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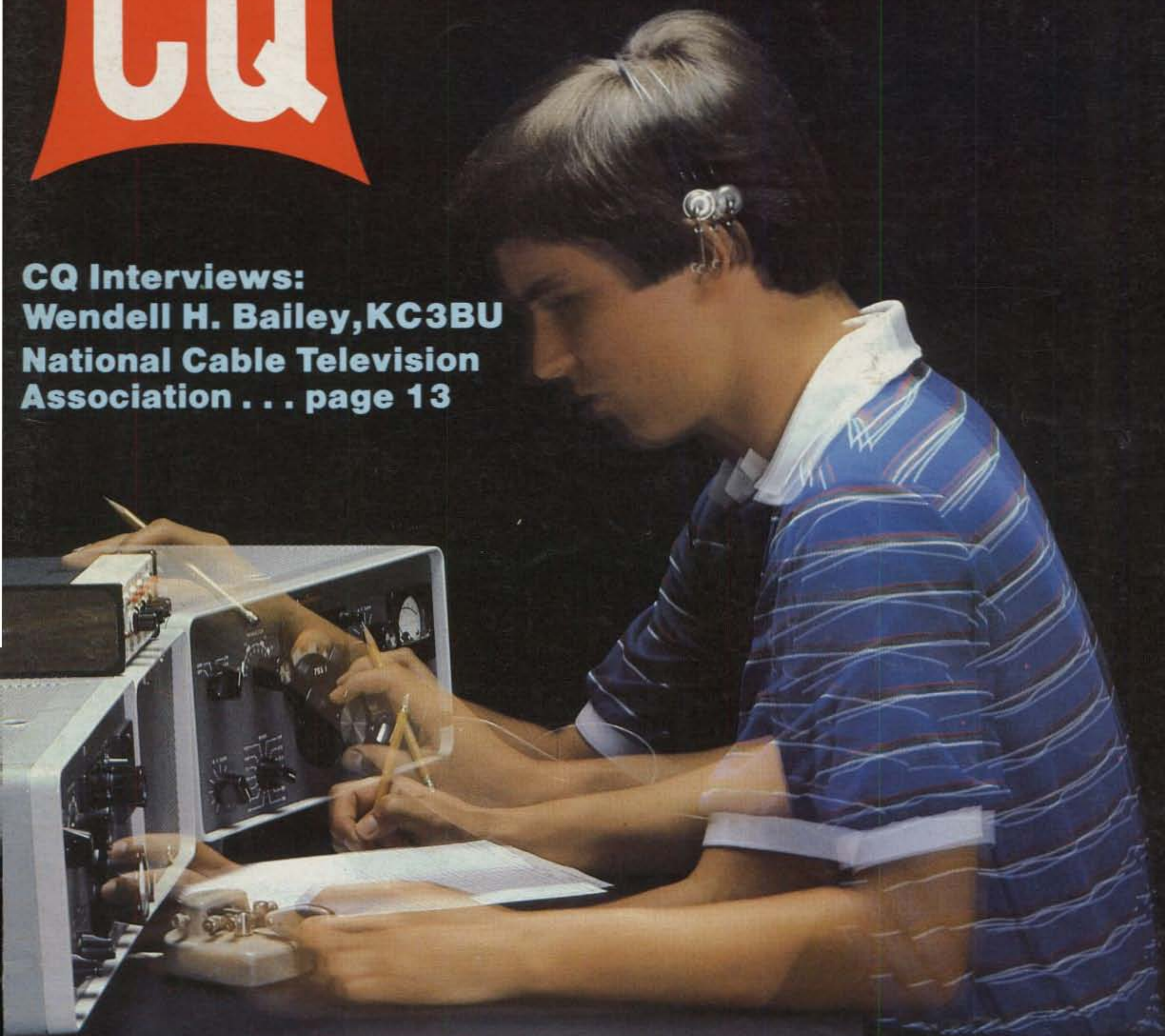
Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

OCTOBER 1982 \$2.00

CQ

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CQ World-Wide DX Contest
C.W. Results . . . page 20



THE RADIO AMATEUR'S JOURNAL

TR-2500

BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g. (1.2 lbs). 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.



CONVENIENT TOP CONTROLS



- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mA Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25 400 mA Ni-Cd batt.
- PB-25H Heavy-duty 490 mA Ni-Cd battery pack.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.



TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W. Low-300 mW.
- TX OFFSET switch, ± 5 kHz to ± 9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- WS-1 Wrist strap.
- EP-1 Earphone.



TR-9130

All mode (FM/SSB/CW) 25 watts, plus...!!!

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver. Available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- 25 Watts RF output on all modes, (FM/SSB/CW).
- FM/USB/LSB/CW all mode. Selectable tuning steps of 100-Hz, 1-kHz, 5-kHz, 10-kHz.

- Six memories. On FM, memories 1-5 for simplex or ± 600 kHz offset, using OFFSET switch, Memory 6 for non-standard offset. All six memories may be simplex, any mode.
- Memory scan.
- Internal battery memory back-up, using 9 V Ni-Cd battery; (not KENWOOD supplied). Memories are retained approx. 24 hours, adequate for the typical move

- from base to mobile. External back-up terminal on the rear.
- Automatic band scan.
- Dual digital VFO's.
- Transmit frequency tuning while transmitting, for OSCAR operations.
- Squelch circuit for FM/SSB/CW.
- Repeater reverse switch.
- Tone switch.
- CW semi break-in; sidetone.
- Compact size and lightweight.
- Covers 143.9 to 148.9999 MHz.



TR-9500

70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi-10 W, Low-1 W, SSB 10 W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.

- HI/LOW power switch. 25 or 5 watts on FM or CW.
- High performance noise blanker.
- RF gain control. • RIT circuit.
- Optional accessories:**
- KPS-7 Fixed station power supply.
- PS-20 Fixed station power supply (TR-9500 only).
- SP-120 External speaker.
- TK-1 AC adapter for memory back-up.



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

Watts to see...



Big LCD, Big 45 W, Big 21 memories, compact.

TR-7950

Outstanding features providing maximum ease of operation include a large, easy-to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950 FEATURES:

- NEW, large, easy-to-read LCD digital display**
 Easy to read in direct sunlight or dark (back-lighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+, S, -), sub-tone number (F-0, 1, 2, 3), tone, scan, and memory scan lock-out. Includes LED S/R/F bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- 21 NEW, multi-function memory channels**
 Stores frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex or ± 600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ± 600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" will sound.
- Choice of 45 or 25 watts output**
 The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts.
- Long-life lithium battery memory back-up**
 Built-in lithium battery has an estimated 5 year life.
- Automatic offset**
 The microprocessor is pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key allows manual change in offset.
- Programmable priority alert**
 The PRIORITY channel may be programmed in any of the 21 memories. With ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. An OPER switch allows an easy move to the PRIORITY channel.
- Programmable memory scan lock-out**
 "LO" key for programming scan to skip selected memory channels, without erasing the memory.
- Programmable band-scan width**
 The lower limit may be programmed into memory "A," and the upper limit into memory "B."
- Center stop during band-scan, with indicator**
 Stops in center of channel during band-scan, with center tuning indicator.
- Scan resume selectable**
 Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. A scan delay of approx. 1.5 seconds built-in.
- Scan control using up/down microphone**
 Momentarily pressing UP or DOWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DOWN automatic scan action. Scan start also possible using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch, or by pressing both UP/DOWN buttons simultaneously.
- Programmable sub-tone channels**
 Optional TU-79 3 frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.
- Built-in 16-key autopatch, with monitor**
 The keyboard functions as a 16-key autopatch during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.
- Front panel keyboard control**
 Used for selecting frequency, offset, programming memories, controlling scan, and autopatch encode. Keyboard lighting is provided.
- Extended frequency coverage**
 Covers 142.000-148.995 MHz, in 5-kHz steps.
- Repeater reverse switch**
 Locking-type switch, with indicator.
- "Beeper" amplified through speaker**
- Compact, lightweight design**
- Easy-to-install adjustable-angle mobile mounting bracket**

Optional accessories:

- TU-79 3 frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7 fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

More information on the TR-7950 and TR-7930 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD
 ...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.



ST-144/μP, 2 Meter FM



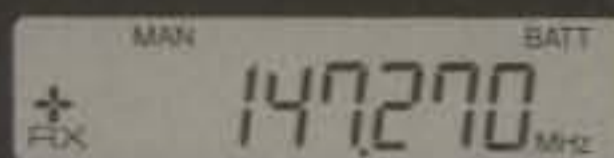
It's Time!

■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTEC technology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

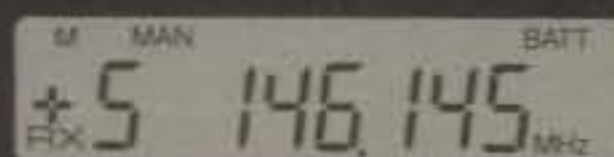
■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.



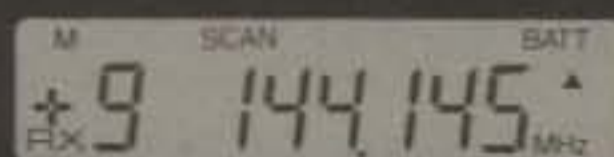
24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.



Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.



The Memory Mode is indicated by the small "M" above "+"; the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.



Memory Scan with "Priority Scan/Auto-Resume" has stopped on Memory 9 to listen for a few seconds.



Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.

—All stated specifications are subject to change without notice or obligation.—

Accessories for SANTEC Handheld Radios

- clockwise from upper left:
- Leather Case (ST-LC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

Sale of the ST-144/μP is subject to FCC certification: approval and availability expected January, 1982.



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Plano TX 75074

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 The ST-144/μP
 Authorized SANTEC Dealers

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 ADDRESS _____
 CITY _____ STATE _____ ZIP _____ CO _____

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MASTHEAD

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The Radio Amateur's Journal

ON THE COVER: No, the camera didn't move. It's just Trey Garlough, WN4KKN, practicing all of the skills needed to be a successful contester. Trey shows just how fast you have to be. Thanks to the camera artistry of Joe Veras, N4QB, he could capture this moment on film.



OCTOBER 1982

VOL. 38, NO. 10

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Zero Bias

AN EDITORIAL

The National Convention in Cedar Rapids this past July turned out to have some rather unique side benefits attached to it. Jack and I got to fly on an airplane that we had never heard of before and on a plane that we had never seen before. We did share the experience with some of the folks from the League as we flew from Chicago to Cedar Rapids. Most important, the weather and the prevailing winds were in our favor all weekend. The weather was perfect for a hamfest and the local winds were calm. This was a boon to out-of-towners like ourselves, as Cedar Rapids has a meat-packing plant on one side of town and the Quaker Oats Company on the other, so depending on which way the wind blows, you're sure to notice local industry.

The Convention started Friday evening with the exhibit hall open from 6:00 to 10:00 p.m. There were a large number of commercial exhibitors present, so everyone had lots to look at, plenty of dials to twist, and literature to pick up. There was a steady flow of hams (and non-hams) through the hall over the three-day period, and by Saturday evening we were out of magazines and most of the books we brought. I did manage to make a few passes through the flea market, but came up empty. The elusive bargain wasn't there for me. One of the exhibitors did have a good deal on hardware, and as I was buying some, Al Caplan, WØRIC, the new Sales Manager for Hy-Gain, passed by and asked one of the unkindest ques-

tions one ham can ask another. He said, "I see you at all these conventions and you're always buying stuff; what are you going to do with it?" Al obviously is not your typical amateur pack-rat who recognizes what most of us do: that a bargain is a bargain, and the widget will come in handy one day.

I got my picture taken with Paul DiNapoli, WD8AHO, as I passed the Encon booth. Paul and his brother Pete market a line of exotic solar panels and equipment which they are expanding to the amateur market. We're working on a review of their panels at this writing so that we can give you a report. Solar-powered repeaters and stations are no longer just a novelty. They work for a lot of people.

Jack and I flew back to New York on Sunday evening. The following Thursday I was off again, heading towards the Flagstaff, Arizona Hamfest. The plane blew a tire on landing in Phoenix, and that's always an interesting experience. I know that it is an infrequent occurrence, that the crews are well trained, and that the situation wasn't really that dangerous, but it does give you an exciting moment or two. I had a couple of hours in between my arrival in Phoenix and my flight to Flagstaff, so there was just enough time for Terry Dillahunty, KØUK (he's also HH2TD), of Signal/One to pick me up at the airport and drive me out to where they make the Millspec 1030. Don Roehrs, WA2SAB, gave me the quick tour (we were working against the clock), and then

after an even quicker lunch I was on my way back to the airport for the flight up to Flagstaff.

Contrary to my belief that Arizona is strictly desert country, let me tell you that there are some of the most beautiful mountain ranges to be seen in Arizona. Another small airline and an even smaller plane flying low through a summer storm gives you a spectacular perspective of the terrain. Flagstaff is up in the mountains not far from the Grand Canyon, and most importantly, it is a lot cooler than Phoenix. There are forests, mountains, and a lot of clear, clean sky to admire and appreciate. Lew McCoy, W1ICP, met me at the airport, and we went right to the Hamfest site (Fort Tuthill) to check it out and to see if any of the flea market people were setting up early (they were).

Lew drove up from New Mexico with his wife, Martha, and the three of us were at the CQ booth. Lew was also a speaker at one of the forums on Saturday afternoon, and Martha had been invited to be one of the judges at the Saturday evening dinner/dessert contest. It was a great four days—almost like a mini-vacation. There was a picnic-type dinner on Saturday night where roast beef and ham which had been cooked on a solar cooker were served (tender and juicy). As I mentioned earlier, solar power was in evidence, as several of the motor homes had solar panels for the amateur gear. There were plenty of bargains at the flea market, and I filled up the recesses of my suitcase with some terrific stuff. I even met some transplanted New Yorkers who I hadn't seen in a long time. (After seeing Arizona, I know why.)

A few days after I came home from Flagstaff, Dick left to cover a Hamfest in Maine. Besides giving me time to work on this issue, it gave me a free weekend for the big project!

The Big Project

Well, antenna fans, those neighbors of mine who didn't know that I was a ham no longer have any doubt. It's up! Starting at about 8:00 a.m. last Saturday morning, Woody, K2UU, and I, joined a little later by Jack, W2LZX, managed to get the tower on the roof, assemble and install the TH5DX plus the 2 meter Boomer, and run the cables. Everything seemed to work out exactly. Nothing was missing in the way of hardware, and it went together in just about 8 hours. The only thing that was missing was the person to take the pictures. We were all too busy working. The next stage is the grounding system and the pictures, plus a write-up on the project.

73, Alan, K2EEK

KV4AA Silent Key

The world-renown call King Victor 4 Able Able is no more. Richard, "Dick" Spenceley, KV4AA, became a Silent Key, succumbing to a massive heart attack at 0800Z on July 30th. He was 77 years old.

Dick had been a resident of the Virgin Islands for over 55 years, starting as K4AAN in 1927 and retaining the call KV4AA from 1941 to date. He was a mem-

ber of the FOC and QCWA and one of the early stations to make DXCC and WAZ. In 1969 he was the fourth person to be elected to CQ's DX Hall of Fame.

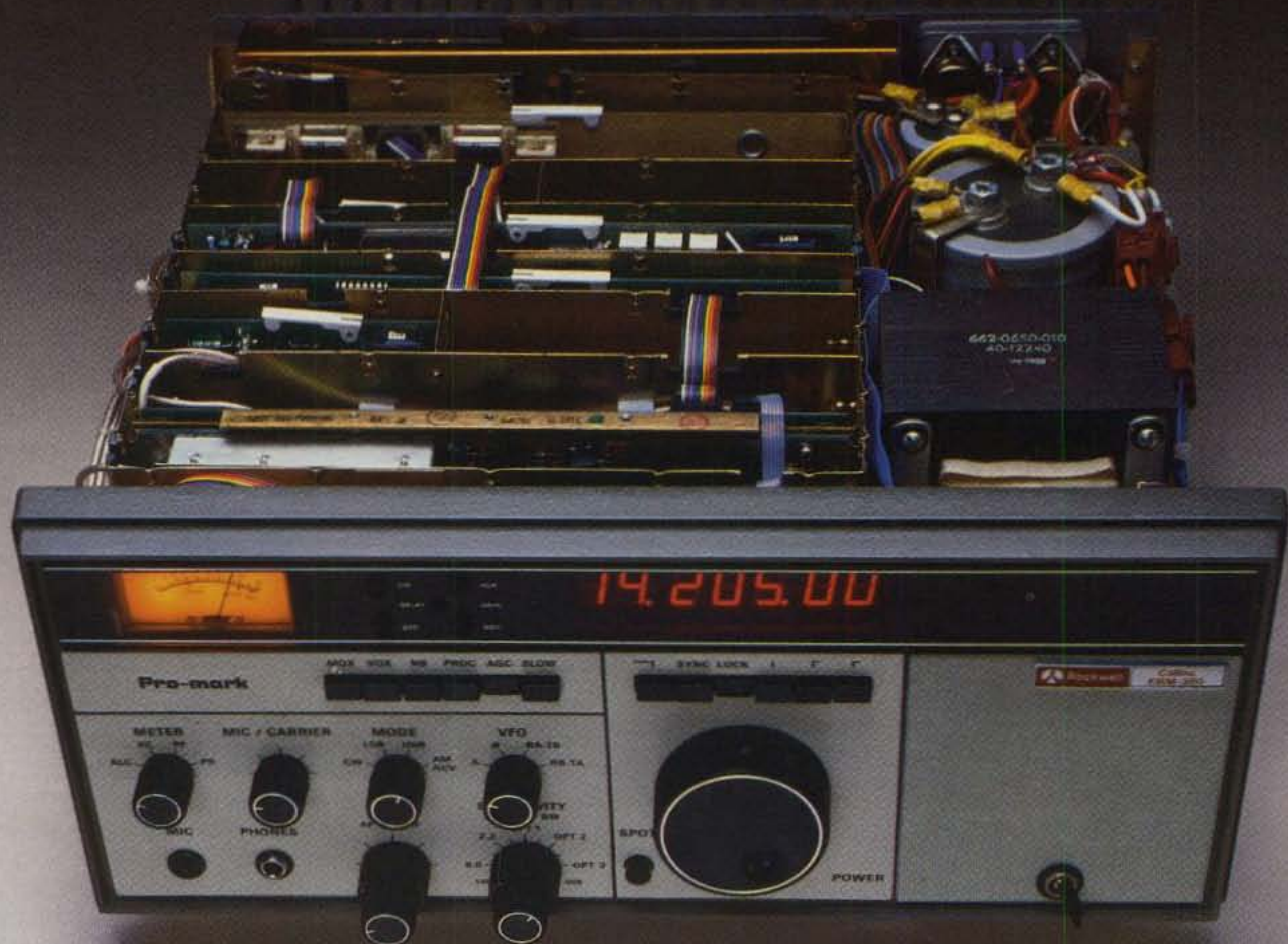
As DX editor of CQ from 1951 to 1959, he created the WPX program. He was also one of the founders of the YASME Foundation, acting as its President from 1959 to 1965. He was instrumental in getting Danny Weil started as VP2VB on the first of many world-wide DXpeditions

sponsored by YASME.

His last project was to get amateur radio into the *Guinness Book of World Records*. His claim of 195,000 contacts in a six-year period from (1976-1981) is now being considered. It would be a fitting reward for his 55 years of devoted service to amateur radio.



The real beauty of the Collins KWM-380 is behind the panel, not on it.



At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually



unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter. Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.



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END FED
NO RADIALS
NO REFLECTED
POWER
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PORTABLE
REMOTE TUNING
2 KW PEP
UPS SHIPPABLE

R3

R3 may be the perfect antenna for condominiums, apartments, small lots or any limited space situation. It is a great antenna for hams who are concerned about neat appearance and maximum performance.

R3's self supporting radiator is only 21ft-6.4m high x 1ft .304m wide at the base. Assembly is quick and easy for portable, marine, field day, DX-peditions, or fixed installations. It is complete with remote tuner.

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DEALERS WORLDWIDE

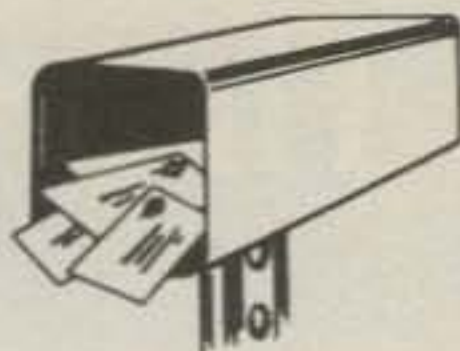


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TELEX 953050



Our Readers Say



More S.W.L. Articles

Editor, CQ:

First let me say how much I enjoy your fine magazine. I almost devour the Novice, QRP, World of Video, Propagation, and Antenna columns between the mailbox and my front door! Your special-topic issues are a wealth of knowledge to all, not just hams alone.

I say all, because hams are not the only ones to value this information. As a long-time s.w.l. (32 years) and a short-time ham (Novice, May this year), I feel the one column your magazine lacks is an s.w.l. column! Bill Welsh's Novice Column series on s.w.l.'ing is but one fine example of what you have to offer the s.w.l. and/or ham. Past s.w.l. letters, including non-ham subscriber comments, attest to this fact. A steady monthly diet of the caliber you are now printing on the subject would be good for both parties—the s.w.l. and your circulation! I for one intend to continue to enjoy both aspects of my hobby, one which is an old friend and the other, a new birth, one that was planned and now is relished!

Thomas B. Henchy, KA7NDH
Murray, UT

Let's Hear It For QRP!

Editor, CQ:

I am writing to express my appreciation for the QRP coverage in the June 1982 issue. It is my impression as a beginning ham that low-power operation is a healthy movement in amateur radio. My enjoyment and success as a Novice using an HW-8 has provided for me: (1) the proof of the possibility of QRP success for a beginner (though, admittedly, several years of listening preceded the license), and (2) the incentive to upgrade to obtain wider frequency range (I just padded the General exam).

So, I have certainly appreciated the QRP coverage in the June issue and the articles by Adrian Weiss and would like to encourage their continuation.

Dan Smelser, KA4WHV
Vidalia, GA

A "Super" Antenna Issue

Editor, CQ:

Thanks much for your "super" antenna issue (August 1982)! Being new in amateur radio, I was impressed with the quality of the articles and how informative they were.

I have been licensed for four months—seven weeks as a Novice and now General class. I have been curious about long-wire antennas for awhile now, and the article by Philip Rand, W1DBM ("Long Wire Antennas, page 13) helped answer a lot of questions. But the article on open-wire feed lines by Lew McCoy, W1ICP (page 40) really opened my eyes. I had been told so many different things about this, that I didn't know what to think. Now that I understand the subject better, my choices will be easier to make. I am using 1/2-wave dipoles now, and I am not satisfied that they are giving me the performance I desire. Thanks again for a great magazine!

Michael Schrowang, KA9NGZ
Granville, IL

Crosby Info, Anyone?

Editor, CQ:

Tnx for the reminder that my subscription was about to run out. You're right. I wouldn't want to miss an issue, and you're also right that I keep every issue for reference. CQ has found the correct formula for the right balance of articles on construction, contests, historical and new techniques, etc., to make it the best.

Like most hams, I am a "goodie" collector, and a few years back I acquired a surplus, commercial 100-watt Crosby transmitter/receiver. It tunes from 1.5 to 7.5 MHz, and I would like to use it on the low amateur bands.

The s.s.b. transmitter type 161B and the receiver type 166 were built by the Crosby Co. of Hicksville, NY, for the Hudson Bay Co., who used it across northern Canada to link their stores and trading posts. From what I can remember, Dr. Crosby was an electronics genius who, among other things, invented a method of f.m. stereo that now appears to have been superior to the RCA system that was chosen for the industry standard.

Dr. Crosby has since died, and it appears that the company is no longer in business. I was wondering if you could make a few local calls to the Crosby's still living in Hicksville to find out if there is a source I can contact for the manuals and schematics. Your help would be very much appreciated.

George J. Devin, VE6BGJ
Edmonton, Alberta, Canada

(Phone calls to the Crosby's still in Hicksville proved fruitless. Any readers out there who can help?—ed.)

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● **10 Meter Dungeons and Dragons Net** - This new net is on the air at 28.720 (also check 28.820) ± QRM Saturdays at 1500 GMT. Be ready with all necessary info. Net control is KA9JOX. If you wish to participate regularly, contact Michael Frost, KA9JOX, Box 1008, Riverside, IL 60546.

● **Smith-Kettlewell Technical File** - This periodical for the visually handicapped interested in current technology is now available in braille, on cassette, and in large print. It is aimed at those hobbyists, students, and professionals interested in construction techniques, IC pin diagrams, test equipment adaptations, and more. There is a subscription fee to cover production costs, as this is a non-profit organization. For a sample issue contact Editor, William A. Gerrey, Smith-Kettlewell Institute of Visual Sciences, 2232 Webster St., San Francisco, CA 94115, or phone 415-561-1619.

● **Bill Gremillion Memorial Radio Club** - The club will operate K4SEX on Saturday, October 2, for county hunters (Heard County, GA). Frequencies: General class portion of phone bands on 10, 15, 20, 40, and 80 meters. C.w. available. S.a.s.e. for confirmation to Bill Gremillion Memorial Radio Club, P.O. Box 2327, Newnan, GA 30264.

● **W2GSA Special Event** - The Garden State ARA, call W2GSA, will hold the Treasure Island DXpedition, Monmouth County, NJ, to commemorate the stay of Robert Lewis Stevenson on the island. It will be held from 1400 GMT October 2 to 1400 GMT October 3 on 3.535 and 14.035 c.w., and 3.900, 7.235, 21.375, and 28.725 s.s.b. For a QSL/certificate send \$1.00 to Lou Eloe, WA2SSH, 7 Carol Ave., Neptune, NJ 07753.

● **Coosa Valley ARC From Rome, GA** - This club will operate to commemorate Heritage Holidays from 1200Z October 9 to 2200Z October 17, 25 kHz on the lower side of the General class phone band 80 through 10 meters. Special certificate for large s.a.s.e. Endorsement for Wagon Train mobile on October 16 to CVARC, Box 183, Rome, GA 30161. (No call given.)

● **Argonne ARC to operate W9QVE** - Two stations will operate on October 9-10 from 1500-2300 GMT to commemorate the first controlled nuclear chain reaction experiment. Frequencies: s.s.b.—3985, 7285, 14285, 21285, 28585 kHz; c.w.—3545, 7045, 14045, 21045, 28045, 3765, 7165 kHz; Novice band 21165 kHz; RTTY 14090 kHz and 146.70 MHz; plus 2 meter 145.19/144.59 MHz repeater, and 146.52 and 147.42 MHz simplex. Send business-size s.a.s.e. or \$1.00 for certificate to AARC, P.O. Box 275, Argonne, IL 60439.

● **WD4KOW from Sunbelt Agricultural Exposition** - This Colquitt County Ham Radio Society will operate on October 12-13 from 0900-1700 EDST each day using the call WD4KOW. Operations will be in the General portions of the h.f. bands, plus repeater on 146.19/79. A special QSL card is available for an s.a.s.e. For more information, contact Joel Goings, AA4P, CC Ham Radio Society, P.O. Box 813, Moultrie, GA 31768.

● **Moscow, MI, DXpedition** - The Hillsdale County Radio Amateurs Assoc. will hold their second annual Moscow DXpedition to Moscow, MI, from 1700Z October 16 to 1700Z October 17 under the call WB8HIZ. Frequencies: 3.940, 7.260, 14.285, 21.360, 50.120, 52.525, 144.310, 146.57 MHz. Exchange will be signal report, name, and QTH (except Moscow station—serial number). All QSL's with an s.a.s.e. will receive a certificate. Send to Ham, P.O. Box 206, Moscow, MI 49257.

