-12 (1) 07-11 (1)*
Central USA	17-18 (1) 18-20 (2) 20-00 (3) 00-01 (2) 01-02 (1)	15-16 (1) 16-17 (2) 17-20 (3) 20-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	12-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1)	06-08 (1) 08-13 (2) 13-14 (1) 07-12 (1)*
Western USA	18-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-01 (2) 01-02 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1)	12-16 (1) 16-18 (2) 18-22 (3) 22-02 (4) 02-04 (3) 04-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1) 04-06 (1)* 06-14 (2)* 14-16 (1)*

HAWAII
November & December, 1980
Openings Given In Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	06-07 (1) 07-08 (2) 08-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	12-14 (2) 14-17 (4) 17-21 (3) 21-00 (2) 00-06 (1) 06-08 (3) 08-09 (2) 09-12 (1)	17-18 (1) 18-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-20 (1)* 20-01 (2)* 01-03 (1)*
Central USA	06-07 (1) 07-08 (3) 08-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (4) 09-13 (3) 13-17 (4) 17-19 (3) 19-20)2) 20-21 (1)	08-13 (2) 13-14 (3) 14-20 (4) 20-00 (3) 00-02 (2) 02-05 (1) 05-06 (2) 06-08 (3)	17-18 (1) 18-20 (2) 20-21 (3) 21-01 (4) 01-03 (3) 03-04 (2) 04-05 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-04 (1)*
Western USA	07-08 (1) 08-09 (2) 09-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	08-10 (4) 10-15 (3) 15-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

Check for 6 Meter openings at times when the 10 Meter forecast rating is shown as (4).

Note: The Alaska and Hawaii Propagation Charts are intended for distance *greater* than 1300 miles. For openings over shorter distances, use the preceding Short-Skip Propagation Chart.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

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

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

3). Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 4 hours in the MST zone; 3 hours in the CST zone, and 5 hours in the EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

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

signals and higher noise levels.

The best bands for DX propagation between *Midnight and sunrise* should be *40* and *80* meters, with openings possible to most areas of the world, but peaking towards the south, southwest and west. Good openings should also be possible on *20* meters, but mainly towards the south and west. Also check for *160* meter DX openings during this period. Again, propagation patterns will be similar to those on *80* meters, but signals will be weaker and noise levels higher.

The following is a sample Work Chart for the C.W. Contest section, devised from the *DX Propagation Charts* which appeared in last month's column. This particular example is for multi-band operation and for a PST zone QTH. Similar Work Charts can be devised for other bands, for other operating conditions, and for other time zones. The Work Chart shows when propagation conditions are expected to be optimum to various areas of the world (propagation index 3 or more, unless otherwise shown) for each three hour time period throughout the day.

Time PST	Band Meters	Areas To Which DX Conditions Expected To Be Optimum
00-03	20	Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Antarctica, Africa*, South America*
03-06	20	South Pacific & New Zealand, Australasia, Caribbean, Central America, Southeast Asia*, Far East*, South America*, Antarctica*
06-09	20	Caribbean, Central America, South America, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Central and South Asia, Europe*, Eastern Mediterranean*, Middle East*, Antarctica*
09-12	15	Europe, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Western Africa, Eastern Mediterranean*, Middle East*, Eastern, Central & Southern Africa*, South America*
12-15	10	Africa, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America
15-18	10	Central & South Asia, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America
18-21	15	Southeast Asia, Far East, South Pacific & New Zealand, Caribbean & Central America, South America, Central & South Asia*, Australasia*, Antarctica*
21-00	20	Far East, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America, Antarctica, Europe*, Africa*, Southeast Asia*

** Propagation index (2), all others (3) or (4)*

Table 1- Sample multi-band contest operating schedule, western USA.

V.h.f. Openings

Lots of *6* meter F-2 layer DX openings are expected this month. Solar activity continues at a high enough level to permit openings to most areas of the world. Conditions should peak towards Europe and in a generally easterly direction before Noon. Openings should pick up towards Africa shortly after Noon, and continue to swing towards a southerly direction during the early afternoon hours. By late afternoon start looking for openings more towards the southwest and west. It's possible that signal levels may at times be quite strong during many of these *6* meter openings.

Some trans-equatorial (TE) type *6* meter propagation may also be possible during November. The best time to check for such conditions is between approximately 8 and 11 p.m., local standard time. TE openings favor locations in the southern tier states, and generally take place to South American countries south of the equator. Signals at best are expected to be weak, erratic, and with considerable flutter fading.

Some meteor shower activity is expected during November which could make possible meteor-scatter type openings on the v.h.f. bands. The *Taurids* shower, which should last for a day or two, is expected to peak on November 3 with a meteor count of approximately 15 an hour. A second shower of about the same duration and intensity, called *Leonids*, should reach peak intensity during the early evening hours of November 16 (EST).

November is generally a month in which some fairly intense auroral activity can occur, bringing with it conditions for auroral-type short-skip openings on the v.h.f. bands. Auroral activity is usually associated with periods of radio storminess and is most likely to occur on those days shown as BELOW NORMAL or DISTURBED in the "Last Minute Forecast," which appears at the beginning of this column.

This month's column contains Short-Skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Hawaii and Alaska and the Continental areas of the USA.

Good luck in the C.W. section of the 1980 *CQ* World Wide DX Contest, and be sure to let me know how these special Contest propagation forecasts work out.

73, George, W3ASK

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