● **Madison County ARC Hidden Transmitter Hunt** - This

event will be held on October 17. Starting point will be Mounds State Park, Anderson, IN. Prizes will be awarded. Contact: Frank Dick, WA9JWL, 921 Isabelle Dr., Anderson, IN 46013, phone 317-642-1237.

● **Mount Sunflower DXpedition** - K0EQH will operate from the highest point in Kansas in Wallace County on October 23-24 from 1700Z on the 23rd to 1700Z on the 24th on s.s.b., c.w., RTTY, and f.m. from 160 through 2 meters. To set up skeds, contact the Western Kansas DX Society, P.O. Box 811, Garden City, KS 67846. S.a.s.e. for commemorative QSL.

● **Special Events Station W3WP** - W3WP will operate for 24 hours on October 24 from Penn's Landing, Philadelphia, PA, to celebrate the birthday of William Penn. Exchange: RS(T), city, state, country, and W3WP log number. Frequencies: phone—3.925, 7.275, 14.290, 21.365, 28.550 ± QRM.; c.w. just inside high end of each band; also repeater 146.685/.085. S.a.s.e. for QSL to Harry White, N3HW, 7520 Verree Raod, Philadelphia, PA 19111.

● **The following hamfests, etc. are slated for October:**

Oct. 1-3, **ARRL West Gulf Div. Convention/Houston Convention 82**, Houston, TX. Contact Houston Convention 82, P.O. Box 79252, Houston, TX 77279; call 713-481-4586.

Oct. 2, **Pack Rats Hamarama 82**, Warrington, PA. Contact Hamarama 82, P.O. Box 311, Southampton, PA 18966, or call K3MXM at 215-635-4942.

Oct. 2, **RAGS Hamfest**, Syracuse, NY. Contact Ed Swiatkowski, 5 Colony Circle, Camillus, NY 13031.

Oct. 3, **31st Annual Rock Hill Hamfest**, Rock Hill, SC. Contact YCARS, Box 4141 CRS, Rock Hill, SC 29730.

Oct. 3, **RA-COM 82**, Mt. Prospect, IL. Contact RA-COM, P.O. Box 89, Mt. Prospect, IL 60056 (s.a.s.e.).

Oct. 3, **1982 Rome Hamfest**, Rome, GA. Contact Buddy Waller, NO4U, 18 London Lane SE, Rome, GA 30161.

Oct. 3, **San Angelo Amateur Radio Swapfest**, San Angelo, TX. Contact Mark Haskell, Rt. 3 Box 92, San Angelo, TX 76903.

Oct. 8-10, **1982 Pacific Division Convention**, Santa Cruz, CA. Contact SCCARC Convention, P.O. Box 238, Santa Cruz, CA 95061; call 408-426-6691.

Oct. 9, **Headwaters ARC Hamfest**, Park Rapids, MN. Contact Ed Delahunt, K0GUV, RR 3, Park Rapids, MN 56470.

Oct. 9, **Western North Carolina Autumnfest**, Leicester, NC. Contact Robert Sawinski, RR 2 Box 267A, Leicester, NC 28748.

Oct. 9-10, **ARRL Virginia State Convention & Tidewater Computer Show**, Virginia Beach, VA. Contact Jim Harrison, N4NV, 1234 Little Bay Ave., Norfolk, VA 23503; call 804-587-1695.

Oct. 10, **Columbia ARA Hamfest**, Columbia, MD. Contact Sue Crawford, 6880 Mink Hollow Road, Highland, MD 20777.

Oct. 10, **CMARC Ham-Fair 82**, Grand Ledge, MI. Contact Ham-Fair 82, P.O. Box 10073, Lansing, MI 48910; call 517-626-2237.

Oct. 10, **21st Annual Hoosier Hills Hamfest**, Bedford, IN. Contact Dick Reistter, KA9JTZ, Hoosier Hills Ham Club, Box 891, Bedford, IN 47421.

Oct. 16-17, **Amacom 82**, Delgado Community College, City Park, LA. Contact Bill Bushnell, WA5MJM, c/o Jefferson ARC, P.O. Box 73665, Metairie, LA 70033; call 504-887-5022.

Oct. 17, **DXPO 82**, Washington, D.C. area. Contact W3UJ, 11803 Enid Dr., Potomac, MD 20854.

Oct. 23-24, **Hamfest Chattanooga 82**, Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404.

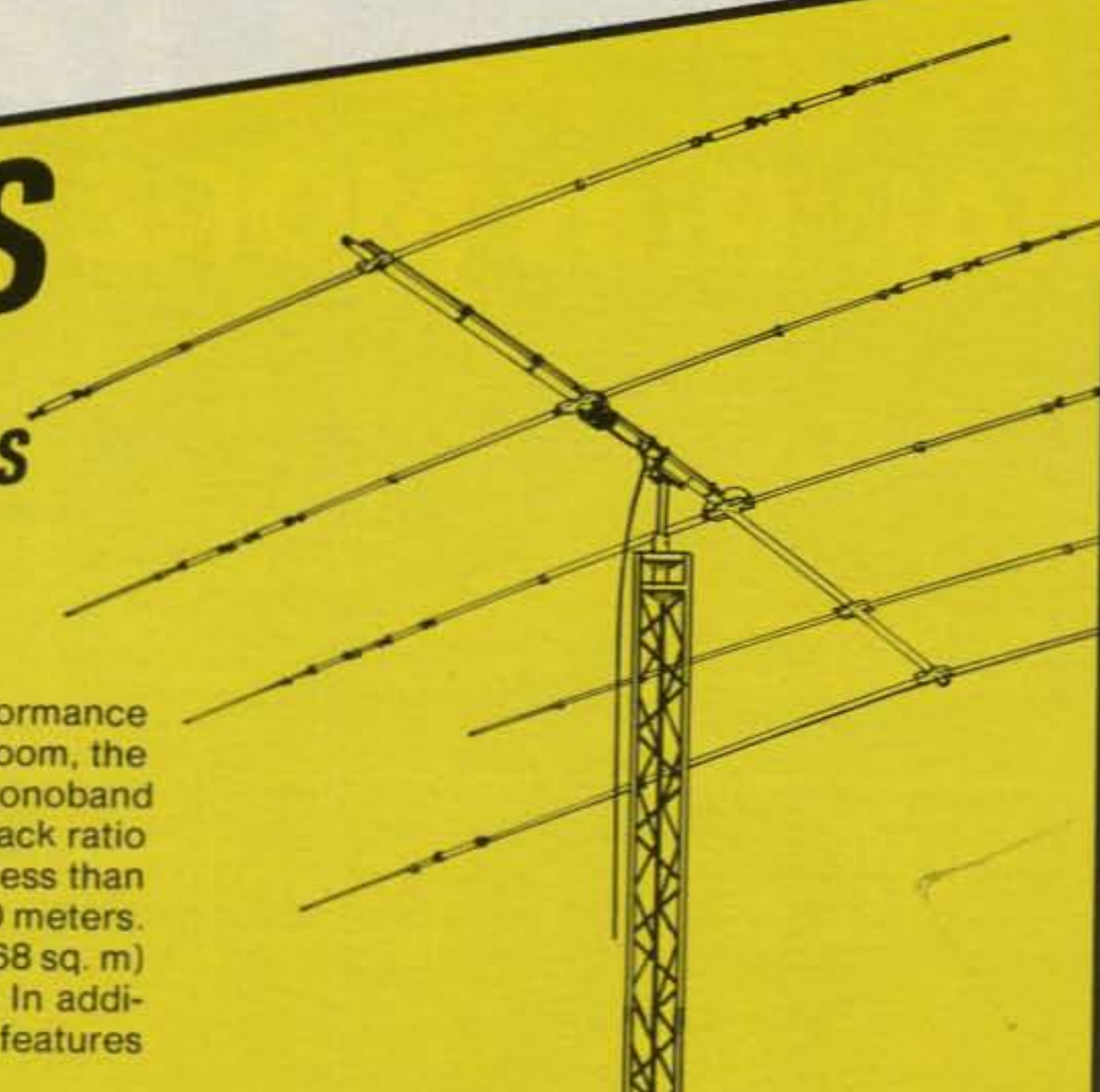
Oct. 30-31, **1982 ARRL Hudson Div. Convention**, Great Gorge, NJ. Contact HARC Convention, P.O. Box 528, Englewood, NJ 07631 (s.a.s.e.).

Oct. 31, **Heart of Ohio Ham Fiesta**, Marion, OH. Contact Paul Kilzer, W8GAX, 393 Pole Lane Road, Marion, OH 43302.

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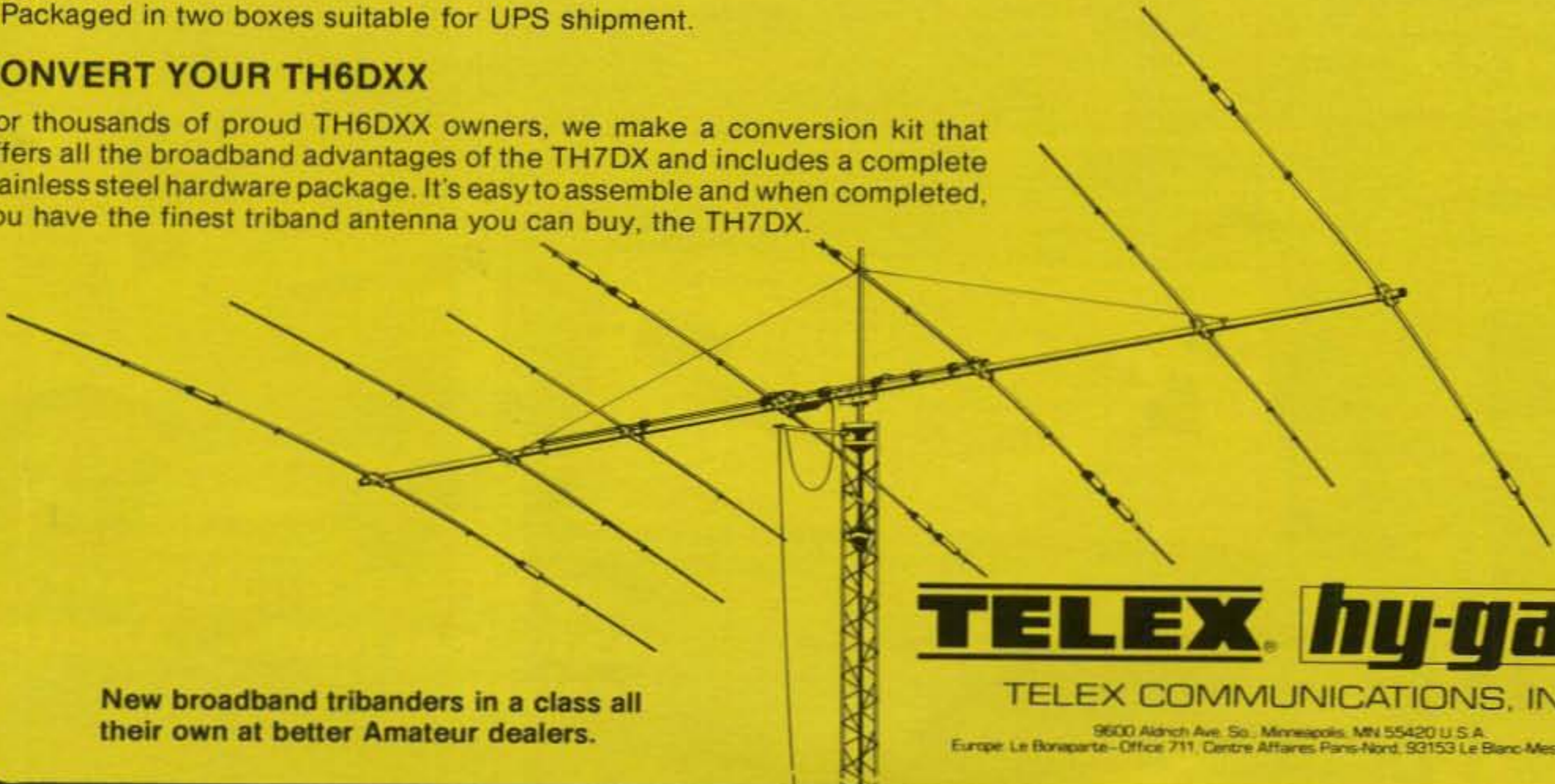
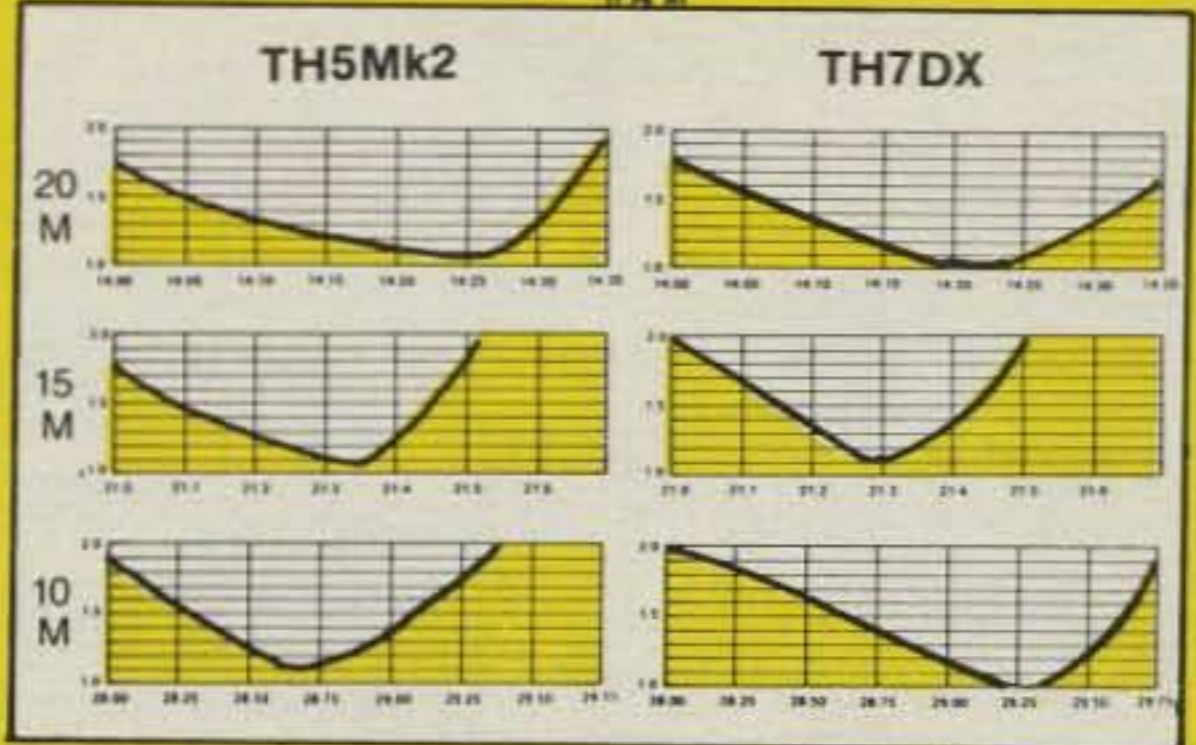
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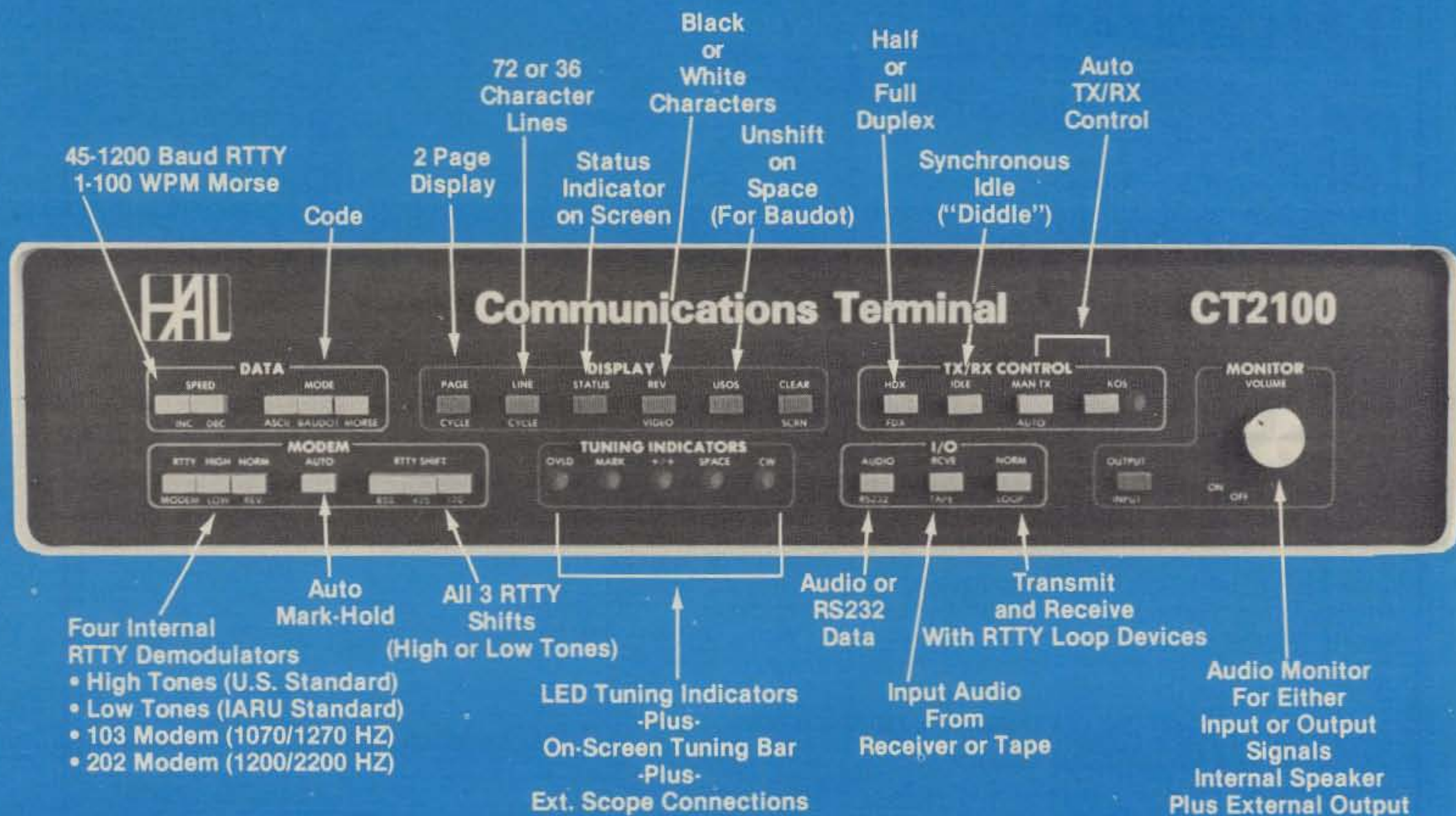
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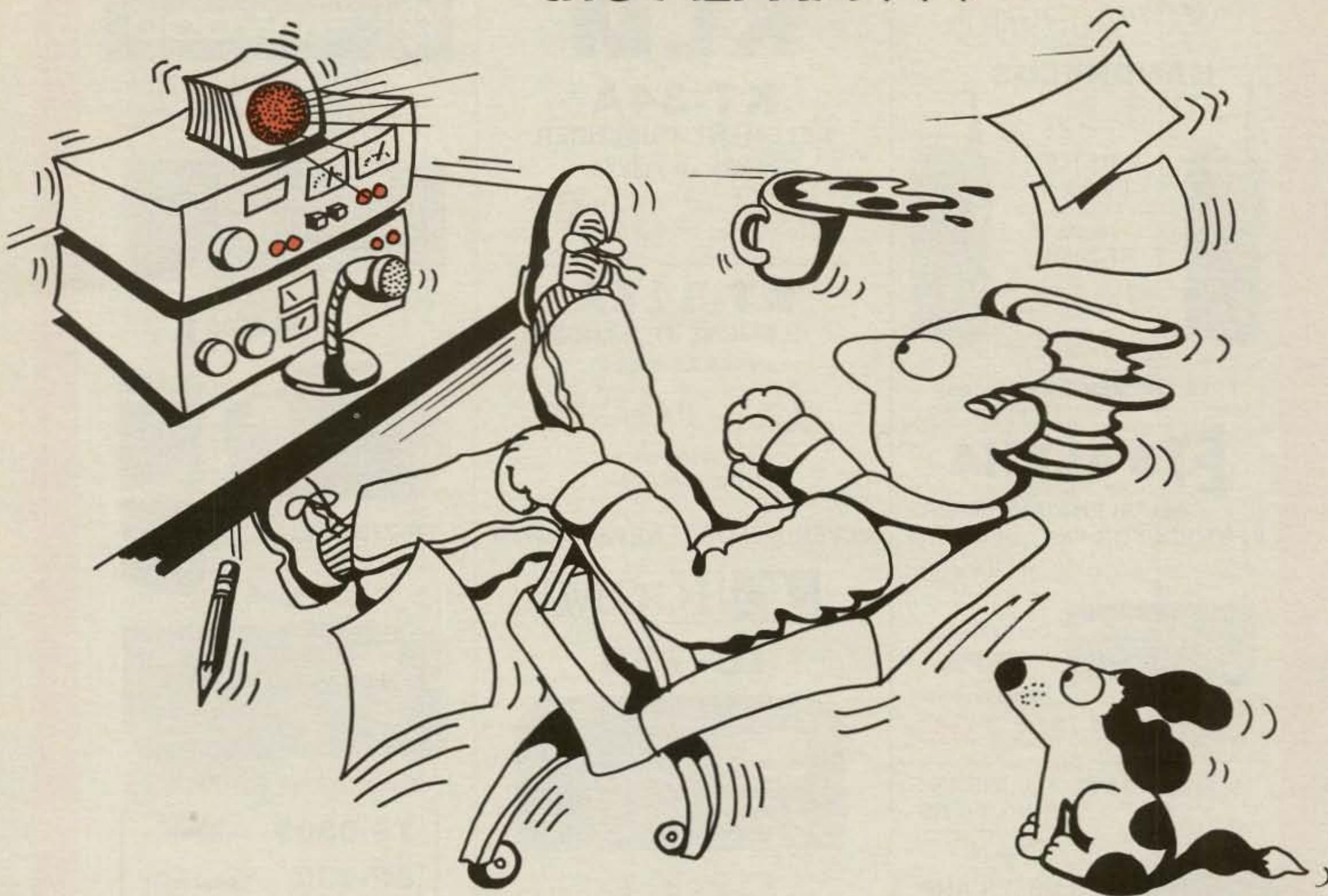
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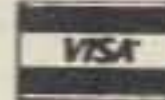
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CQ Interviews:

Mr. Wendell H. Bailey KC3BU

Vice President Science and Technology Dept. National Cable Television Assoc. Washington, D.C.

BY DR. THEODORE J. COHEN, N4XX

Wendell H. Bailey is Vice President of the Science and Technology Department of the National Cable Television Association (NCTA). He has held this position since April 1981.

Prior to joining NCTA, Mr. Bailey spent eight years at MCI Telecommunication Corporation in Washington, D.C. Here, he held a variety of positions including circuit engineer, senior engineer, and manager of operations. He also served as the Manager of Engineering, Planning, and Coordination for the five years prior to joining NCTA. Before joining MCI, Mr.

Bailey spent seven years at AT&T where he specialized in private-line communications, radio, and switching systems.

A native of Kentucky, Mr. Bailey has lived most of his life in the Washington, D.C. area. He is a graduate of the University of Maryland, and is an active amateur radio operator (KC3BU). Wendell, his wife, and daughter live in Fort Washington, MD.

It is with great pleasure that CQ now presents its exclusive interview with Mr. Bailey on the vexing problem of cable television interference.

CQ: Wendell, what is the nature of the cable television interference (CATVI) problem?

Bailey: Simply put, CATVI is interference that hams may experience from a cable television system. The interference is the result of faults in the system, such as loose connectors. If these faults occur in close proximity to amateur stations operating on the 2-meter band, enough of the TV signal may leak out and cause sensitive receiving gear to react.

CQ: But isn't a leaky cable system a "two-way street"?

Bailey: Oh, yes! The same faults that per-

mit TV signals to leak out also provide paths for signals to enter a cable system. Therefore, a ham who operates his or her rig in a perfectly legal manner can get into a leaky cable system and disrupt service on certain channels. Such a disruption in service is not the ham's fault, and the FCC Rules lay the responsibility to "tighten up" such a system against these occurrences with the cable system operator.

CQ: How is the interference characterized in each case?

Bailey: To hams, the interference most frequently takes the form of a squelch break or a steady carrier on 145.25 MHz. To the cable system viewer, the problem may vary from mild interference to complete picture distortion on a specific cable channel.

CQ: Do the cable industry and the amateur community consider CATVI to be a serious problem?

Bailey: Yes! Hams have a long history of fighting for the right to use their frequency bands unmolested by interlopers. The cable industry, on the other hand, has to use an expanded set of channels in order to meet the programming requirements laid on them by franchising authorities. Loss of frequency use by either or both parties, therefore, is considered to be a very serious matter.

CQ: Just what are the r.f. leakage standards imposed by the FCC?

Bailey: The leakage standard germane to this issue is: Thou shalt not leak a signal of more than 20 microvolts-per-meter measured at 10 feet.

CQ: But aren't new standards being proposed which are less stringent?

Bailey: Yes, but not without good reason. Currently, the FCC has a docket under consideration (*Docket 21006—ed.*) which addresses signal leakage levels for cable systems. This docket is concerned, in particular, with the problem of potential interference to communications on the FAA's aeronautical frequencies. As part of the inquiry, a long and exhausting research project was sponsored by the FCC to characterize this type of interference. Participating in the study were representatives of the FAA, NTIA (*National Telecommunication and Information Agency—ed.*), NCTA, and other groups.

*8603 Conover Place, Alexandria, VA 22308

CQ: What, specifically, was the result of the study?

Bailey: The net result was a recommendation to relax the signal leakage rules, with the levels suggested in the range 50 to 100 microvolts-per-meter at 10 feet. I would like to point out that relaxation of the radiation standards is being recommended only after a very thorough analysis into the facts of this particular problem. No such effort has yet been undertaken in the matter of interference to and from amateur communications. However, the NCTA Engineering Committee has recommended that this type of study be initiated as soon as possible.

CQ: Legal actions by amateurs in several parts of the country have apparently been taken to force a number of cable operators off cable channels E and K (145.25 MHz and 223.25 MHz, respectively—ed.). Would you comment on this?

Bailey: Ted, I've heard rumors to this effect, but to date, I have seen only one report about a cable system losing the use of a channel in this way. According to the report, the system did not comply with the FCC standards on leakage, and the system's operator was unwilling even to make an attempt to comply. If this is really true, the FCC Rules are clear: this operator cannot use the channel in question until he is willing to comply with the FCC Rules.

The NCTA is working on a joint engineering committee which was formed to research the CATVI problem as it involves the amateur service.

CQ: What steps has the NCTA taken, and what steps do you plan to take, to eliminate CATVI problems?

Bailey: The major step taken by the NCTA is to offer to work with the ARRL in order to educate both the cable industry and the amateur community as to the nature of CATVI problems and ways in which our two groups can live together. In this regard, we are working to establish liaison with the ARRL. Further, the NCTA is working on an engineering committee to research the CATVI problem as it affects the amateur service.

CQ: Wendell, what specifically has the NCTA done to educate cable operators about CATVI as it affects the amateur?

Bailey: The NCTA has recently reprinted several articles on CATVI from *QST* as part of a special message on the subject from NCTA's Office of Science and Technology to cable operators around the country. This material appeared in the June issue of our journal, *Techline*. This issue was sent to every member of NCTA and to every member of the Society of Cable Television Engineers. In addition, 500 copies were distributed by CATA (*Community Antenna Television Association—ed.*) at their annual convention. All together, some 10,700 copies were mailed or distributed, making this the largest circulation of any NCTA document ever.

We have developed a procedure to assist in resolving individual CATVI complaints at the local level.

CQ: But what about CATVI complaints? What is being done to resolve them?

Bailey: We have developed a procedure to assist in resolving individual CATVI complaints at the local level. In particular, the ARRL has developed a questionnaire which will be completed by the amateur who receives a CATVI complaint, by the League, or by the NCTA, as the case may be. The form is designed to determine if the most effective steps have been taken to eliminate the problem. If not, methods which most likely will lead to an amicable solution are recommended.

CQ: But what if the problem still remains?

Bailey: The reporting procedure allows for referrals of complaints to the NCTA liaison office headed by Mr. Robert Dickinson, W2CCE. He will contact the cable system operators in order to determine how the problem can be resolved. If Mr. Dickinson's efforts are unsuccessful, the problem will be referred directly to NCTA for follow-up. We will then contact the owners and/or operators of the system in question and will make every effort to work out a solution.

CQ: How effective have you been in resolving CATVI problems in this manner?

Bailey: Ted, it is too early to claim a great deal of success. However, by the time this interview is published, I hope we can report that the overall CATVI problem is diminishing as a result of our efforts.

CQ: How do you feel about regulatory solutions to CATVI?

Bailey: I think that both the NCTA and the ARRL believe CATVI problems can best be resolved through sincere cooperation

between the cable operators and the amateur community. Regulatory involvement can lead to delays and animosity between these two groups, both of whom have a stake in the success or failure of each other's service.

CQ: What do you mean by your last statement?

Bailey: Well, hams have much to gain from the successful operation of a cable television system in their community. As for the cable industry, we are hungry for technicians and engineers, and we look to the amateur community for well-trained and interested people.

Amateurs should work with the chief engineer of the cable system involved to pinpoint problems and to effect solutions.

CQ: Is there anything amateurs can do to resolve CATVI problems at the local level before contacting the ARRL?

Bailey: Yes, there is, Ted. Amateurs should work with the chief engineer of the cable system involved to pinpoint problems and to effect solutions. This effort should be undertaken in a friendly manner by both parties. If success is not achieved, the ham should then call the ARRL and should be prepared to explain what steps have been taken. The established procedures I just mentioned will then be put into effect, and if necessary, the NCTA will become involved.

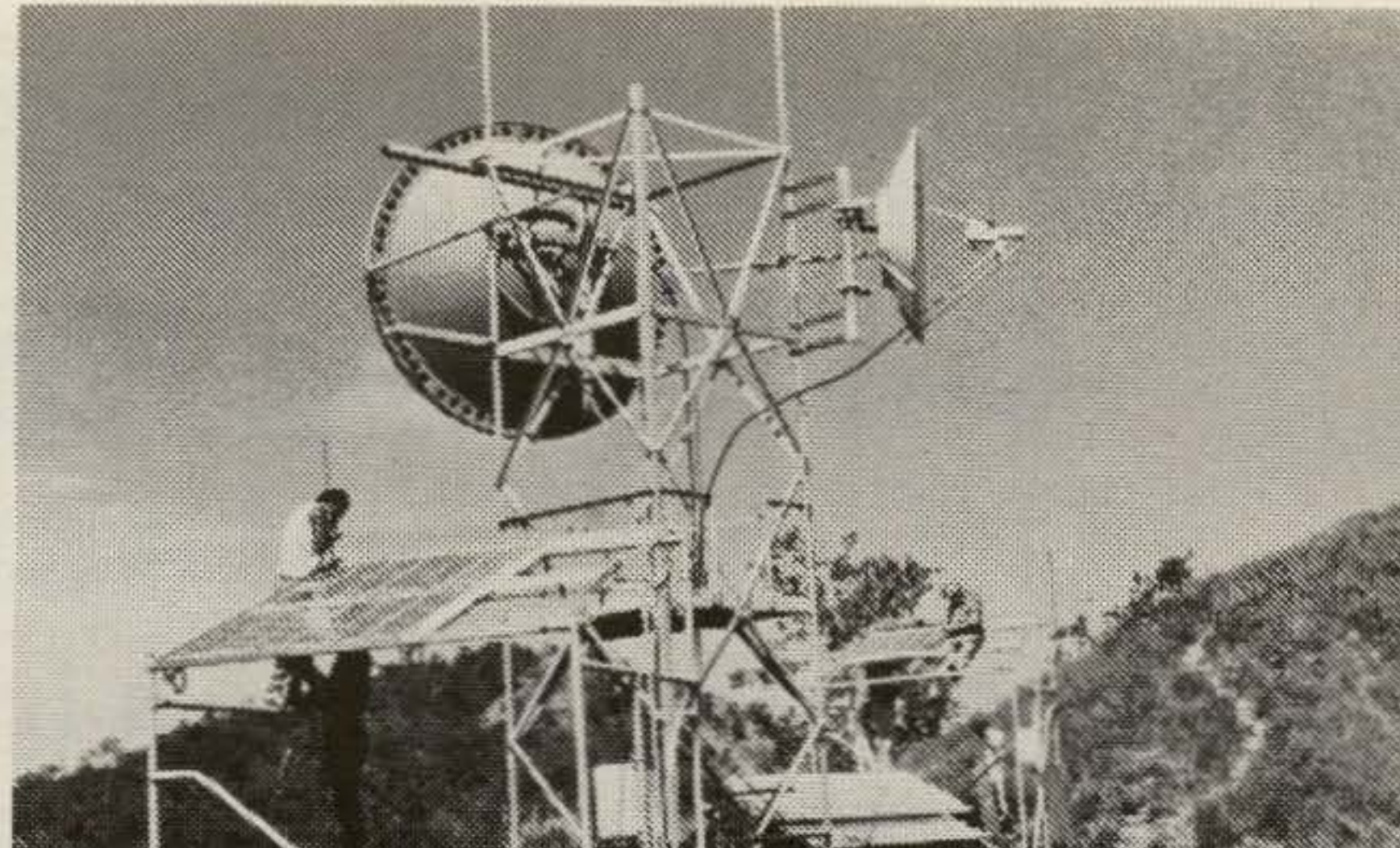
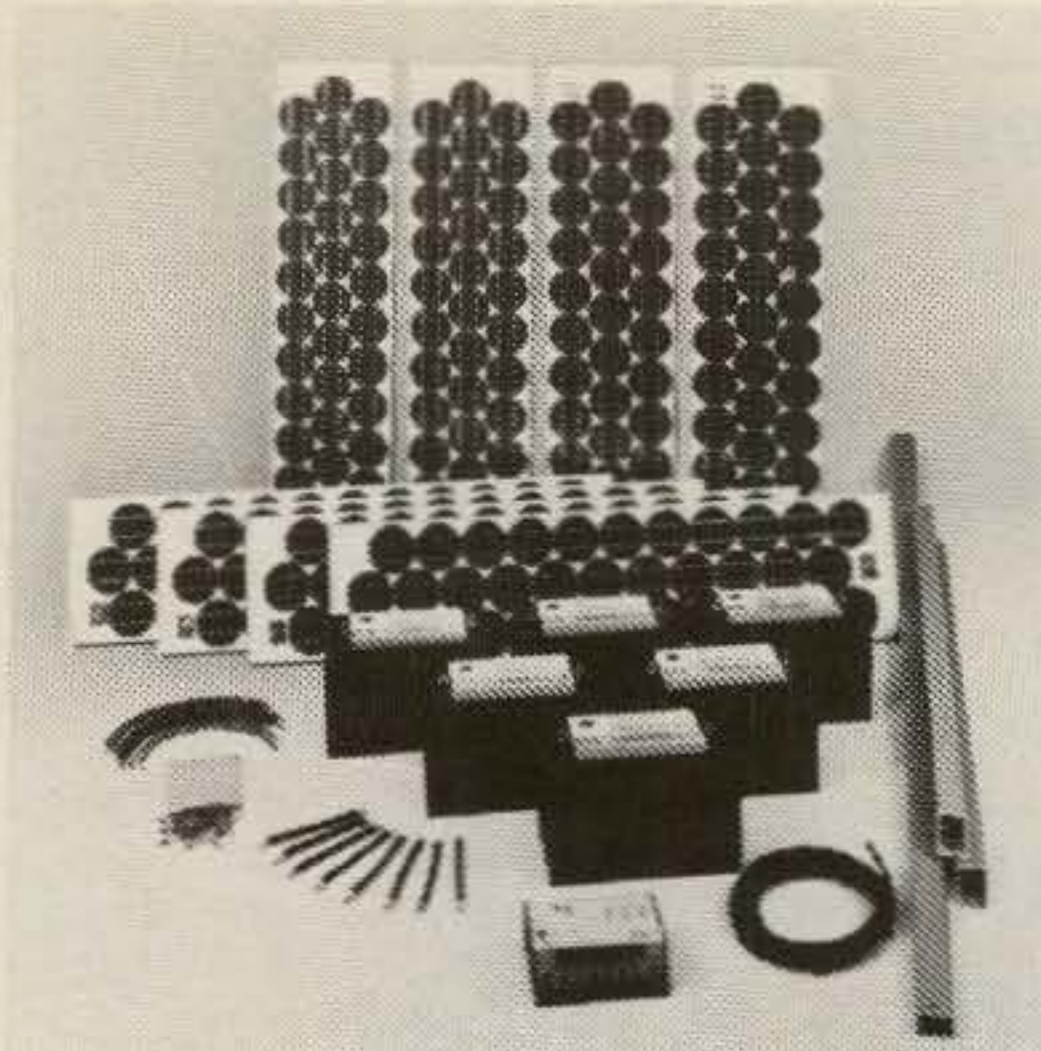
We can all live together if we cooperate instead of fight. I am confident that the first steps towards . . . coexistence have been taken.

CQ: Wendell, one last question. Do you think the cable television industry can co-exist with amateurs on cable channels E and K?

Bailey: We can all live together if we cooperate instead of fight. I am confident that the first steps towards this type of coexistence have been taken.

CQ: Thank you very much for this enlightening view of your Association's activities.

Bailey: I appreciate having had the opportunity to discuss our work in CQ!



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CIRCLE 37 ON READER SERVICE CARD

With the CQ WW DX C.W. Contest coming up, here is one way to improve your chances.

Civilizing The AEA CK-1 Contest Keyer

A Few Ideas on Improving a Popular and Versatile Keyer

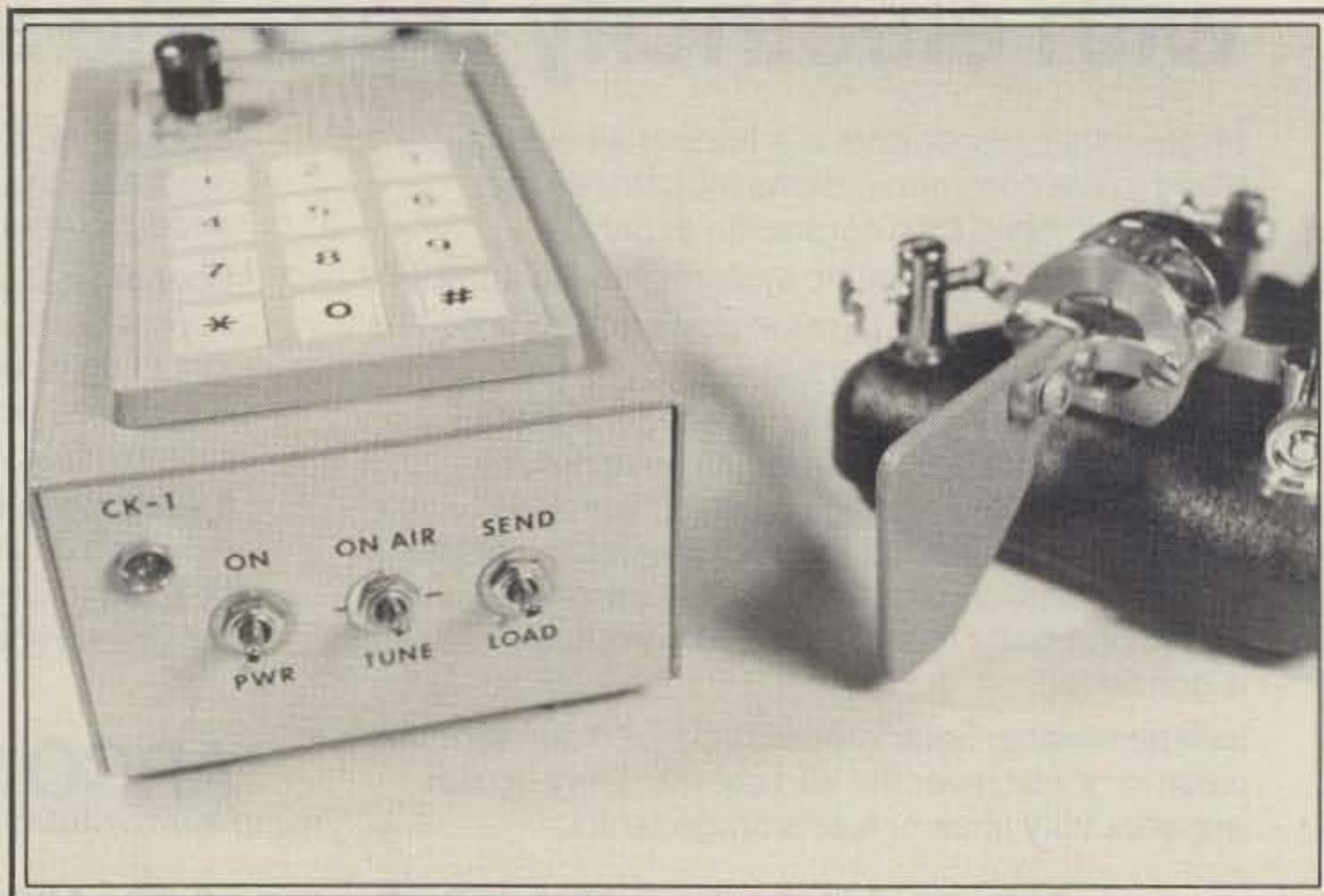
BY STEPHEN E. RUSSELL*, W0OGJ

The mark of success or longevity in a product line in the amateur radio industry is when a product is held onto by its owner and modified to make it even better. W0OGJ reworked his AEA CK-1 Contest Keyer to do just that—make it better.
—K2EEK

My passion is c.w., and electronic keyers. While I prefer to build them, occasionally a commercial keyer comes along with features too fantastic to resist. Such was the case with the CK-1 Contest Keyer. When AEA announced the CK-1 with features such as 10 memories, 500-character memory capacity, digitally selected speed from 1 to 99 w.p.m., pre-set speeds, automatic serial-number generator, dot and dash memory, weighting, etc., I had to have one.

I found the CK-1's microprocessor circuit amazingly flexible. However, the keyer is designed somewhat unconventionally and has a few features that didn't fit well with my existing station. Specifically, I didn't care for the connectors (DIN jack for paddle input, RCA phono jack for keying output) and the location of the **Send/Load** switch, which is positioned on the left side at the rear and is not labeled as to which position is which. The audio from the small internal speaker leaves something to be desired. In addition, it requires an external a.c. adapter, and even with rubber feet I found the keyer slid around the desk because of its light weight.

By repackaging the keyer I was able to correct the features I found annoying, and in the process add a few features not found in the original keyer. The repackaged keyer includes: (1) a larger, more pleasant-sounding speaker; (2) standard quarter-inch phone jacks for paddle and output; (3) a built-in a.c. power supply with



Front view of modified CK-1 with paddle for size comparison. Left to right: LED, S-1, S-2, S-3. All switches are full up for normal operation.

LED indicator and binding posts for battery operation; (4) more versatile and convenient switch placement; (5) a solid, stable unit that doesn't slide around.

The modifications are neither spectacular nor difficult, but they do result in a keyer that is extremely easy to use. The improved tone from the larger speaker is reason enough to make the changes. Of course, most of these modifications can also be applied to other AEA keyers and Morse code trainers with success.

You should first accumulate components for the power supply, switches, and connectors you wish to use. Then pick a cabinet of a size that will allow you to comfortably mount all the new components with room for the existing CK-1 keypad and associated keyer circuitry. I selected an LMB® C-R type cabinet measuring 6 1/4" long, 3 1/2" wide, and 2" high. I found it to be just large enough for my purposes. However, unless you have had some experience fitting a number of

components into a small space, you may wish to choose a larger container. A cabinet with a sloping front might be handier for ease in using the keypad.

Remove the CK-1 from the original plastic case by removing one screw on each side of the case. Make a note of which wires go to which connectors, especially the power-supply input. This will ensure that you will be able to reconnect them to the proper places in the new cabinet. Unsolder all leads to connectors and the **Send/Load** switch. I lengthened these leads by soldering additional lengths of stranded wire and insulated the connections with heat-shrink tubing. You'll find this step will make the job of reconnecting easier.

Apply masking tape to the exposed surfaces of your new chassis. The tape will protect the surface while you are cutting and drilling, and will give you a good surface to mark the locations for the holes you will need. Carefully measure

*38 Lawrence Place, Freehold, NJ 07728

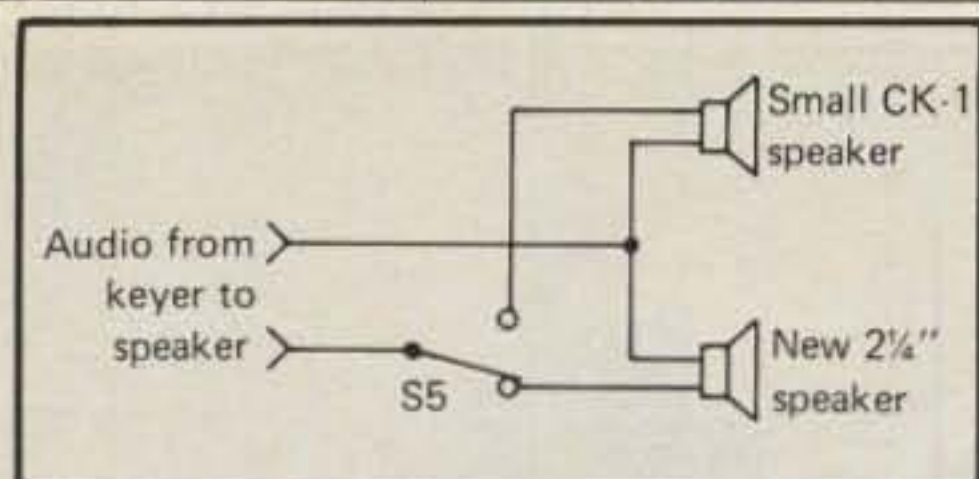


Fig. 1— Modified speaker circuit. S-5 can be eliminated if the original CK-1 speaker is not needed.

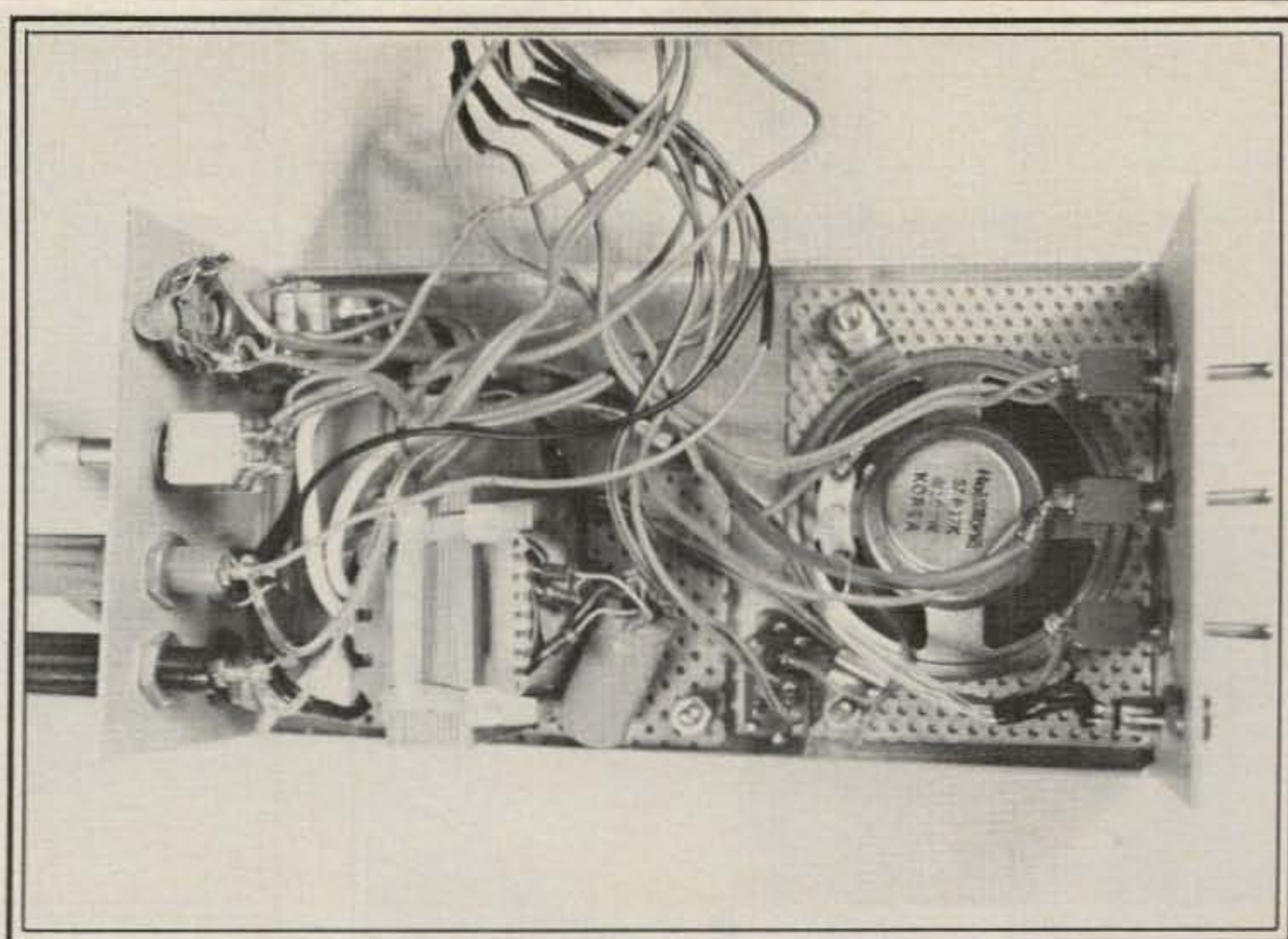
the inside rim of the keypad top of the CK-1. My keyer measured approximately $4\frac{3}{4}'' \times 2\frac{7}{16}''$ on the inside rim. With a ball-point pen, transfer this rectangular measurement to the chassis you have selected. Remember to allow enough room at the back and front of your chassis for connectors and switches to protrude into the cabinet without touching keyer components, and be sure your power supply and speaker will clear the keyer and connectors.

Drill four $\frac{3}{8}$ -inch holes near the inside corners of the rectangle you have drawn on the chassis, being careful not to get too close to, or outside of, the lines. Using a jig saw or sabre saw, cut the rectangular opening for the keypad just slightly smaller than necessary. Be sure to use a fine-tooth metal cutting blade, or you could bend the chassis. Now, with a flat file, smooth and even the edges, and enlarge the opening just enough to allow a tight friction fit for the keypad top. Don't take off too much metal at one time. It's safer to take it slow and easy with cutting and filing. You can always take more metal off, but you can't put it back once it's gone. A little extra care here will help ensure a professional-looking job.

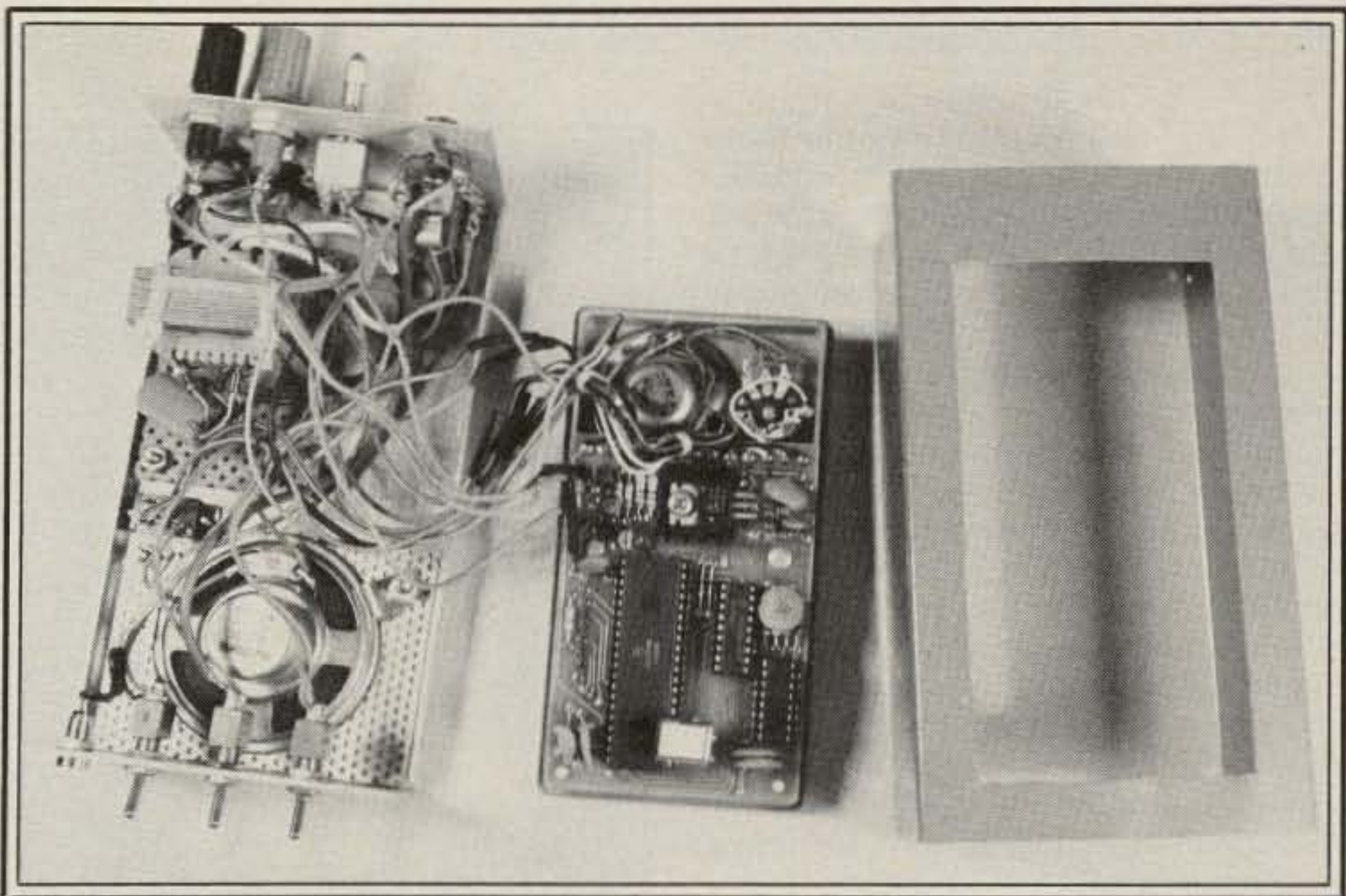
You've completed the most difficult part. Now you merely drill holes for and mount the switches, connectors, and speaker. I chose mini-toggle switches, and $\frac{1}{4}$ -inch phone jacks for paddle and keying output, but use whatever you prefer or have on hand. I mounted my $2\frac{1}{4}$ -inch speaker on the bottom of the chassis. You could use a chassis punch to make the speaker hole or drill a number of holes in a circular pattern.

S-5, a small s.p.d.t. slide-switch, was added on the bottom of the chassis to allow choosing between the original and the new speaker, as per fig. 1. However, I found the larger speaker provided more audio and much better tone than the original at all volume levels and pitch settings, so the switch could be eliminated if you wish.

For a power supply I used a plug-in type a.c. adapter which supplied 14.8 volts with no load. The voltage dropped to 10.8 volts with the keyer drawing 260 milliamperes. I removed the plastic case and fastened the transformer and associated diodes and filter capacitor to a small



Blowup view of modified CK-1. Shown at the right is the chassis top with the opening cut for the CK-1 keypad and keyer components (center). At the left is the chassis bottom, showing speaker, power supply, switches, and connectors.



Close-up of chassis bottom showing placement of speaker, power supply, switches, and connectors.

piece of perfboard with tie wraps. If space is not a problem, you could build your own power supply, as shown in fig. 2. I provided a fuse in the primary of the transformer, and binding posts in parallel with the d.c. output of the power supply to allow its use with a battery for Field-Day-type operation. In addition, an LED indicator will show when the unit is powered up. The keyer requires approximately 9 to 15 volts d.c., and has its own internal voltage regulation provided by a 7805 regulator chip.

Although the keying output is bipolar, the instruction manual advises that with

some transceivers, including the ICOM 701 and Ten Tec line, a jumper may be required across D4 to key properly. To key my Atlas 350 XL (positive keying), I found I also had to lift the cathode (banded end) of D3 from the board. Therefore, I added S-4, an s.p.d.t. toggle switch, on the rear of the chassis to perform the function of switching between positive and negative polarity keying (see fig. 3). Having rigs with both types of keying, I found this switch useful. If you only have one or the other, you could eliminate S-4. However, it could prove handy if you plan to use your keyer with a different transmitter.

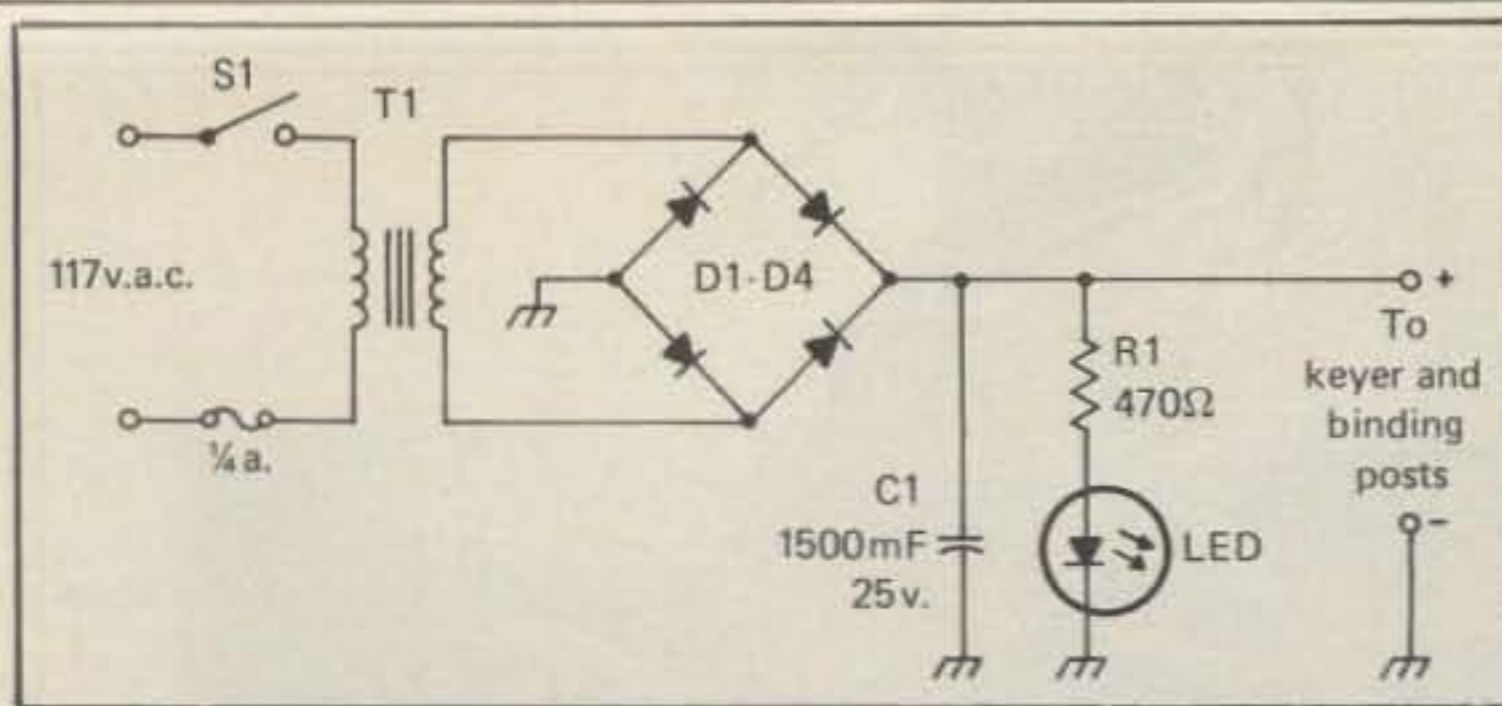
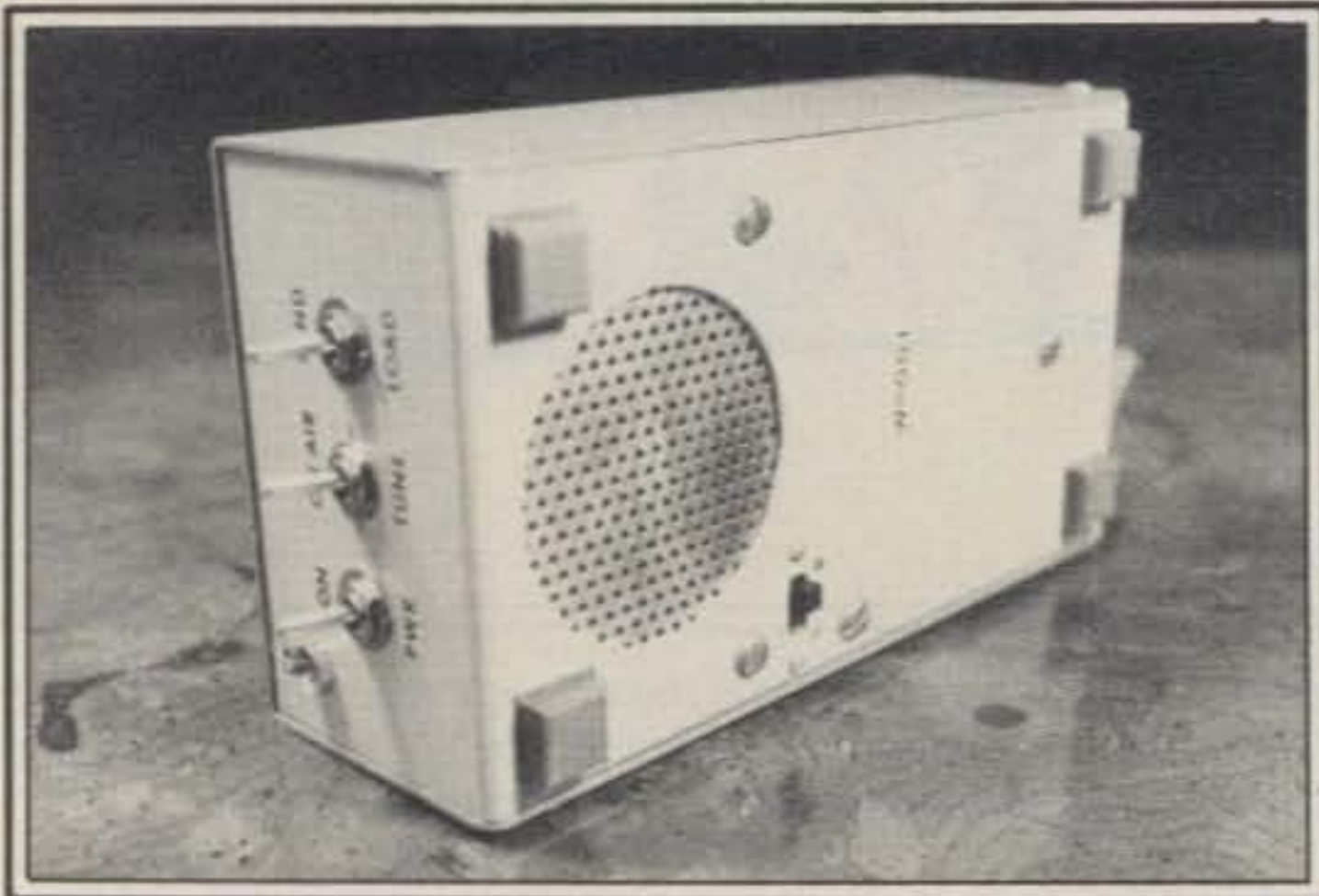


Fig. 2- Optional power supply circuit.



Rear view showing paddle input and keyer output jacks, keying polarity switch S-4, battery binding posts, fuse, a.c. cord.



Bottom view, showing speaker and mini slide switch, S-5.

The CK-1 will normally key the transmitter in both **Send** and **Load** modes. But by using a center-off-type switch for S-2, you can practice your c.w., or program the keyer without keying your transmitter. I much prefer to program the memory off the air. One position of S-2 allows you to tune your transmitter by shorting out the output jack. The center-off position allows operation off the air. The third position will allow the transmitter to be keyed normally. I used shielded cable (RG-174) for keying output leads.

For the **Send/Load** switch, S-3, I used a toggle switch, because I found it quicker and easier to use than the slide-switch provided. They are wired exactly the same, of course. In my keyer, all switches must be in the full up position for normal on-air operation.

Be sure to add rubber feet to your chassis to keep it from sliding around and to allow a space for the audio of your new speaker, if you've mounted it on the bot-



Top view of modified CK-1.

tom of the chassis. I found the 1/4-inch rubber stick-on-type feet found in hardware stores to be perfect.

The addition of press-on-type lettering to the keyer switches will put the final professional touch to your work. You've made a great keyer even greater.

Now, when you're going hot and heavy in a big contest or rag chewing with old friends, your personalized CK-1 will be working with you, belting out those dots and dashes with the sweet resonant tones that are music to any c.w. man.

Parts List

- C-1 1500 uf, 25 v. electrolytic capacitor
- D1-4 100 p.i.v. full wave rectifier (Radio Shack #276-1171)
- R-1 470 ohm, 1/4 watt resistor
- S-1 s.p.d.t. toggle switch
- S-2 s.p.d.t. center-off toggle switch
- S-3 s.p.d.t. toggle switch
- S-4 s.p.d.t. toggle switch
- S-5 s.p.d.t. mini slide switch
- T-1 power transformer, 12.6 v., 300 ma (Radio Shack #273-1385)
- Misc: chassis, a.c. cord, 1/4 amp fuse, binding posts, 1/4-inch phone jack—2 conductor, 1/4-inch phone jack—3 conductor, LED, rubber feet.

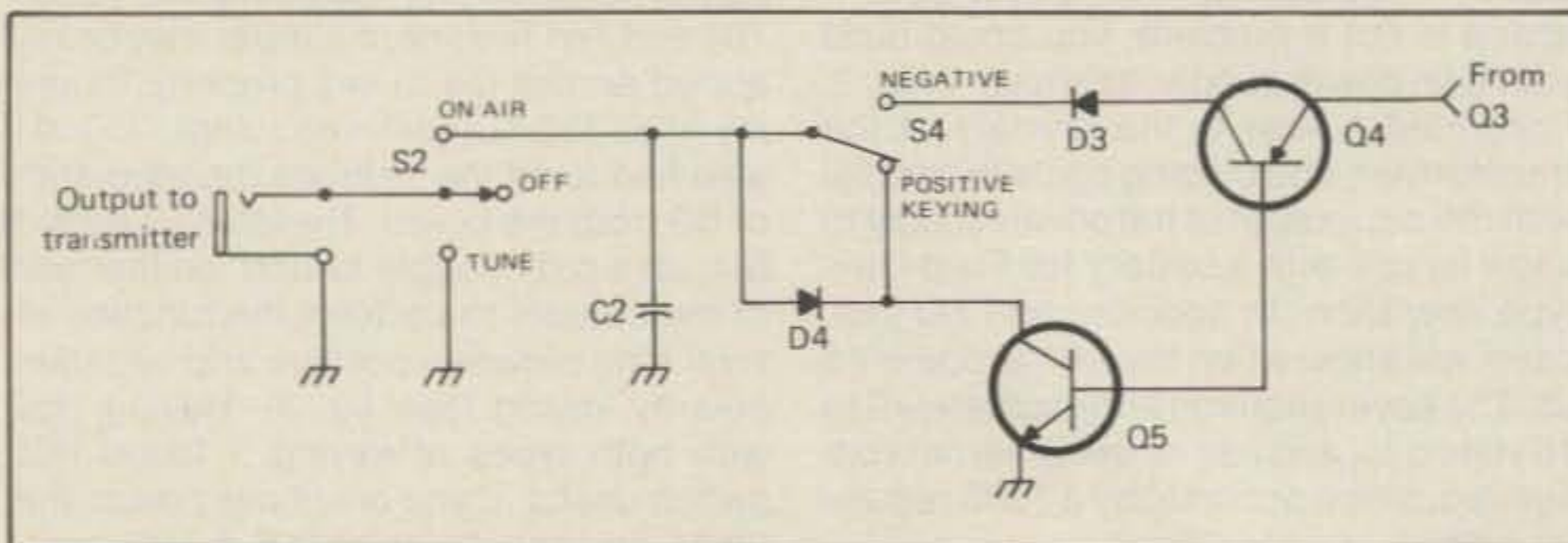


Fig. 3- Original keying circuit of CK-1 showing addition of S-2 and S-4. All others are existing components.

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CIRCLE 49 ON READER SERVICE CARD

1981 CQ WORLD-WIDE DX CONTEST C.W. RESULTS

BY BOB COX*, K3EST, AND LARRY BROCKMAN**, N6AR

Just when you thought the conditions were retreating into the past, Mother Nature smiled on the C.W. weekend. The conditions were not just good, they were outstanding. Comments from around the world testified to sunspot maximum conditions.

The overall All Band winner was the result of a close competition between 9Y4VT and CT3BZ. These two fine operators set an example for others in their operating techniques and duplicate-free logs. This year Richard Norton, 9Y4VT, took the world crown. He was followed closely by Martti Laine, CT3BZ. HK3A operated by Fred Laun of HS1ABD fame was third in the world, and N6BT/AH0, who hopes to return to Saipan in 1982, was fourth.

The top USA All Band score was decided by less than a minute's operating time on a good band. K1GQ edged out K8LX for top place. The top five USA scores were better than the "old" 1980 record of 2.83 MEG points.

Four new continental record champions emerged: CT3BZ, Africa; N6BT/AH0, Oceania; UF6CR, Asia; & EA2IA, Europe.

Single band entrants were paced by LU8DQ's World Record 21 MHz score. Jorge's location and operating skills present a tough combination to challengers. The following stations set new records: EA8AK, Africa (1.8); 4X4NJ, Asia (1.8); UA9TS, Asia (3.5); JE3MCC, Asia (7); UA9ADQ, Asia (14); OH8SR, Europe (14); YU3ZV, Europe (21); KG6DX, Oceania (14); YV1DO South America (1.8).

In the USA, W1ZM (K1ZM op.) (3.5), K0RF (7), K6EWL (21), and N4ZC (28) all set new records.

In the Multi-Single category, P41E took the world top honors, thereby setting a new South American record. Second place winner, YU3EY and his crew, set a new European record in the highly competitive European Multi-Single division.

The new USA Multi-Op. Single Transmitter record holder was N4AR. The boys from Maine, N1AC, pushed Bill's crew to the wire before settling for second place. W3BGN rounded out the top three USA scores.

*6548 Spring Valley Drive, Alexandria, VA 22312.

**7164 Rock Ridge Terrace, Canoga Park, CA 91307.



Ibrahim, SU1IM, the Grand Old Man of Egypt, is still active daily. On the left is Ville, OH2MM, a visiting op at SU1AA.

In the battle of the Goliaths, W2PV captured the top world Multi-Multi score—no easy feat for a US station. They were followed closely by N2AA. W2PV beat the old US record by over a million points. In Europe the top honors went to the gang at OH3AA. They also set a new European record, and to finish off the Multi-Multi records way out on Niue, ZK2RU set a new Oceania record.

The contest is made more interesting by expeditions. The trophy for Single Operator expedition goes to SU1AA operated by OH2MM. This trip not only gave contesters an uncommon country multiplier, but also a rare zone. The expeditions of the following made the contest a pleasure: N6BT/AH0, ZK2RU, V3MS, K8CW/C6A, 8P6J, VP2VHX, HH2VP, VP2MEV, J6LZA, W4UY/PJ7, SU1AA, CT3BZ, C5AAU, 9K2DX, 8Q7BP, FC0FOO, YJ8RW, K3SA/PJ3, 9Y4VT, W4BPD/C6A, 6Y5JW, OH0AL, HB0AYZ,



Nigel, G3TXF (left), and Roger, G3SXW (right), arriving in Alderney (one of the three islands that make up GU3) for the 1981 CQ WW DX CW Contest—operation GU3SXW.

P41E, 9Y4KG, and FO0KP. Thanks for all your efforts.

The QRPP category is now well established. This year we had over 110 entrants. The All Band winner was AC2U. He beat out N3RS for the top World and USA position. In the future, if QRPP continues to grow, the committee will have to devise a better awards technique. Do you have any suggestions? If you do please write to the committee.

The World high club score goes to the Northern California Contest Club. This Club went from 9 MEG points in 1980 to over 160 MEG in 1981. Congratulations! Following in a very, very close second place was the Yankee Clipper Contest Club. One or two scores would have made the difference between first and



Chas, I0XXR, shown with FT-101 rig and TH3MK3 antenna.

second place. The Frankford Radio Club rounded out the top 3 club scores in the world. The top DX club score was the Lithuanian Contest Group, followed by the competitive scores of the Voroshilovgrad Radio Club (UB5) and the Kaunas Polytechnic Institute Radio Club.

The contest community around the world will remember this fall when the signals are strong and clear that a few of our friends are not present. W2PV, UI8LAG, and W3KT have become Silent Keys. Each one contributed to what the contest stands for: enjoyment and excellence. We will miss them.

The following people devoted much time and effort to verifying the results: Frank, W1WY; Terry, N6CW; Glenn, K6NA; John, K1AR; Jim, W7EJ; Dave, K2SS; John, K9DX; Fred, AD6C; Doug, KR2Q; Gene, N2AA; Reg, N6SV; and new committee members John, K2VV; Ed, N3ED; and Tree, N6TR.

We all wish you the best of a good contest season.

73, Bob, K3EST, and Larry, N6AR

U.S.A. QRM

Working ZK2RU for first contact with Niue in 47 years... *W4DGJ*. Thrill to work *VQ9* & *HZ* long path, 7 MHz... *K4PI*. Best contest of them all. My first time for *CQ WW CW*; too bad it's always on Thanksgiving... *K5NW*. Precip static made me yearn for my old quads... *K6NA*. Lay down on Saturday night for 2 hours and wound up sleeping for 13 hours... *KD9E/6*. Tough using a *KT-34* on 40/80... *WD6EWG*. My neighbor's new video-recorder did me in... *WB6EXW*. There is nothing quite like the "WW" for competitive sport... *W6US*.

Wait till next year!... *N1AC*. Worked *CT3BZ* on 5 bands—sure hope that bottle of wine comes in soon... *K1XA*. Hitting 100 QSO's/hr on 28 MHz, *WAC* on 7 MHz with the Butternut vertical... *KQ2O*. This still remains the premium DX contest of the year... *K2TD*. Next year we're going to use a beam and linear... *N4RJ*. *FB8WG* called me on 15... *W5RRR*. Got to be pretty good at replacing diode stacks in *SB-220*'s during the contest... *NC6T*. This year *HZ1HZ* tail-ended a European, calling me... *W7IR*. Enjoyed the *PREMIER CW* Contest of all... *KD7H*. In Washington State we had only a brief 10 meter opening to Europe—a hint of the future... *W7WA* (*Opr. of K7RI*). It seems the rarer the DX station, the longer he takes to identify... *N7RO*. In the desert the heavy rain wiped out my balun... *K7NO*. Maybe it's time to reconsider the *RST* exchange for contests... *K7FC* and *N7ES*. A beam and Extra Class ticket sure help on 40!... *K7ABV*.

Along with my 160 meter log please find list of serious violators of the DX Window—request you start disqualifying those who take part... *K0PP/7*. New countries, lots of activity, antenna testing—that's the *CQ WW*... *KG7D*. Conditions so good it was hard to pick the right band to be on... *K8LX*. 48 straight is tough on the body... *N8II*. Caught the flu by preparing so frantically for the Test—just exhausted... *K8GL* and *W8UA*. My indoor dipole for 10 snagged 152 QSOs... *W8GOC*. Fun? Cracking some *BIG* pileups with 200 watts!... *N8BC*. A hot final amp helped in my unheated garage... *K8BA*. 250 QSOs with a straight key—whew!... *WD8IXE*.

When the amp blew, I drove 120 miles for tubes and got back in the Contest... *WD8AUB*. Simply, thanks to all for a great weekend... *W8LRL*. Zones 17 and 18 called me on 80 meters!... *K9BN*. First contest—I'm hooked!... *KC9T*. Finally got that Zone 34... *AK0M*. Really great runs to Europe on 40... *K0RF*. We were killed by severe line noise on all bands. It came up one-half hour before test... *N5RM*. *JA* signals at dawn on 3.5 MHz Sunday morning among loudest ever heard... *K1ZM*. Biggest thrill—no breakdowns!... *A11E*. Worked *TG9AC* for number 86 top band... *AA1K*. Are you sure 10 meters is on the way out?... *KA1CFC*. My Extra Class license came in the mail 7 hours before start of contest... *WA1FCN*. Worked *CT3* as first DX on 80 meters... *KA1CZF/QRP*.

DX QRM

This is my swan-song contest, since I am entering the OTC this year... *OH2BH* (*Opr. of CT3BZ*). Best condx ever on CW weekend; ran out of stations on Sunday... *VE3BMV*. Lazy, tired and cold = me... *VE1AIH*. Great fun—*CU* next year... *VE6OU*. Lost rotor at 4 hours into contest and amplifier 10 hours later. Thanks a lot Murphy... *KH6ND*. I must have been popular. A lot of stations wanted to work me again and again and again... *VE1BEC*. Did enjoy your contest very much... *VE2DPO*. Bit confusing at first with stations using short figure "A" instead of "1"... *VO1AW*. No time for full effort, but couldn't stay away entirely!... *VE1BCZ* (*Opr. of VE3UOT*). Not good propagation in Melilla... *EA9JV*. Extremely difficult working zones 6, 7, 10, 12, as these are completely blotted out by U.S.A. stations... *ZS2RM*. *JT60UB* QSO!... *VE2GCO*. Much less intensive contest effort this year after major efforts as *5W1BZ*... *ZL1AIZ*.

U.S.A. beaming east while Europe beams west; no one beams south... *VK2AYD*. No permission for 3.5 or 7 MHz... *OH2MM* (*Opr. of SU1AA*). To those who did not get in the log, I will be back next year... *N6BT/AH0*. Biggest thrill was having *8Q7BP* answer my *CQ*... *4X6FY*. Vy nice condx first night (160 M)... *EA8AK*. Almost no CW activity from Africa, So. America, and Caribbean... *VE1TG*. Condx mediocre (3.5 MHz)... *KP4KK/DU2*. Condx much to be desired on 28.100–28.600 (Australian Novice freq.)... *VK5NVV*. Conditions couldn't really have been better on 40 M... *VE3KRN*. The activity was tremendous overall with good condx into Europe (7 MHz)... *VO1QU*. Much more courtesy than discourtesy... *KH6JWK*. Surprised with 579 from *VP8ANT* (1.8 MHz)... *VE3INQ*. Hard to believe the multiplier on 7 MHz equal or greater than 21 and 28 MHz... *VE3IY*.

100 m.p.h. winds blew down 40/80 M on 2nd night and prevented turning the beam... *FC0FOO*. Fantastic contest; for the first time over 2000 QSO's and solid total score... *ON4FD*. My new antenna mounted late Friday afternoon... *OZ8AE*. Think the time has come to consider a bug-key... *G3XTT*. *K9GL* was audible at 0500 GMT

on 21 MHz... *G3RAU*. Band opening of 15 appeared like a sunrise. First a few weak signals, and within a few minutes the band was roaring... *DK3GI*. Made 17,000 points more than last year... *Y34SE*. Propagation was unexpectedly good... *TF3YH*. Confusing when *KP4KK/DU2* and *UK1PGO* both call on the same frequency (3.5 MHz)... *SM4CAN*. Was delighted to work *VP8ANT* for an all-time 1.8 MHz new country. Also made top band *WAC* for the first time... *GW3NYY*. First attempt and found the matchsticks in the eyes needed replacing often... *G3XKQ*.

It is very clear that it is impossible to work much *WAC* with poor antennas. See you next year with new "antenna farm"... *HA0DU*. Beautiful Contest, big QRM... *I2WDB*. In my Zone blackout in electricity for 6 hrs... *IS0MVE*. Vy interesting contest. First time on CW... *OH5OZ*. Copying code after 47 hours without sleep is a bit difficult. Duplicate problem is getting very bad... *OH8SR*. Propagation good this year. None of the usual power line or storm damage. Expect some low band record to be broken... *OK2BFN*. Hard work for 48 hrs; I vote for some rest period... *4N1U* (*YU1PKC*). Bad condx second day and linear amp went *QRT*... *YU3EW*.

We surely need a beam on 40; perhaps next year!... *F3TV*. Excellent QTH on the island of Alderney went somewhat in compensating for mediocre antennas... *GU3SXW*. Excellent band opening and activity from U.S.A. and Canada on 40 meters... *HG5A*. The signals from USA were better on 7 MHz than on any other bands—worked 22 states!... *I2UIY*. Wish we had 160 M!... *SM5GMG*. Biggest thrill—every QSO with my 3 watts and dipole only 2 meters up... *OK3CAA/P* (*QRP—160*). Conditions were so FB on low bands that we forgot to look after multipliers... *OH7AB*. Many U.S.A. stations on all bands... *UR2RHF*. Thanks for nice contest. My first time entering single band 80 M, very FB!... *UR2QD*. Very FB conditions on 28 MHz... *UA1DF*. *QRP* power, *QRP* antennas, *QRP* time, but *QRO* fun!... *VE3KZ*.

STATION OPERATORS

Multi-Operator Single-Transmitter

AA3B & **WA3NRU**, **WB3DJF**, **AA4KT** & **AA4H**, **N4DW**, **AA6T** & **N6BSU**, **Net**, **AF6S** & **Net**, **AH6BK** & **K7TI**, **WB6SHD**, **AD8I** & **K1LT**, **K8ND**, **K8HFO**, **WB8YS**, **WB8ALG**, **DK8SU**: **DF7TV**, **DL3SAS**, **DL5TT**, **DL5TV**, **DL9SAL**, **DK8TU**: **DK5GB**, **DK5HH**, **DK6QI**, **DL7ZN**, **DF5GX**, **DL7PL**, **DK2VQ**, **DK1PD**, **DL8JR**: **DL7AEN**, **DL7ON**, **DL7SI**, **EA3CNY**: **DJ2YE**, **DK3KD**, **EA3MM**: **EA3BEN**, **EA3BR**, **EA3CAC**, **EA3CRX**, **EA3CVD**, **EA3AEF**, **EA3AFM**, **EA3AT**, **EA3RCR**: **EA3AIR**, **EA3ALV**, **EA3AZY**, **EA3IH**, **EA3JA**, **EA3OG**, **F3TV**: **F5IN**, **F6ARC**, **F6BEE**, **F6KAW**: **F2QQ**, **F6ASS**, **F6BBO**, **F6BPP**, **F6CWN**, **F6DJB**, **F6DZS**, **F6EBN**, **F6EPY**, **F6FLV**, **F6GDK**, **F6GIF**, **F6GWV**, **F6HCU**, **F6HMQ**.

G3SSO: **G3FXA**, **G3MZV**, **G3NKS**, **G4BEZ**, **G5EBU**, **G8DV**, **G6UW**: **G3ZAY**, **G3ZRJ**, **G4BUO**, **G4FAM**, **G8JC**: **G3NXQ**, **G3RLF**, **G3TOD**, **G4KTW**, **G4AAL**, **G4NEC**, **GB2MM**: **G3R2I**, **G3XVR**, **G4DSE**, **G4GXL**, **G6IUY**, **GU3HFN**: **GU3MBS**, **GU4CHY**, **GU4EDN**, **GU3SXW**: **G3SXW**, **G3TXF**, **G3RRS**: **G3SJK**, **G3UKS**, **G3VPW**, **G4CEB**, **G5CMX**, **G5DQY**, **HA9KOL**: **HA9OL**, **HA9OT**, **HA9PG**, **HA9RC**, **HA9RS**, **HA9RX**, **HA0KHV**: **HA0HW**, **HA0IF**, **HA0IR**, **HB9AJ**: **HB9AQF**, **HB9BAQ**, **HB9BRW**, **HB9BWN**, **HB9CBT**, **HB9CCT**, **HB9CLO**, **HB0AYZ**: **Stoeckli**, **Schuetz**, **HE90ZH**: **HB9RE**, **HB9Z**, **HG5A**: **HA5FM**, **HA5FN**, **HA5GF**, **HA5JI**, **HA5LN**, **HA5MK**, **HA5OM**, **HA5PP**, **HA7RY**, **Budai**, **HG6V**: **Laszlo**, **Laszlo**, **Geza**, **Lajos**, **Gyozo**, **Istvan**.

I2UIY & **I2PJA**, **JA3YEE** & **JA3JF**, **JA3WLF**, **JA6HFV**, **JA1YCL** & **JA1GQB**, **JK1JSS**, **JE2RQU**, **JH8MHZ**, **JA8YAK** & **JA8RWU**, **JA8TUJ**, **JA8OGH**, **JH7WUH**, **JR7JLH**, **JH7ISE**, **JA1YCL** & **JA1OQC**, **JK1AES**, **JE2OIZ**, **JA3XIS**, **JR6JOE**, **JH0DRT**, **K1EB** & **W1XK**, **K1GSK** & **WB1FPF**, **K1RQ** & **A11S**, **KB1W**, **K1RU** & **K1YR**, **K1XA** & **W1OD**, **AA2Z**, **K1XM** & **K1PR**, **N1EE**, **K2BA** & **KB8MF**, **K2TD** & **Net**, **K3QMR** & **W3YQ**, **WB3KXK**, **KA8GCD**, **K3ZUF** & **KF3R**, **K4EBY** & **K4YEP**, **K5KG** & **KD4M**, **WN4KKN**, **K5TU**, **K5VWW**, **N5DU**, **W5SG**, **K5RX** & **KM5R**, **K6ANP** & **K6LRN**, **KK6X**, **N6DCJ**, **K6DC** & **K6KCM**, **K6MA**, **N6ST**, **W6BJH**, **K6HIH** & **K6AHC**, **K6SG** & **KV6H**, **K6XV** & **K6PJY**, **N6FJ**, **N6VV**, **K7CS/0** & **WA0ECN**, **K8AQM** & **AC8W**, **A18D**, **K8DD**, **K8MJZ**, **KC8KQ**, **KJ8A**, **WA8ARS**, **WA8MEC**, **WD8CRY**, **K8US** & **WD8IR**, **K8RWL** & **K8FFC**, **K8UAA**, **K8QG**, **KC8CL**, **KM8L**, **KJ8Q**, **KA3GIK** & **WB3FJZ**, **K8HUJZ** & **K8HXX**, **KB2CR** & **KC2IX**, **WA2HUUY**, **WB2CAA**, **KB3MM** & **N3ARK**, **KB6ST** & **K6CSL**, **N6CVC**, **KB0FP** & **K0INR**, **KF0H** & **WD0EWD**, **KJ5W**: **AK5V**, **K5EE**, **KV5Y**, **N5WS**, **KL7AF** & **AL7DH**, **KL7KB**, **KQ20** & **K2B0**.

LA1H: **LA4KO**, **LA8UL**, **LA90I**, **LZ1KKA**: **Mihova**, **Mihov**, **Obretenov**, **LZ2KEF**: **LZ2CC**, **LZ2PO**, **LZ2HE**, **LZ2DF**, **LZ1A310**, **LZ2KLR**: **Marinow**, **Petrow**, **Zamfirow**, **LZ2KSQ**: **Kirilov**, **Nikolov**, **N1AC** & **K1UO**, **W1IH**, **N1TZ** & **K1SF**, **K1DXK**, **K1FJZ**, **K1IU**, **KA1ERF**, **N1ACU**, **N2GC** & **N2KW**, **WA2B0T**, **WA2RNT**, **N4AR** & **N1GL**, **K1NA**, **N4KG**, **W8KIC**, **WA8TBQ**, **N4KE** & **AJ2E**, **KJ4U**, **W4FDA**, **W4QRT**, **W4ASGF**, **N4RJ** & **N4H**, **N4OL**, **N4PN**, **N4TZ**, **W8ZF**, **N4RV** & **N4RA**, **N4XM** & **KC4W0**, **N04R**, **N6CW** & **K1LL**, **KT6V**, **N6DHY** & **K6RIR**, **N6IC**, **WA6TLA**, **N6IG** & **N6NE**, **N6MG** & **KD6PY**, **N6ND** & **N6SO**, **N6ZL**, **W6UQF**, **WA6DBC**, **N6RZ** & **W6NV**, **NQ4I** & **KA4MNS**, **KS40**, **NC6T** & **N6FH**, **W6CCP**, **W6TSE**.

OE1JNB & **OE1DSA**, **OH2AA**: **OH2BNP**, **OH2BQS**, **OH2BX**, **OH2JA**, **OH2YY**, **OH2VY** & **OH2BAZ**, **OH2BEN**, **OH3AC**: **OH3BJ**, **OH3ST**, **OH5BM** & **OH5BB**, **OH5LP**, **OH5UQ**, **OH7AB**: **OH7PF**, **OH7UE**, **OH7VR**, **OH8AV**: **OH8PF**, **OH8SW**, **OH9PH** & **OH9UW**, **OH0AL**: **OH2DP**, **OH2FS**, **OH2LP**, **OK1KQJ**: **OK1AYP**, **OK1AZG**, **OK1BZ**, **OK1DC**, **OK1DLE**, **OK1DVB**, **OK1ICM**, **OK1IMP**, **OK1IMR**, **OK1AXS**, **OK1KRQ**: **OK1ADS**, **OK1ALW**, **OK1AWY**, **OK1DIM**, **OK1DWA**, **OK1KSO**: **OK1AEZ**, **OK1AMF**, **OK1JCW**, **OK1JJB**, **OK1JKT**, **OK1JWA**, **OK1SF**, **OK1WT**, **OK1KYW**: **OK1ADU**, **OK1DKA**, **OK1MSN**, **OK1KUA**: **OK1ASQ**, **OK1-22317**, **OK1KTA**: **OK1DEY**, **OK1FER**, **OK2KYC**: **OK2BSC**, **OK2BUC**, **OK2SMD**, **OK3KEE**: **OK3CGG**, **OK3CTL**, **OK3MB**, **OK3TKA**, **OK3KTD**: **OK3CFE**, **OK3TBA**, **OK3TCF**, **OK3TCV**, **OK3RJB**: **OK3CKW**, **OK3CQD**, **OK3CQR**, **OK3SEM**, **OK3TCL**, **OK3TDO**, **OK3-26627**, **OK3RKA**: **OK3CPC**, **OK3TAM**, **OK3TDP**, **OK3-26016**, **OK3-27254**, **OK3-27256**, **OZ5EDR**: **OZ1HET**, **OZ3QN**, **OZ9SN**.

PA6GN: **PA6ERA**, **PA6GAM**, **PA6GIN**, **PA6VAJ**, **P41E**: **K800**, **K3NA**, **K4BAI**, **N4TO**, **W60AT**, **R5I**: **Club**, **SK5AA**: **SM5ACQ**, **SM5APS**, **SM5FUG**, **SM5KAS**, **SK8LM**: **SM8CXU**, **SM8DRO**, **SM8FSK**, **SM2JUR** & **SM2BJE**, **SM5GMG** & **SM4GLC**, **SM8GNS**, **SP2ZFJ**: **SP2ASJ**, **SP2FAP**, **SP2086-EL**, **SP3KCT**: **SP3JJI**, **SP-1151-PO**, **SP5KTR**: **SP5DWE**, **SP6SA**, **SP0083WA**, **SP6PAZ**: **SP6FJG**, **SP6HEK**, **SP9PDG**: **SP9CSW**, **SP9-2291**, **UK1TBB**: **UA1TAL**, **UA1TDS**, **UA1UG**, **UK2AAP**: **Club**, **UK2AAQ**: **Club**, **UK2AAX**: **UC2AFX**, **UC2008-119**, **UC2009-522**, **UC2009-523**.

UK2ABE: **Getjmann**, **Novikov**, **Sologub**, **UK2ABM**: **UC2AAP**, **UC2009-575**, **UC2009-593**, **UK2BAG**: **UP2BAD**, **UP2BAE**, **UP2BV**, **UP2BZ**, **UP2DT**, **UK2BAP**: **Club**, **UK2BBB**: **UP2BIJ**, **UP2MB**, **UP2PAX**, **UP2PX**, **UP2038-727**, **UP2038-892**, **UP2038-938**, **UP2038-1039**, **UP2038-1052**, **UK2BBF**: **UP2BJD**, **UP2BIY**, **UK2BBQ**: **UP2BAT**, **UP2BFV**, **UP2BJY**, **UK2BBX**: **UP2BJU**, **UP2038-1051**, **UK2BCC**: **UP2BJK**, **UP2038-728**, **UP2BDW**, **UP2038-271**, **UK2BCM**: **UP2BFN**, **UP2BSK**, **UK2BCD**: **UP2038-1050**, **UP2038-1049**, **UK2BDZ**: **UQ2GAE**, **UQ2GFM**, **UQ2037-168**, **UQ2037-261**, **UK2GJL**: **UQ2GEJ**, **UQ2037-91**, **UK2GKO**: **UQ2GCT**, **UQ2GFD**, **UQ2PP**, **UK2GKW**: **UQ2GKM**, **UQ20C**, **UQ20I**, **UQ2037-83**, **UK2PAM**: **RP2BFU**, **UP2038-794**, **UK2PAO**: **UP2BHN**, **UP2BIC**.

UK2PAP: **UP2BCI**, **UP2BN**, **UP2NV**, **UP2OX**, **UP2038-1665**, **Petrus**, **UK2PAT**: **UP2038-439**, **UP2BEC**, **UP2BCO**, **UK2PBR**: **UP2BCU**, **UP2038-1541**, **UK2PCR**: **UP2B8T**, **UP2BCR**, **UP2BCT**, **UP2BDF**, **UP2BEY**, **UP2BF1**, **UP2BFL**, **UP2BIO**, **UP2PAV**, **UP2PCI**, **UP2038-1620**, **UK2PRC**: **UP2BBM**, **UP2BIL**, **Laimas**, **UK2RDY**: **Club**, **UK2TBC**: **Club**, **UK3ACM**: **Club**, **UK3APV**: **UA3DOW**, **UA3DPX**, **UW3BV**, **UK308V**: **UA3DFD**, **UA3142-1762**, **UA3142-1770**, **UK3TBF**: **Club**, **UK3XAB**: **UA3XAC**, **UA3127-200**, **UA3127-204**, **UA3127-216**, **UA3127-322**, **UA3127-348**.

UK4ACE: **Club**, **UK4FAV**: **UA4FBL**, **UA4FCU**, **UA4FCM**, **UA4FDY**, **UA4148-273**, **UK4LAZ**: **UA495-LAJ**, **UA4LBE**, **UA4LBN**, **UA4LCH**, **UK4PNZ**: **Club**, **UK4WAA**: **UA4WBC**, **UA4WBG**, **UA4WBG**, **UA4W5J**, **UA4095-511**, **UK4UAB**: **Club**, **UK5AAZ**: **UB5AAL**, **UB5ABZ**, **UB5ADN**, **UK5ECT**: **Club**, **UK5FAB**: **UB5FCR**, **UB5FEL**, **UB5070-677**, **UK5GKW**: **Club**, **UK5HAB**: **EZ5HBO**, **UB5071-73**, **UK5IGL**: **Club**, **UK5MAF**: **RB5MUV**, **UB5MDC**, **UB5MJX**, **UB5MNM**, **UB5MNX**, **UB5MOA**, **UY5LK**, **UK5MCO**: **UB5MRN**, **UB5MTS**.

UK5MCP: UA08DD, UB5MOJ, UB5MLV, UB5MPD. UK5MCT: UB5MRI, UB5MRM. UK5MDI: UB5MBM, UB5MJS, UB5059-5, UB5059-6. UK5MEG: RB5MHY, RB5MUQ, UB5MAQ, UB5MRB. UK5NAJ: UB5NBE, UB5NDA, UB5057-273. UK50BE: UB5064-1353, UB5064-1362, UB5064-1528. UK50CI: Club. UK5UDX: UA4LAR, UB5LAR, UB5RCA, UB5UCE, UB5UCF, UB5065-2. UK5YAA: UB5YAE, UB5YAH, UB5YAR, UB5YAW, UB5YBX.

UK6AJN: Club. UK6APP: EZ6ACB, EZ6ADW, UA6ARX. UK6ARA: UA6APL, UA6APU. UK6FAA: Club. UK6FAB: Club. UK6LAA: Kozadaev, Khanin, Korovkin, Liokumovich, Larionov, UB5073-1133. UK6LAZ: UA6LHK, UA6LIG, UA6150-1067, UA6150-1060, UA6150-1070. UK6LEZ: UA6HLP, UA6LJE, UB5ILW, UB5MGZ. UK6LTA: UA6LAM, UA6LWD, UA6LYQ, UA6150-621, UA6150-686, UA6150-688. UK6PAA: Club. UK6QAA: Club. UK9AAN: UA9AIS, UA9AJD, UA9AKI, UA9ALP, UA9QBS. UK9ACP: UA9AAP, UA9ADE, UA9ADY, UA9AFO, UA9AGY, UA9165-1635. UK9ADS: Club. UK9ADY: UW9AT, UA9AFZ, UA9AFH, UA9ADH. UK9AEC: Gordlevskih, Zaev, Kovalyov.

UK9FER: UA9FAR, UA9FAL, UA9FAJ, UA9FDW, UA9FGJ. UK9OAZ: Club. UK9OBD: UA9OCK, UA9ODH, UA9145-805. UK9SBI: UA9SCG, UA9SHU, UV9SA, UV9SG, UW9SG. UK9WAT: Club. UK9QAA: UA9QDL, UA9QWB, UA9QWN, UA9098-74. V3MS: W8CP, W8UN. VE1DXA: VE1BSE, VE1FH, VE1MX, VE1UG, VE1YX. VE3MFA & VE3IUE, VE3KTC, VE3LWL, VE3MFZ. VE3OCU: VE3MHA, VE3MPX. VE5DX & VE5AD, VE5KX. VE7WJ: VE7ZZ, W7XN, W7ZR.

W1BK & N1BH, W1BR, W1RM & K1JD, KA1BUQ, W1BIH, W1WEF, W1XX, W2RQ & W2SQ, W2UI & N3KR, W38GN & K2BMI, KC2X, WA22KY, W3KFO & K2JLT, W3NZ & KA1CQM, KD3H, W48PD/C6A & KA3DAG, W4NL & K3AO, K3KG, K4FJ, KA4S, KU4W, N4TX, W5RRR & K5GN, K6SU, KN5F, KN5H, W65WHR, W68SY & Net, W6OWO & AG6D, N6BV, N6BZA, W66DSV, W66ERA, W6UA & W6UM, W6YX: N3ER, WA6ITV, W7NI & A17B, W7RX & K7XX, W7YQZ, W7YF, W7FF, W8FN & AD8P, W8WE: AJ8T, KA8FRQ, KA8MDM, KB8MG, KC8AU, KC8NH, NB8AZ, NB8CJR, W8FF & K18K, W8WYJ, W8NA & W8AR, W8CW, W8FNO, W81CNM & N1BVZ, W86PNF & K8RMN, N8CID, W8PBS, W8ZK, W8ASN, W8AVTS, W8MDG, W8TE & N17K, KL7EC.

XE2BC: N6OP, N6TU, Y23DL & Y23CL, Y27DL, Y32ZN: Y32UG, Y32WN, Y41ZA: Y23BA, Y41VA, Y41ZA, Y41ZF & Y21CF, Y43ZK: Y22BK, Y32YG, Y59ZA & Y45SA, Y59YA, Y08KGA: Y08DD, Y08DAV, Y08ER, Y08KGH: Y08AIN, Y08CMB, YU3EY & YU3BO, YU3FK, YU3SO, YU3MY, YU3TVI, F50Q, YU4EXA: YU4WFT, YU4VRA, YU4WFN. 4A2Q: XE2AQ, XE1BGM, XE2GDD. 6Y5JW: VE3DAP, VE3IYS, 9Y4KG: W6KG, W6QL.

STATION OPERATORS Multi-Operator Multi-Transmitter

A16V & NB6G, N6KT, K6BF, W6MYP, W6UYKM, W6EEN, W65FBI, K6KLY. DL8KF: DJ8FR, DF3LP, DJ2BV, DJ4FZ, DK8LE, DF6LI, DJ7SW, DL5LC, DK8LD, DK7LJ, DF6LH, DJ4SO, DL2ZT, DF3LZ, DL2NF, DJ2LU, DK9AV, F08KP: W6SZN, N6TV, AA6G, HZ1AB: K8JJ, W7KJJ, W8MOA, N6OL, JA1YAB: J110HP, JF2FDH, JH7NZU, JH8GG, JA1YHA, JH4TJS, J11AEB, JK1LSE, JA4OYR, J11UEJ, JA1YXP, JH8NPR, JH4OWG, JA7WFS, JA8WGG, JF2QHM, JA2YEF: JR2PVI, JR2TPD, JR2TWA, JR2UWZ, JE2FRT, JE2KIH, JE2RDI, JE2RWP, JE2UGT, JE2WMB, JE2WJB, JF2ACB, JF2ERH, JF2NFC, JF2NTV, JF2SFF, JF2VRV, JF2WMP, JF3EIT, JH4XKV, JH9LW, JA2YKA: JG1GIF, JJ1BTA, JE2NQC, JE2ROT, JE2SRB, JH2QXG, JR2GMC, JH4VBO, JH6RPZ, JA9NFO, JA9SSY.

JA3YB: JE3PAS, JE3PED, JF3KKO, JF3PGA, JG3GKK, JG3GQB, JG3IUG, JI38PB, JI3KWZ, JH4CES, JH4IFF, JR4AGT, JH5BIT, JH5JKH, JA9TAF, JA9TOZ, JA3-30356, JA3YKC: JE3BLA, JA5TDH, JR4BSM, JR3FRR, JH3PKS, JF3PMM, JH3PRR, JA5MOU, JF3RAL, JE3MXQ, JH4PAM, JG3IQJ, JR6JNF, JE3MAS, JH4WER, JG3LLB, JF3SFP, JH3VOT, JR3KEG, JA5GZB, JA3ODL, JA4YEB: JR2EVU, JH4AQA, JH4MBE, JH4NJC, JR4CBJ, JR4MOQ, JA6YDH: JE6DSG, JA4JYL, JE6ASN, JH6MWW, JH6NLY, JH6RAD, JH6SWF, JE6LFO, JE6SAY, JG1TAW, Kamito, JA7YAA: JG1IGW, JR2NKG, JH7AEF, JH7CUO, JH7GFO, JH7HWR, JH7LIS, JH7UJN, JH7WTC, JR7OMD, JR7SEI, JE7AWM, JH88ME, JA9YBA: JA9DZS, JA9LJI, JA9LNI, JA9LWB, JA9OTX, JA9UAD, JH8CAZ, JH8HHU, JF1YPF: JH10GC, JR1MTS, JR1UTC, JG1GGF, JE1QDD, JJ1AJT, JK1KZA, JL1KYN, JH1YDT: JF1EAL, JK1CPG, JK1FLU, JH6UUN, JA8VSH, JH8HNI.

K10X & N1RC, W888TH, K1VR, K1RX, W1FV, KC1F, KB1T, K1ZZ & K1BW, K1CC, K1GX, K1TO, W1GNC, AK4L, K2TR & K2WR, K1CO, K2UA & W3XU, N3RD, N2ME, N2BA, WA2HGM, WA2SFB, K6XO & W1ARR, N6AUV, AA4KB, KD6ZL, K6ZM & K2PV, AK6T, NB6L, WA6JCZ, K9GL & K9BG, W89TIY, K9RS, W99IIC, W90FV, K9NO, KJ9W, K9HMB, W89CAS, K9PW, AG9A, KD6NH & N6KB, KN6M & AH5Z, AA6DX,



Operators of YW5A: (standing, left to right) John, YV5AAQ; Ray, DL2GG; Billy, YV5ANE; Edwin, YV5HUI; Mike, YV5AAZ; Hermes, YV5DFI; Piti, YV5NN; Mauricio, YV3BDQ; (front, left to right) Jorge, YV4BMV, and son; Ali, YV2BE; Napo, YV5BNR; and Joe, YV5ANT.

KD6T, KJ6V, K86YF, N6PO, W6MFZ, N6DN, K86XN, N6BPL, WA6AVS, W66KNU, Betty, Sonya, N2AA & K2GL, K2BQ, K2NG, K2GM, K2TW, K2SS, K2TT, KR2J, KR2Q, KR2W, KU2M, K5NA, N2RM & N2ATX, N2MM, KB3TN, N3RW & W3YFV, N5RM & NS4M, AA5C, K5IU, K5MM, KM5X, N5BQQ, N6RO & N6XI, N6CN, WA6DIL, WA6WEQ, K6XM, K9LBO, K87SC, N9MM & K9UWA, W9LT, N9NC, K9FC, K9FN, N9NS, K89AF, K9JF, W89STD, W9RE, W89POH, W9ZRX, W90BF.

OH1AA: OH1LF, OH1LQ, OH1MD, OH1NH, OH1OI, OH1OG, OH1RM, OH1SV, OH1SW, OH1SY, OH1TV, OH1WR, OH2PQ, OH3OM, OH3ZE, OH5NG, OH2AW: OH2BNP, OH2BPN, OH2BQS, OH2JA, OH2BBH, OH2BEQ, OH2JG, OH2EE, OH5UX, OH5XL, OH6UM, OH3AA: OH2CR, OH2DT, OH3UU, OH3JR, OH3XT, OH3WS, OH3XS, OH3TO, OH3YI, OH3EQ, OH3WZ, OH3KS, OH3RF, OH3IQ, OH3XZ, OK1KPU: OK1AXA, OK1JAX, OK1JDX, OK1DLD, OK1MMW, PA6WW: PA3ABA, PA3ADJ, PA3ADM, PA3BFM, PA3BFX, PA3BIL, PA3BTH, PA2DXY, PA2PMF, PA8AAJ, PA8IMA, PA8JWK, PA8LVB, PA8SKP, PA8VDV, PA8PSK, PA8KOR, F6DXE, U2R: UR2FO, UR2FU, UR2HU, UR2IG, UR2HB, UR2JW, UR2MS, UR2RAM, UR2REC, UR2RKF, UR2RMB, UR2TAB, UR2-083-910, Y7BR: YU1EW, YU1UU, YU10FJ, YU70QI, YU70QZ, YU70BC, YU70FK, YU3APR: YU3FR, YU3FK, YU3DM, YU3BO, YU3SO, YU3TUX, YU3EO, YU3TVI, YU3EY, W1YN & AG1C, AK1A, KA10, W2PV & K1DG, K1JX, KA1R, KC1Q, N2NT, WA2SPL, K2SX, K2XA, K3UA, WA3ZAS, W3GM & K3GM, K3OA, K3ND, K3FD, W3FV, N3VV, N3AMK, W82YOF, K83GJ, W3LPL & A13M, K3DI, K3RA, K3EST, WD4AXM, K3RV, KT4W, WA3UXU, W3NX & AD3V, N8NA, W6XX & W6TPH, AE6U, N6GW, 4X4WN, N6TH, K6TMB, N6DDK, W6CF, K6HNZ, W8AIIH & W8ARBW, K8FVF, N8NO, K8TG, N8BIH, KM8O, W8RIF, ZK2RU: K6RU, AA6AD, W6VG.

U.S.A. Club Scores

Northern California Contest Club	160,376,446
Yankee Clipper Contest Club	159,837,851
Frankford Radio Club	155,503,310
Potomac Valley Radio Club	70,587,887
North Texas Contest Club	27,056,996
San Diego DX Club	19,767,727
Murphys Marauders	19,726,822
Mad River Radio Club	19,030,623
Ill-Wind Contesters	15,278,585
Southern California DX Club	14,818,780
Southeastern DX Club	14,578,462
Northern Illinois DX Association	10,981,070
Texas DX Society	10,102,624
Willamette Valley DX Club	8,654,889
Eastern Iowa DX Association	8,418,034
Rubber Circle Contest Club	8,322,335
Greater Milwaukee DX Association	7,407,480
Kansas City DX Club	5,146,050
Central Virginia Contest Club	5,049,640
Northern Ohio A.R.C.	4,989,705
Albuquerque DX Association	3,661,073
Michigan DX Association	3,608,046
Northern California DX Club	3,554,105
Vulcan DX Club	3,364,102
Central Arizona DX Association	3,287,775
Northern Ohio DX Association	3,138,514
Colorado Contest Conspiracy	2,994,662
Alamo DX Amigos	2,962,474
Western Washington DX Club	2,753,681
Neenah-Menasha A.R.C.	2,478,717
Rochester DX Association	2,270,349
Sheboygan County DX Association	2,047,596
Gloucester County A.R.C.	1,931,336
Lynchburg A.R.C.	1,908,092
Northern Florida A.R.S.	1,829,554
Mississippi Valley DX and Contest Club	1,735,452
DX Association of Connecticut	1,333,377
Meridan A.R.C.	1,311,858
Hart House A.R.C.	1,305,985
Southwest Ohio DX Association	1,286,995
Northern Florida DX Association	1,027,598
Montgomery A.R.C. (MD.)	882,283
Long Island DX Association	784,397

DX Club Scores

Four Lakes A.R.C.	758,424
Redwood Empire DX Association	566,927
Kansas City DX Association	533,849
Red Stick DX Association	443,457
Dauberville DX Association	237,267
BARRA (Buffalo, NY)	232,773
Eastern Michigan A.R.C.	211,564
Central Iowa Radio Amateur Society	190,126
Mid-Ohio Valley A.R.C.	180,328
Cuyahoga Falls A.R.C.	75,872
Lithuanian Contest Group	22,685,926
Voroshilovgrad Radio Club	19,432,964
Kaunas Polytechnic Institute R.C.	19,336,688
Southern German DX Group	17,578,259
YU DX Club	14,258,804
Halifax A.R.C.	10,708,702
Rhein Ruhr DX Association	9,649,907
Alaska DX Association	9,213,800
The Bullmertz (Sweden)	8,769,208
Ontario Contest Club	8,469,309
Tallinn Radio Club	7,731,089
Fraser Valley DX Club	7,379,093
CW YV Club	5,625,000
Israel DX Club	4,199,232
Marianas Amateur Radio Club	2,932,220
Northern Lithuania DX Group	2,851,453
Saar Pfalz DX Club	2,386,318
Danish DX Group	1,924,050
A.S. Filaret DX (Romania)	1,782,274
Grupo Argentino de Radiotelegraphia	1,771,479
SP DX Club	685,857
ES DX Club (Poland)	268,447
ZSTC (Ukraine)	143,728
Szkolny Club (Poland)	107,739
SP6PAZ Club	53,390
"Iskra" Krzeszowice (Poland)	52,770

Addendum: The Kansas City DX Club in the 1980 Contest was credited with a score of 2.9 MEG points, but actually the score should have been 8.1 MEG due to the omission of the Multi-Multi Phone score from AB0I. We apologize for this mistake.

C.W. TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

World

Martti Laine, CT3BZ

Donor: Albert Kahn, K4FW (W2AB Memorial)

World—QRPP

Ted van Beek, AC2U

Donor: Gene Walsh, N2AA

U.S.A.

Willard L. Myers, K1GQ

Donor: Frankford Radio Club

Canada

Jim Roberts, VE3IY

Donor: Canadian DX Association

Carib./C. A.

Ivan R. Belvis, Jr., WP4BDS

Donor: Jim Neiger, N6TJ

Europe

Al Slater, G3FXB

Donor: Edward Bissell, W3AU

Africa

FR0GGL

Donor: Gordon S. Marshall, W6RR

Asia

Alexander Nicolaevich Karamian, UF6CR

Donor: Japan CQ Magazine

Japan

T. Aoyama, JA1IDY

Donor: Palm Garden Contest Club

Oceania

Thomas H. Schiller, N6BT/AH0

Donor: Maui Amateur Radio Club

SINGLE OPERATOR, SINGLE BAND

World

Jorge Humberto Bozzo, LU8DQ (21 MHz)

Donor: W2JT Memorial, No. Jersey DX Assoc.

World—3.5 MHz

Francesco Chiodini, I4IND

Donor: Fred Capossela, K6SSS

U.S.A.

Stephen F. Biddle, K6EWL (21 MHz)

Donor: No. Illinois DX Association

Canada

Kari Korhonen, VE1BRB (14 MHz)

Donor: Canadian Amateur Radio Federation

Carib./C.A.

Isaac Novoa-Lopez, NP4DA (21 MHz)

Donor: DX Club of Puerto Rico

Europe—14 MHz

Markku Nyssonen, OH8SR

Donor: G2LB Memorial (From Friends)

South America

Franklyn Brooker, 9Y4VU (28 MHz)

Donor: Rafael Ponce de Leon, CX3BR

MULTI-OPERATOR, SINGLE TRANSMITTER

World

P41E (Oprs. K4BAI, N4TO, W6OAT, K3NA, K00O)

Donor: Anthony Susen, W3AOH

U.S.A.

N1AC (Oprs. N1AC, W1IHN, K1UO)

Donor: Douglas Zwiebel, KR2Q

MULTI-OPERATOR, MULTI-TRANSMITTER

World

W2PV (Oprs. K1DG, K1JX, KA1R, KC1Q, N2NT, WA2SPL, K2SX, K2XA, K3UA, WA3ZAS)

Donor: Hazard Reeves, K2GL

U.S.A.

N2AA (Oprs. K2GL, K2BQ, K2NG, K2GM, K2TW, K2SS, K2TT, KR2J, KR2Q, KR2W, KU2M, K5NA)

Donor: James Rafferty, N6RJ

CONTEST EXPEDITIONS

World—Single Operator

SU1AA (Opr. Ville Hiilesmaa, OH2MM)

Donor: Yankee Clipper Contest Club

World—Multi-Operator

ZK2RU (Oprs. K6RU, AA6AD, W6VG)

Donor: Bill Schneider, K2TT

SINGLE OPERATOR—ALL BAND

World—Phone/CW Combined

Martti Laine, OH0BH/CT3BZ

Donor: John Knight, W6YY

CLUB TROPHIES

World—Phone/CW

Northern California Contest Club 160,376,446

Donor: CQ Magazine

MOST IMPROVED—PHONE/CW

Northern California Contest Club

Donor: Southeastern DX Club

WORLD TOP 10 QRPP

(5w input)

All Band

1.	AC2U	591,856
2.	N3RS	577,205
3.	UP2BFC	441,881
4.	OK2PDL	321,984
5.	K4LTA	281,082
6.	N4BP	268,832
7.	AJ7S	267,544
8.	VE3KZ	261,632
9.	HP1XAT	253,215
10.	DF4RD	220,712

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSO's, Zones, and Countries. Certificate winners are listed in Bold Face.

C.W. RESULTS

SINGLE OPERATOR NORTH AMERICA

UNITED STATES

K1GQ	A	3,276,768	2111	138	390
K1KI	"	3,169,751	2044	132	401
K1AR	"	2,916,822	2003	130	371
W1KM	"	2,628,120	2034	121	319
W1DA	"	1,748,810	1442	116	299
W1PH	"	1,581,306	1298	105	314
W1ZT	"	1,323,084	1177	110	289
W1RR	"	1,289,148	1093	115	297
K1SA	"	1,178,532	1208	96	246
W1FJ	"	947,076	973	89	249
KG1E	"	851,390	922	93	223
A1E	"	548,386	740	76	178
AB1U	"	480,896	589	83	208
K1IK	"	368,460	468	89	187
W1NG	"	368,368	448	105	194
K1JB	"	344,796	544	72	164

W0MHH/1	"	258,120	434	68	148
K1BV	"	227,664	514	45	108
W1CNU	"	175,062	300	52	127
W1LQO	"	162,985	340	54	131
K1FOW	"	157,094	166	68	161
AD1F	"	132,396	267	54	123
W1IUU	"	117,465	228	60	131
N1AU	"	107,200	234	52	108
W1HUE	"	89,708	205	52	112
KA1FGH	"	86,394	255	32	87
WA1NRT	"	81,515	210	41	96
W1HX	"	77,832	151	61	123
KA1CLV	"	70,785	176	48	95
KD1U	"	56,529	201	27	72
KB1U	"	45,864	152	35	69
KA1CY	"	37,922	102	51	83
K1VHS	"	27,141	92	37	72
W1OPJ	"	11,350	76	15	35
W1PLJ	"	6,216	53	15	27
W1WAI	28	292,125	801	30	95
KA1CFC	"	201,135	605	27	88
N1BHL	"	57,482	245	22	60
KA1EHR	"	3,136	44	11	21
W1GNR	21	217,002	636	32	86
WA1FCN	"	191,646	557	30	87
W1END	"	50,072	198	28	60
K1VWL	"	39,809	185	23	54
K1EFI	14	172,099	526	31	82
KA1BTF	"	10,971	74	16	37

K1MA	7	215,424	719	24	78	KA2IBT	"	18,392	88	26	50	K3JGJ	"	195,620	326	64	144	
AA1M	"	37,530	197	17	53	W2XQ	"	9,246	48	28	41	WB3FSB	"	178,020	307	63	144	
W1BWS	"	9,374	77	10	33	KA2FEW	"	4,005	95	20	25	WA3SZY	"	147,573	309	53	118	
W1ZM	3.5	151,497	610	22	71	N2AWH	"	2,143	50	15	13	N2MA/3	"	146,848	241	83	125	
						KA2IWK	"	1,674	50	17	14	W3HDH	"	130,640	252	61	123	
K1PBW	1.8	6,160	61	17	27	N2IN	"	900	17	8	12	K3IE	"	118,192	234	54	124	
K1MEM	"	5,964	65	14	28	K2MFY	28	89,901	327	26	67	WA3IMY	"	110,230	267	48	103	
W1BB/1	"	1,533	25	8	13	KA2MNI	"	27,090	135	21	49	KA3CRC	"	106,386	253	45	104	
						N2AU	21	406,640	1021	35	101	W3GNQ	"	100,080	210	56	124	
K2VU	A	2,783,920	2079	118	342	WA2HZR	"	195,536	560	33	88	N3HVM	"	99,593	223	54	109	
W2REH	"	2,777,236	1857	135	373	WA2LOG	"	105,576	348	29	77	KA3CR	"	98,436	233	54	102	
N2LT	"	2,768,157	2135	118	323	W2RPZ	"	33,884	141	28	58	AJ3H	"	52,138	143	46	85	
W2VJN	"	2,374,930	1554	142	388	KA2LEB	"	29,260	133	25	52	K3KNH	"	49,176	181	41	85	
AE2A	"	2,227,357	1653	123	350	K2MN	14	2,212	27	9	19	WB3JRU	"	40,770	153	48	87	
W2GD	"	2,171,310	1630	126	335	W2KHQ	7	23,232	129	17	47	WB3CAC	"	26,712	109	32	52	
W2IB	"	2,128,475	1560	120	348	WA2SQY	"	18,240	112	17	43	WB3KIL	"	3,577	35	22	94	
KQ2M	"	1,784,727	1427	120	321	K2LP	3.5	12,960	88	17	40	N3BJ	28	165,540	478	30	27	
K2BU	"	1,692,186	1399	112	305	N3AD	A	2,481,507	1943	119	320	KA3BFX	"	101,442	337	28	78	
W2TA	"	1,517,820	1278	112	298	K4PQL/3	"	2,250,039	1711	121	332	W6GMZ/3	"	64,246	246	25	66	
W2YC	"	1,217,200	1067	104	296	N3BB	"	2,168,530	1641	123	332	WA3DMH	"	8,648	64	12	34	
W2GGE	"	951,709	915	90	269	K300	"	2,046,268	1641	119	309	K3TW	21	207,179	603	31	88	
K2NJ	"	921,284	882	103	261	K30P	"	1,738,954	1346	125	321	KC3N	"	97,643	389	26	65	
N2JJ	"	850,698	897	95	239	W3AP	"	1,564,620	1214	118	327	SM8KV/	"	60,260	205	28	67	
W2TZ	"	752,740	858	82	223	N3ED	"	1,398,768	1313	101	267	W3	"	9,984	75	17	31	
K2QF	"	738,390	796	105	221	K3VW	"	1,328,601	1396	88	239	WA3JXW	"	3,5	34,100	168	17	58
N2UN	"	708,671	761	91	240	K3WJ	"	1,277,684	1148	108	280	K3FN	3.5	18,282	116	17	51	
N2DT	"	701,244	774	87	215	K3WW	"	1,160,220	1092	105	261	KA1K/3	1.8	2,646	53	10	17	
KF2O	"	567,056	613	89	243	N3RG	"	981,120	996	91	245	LA4LN/	"	275	39	5	6	
N2MR	"	473,224	569	88	210	K3ZZ	"	898,068	787	107	295	W3	"	275	39	5	6	
K2PA	"	470,470	599	84	202	W3AM	"	824,250	857	100	250	W4RX	A	1,957,137	1528	128	341	
W2FTY	"	393,104	444	96	215	W3UJ	"	797,818	801	101	242	K7SV/4	"	1,835,541	1383	125	334	
KK2E	"	351,671	540	60	163	W3GN	"	761,560	850	94	222	N4UA	"	1,253,448	1169	104	274	
W2IY	"	301,158	388	85	201	K3TC	"	743,566	730	102	256	W4YE	"	999,544	955	105	259	
W2GKZ	"	291,510	434	72	174	W3GU	"	723,142	764	99	230	K4AMC	"	775				

TOP SCORES

WORLD

Single Op All Band

9Y4VT	5,803,776
CT3BZ	5,701,590
HK3A	4,478,204
N6BT/AH0	4,241,746
UF6CR	4,101,936
8P6J	3,868,716
K1GQ	3,276,768
K8LX	3,270,780
K1KI	3,169,751
EA2IA	3,057,204

Single Op Single Band 28 MHz

YJ8RW	612,255
OH3XZ	546,360
DL1BU	509,878
YT3L	484,120
YU3EW	466,570
JH1EDD	462,070

21 MHz

LU8DQ	1,359,711
YU3ZV	732,096
DK3GI	714,280
VE3BMV	653,856
YU7OCV	459,801
K6EWL	454,648

14 MHz

OH8SR	672,600
SM0AJU	560,324
KG6DX	525,420
SM2CEW	479,820
UA9ADQ	447,874
W8UVZ	368,382

7 MHz

UA1DZ	339,532
K0RF	337,280
AB0I	335,775
YU4AW	287,538
UB5JMR	241,440
JE3MCC	240,700

3.5 MHz

I4IND	172,782
W1ZM	151,497
UC2ACA	136,394
DJ2BW	130,974
UA9TS	122,567
YU2RA	109,755

1.8 MHz

EA8AK	41,470
YV1OB	25,806
GW3NYY	21,320
OK3KFF	19,764
4X4NJ	18,252
UA9SAX	17,480

Multi-Op

Single Transmitter

P41E	8,059,296
YU3EY	7,674,190
YW5A	5,481,975
R5I	4,892,184
N4AR	4,564,350
UK2PCR	4,512,285

Multi-Op

Multi-Transmitter

W2PV	10,431,729
N2AA	10,147,820
W3LPL	9,628,026
OH3AA	9,301,635
K2UA	9,210,792
N9MM	8,884,400

USA

Single Op All Band

K1GQ	3,276,768
K8LX	3,270,780
K1KI	3,169,751
N5AU	2,977,424
K1AR	2,916,822
K2VV	2,783,920
W2REH	2,777,236
N2LT	2,768,157
W1KM	2,628,120
K9DX	2,624,064

Single Op Single Band 28 MHz

N4ZC	382,782
W0UA	376,248
W0ZV	347,520
W8WPC	324,324
K0ZZ	323,342
N4ZZ	315,126

21 MHz

K6EWL	454,648
N2AU	406,640
K4VX/0	397,764
K8CX	358,912
K9QVB	337,410
W0KEA	306,125

14 MHz

W8UVZ	368,382
K9PPY	350,908
K0ZX	327,228
W9OA	315,315
N8CC	280,250
W9NUD	277,536

7 MHz

K0RF	337,280
AB0I	335,775
W9VNE/8	230,690
K1MA	215,424
K4PI	181,888
WD9IIX	133,118

3.5 MHz

W1ZM	151,497
N4UM	35,440
K3FN	34,100
N5CR	30,355
K3TG	18,282
WD9AHJ	13,851
N7RM	13,604

1.8 MHz

W8LRL	8,234
K1PBW	6,160
K1MEM	5,964
N4IN	5,418
K5UR	4,477
K6SE	3,496

Multi-Op

Single Transmitter

N4AR	4,564,350
N1AC	4,149,032
W3BGN	3,930,997
K1XA	3,444,246
N4RJ	3,362,446
W4NL	3,253,040

Multi-Op

Multi-Transmitter

W2PV	10,431,729
N2AA	10,147,820
W3LPL	9,628,026
K2UA	9,210,792
N9MM	8,884,400
K1ZZ	8,758,260

W4YN	56,682	150	46	88
N4FGF	52,200	173	42	78
WA4DRU	41,580	117	41	91
W9TS/4	34,963	111	48	76
K4FPF	24,459	92	32	61
W40GG	22,714	100	33	49
W4DGI	17,225	99	20	45
N4ZC	382,782	1018	32	99
N4ZZ	315,126	922	32	91
WB4TDH	223,971	636	31	90
AA4AK	201,662	590	30	88
K4JSI	56,494	211	23	71
K4GNP	24,600	136	21	54
W4GTS	20,230	106	21	49
K4II/4	5,670	54	14	31
W4IO	3,168	36	11	21
N4BU	217,695	686	31	84
K4XL	174,585	534	30	83
K4HCY	89,670	324	28	70
W4JD	54,472	217	26	62
KA4RLP	12,103	97	20	29
W3YY/4	176,202	533	32	85
W4AAV	152,460	460	33	88
N4WD	109,545	387	30	79
N4CT	60,260	230	25	67
W4KMS	23,870	111	20	57
W4NM	4,440	44	13	24
K4PI	181,888	556	28	88
KG4W	93,177	379	24	63
W4VQ	56,430	219	23	67
WA4SV0	53,222	231	23	66
N4OT	22,997	137	15	46
N4UM	35,440	175	20	60
N4SU	10,945	72	16	39
N4IN	5,418	57	14	29
W4DR	3,298	45	13	21
W4PZV	1,200	25	9	15
N4ARO	700	19	8	12
N5AU	2,977,424	2089	142	349
(Opr. K5ZD)				
K5GA	2,434,864	1697	142	354
N5JJ	2,042,482	1618	130	312
K5KU	1,591,370	1432	121	286
K5NW	1,375,617	1166	123	288
N5JB	1,161,981	1064	116	253
AD5Q	776,298	851	101	226
K5LP	706,982	825	92	210
W5DV	620,366	714	99	214
KA5W	568,176	667	95	209
WA5S0G	493,190	601	97	201
K5KLA	464,648	684	73	168
K5DB	347,415	504	100	165
W5BE	273,969	440	74	145
W50SJ	271,508	478	72	134
K5SA	240,189	495	59	118
K05A	164,630	349	48	115
WB5TEQ	118,475	246	61	114
KM5G	99,116	255	43	99
W5QF	73,304	194	48	88
W5JC	47,570	134	48	86
W5EIJ	40,208	142	42	70
KA5Q	30,530	130	27	59
W5YH	27,560	93	34	70
N5UA	14,076	74	25	43
W5XZ	308,238	889	30	93
N5JW	296,582	839	30	92
N5TP	264,125	750	27	98
AF5M	225,459	651	32	91
WB5YOT	117,484	449	25	67
N5CDO	95,772	365	24	68
K5RF	31,350	149	19	56
W5ASP	22,081	113	20	51
WB5DDI	137,690	554	28	70
K5SF	118,674	359	33	81
AC5R	22,011	114	23	46
KB5YY	16,744	114	18	34
W5FO	238,243	628	34	103
K2SCU/5	3,842	39	12	22
K9MK/5	40,068	173	24	60
N5CR	30,355	182	19	46
N0IN/5	6,600	64	15	25
K5BZU	2,697	42	10	19
K5UR	4,477	72	15	22
(Opr. K5ZD)				
K6NA	1,639,820	1268	141	314
N6GG	1,078,836	1039	110	253
N6AR	903,033	856	119	254
W6MSF	847,658	935	100	217
(Opr. WA6HC1)				
N6ZZ	809,723	792	110	251
W6SX	772,740	1016	86	184
W6KUT	728,466	848	109	208
N6JV	695,872	746	114	218
W60KK	675,272	784	99	203
W6ISQ	651,002	703	102	224
N2YQ/6	634,644	778	103	186
N6AN	592,764	742	96	186
N6QR	498,645	571	102	213
W6NKR	416,295	458	102	217
KD9E/6	416,245	515	95	200
K6PU	379,490	495	100	174
WB6JMS	364,694	488	98	176
WD6EWG	283,504	512	72	136
WB6FDQ	268,056	437	82	134
W6WB	247,296	350	83	173
K6OMB	242,844	440	73	123
WA6HAE	224,928	369	74	139
AD6D	221,832	366	79	137
W6BYH	208,458	316	73	149
N6ZB	207,336	460	63	100
WA6LFF	200,026	237	72	134
N6NF	171,437	452	50	83
N6HK	170,753	285	69	140
KG6O	152,471	273	65	102
K6DR	131,520	344	52	85
K6LAN	122,472	271	59	103
WB6KBZ	117,735	309	52	89
(Opr. WB6PY1)				
N6HR	117,096	211	72	132
N6OZ	115,456	251	58	106

N6UW	107,008	264	63	89
W5FL/6	89,206	221	55	91
K6MA	81,760	221	60	86
W6MFC	78,736	248	40	72
KS6H	76,608	278	50	64
N6JM	76,038	201	57	81
W6OUL	69,960	208	47	85
WB6EXW	69,580	184	58	82
K6YRA	56,696	119	54	98
(Opr. AE6P)				
N6ESV	44,322	191	31	52
AA6DP	40,670	148	41	57
W6SYL	33,957	160	29	48
W6EYC	32,926	113	36	65
AC6H	27,528	141	34	40
WA6TKT	26,329	92	51	62
N6CT	20,995	112	22	43
N6EZN	17,613	120	22	35
K6SMH	15,680	77	37	43
W6SZ	15,124	69	26	50
W6QDE	11,210	68	25	34
KA6ING	4,140	39	23	22
KB6ZA	1,032	22	11	13
WA6HAD	836	50	10	9
KA6QXG	297	13	6	5
K6OZL	207,805	634	31	84
W6TMD	84,300	293	27	73
K6EWL	454,648	1140	35	101
N6TO	96,642	385	27	64
K6VL	76,512	278	29	67
K9WY1/6	30,660	173	21	39
WA6VNR	20,764	129	21	37
W6PU	154,488	436	33	90
KA6DSW	56,052	247	24	57
K6XT	25,488	122	26	46
W6HJ	19,924	106	23	45
W6YA	133,038	408	31	83
W6AM	126,222	402	29	80
(Opr. N6AW)				
N6FS	53,448	285	22	46
W6US	9,288	110	14	22
K6SE	3,496	92	11	



HL-32V—This Little Beauty is the first of our compact, low profile amplifiers for use with handheld radios. For VHF operations, this unit produces 10W to 25W output with drive from your 0.5W to 3W handheld. Excellent for mobile use in your car.

Turn it on with the convenient front panel controls, including Power LED and Transmit LED, or slip the package under the seat out of sight and out of mind.

Low insertion loss on receive and selectable power level design provides low VSWR to the transceiver.

Use with any talkie from 0.5W to 3W for 10W to 25W output.

The HL-32V operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only \$89.95 suggested retail! At your favorite dealer now!



HL-20U New Product Preview—Another super compact from Tokyo Hy-Power Labs... This one is for UHF, and it's beautiful, with the controls on the brushed metal face panel to make operation as easy as touch-and-go.

The ultra compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to produce a big 20W output signal.

Your UHF handheld operations have never experienced anything like this surprising little amplifier from Tokyo Hy-Power Labs. Price and availability of the HL-20U will be announced soon.

TOKYO HY-POWER LABS, INC.

Long the quality leader among fine Japanese communications equipment manufacturers, TOKYO HY-POWER LABS now makes these outstanding units available to you through American dealers. Now you can get our advanced features and quality at your kind of prices.

PRECISION MATCHING PAIR



HC-150
&
HC-2000

Tokyo Hy-Power Labs' HC-150 tuner, with an accurate 200W 3-30 MHz power meter/VSWR bridge and sturdy, quality-built coax or wire line antenna coupler, provides smooth, precision matching from any barefoot transceiver to antenna between 10 and 200 ohms. For a most reasonable sum of \$99.95.

If stompin' through the QRM at the edges of the band, where somehow the DX always seems to be, and where the VSWR usually heads for the sky, is your kind of thing; the HC-2000 is your kind of coupler. It can provide a matched antenna, while ready for both forward and reflected power at the same time on the accurate dual meter VSWR/wattmeter. At \$349.95 suggested retail, the HC-2000 can handle the output resulting from the full legal limit input to your linear amplifier.

The next time you want to make a lumpy line flat or to make a long line perform as it should, use a quality built, quality performing Tokyo Hy-Power Labs antenna coupler.

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SAITAMA, JAPAN

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CIRCLE 111 ON READER SERVICE CARD

The HD-73 Rotator by Alliance

A precision instrument
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The HD-73 combines Dual-Speed rotation and a single 5-position switch with the clear visibility of a backlit D'Arsonval meter. So you get precise control for fast and fine tuning.

And the advanced technology of HD-73 is backed by quality construction. Heavy duty aluminum casings and hardened steel drive gears. Lifetime factory lubrication that

withstands -20°F. to 120°F. temperatures.

The superior design of the HD-73 mast support bracket, with optional no-slip positive drive, assures perfect in-tower centering with no special tools. Automatic braking minimizes inertia stress.

Easy to install, a pleasure to use. The HD-73 is on your wavelength. Write for performance details today.



I want to tune in on HD-73.

Send complete details

Give me the name of my nearest dealer.

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ADDRESS _____

CITY _____ STATE _____ ZIP _____

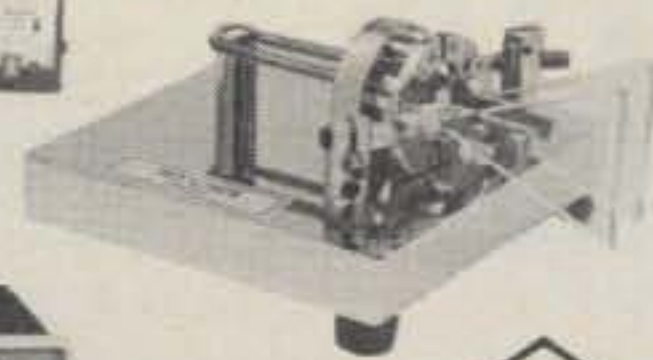


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CQ



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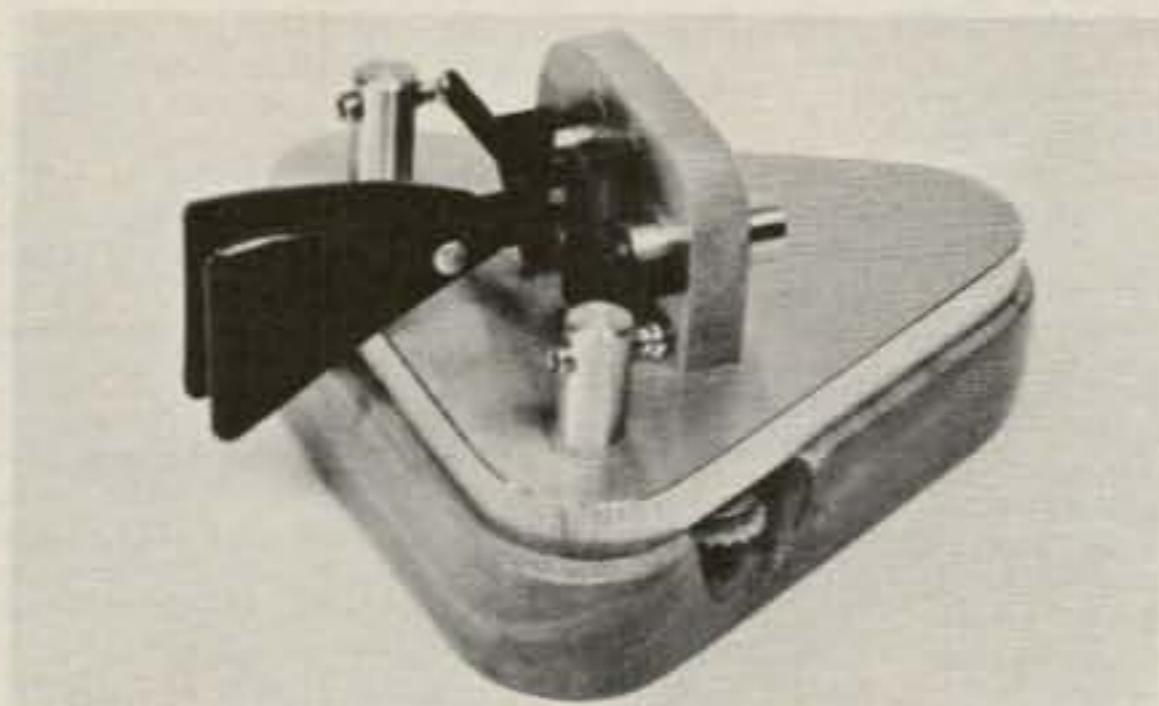
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CIRCLE 92 ON READER SERVICE CARD

"Our Keys Unlock the World"



The Brass Racer-EK-1, look carefully, you may not notice that this paddle is also a keyer. Built into the base is a fully iambic, dot-dash insertion, and adjustable speed control keyer using the Curtis 8044 chip. Nearly invisible but a convenient, spacesaving, portable keyer/paddle unit. Vibroplex quality throughout.



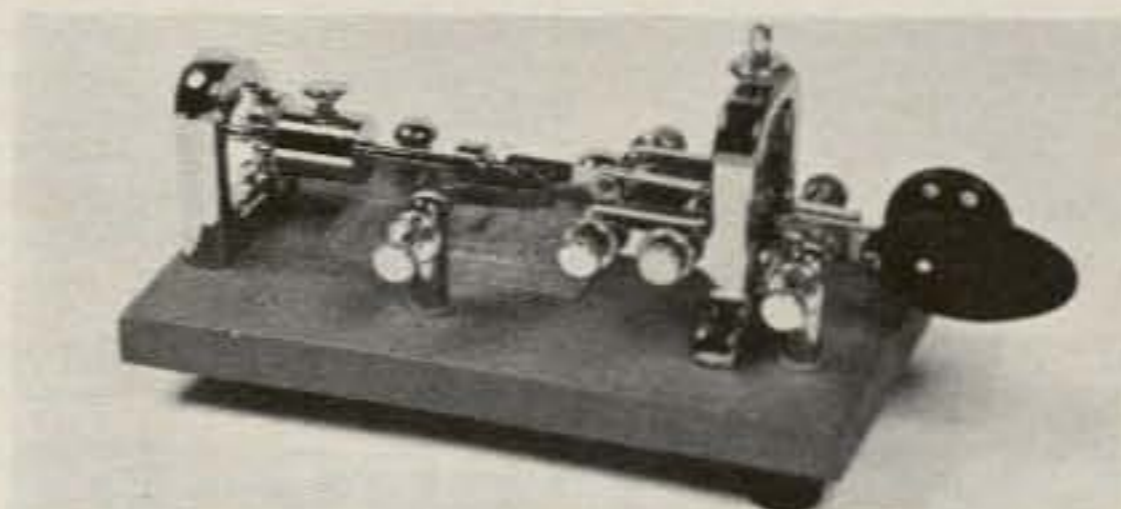
The Brass Racer-Iambic, a truly distinctive new design of iambic paddle; crafted from solid brass and mounted on a base of polished hardwood. Beautiful to look at; beautiful to operate. The paddle tension is adjustable to the operator's likes with a twist of our unique tensioning system. Just set it and forget it. A lifetime of smooth, easy operation. Experience the pride of owning a Vibroplex.



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CIRCLE 61 ON READER SERVICE CARD

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We're AGL, North Texas' AUTHORIZED Dealer for more than 70 different product lines of Amateur Radio Equipment. Need antennas and towers? We got 'um—just call Bill (K5FUV) or Gordon (N5AU) for your special requirements. Mike (KG5F) can advise you on transceivers and accessories. Let Gary (KM5X) box it up and send it your way, while Bob (W5AH) stands ready to help with your service and warranty needs. We like to talk radio, DX, contests, or tell jokes...Gordon's busy learning some new Texas Tall Tales!

CUSHCRAFT

A3 3el triband beam	\$174.00
A4 4el triband beam	\$227.00
A743 7-10 mhz add-on kit	\$62.00
A744 7-10 mhz add-on kit	\$62.00
20-3CD 3el monobander	\$172.00
20-4CD 4el monobander	\$240.00
15-3CD 3el monobander	\$96.00
15-4CD 4el monobander	\$108.00
10-3CD 3el monobander	\$76.00
10-4CD 4el monobander	\$89.00
A32-19 19el 2m "Boomer"	\$84.00
214B 14 elem. SSB "Jr. Boomer"	\$69.00
214 FB FM "Jr. Boomer" 2m	\$69.00
ARX2B 2m "Ringo Ranger II"	\$35.00
ARX450B 450 mhz "Rng. Rngr."	\$35.00
A-147-20T 20el 2m	\$62.00

HY GAIN

V2S 2m gain vertical	\$38.00
TH7DX 7 el tribander	\$369.00
TH5MK2S 5el tribander	\$312.00
TH3MK3S 3el tribander	\$215.00
TH2MK3S 2el tribander	\$135.00
TH3JRS 3el jr. tribander	\$157.00
HQ-2S 2el quad	\$265.00
402BAS 2el 40m	\$195.00
205BAS 5el 20m	\$295.00
204BAS 4el 20m	\$226.00
203BAS 3el 20m	\$132.00
155BAS 5el 15m	\$176.00
153BAS 3el 15m	\$74.00
105BAS 5el 10m	\$115.00
103BAS 3el 10m	\$55.00
DB1015AS 3el duobander	\$150.00
64BS 4el 6m	\$52.00
66BS 6el 6m	\$99.00
18 HTS hy tower vertical	\$339.00
18AVT/WBS 5 band vertical	\$89.00
14AVQ 4 band vertical	\$54.00
214 14el 2m	\$32.00
2BDQ 2 band dipole	\$49.00
5BDQ 5 band dipole	\$98.00
BN86 balun	\$17.00

Note: Part numbers with S on the end denote stainless steel hardware. Some small quantities remain of older stock; call for prices.

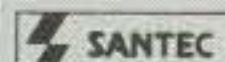
KLM

KT34XA 32 ft. boom tribander	\$449.00
KT34A 16 ft. boom tribander	\$309.00
7.2-1 40m dipole	\$155.00
7.2-2 40m 2el beam	\$289.00
7.2-3 40m 3el beam	\$439.00
7.2-4A 40m 4el beam	\$599.00
5el 20m "Big Sticker" mono	\$429.00
6el 20m "Big Sticker" mono	\$610.00
6el 15m "Big Sticker" mono	\$389.00
6el 10m "Big Sticker" mono	\$225.00
144-148-13LB 2m "Long-Boomer"	\$75.00
144-150-16C 2m circular	\$95.00
432-16LB 432mhz "Long-Boomer"	\$59.00
420-470-18C 450mhz circular	\$57.00

KLM antennas may be shipped from California or Texas, Freight Collect. Most require truck shipment. Call for details.

HUSTLER

5BTV 5 band trap vertical	\$99.00
Mobile antenna resonators:	
std	super
10m	\$10.00 \$15.00
15m	\$10.00 \$15.00
20m	\$12.00 \$18.00
40m	\$15.00 \$21.00
75m	\$17.00 \$32.00
BM-1 bumper mount	\$16.95
MO-1 fender mount mast	\$22.36
MO-2 bumper	\$22.36
CGT-144 2m colinear w/mount	\$46.70



October Special \$285⁰⁰



ST-144 μ P

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CK2



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KWM-380



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In their infinite wisdom, the phone people require that we have twice as many lines as people to answer them. Just be patient and try again later; we aren't going belly-up any time soon. Also, we can't keep someone down here to answer the phone at night or on weekends, and we're too busy to answer the WATS on Saturdays.

TEXAS FOLKS

Please note that we're open until noon on Saturdays just for you. Visitors are welcome, too. We're in Keystone Park Shopping Center, across from Texas Instruments. Look for us under our two towers.

TELREX ANTENNAS

WARNING: These antennas are not for the faint of heart. They are heavy. They are large. They are expensive. They also work. These antennas require truck delivery and come in large boxes.

	WT.	Area
10m523 5el 10m beam	64lb.	4.5
10m636 6el 10m beam	85lb.	6.0
15m532 5el 15m beam	95lb.	10.0
15m845 5el 15m beam	140lb.	14.0
20m436 4el 20m beam	108lb.	12.0
This is a custom antenna.		
20m536 5el 20m beam	113lb.	13.5
20m546 5el 20m beam	n/a	n/a
This is a custom antenna.		
20m646 6el 20m beam	176lb.	17.0
40m329 3el 40m beam	110lb.	12.6
40m346 3el 40m beam	177lb.	13.8
TB5EM 5el tribander beam	49lb.	7.0
TB6EM 6el tribander beam	85lb.	10.0

Call for pricing — F.O.B. Dallas.

ROHN TOWER

25G 10 ft. section	\$40.50
45G 10 ft. section	\$91.90
25AG4 top sec., req. bearing	\$54.00
45AG4 top sec., req. bearing	\$103.00
GA25G guy bracket with bars	\$22.00
GA45G guy bracket with bars	\$43.00
SB25G short base section	\$19.00
SB45G short base section	\$43.00
EP 2534-3 3 hole equalizer plate	\$9.95

Self Supporting Towers

HBX56 56 ft. self support	\$335.00
HDBX40 40 ft. self support	\$249.00
HDBX48 48 ft. self support	\$305.00

Our BX series towers include the base stubs. Beware those who charge extra for them. Also, freight collect from Dallas may save over freight pre-paid because of varying distances and routing. Drop ship or factory pick-up prices may be higher due to factory pricing policies. West Coast/Rocky Mountain prices may be 10% higher depending upon shipping point. Call for firm quote before ordering.

ROHN FOLD-OVER TOWERS

FK2548 48 ft. 25G foldover	\$699.00
FK2568 68 ft. 25G foldover	\$869.00
FK4544 44 ft. 45G foldover	\$981.00
FK4564 64 ft. 45G foldover	\$1170.00

Freight prepaid on foldover towers. Sales tax may be applicable in some areas. West Coast/Rocky Mountain prices 10% higher.

HY-GAIN CRANK-UP TOWER

HG-52 SS 52 ft. self support	\$874.00
HG-54 HD 54 foot self support	\$1414.00
HG-70 HD 70 foot self support	\$2187.50

Above shipped from Lincoln, NE. Sales tax required in some areas, freight paid on shipments in 48 states. Call for details on these and other Hy-Gain items.

PHILYSTRAN GUY CABLE

This is RF transparent, sun resistant, guy cable. Avoid those hours of putting insulators into steel cable. Enjoy the advantages of freedom from unwanted resonances that can soak up your radiated RF energy.

HPTG 4000 4000 lb. test cable	\$.44/ft.
HPTG 6700 6700 lb. test cable	\$.60/ft.
9901LD potting head	\$4.99
9902LD potting head for 6700 lb.	\$5.49
Socketfast potting compound	\$.90/pt.

TOWER HARDWARE

3/16" EHS steel guywire	\$.12/ft.
1/4" EHS steel guywire	\$.15/ft.
3/16" ccm cable clamp	\$.29 ea.
1/4" ccm cable clamp	\$.39 ea.
3/8 x 6" TBE&E turnbuckle	\$5.39
1/4" th thimble	\$.24 ea.
3/16" preformed guy grip	\$1.75
GAS604 screw anchor	\$12.00
GAR604 concrete guy anchor	\$12.00
M200H 2" x 10' steel mast	\$37.00
500D guy insulator	\$.85
502 large guy insulator	\$1.80

Note: Some items too large for UPS shipment. Call before ordering to check shipment mode.

HY-GAIN PACKAGE #1

TH7DX	7el Tribander
HG 52SS	Self Supporting Tower
Ham IV	Rotor
COA	Coax Arms (3 Furnished)
HG-10	10 ft. steel mast
HG-TBT	Thrust Bearing

Your Price!!! \$1,533.00

FREIGHT PRE-PAID!!!

May require 4 to 6 weeks delivery. Sales tax may be applicable in some states. Shipped from Lincoln, NE. Cashier's check or money order in advance required—no credit cards. Sorry, no substitutions on this package.

HY-GAIN PACKAGE #2

HG-52-SS	52 Ft. Crank-Up
HG-10	10 Ft. Mast
HG-TBT	Thrust Bearing
HG-COA	(3) Coax Arms
Ham IV	Rotor

ALL FOR ONLY \$1,190!!!

Shipped from Lincoln, NE. Allow 4 to 6 weeks for delivery.

ROTORS

Ham IV	\$192.00
TZX	\$247.00
HDR300 for LARGE arrays	\$419.00
Alliance HD73	\$94.00

CABLE

Saxton RG213 50 ohm coax	\$.31/ft.
RG 11/U 75 ohm coax	\$.31/ft.
LDF4-50 Andrews HELIAX [®]	\$1.48/ft.
8 cond. rotor cable	\$.18/ft.
8 cond HD rotor cable (for 150+ft.)	\$.36/ft.
Mini 8 52 ohm small coax	\$.16/ft.

Helix[®] cannot be shipped by UPS as it cannot be coiled tightly enough to conform to size restrictions without damage.

CONNECTORS

Amphenol PL259 (Silver Plated)	\$1.25 ea
Amphenol 82-61 type n	\$.285 ea
Andrews L44U UHF female	\$17.00 ea.
Andrews L44PUHF male	\$17.00 ea.

SPECIAL NOTICE

We will be CLOSED the 29th and 30th of OCTOBER for the CQ WWSSB CONTEST

Sorry, we can't accept personal checks for mail orders, and can't ship C.O.D.

Due to the Yen rate, manufacturer's whims, increasing costs, and the 90 day lead time, all prices are subject to change without notice or obligation; they may go up or they may come down.

Quantity discounts begin at 100 units, except for cable and tower hardware.

PLEASE NOTE:

All drop ship orders, Hy-Gain tower orders, and Rohn foldover towers require payment by cashier's check or money order in advance. We won't accept credit cards for those items only.

CALL TODAY 1-800-527-3418

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BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

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9Y4VT	116/9/16	385/17/43	553/23/61	1220/29/66	874/27/68	1140/28/71
CT3BZ		385/17/44	643/18/52	1324/29/72	1279/25/68	1075/22/58
HK3A		328/14/40	320/18/51	938/24/68	925/25/57	1312/26/71
N6BT/AH0	18/2/2	238/15/27	497/19/30	522/29/56	1587/28/60	1221/28/53
UF6CR	83/8/22	183/9/33	509/15/49	970/27/65	787/21/53	1130/20/65
8P6J	25/5/8	154/9/15	256/12/30	1457/26/57	1450/29/68	1323/26/63
K1GQ	8/7/8	208/18/61	425/24/76	576/32/85	438/31/80	473/26/80
K8LX	10/6/8	88/15/46	366/22/65	636/29/81	559/28/78	636/27/81
K1KI	17/7/11	119/17/58	311/17/67	604/32/96	464/31/84	529/28/85
EA2IA		582/15/51	659/19/58	368/25/70	591/25/66	878/26/73

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
K1GQ	8/7/8	208/18/61	425/24/76	576/32/85	438/31/80	473/26/80
K8LX	10/6/8	88/15/46	366/22/65	636/29/81	559/28/78	636/27/81
K1KI	17/7/11	119/17/58	311/17/67	604/32/96	464/31/84	529/28/85
N5AU	15/10/11	97/15/33	386/27/68	511/33/82	538/31/73	542/26/82
K1AR	4/4/3	134/14/50	226/33/64	447/30/85	587/31/80	605/28/89
K2VV	9/3/5	109/12/38	365/19/63	584/28/85	531/29/76	481/27/77
W2REH	6/5/13	88/14/42	371/22/64	547/34/93	377/31/82	468/29/87
N2LT	3/2/1	129/12/40	434/20/66	490/28/69	445/31/69	634/25/78
W1KM	3/2/2	274/19/56	414/23/68	460/24/60	360/29/66	523/24/67
K9OX	13/7/6	89/12/41	315/22/66	464/30/78	523/30/78	509/25/79

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

Station	160	80	40	20	15	10
P4IE	16/7/14	375/16/40	534/23/63	1636/35/97	1010/36/91	1484/31/83
YU3EY	27/6/26	89/10/55	479/31/95	618/35/131	780/36/125	2058/32/113
Y5WA	9/7/6	348/16/41	580/24/66	1083/29/88	888/29/69	981/29/69
RSI	65/10/32	653/19/62	626/24/75	684/34/86	1381/31/90	1001/35/96
N4AR	17/9/16	67/16/62	461/28/92	755/34/110	499/33/101	686/32/97
UK2PCR	104/8/34	266/18/60	439/25/86	1034/32/85	780/33/88	609/33/89

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

Station	160	80	40	20	15	10
N4AR	17/9/16	67/16/62	461/28/92	755/34/110	499/33/101	686/32/97
N1AC	5/4/5	104/15/53	333/27/72	1008/35/95	622/32/77	638/27/86
W3BGN	14/9/12	111/17/61	390/25/74	566/35/100	441/35/94	793/31/100
K1XA	1/1/1	73/15/56	481/23/72	757/35/95	424/34/88	489/27/86
N4RJ	6/6/5	46/15/45	388/27/77	701/35/106	569/35/98	363/28/85
W4NL	13/11/12	70/16/57	283/24/71	785/35/106	502/31/91	357/27/79

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

Station	160	80	40	20	15	10
W2PV	72/14/27	427/18/70	1101/30/103	1389/35/118	1228/35/103	1050/34/106
N2AA	49/12/15	461/21/70	803/26/85	1475/37/115	1314/35/113	1051/33/108
W3LPL	53/12/20	263/18/65	1012/30/106	1323/38/113	1174/35/111	845/33/110
OH3AA	250/9/36	596/17/56	941/24/81	1823/34/92	1632/31/86	1440/33/96
K2UA	41/11/17	380/18/65	1161/29/91	1051/36/119	1129/35/109	1006/33/106
N9MM	83/16/25	223/21/56	870/29/96	1253/39/115	1157/35/103	1072/33/100

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

Station	160	80	40	20	15	10
W2PV	72/14/27	427/18/70	1101/30/103	1389/35/118	1228/35/103	1050/34/106
N2AA	49/12/15	461/21/70	803/26/85	1475/37/115	1314/35/113	1051/33/108
W3LPL	53/12/20	263/18/65	1012/30/106	1323/38/113	1174/35/111	845/33/110
K2UA	41/11/17	380/18/65	1161/29/91	1051/36/119	1129/35/109	1006/33/106
N9MM	83/16/25	223/21/56	870/29/96	1253/39/115	1157/35/103	1072/33/100
K1ZZ	50/13/18	353/20/67	909/28/89	1173/36/119	1049/34/97	1005/33/108

W8SR	**	79,170	267	29	76	
K4VX/0	21	397,764	1068	34	93	
W0KE	**	306,125	824	34	88	
W0MHJ	**	244,488	727	34	88	
N0BCN	**	116,202	377	30	77	
N9BD/0	**	33,900	161	22	53	
K0ZX	14	327,228	850	36	98	
AC0S	**	121,680	404	27	77	
W0SA	**	60,426	253	27	54	
W0FO	**	12,212	96	12	31	
KF0A	**	4,309	48	12	19	
K0RF	7	337,280	949	31	93	
AB0I	**	335,775	1080	26	85	
(Opr. K0XR)						
KJ0D	**	42,600	319	23	52	
W0JU	3.5	10,836	95	15	28	
W0RT	**	3,128	41	12	22	
W0CMM	1.8	3,276	65	13	15	
K0ZK	**	1,520	39	10	9	

ALASKA

AL7H	A	2,078,352	2683	107	199	
KL7RA	**	2,015,026	3340	85	162	
KL7Y	**	108,102	363	57	72	
AL7X	28	75,460	747	21	23	

BAHAMAS

K8CW/C6A	7	85,572	609	15	51	
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BARBADOS

8P6J	A	3,868,716	4665	107	241	
(Opr. N6TJ)						

BRITISH VIRGIN ISLANDS

VP2VHX	A	308,924	917	50	104	
(Opr. N60M)						

CANADA

VE1AH	A	774,080	922	86	242	
VE1ANU	**	462,735	603	85	230	
VO1AW	**	172,142	423	53	113	
VE1CAW	**	129,628	556	26	66	
VE1TG	21	89,440	465	24	56	
VE1RB	14	167,132	772	26	68	
VE1CEG	**	56,225	333	18	47	
VO1QU	7	14,112	124	13	35	
VE1BEC	1.8	472	65	2	2	
VE2AYU	A	935,688	1209	88	224	
VE2DPO	**	121,268	369	46	96	
VE2AH	14	138,753	644	22	59	
VE2WA	**	4,810	50	14	23	
VO2CW	7	25,393	158	20	47	
VE3IY	A	2,607,795	2563	113	292	
VE3DZV	**	470,880	624	87	201	
VE3HD	**	411,808	537	89	183	
VE3GCO	**	393,476	596	78	178	
VE3UOT	**	275,317	410	77	182	
(Opr. VE1BC2)						
VE3GCE	**	158,498	310	66	128	
VE3NBW	**	27,010	135	29	45	
VE3MKJ	**	17,160	155	20	32	
VE3BMV	21	653,856	1665	35	112	
VE3DUS	14	73,206	334	23	58	
VE3KRM	7	113,119	557	25	66	
VE3INQ	1.8	10,944	238	11	13	
VE4AIV	A	195,917	861	39	68	

VE4MF	**	69,550	186	45	85	
VE6OU	A	1,839,702	2302	110	217	
VE6OC	A	12,264	122	16	28	
VE7BT	A	885,720	1687	82	136	
VE7QC	28	11,340	139	14	21	
VE7DLM	14	52,083	236	19	62	
VY1DD	21	960	28	9	11	

DOMINICA

J73D	1.8	184	10	3	5	
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DOMINICAN REPUBLIC

H1BLC	3.5	12,298	278	8	14	
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HAITI

HH2VP	A	1,666,224	2425	89	215	
(Opr. N4XR)						

HONDURAS

HR1AT	14	38,125	294	21	40	
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JAMAICA

6Y5HN	A	349,168	967	46	111	
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MEXICO

XE2MX	A	715,009	1814	65	108	
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MONTSERRAT

VP2MEV	A	1,138,671	2197	70	163	
(Opr. AJ6V)						

PUERTO RICO

WP4BDS	A	607,506	1915	49	97	
K6BR/KP4	**	32,940	252	27	34	
NP4DA	21	57,816	321	21	45	

ST. LUCIA

J6LZA	A	2,855,358	3463	109	254	
(Opr. WA6VEF)						

ST. MAARTEN

P47A	A	1,748,700	2831	79	182	
(Opr. KF1V)						

U.S. VIRGIN ISLANDS

W4UY/PJ7	**	543,864	900	77	171	
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AFRICA

BURUNDI

WB3JRU	A	3,348	38	14	22	
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CANARY ISLANDS

EA8ZZ	A	94,815	247	44	85	
EA8VV	21	44,116	183	26	56	
EA8ZS	7	83,220	464	15	45	
EA8AK	1.8	41,470	242	17	41	

CEUTA & MELILLA

EA9JV	21	68,996	251	24	70	
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DJIBOUTI

J28DM	A	182,535	475	42	87	
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EGYPT

SU1AA	A	2,382,114	2631	87	214	
(Opr. OH2MM)						
SU1MI	**	1,518	66	8	15	

THE GAMBIA

C5AAU	A	1,376	19	15	17	
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KENYA

5Z4CS	A	628,918	1033	66	140	
(Opr. JE1JKL)						

MADEIRA ISLAND

CT3BZ	A	5,701,590	4706	111	294	
(Opr. OH2BH)						

MOROCCO

CN8CO	A	493,318	992	51	116	
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REPUBLIC OF SOUTH AFRICA

ZS2RM	A	25
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JA8DNV	**	30,120	182	22	38
JA2INS	**	28,187	142	25	46
JH7LVK	**	23,540	165	21	34
JA2LA	**	10,023	89	14	25
JA6BIF	**	8,262	95	13	21
JA7GAX	**	3,330	65	10	8
JA5DQH	1.8	4,293	62	11	16
JA7NI	**	4,158	67	12	15
JR1AHH	**	1,008	23	8	10
JA9BOH	**	584	22	5	4
KUWAIT					
9K2DX	A	2,263,494	2453	92	235
(Opr. N6NI)					
MALDIVE REPUBLIC					
8Q7BP	A	69,870	316	25	60
(Opr. C5ABH)					
MONGOLIA					
JT60UB	A	17,338	269	19	37
OMAN					
A4XJO	A	875,368	1335	73	174
QATAR					
A71AE	7	26,936	204	15	37
SAUDI ARABIA					
HZ1HZ	A	923,616	1107	77	211
SRI LANKA					
4S7MX	21	407,565	1279	35	100
ASIATIC U.S.S.R.					
ASIATIC RUSSIA					
UV9AX	A	2,299,443	2022	103	290
UA9UAR	**	716,274	1283	69	165
UA8SE	**	238,581	644	44	103
UA8LAF	**	95,232	317	53	71
UA8LCZ	**	68,272	202	58	78
UA9UGA	**	65,058	517	17	25
UA9AFG	**	63,246	177	46	79
UA9NN	**	42,075	102	59	94
UA9ACU	**	20,280	123	18	42
UA9OCI	**	11,750	52	23	24
UA9ZDE	**	10,908	144	21	22
UA9PP	**	9,568	80	19	27
UA9CHV	**	2,552	39	11	19
UW8AF	28	198,198	843	26	73
UA9QBE	**	141,480	524	29	79
UA9QBT	**	136,148	520	27	74
UA9XS	**	106,128	243	24	75
UA8FAY	**	25,668	434	11	14
UA9QBE	**	25,200	150	13	28
UA8CCR	**	20,090	171	18	23
UA8SAU	21	316,825	1094	29	86
UA9CIQ	**	245,000	904	30	70
UA8SGJ	**	32,232	193	25	43
UA9ADQ	14	447,874	1412	34	88
UA9WDM	**	13,025	137	16	17
UA8SGL	7	29,680	317	17	36
UA8JAD	**	23,001	230	19	32
UA9TS	3.5	122,567	622	17	56
UA9AJO	**	58,023	371	16	47
UA9CBM	**	51,904	300	13	51
UA900	**	27,387	185	11	40
UW8LI	**	14,070	190	15	27
UA9SAX	1.8	17,480	179	9	29
AZERBAIJAN					
UD6DKW	A	151,632	473	34	83
UD6DLL	28	44,622	256	23	51
UD6CN	7	14,308	102	15	34
UD6DMV	3.5	45,720	391	9	36
GEORGIA					
UF6CR	A	4,101,936	3634	102	286
UF6FFX	28	74,053	396	20	51
UF6FER	**	38,610	278	19	35
UF6FBX	21	3,780	105	13	23
UF6FFF	14	233,280	864	29	69
UF6FFJ	**	60,818	450	17	30
UF6QAN	**	33,088	246	13	34
UF6FDR	7	101,931	609	15	46
KAZAKH					
UL7CCI	A	163,310	412	39	92
UL7QF	28	160,860	724	22	62
UL7C8P	14	78,888	376	21	55
UL7GDH	**	42,581	305	17	32
UL7CAL	7	105,436	471	24	62
UL7JAW	**	101,166	540	19	59
UL7TBM	**	83,266	425	20	59
UL7ECH	3.5	63,278	461	17	41
UL7PBY	**	33,432	246	12	44
UL7CAD	1.8	6,214	87	9	17
KIRGHIZ					
UMBMCY	28	61,530	371	21	47
UMB8BA	7	44,370	310	13	45
UMB8PC	3.5	25,360	249	9	31
UMB8MAZ	1.8	3,894	72	6	16

TURKOMAN					
UH8DC	A	1,651,674	2129	78	204
UH8HBR	**	47,616	282	19	45
UH8EAA	7	231,595	977	25	66
UZBEK					
UI8BI	A	1,225,430	1546	89	221
UI8ADR	28	90,744	474	21	55
EUROPE					
AALAND ISLANDS					
OH0XX	A	2,490,540	2547	115	297
AUSTRIA					
OE6KZ	A	381,220	728	63	182
OE3RE	**	321,353	790	57	154
OE1JJB	**	8,760	93	22	38
OE3GSA	28	298,507	995	32	89
OE1WO	21	615	18	6	9
AZORES ISLANDS					
CT2CY	14	168,345	840	25	62
BELGIUM					
ON4FD	A	1,553,140	2293	86	230
ON4XG	**	439,064	891	59	139
ON5JM	7	202,730	1110	22	73
ON5WL	3.5	27,636	475	9	38
BULGARIA					
LZ2BR	A	159,796	613	50	132
LZ1NJ	**	109,005	376	45	84
LZ1GZ	**	41,310	277	26	59
LZ1RN	**	29,862	355	12	30
LZ1YE	28	181,940	717	32	78
LZ2TW	14	70,012	355	30	62
LZ1LW	**	65,807	461	22	57
LZ1GV	**	4,118	59	11	18
LZ2DX	7	100,776	671	20	56
LZ1WJ	**	37,572	404	15	47
LZ1DQ	**	19,350	246	11	39
LZ2PP	3.5	101,964	870	21	87
LZ2RF	1.8	10,962	234	9	33
LZ2CW	**	3,078	110	5	22
CORSICA					
FC8FOO	A	1,094,940	1693	81	235
(Opr. N6RA)					
CZECHOSLOVAKIA					
OK2BLG	A	1,493,736	1530	115	321
OK3OM	**	1,231,460	1667	91	244
OK2BHV	**	1,045,044	1389	99	278
OK1FCW	**	903,420	1474	74	178
OK1AVD	**	797,000	1512	86	239
OK1AD	**	636,744	1040	79	179
OK2TBC	**	605,745	947	90	225
OK3YX	**	563,654	839	92	234
OK1FCA	**	389,301	855	65	186
OK2QX	**	343,808	534	84	232
OK3PQ	**	335,175	804	55	150
OK2YN	**	278,600	603	57	142
OK1ZP	**	247,736	691	54	125
OK1KZ	**	215,055	612	50	127
OK1DVK	**	201,122	433	68	159
OK1AWF	**	196,206	567	48	111
OK3IF	**	179,136	448	54	138
OK3YCA	**	155,730	435	51	94
OK1AWC	**	143,075	551	34	79
OK3FON	**	141,888	330	58	134
OK3CEG	**	129,990	299	61	149
OK1MKU	**	124,998	361	44	122
OK3BA	**	112,144	384	46	117
OK3KYR	**	111,200	369	42	97
(Opr. OK3DT)					
OK3CAQ	**	90,770	269	45	100
OK1AOR	**	74,930	241	50	77
OK1AYN	**	60,424	174	51	131
OK1DMM	**	49,692	211	39	84
OK1FAM	**	49,456	249	28	60
OK2PBG	**	48,392	214	28	64
OK1APJ	**	46,550	169	41	57
OK10FA	**	43,056	222	49	43
OK3KAP	**	40,313	208	29	62
OK2DB	**	38,250	181	43	82
OK1MIN	**	31,595	126	37	53
OK1MWN	**	30,736	178	24	64
OK1DRY	**	28,800	166	33	95
OK1MZO	**	27,051	175	31	96
OK1AOU	**	22,050	131	29	34
OK1AVG	**	21,120	166	22	33
OK1JDJ	**	20,826	202	17	61
OK1DGN	**	16,947	131	19	44
OK2KHS	**	13,952	172	16	48
OK2SGW	**	12,546	115	16	25
OK3BRK	**	8,288	117	11	45
OK1DMS	**	7,239	103	16	54
OK1APS	**	6,156	66	18	39
OK2SWD	**	2,368	64	9	28
OK1AEH	**	648	23	8	16
OK1ORA	**	216	11	4	4
OK1DCU	28	320,679	1257	30	77
OK1ZL	**	229,416	739	33	88
OK2BJU	**	32,040	202	21	39
OK3IAG	**	26,568	147	32	49
OK3CFP	**	25,704	150	22	46

OK1AVI	**	19,551	142	20	37
OK1MSP	**	10,659	77	20	31
OK1JIM	**	5,617	51	18	23
OK1AYQ	**	2,567	55	9	8
OK3KSO	**	609	30	9	12
OK3ZWX	**	180	12	6	9
OK1TN	21	257,255	950	30	85
OK3CDP	**	171,348	556	34	97
OK1MG	**	160,121	586	30	83
OK3KAG	**	150,282	654	25	74
OK2SAT	**	100,260	504	25	65
OK2BUW	**	98,200	418	28	78
OK1AES	**	83,265	373	27	63
OK1JVO	**	65,110	347	22	63
OK3KEX	**	48,174	319	22	52
OK1DZD	**	8,700	139	13	16
OK3KGO	**	1,178	22	6	13
OK1ASQ	**	1,037	23	8	9
OK3CLA	14	80,256	602	20	56
OK1FV	**	76,540	371	29	60
OK2BUJ	**	69,222	341	24	59
OK2BGR	**	48,818	312	23	54
OK1JPH	**	32,770	268	16	42
OK1DDW	**	22,491	266	11	38
OK1ZY	**	8,880	91	15	33
OK3CDN	**	6,806	116	9	32
OK1JZZ	**	5,543	87	10	13
OK1FRJ	**	3,220	52	11	12
OK2BFN	7	167,295	891	21	74
OK3CAU	**	4,950	23	9	10
OK1XG	**	1,488	30	8	16
OK2SPS	**	462	16	6	8
OK3CEI	3.5	28,620	419	9	45
OK1DKR	**	22,740	300	9	51
OK1DEC	**	16,422	277	8	43
OK1AXA	**	15,860	257	9	43
OK1DCN	**	11,454	210	9	37
OK2PCF	**	11,130	243	7	35
OK2BAJ	**	10,810	236	7	40
OK3RRF	**	9,282	323	6	28
OK1OPT	**	8,892	225	6	32
OK2HI	**	8,052	127	8	36
OK1MKI	**	6,981	94	7	32
OK3ZBU	**	6,000	91	7	33
OK3CNP	**	5,334	82	8	33
OK3CPW	**	4,469	90	7	39
OK2BWZ	**	3,267	118	4	29
OK3COK	**	2,331	55	3	27
OK1OLD	**	1,681	36	7	34
OK2PFX	**	1,000	40	4	21
OK2BNV	**	480	31	4	12
OK2BZZ	**	209	24	3	8
OK3KFF	1.8	19,764	303	11	43
(Opr. OK3COW)					
OK1OFF	**	10,305	240	8	37
OL4BBP	**	4,488	137	6	28
OK1PGF/P	**	4,214	82	8	35
OK1STU	**	4,165	124	6	29
OL6BAB/P	**	3,744	101	3	6
OK2BKR	**	3,597	106	6	27
OK1KPA	**	3,120	123	5	25
OK2BWM	**	2,673	82	7	26
OL2BCC	**	2,296	82	4	24
OK1MNV	**	2,054	81	4	22



The Multi-Single team of K8AQM. Front to back are A18D, AC8W, K8DD, KC8KQ, and WA8ARS.



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CIRCLE 34 ON READER SERVICE CARD

HA7MS/P	**	49,654	360	21	53	SP9CTS	**	168	12	5	9	Y06BMC	**	2,222	100	5	17	SM0LH	**	13,320	141	13	32	RA6AMH	**	270	8	7	8
HA8KQX	7.0	89,770	549	23	71	SP5AD	28	201,366	685	32	81	Y02BMP	**	1,088	68	3	14	SM6DPF	**	10,707	101	14	29	UW3UQ	21	234,680	998	29	81
HA8QZ	**	53,404	446	18	61	SP5ACN	**	104,244	325	33	86	Y08BDV	**	820	40	5	15	SM7WT	21	36,366	201	24	42	UA1QAU	**	125,550	628	30	60
HA5KDB	3.5	94,944	933	14	55	SP1KAA	**	20,776	163	17	32	Y06BTY	**	432	41	3	9	SM7TV	**	14,812	150	14	32	UA3EZ	**	115,425	597	27	68
		(Opr. HA7UX)						(Opr. SP1ADM)				SM2JSN	**	7,968	98	10	22	UW3HY	**	65,404	380	23	60						
HA6NL	**	48,132	638	12	51	SP5AFL	**	19,152	160	18	30	SM7KNW	**	950	14	12	13	UA3VAS	**	59,204	380	23	59						
HA7VM	**	10,023	250	8	31	SP9AAB	**	17,954	156	17	30	SM1DJI	**	186	11	2	4	UA6AJO	**	50,112	380	18	54						
ICELAND												SM8AJU	14	560,324	1751	34	93	UW3WZ	**	30,608	199	19	45						
TF3YH	28	366,757	1722	23	74	SP4EDQ	**	17,520	94	22	51	SM6JY	**	33,696	339	15	39	UA3YAO	**	54,075	362	22	53						
TF3CW	21	380,430	1911	25	65	SP3BQC	**	7,105	76	13	22	SM3GJN	**	29,920	249	13	31	UA3UBN	14	114,495	630	24	61						
IRELAND												SM2CEW	**	479,820	1444	35	97	UA4HDZ	**	112,318	604	29	60						
E11DH	28	222,224	1209	24	62	SP9ZD	**	6,279	62	15	24	SM5UQ	**	16,556	213	11	32	UW6CV	**	72,474	373	27	64						
E17CC	**	35,235	379	13	32	SP8EDP/4	**	1,144	17	11	15	SM5AQJ	**	6,100	66	15	35	UA4PNL	**	65,619	446	21	48						
ITALY												SM5AD	7	95,128	513	21	67	UA6AUT	**	52,839	391	19	38						
I2UBI	A	1,677,900	2143	94	246	SP6AYT	**	6,660	70	18	29	SM6BXD	**	17,930	134	14	41	UA3DER	**	52,052	104	13	28						
I7PXV	**	350,556	712	76	186	SP2JKC	14	154,770	694	30	80	SM5IMO	**	6,549	99	12	25	UA1ZEC	**	14,722	201	15	19						
I1POY	28	174,357	783	25	66	SP2AVE	**	117,688	652	25	69	SM6JNT	**	3,780	89	6	24	UA1DZ	7	339,532	1387	29	87						
I8XXR	**	164,731	670	27	74	SP6ATG	**	116,654	610	26	68	SM7HCW	**	3,630	54	9	24	UA6LLT	**	145,845	769	27	77						
I2WDB	21	33,614	282	16	33	SP6DMJ	**	44,643	353	7	69	SM3CBR	**	392	20	4	3	UA6AAM	**	37,106	396	18	41						
I1QJC	14	48,321	418	15	48	SP6UK	**	37,224	256	19	53	SM4CAN	3.5	41,610	387	17	56	UA4QM	**	5,418	69	14	29						
I1XPQ	7	17,499	186	13	44	SP6BVR	**	31,524	338	16	47							UW3HV	3.5	58,156	606	15	52						
I4IND	3.5	172,782	1113	19	68	SP2JGK	**	34,100	346	16	46							UA3PAW	**	45,689	559	13	48						
MALTA												SP5CJQ	**	26,334	251	12	45							UA3DFC	**	26,680	361	12	46
9H1CH	28	162,750	699	27	78	SP5MBA	**	25,380	243	13	47							UA1ZCR	**	8,955	147	11	34						
THE NETHERLANDS												SP6BEN	**	25,288	248	14	44							EZ6PAC	1.8	918	51	6	11
PA0XPQ	A	422,734	831	63	166	SP8MJ	**	21,970	153	19	46							UA3LBE	**	684	34	5	14						
PA0ABM	**	292,992	560	61	163	SP2EFU	**	21,358	204	16	43							EZ6ADW	**	570	30	5	10						
PA0UV	**	273,824	607	59	140	SP7JWZ	**	18,360	156	16	35							UA3JD	**	360	33	3	9						
PA0GT	**	217,892	390	71	173	SP2GOW	**	14,336	106	18	46							EZ6ACB	**	70	10	3	4						
PA0TA	**	207,580	446	63	151	SP7MGD	**	6,426	103	11	31							FRANZ JOSEF LAND											
PA0WRS	**	181,746	397	59	148	SP6DMI	**	5,842	73	11	35							UK1PGO	A	506,880	1152	64	128						
PA0DIN	**	64,080	225	42	138	SP9AIM	**	3,648	57	11	27							UA1PAM	14	5,136	54	19	29						
PA3BOK	**	11,546	178	24	63	SP3DLO	**	3,384	66	11	25							KALININGRAD											
PA3ASC	21	29,040	124	16	44	SP5ARN	**	68,614	312	26	65							UA2EC	A	810,432	1203	90	246						
PA0PHK	14	18,389	145	17	54	SP4EEZ	**	66,502	417	17	65							UA2FCB	**	145,728	563	58	149						
PI1PT	7	15,950	118	16	39	SP5JTR	**	55,204	428	16	58							UA2FCZ	21	5,688	68	12	24						
NORWAY												SP3DAH	**	40,257	319	15	56							UA2FEW	7	12,160	222	8	30
LA3WAA	A	1,162,254	1844	80	211	SP2HMT	**	30,120	294	14	46							KARELIAN A.S.S.R.											
LA5ZW	**	1,070,136	1440	88	246	SP9EMI	**	22,428	175	16	47							UA1NAY	A	192,639	556	47	110						
LA4YW	**	471,511	907	69	160	SP5IMK	**	952	24	6	11							LATVIA											
LA4RQ	**	5,547	54	20	23	SP1EPP	3.5	22,494	454	9	37							UQ2GDD	A	1,688,036	2055	99	262						
LA6XI	**	1,682	36	11	18	SP8EMO	**	16,800	285	7	43							UQ2PM	**	140,728	439	56	150						
LA2DAA	21	30,874	301	10	33	SP4BYQ	**	8,229	188	8	31							UQ2CR	**	96,547	397	42	89						
LA7SI	**	27,712	215	16	48	SP6FER	**	7,749	115	8	25							UQ2GKM	**	26,484	123	26	57						
LA6ZV	**	15,933	177	13	47	SP4AAZ	**	2,378	76	5	24							UQ2GEC	**	7,599	103	19	32						
LA4XX	**	5,547	55	16	27	SP9DH	1.8	11,696	262	7	36							UQ2GDM	28	336,736	1002	34	102						
LA2KD	**	2,888	45	15	23	SP3GVX	**	4,719	146	5	28							UQ2GIZ	**	172,356	623	30	76						
LA7XB	14	36,540	285	17	41	SP9UH	**	4,704	153	5	27							UQ2GCN	**	32,332	237	19	40						
LA7VL	**	30,480	231	19	41	SP1DPA	**	4,004	147	4	24							UQ2GBJ	**	29,510	209	17	48						
LA5YJ	3.5	67,270	702	16	46	SP6CZ	**	3,930	133	6	24							UQ2OP	**	24,640	187	16	39						
POLAND												SP8BVJ	**	1,650	66	4	21							UQ2GLS	**	9,030	123	10	20
SP3HLM	A	796,789	976	97	246	SP6LTF	**	1,600	87	4	16							UQ2GA	21	104,696	466	26	66						
SQ5Z	**	497,920	1217	67	189	PORTUGAL						CT1A0Z	7	141,860	868	19	63	UQ2GDW	14	321,720	1255	29	91						
		(Opr. SP5ANJ)				ROMANIA												UQ2GDF	**	451	17	4	7						
SP8HRA/9	**	466,500	760	83	217	Y06VZ	A	311,256	840	58	166							UQ2GFN	7	55,074	445	16	51						
SP3HC	**	199,199	577	53	146	Y08FR	**	237,652	686	59	153							UQ2GCP	**	15,635	257	13	38						
SP4JWD	**	166,911	497	52	125	Y03CR	**	128,117	301	64	145							UQ2AO	3.5	16,100	272	8	42						
SP5BR	**	154,452	367	58	153	Y04PX	**	56,286	341	30	88							UQ2GGE	**	13,795	221	8	40						
SP5LM	**	134,640	378	55	149	Y07ARZ	**	39,904	148	41	75							UQ2GEY	**	11,924	213	9	35						
SP6AZT	**	133,781	309	60	117	Y02BPM	**	36,714	257	14	59							UQ2PP	**	1,800	33	7	33						
SP9BBH	**	119,040	405	41	119	Y03RF	**	25,877	97	46	67							UQ2GFU	1.8	5,495	149	6	29						
SP9AKD	**	99,693	285	57	114	Y02BEO	**	25,752	190	20	67							LITHUANIA											
SP7AWA	**	89,355	299	49	112	Y07AWQ	**	21,945	176	27	68							UP2NK	A	2,231,411	2312	105	298						
SP3IOE	**	73,753	281	43	88	Y05BEU	**	7,920	154	13	35							UP2BAS	**	552,615	1211	67	218						
SP3EQE	**	48,510	241	32	78	Y08BDQ	**	2,173	48	12	29							UP2NA	**	465,290	891	62	176						

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UP2AV	13,340	142	13	33
UP2BA0	14	326,920	1777	24 64
UP2BEI	161,280	712	30	75
UP2BB	43,080	403	15	45
UP2BJM	7	11,730	152	14 37
UP2BEZ	4,592	107	9	19
UP2CT	3.5	34,314	492	11 46
UP2BEW	20,538	413	8	34
UP2BIF	7,210	197	6	29
UP2BCX	1,197	55	4	17
UP2BAW	1.8	16,785	354	9 36
UP2BCG	5,735	180	6	25

MOLDAVIA

U050AL	A	210,673	362	54	137
U050DT	66,528	171	36	96	
U050WC	28	30,736	216	20	48
U050BD	14	93,292	722	22	61
U05GR	3.5	4,134	68	7	32
U050DB	1.8	4,131	141	6	21
U05AP	325	22	4	9	

UKRAINE

UB5LAW	A	1,978,291	2010	112	315
UB5EC	1,690,812	2104	105	297	
UB5MBP	1,322,010	1656	100	270	
UT5HP	813,054	1257	92	289	
UB5MFT	493,450	967	74	219	
UB5UKW	435,870	865	65	196	
UB5ICS	430,660	721	81	224	
UB5UKO	205,368	411	75	183	
UB5MNR	181,390	622	49	145	
UB5MEH	131,036	400	44	120	
UY5TE	123,120	472	47	133	
UB5MLP	96,117	308	45	116	
UB5QCK	74,534	240	49	117	
UB5VK	68,707	354	31	96	
UB5TR	58,984	258	36	110	
UB5MCV	50,850	340	21	69	
UB5RCA	29,068	160	30	56	
UB5FDG	21,528	133	24	54	
UB5UWM	11,448	76	25	29	
UB5DAV	11,194	163	20	38	
UB5MMF	7,486	63	6	9	
UB5ZBM	28	52,954	272	27	56
UB5RCH	20,295	199	13	32	
UB5UKJ	10,336	112	10	28	
UB5EKG	3,570	68	8	22	
UB5UAW	2,760	54	8	22	
UB5UWZ	1,785	35	9	12	
RB5EGT	572	33	4	9	
RB5IOV	6	1	1	1	
UB5IIA	21	208,488	865	30	89
UB5WCW	161,332	689	29	77	
UB5GBN	58,794	356	23	59	
UB5SG	22,880	200	17	38	
UB5UCJ	14	216,783	881	34	77
UB5LCK	181,272	1069	25	58	
UB5ZEL	176,952	910	27	74	
UB5SCE	175,489	711	32	81	
UB5MBN	71,337	469	21	52	
UB5BZ	52,920	430	18	42	
UB5KAF	48,300	397	20	40	
UB5IAN	44,992	413	18	46	
UB5WCV	16,695	206	14	39	
UB5CEM	7,550	145	11	27	
UT5HZ	1,932	84	10	13	
UB5EEP	1,904	34	9	19	
UB5JMR	7	241,440	1192	31	89
UB5UCR	55,476	362	18	49	
UB5GAY	36,102	305	15	51	
UB5FJ	20,511	190	13	40	
UB5WCJ	15,808	152	12	40	
UB5KAK	6,688	69	11	33	
UB5KAU	3,075	104	9	16	
UB5OCR	1,008	24	8	16	
UB5NCV	3.5	48,508	595	14	53
UB5NO	44,086	562	12	55	
UB5HAF	23,608	382	11	41	
UB5KBE	20,539	372	9	38	
UB5UFJ	11,844	226	12	30	
UB5UFO	8,619	105	7	32	
UB5FDF	5,511	171	7	26	
UB5VAW	5,130	99	7	31	
UB5QEB	1,020	44	6	14	
UB5ZAL	1.8	10,260	203	10	35
UB5WF	9,320	215	8	32	
EZ5WAB	4,030	127	6	25	
UB5MFY	3,025	100	6	19	
UB5ECO	1,168	61	5	14	
UB5AAF	931	43	4	15	

WALES

GW4BR5	A	887,285	1587	72	179
					(Opr. GW4DZE)
GW3KYA	21	84,656	532	21	53
GW3MPB	14	41,920	276	20	60
GW3NYY	1.8	21,320	341	11	41

YUGOSLAVIA

4N1U	A	2,458,920	2325	116	349
					(Opr. YU1PKC)
YU7AF	613,326	1294	69	169	
YU1BM	420,716	800	72	197	
YU7NGO	334,633	719	64	163	
YU1NZW	131,217	367	52	139	
YU7WW	89,324	282	52	111	
YU2QU	1,920	138	35	81	

YU1RA	224	8	8	8	
YT3L	28	484,120	1412	33	97
					(Opr. YU3BC)
YU3EW	466,570	1336	35	95	
YU2SD	308,792	927	33	88	
YU1EFG	284,400	856	33	80	
YU2CTU	243,432	842	29	79	
YU3CAB	240,468	792	31	85	
YU7PWN	98,622	433	27	59	
YU7BPQ	57,154	262	27	55	
YU3ZV	21	732,096	1957	37	107
YU7OCV	459,801	1301	36	105	
YU1DX	325,376	1189	33	91	
YU2OG	304,420	1028	32	92	
YU7PEF	14	295,550	1196	32	83
YU1KQ	129,160	666	23	38	
YU5FKD	16,920	229	14	33	
YU4AW	7	287,538	1393	23	79
YU4EGZ	115,056	633	24	78	
YU2ACF	98,490	758	16	54	
YU7AZ	26,733	275	14	43	
YU3IXY	20,935	395	13	40	
YU7QDT	15,963	150	13	38	
YU2RA	3.5	109,755	816	19	62
YU4VBR	74,008	618	22	66	
Y29HDE	56,305	660	17	52	
YU7SF	21,756	370	8	41	
YU3USB	9,061	202	8	33	
YU3TGB	1.8	9,890	196	9	37

OCEANIA

AUSTRALIA

VK2BQQ	A	735,294	868	103	191
VK2AYD	629,251	905	91	150	
VK2APK	542,059	880	83	128	
VK2GW	182,826	498	55	71	
VK6FS	129,362	308	48	94	
VK5KL	814	13	11	11	
VK4LX	28	407,868	1121	33	90
VK4XA	264,880	1014	27	61	
VK6AJ	169,446	621	28	65	
VK5NVV	14,174	126	15	23	
VK2DID	21	13,050	100	19	26

FRENCH POLYNESIA

F08DF	A	143,200	609	38	42
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GUAM

KG6DX	14	525,420	1289	37	102
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HAWAII

KH6ND	A	1,801,331	2206	109	168
KH6IJ	4,875	43	20	19	
KH6DX	28	392,574	1452	34	57
KH6JWK	21	46,696	304	21	31
KH6CC	1.8	13,481	266	9	8

INDONESIA

YB8AEG	A	370,176	656	76	116
YC8VM	21	95,745	495	27	38

MARIANA ISLANDS

N6BT/AH8	A	4,241,746	4083	121	228
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MARSHALL ISLANDS

KX6PI	7	167,144	839	27	41
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NEW HEBRIDES

YJ8RW	28	612,255	2138	31	66
					(Opr. ZL1AM0)

NEW ZEALAND

ZL1AIZ	7	19,133	125	20	33
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OGASAWARA

JD1ABX	21	4,301	71	12	11
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PAPUA-NEW GUINEA

P29NPL	28	6,680	114	11	9
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PHILIPPINES

KP4KK/ DU2	3.5	55,328	339	20	36
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SOUTH KIRIBATI

T44AA	A	6,228	115	10	8
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SOUTH AMERICA

ANTARTICA

KC4USV	21	290,829	1259	28	49
					(Opr. N6WT)
VP8ANT	1.8	594	18	4	7

ARGENTINA

LU1EWL	A	411,768	839	58	110
LU8DQ	21	1,359,711	2993	37	116

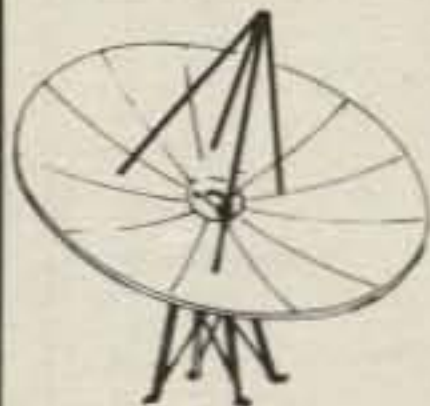
BRAZIL

K5RX	1,614,944	1300	119	317	AA6T	122,430	290	60	94	BAHAMAS					ASIA					JABYAK	448,500	649	96	154
KJ5W	1,523,116	1407	115	294	KJ6F	73,962	200	44	82	W4BPD/C6A	115,908	723	35	43	ASIATIC RUSSIA					JA1YCL	260,984	586	61	91
N6ND	2,414,346	1758	141	330	KK6X	35,956	125	33	63	BELIZE					UK9AAN	4,300,833	2756	147	390	JABYEE	234,016	401	77	129
N6IG	2,369,760	1722	140	340	N6QC	594	19	6	5	V3MS	3,307,920	4145	108	250	UK9FER	3,355,520	2795	109	319	EUROPE				
N6CW	2,218,390	1624	141	344	W7RX	1,331,700	1335	113	232	CANADA					UK9ADY	2,072,673	1979	97	272	AALAND ISLANDS				
NC6T	1,966,770	1644	121	289	W7NI	692,992	1012	84	180	VE1DXA	3,357,354	3174	117	312	UK9OAZ	1,931,778	1299	87	234	DH8AL	925,750	1500	97	253
K6XV	1,943,810	1477	136	315	AD8I	3,225,735	2277	127	358	VE7WJ	2,920,776	3103	125	268	UK9QAA	1,922,050	2318	106	219	AUSTRIA				
N6MG	1,966,770	1644	121	289	K8AQM	2,189,064	1660	126	337	VE5DX	2,777,273	3064	124	267	UK9ACP	1,115,909	1507	67	196	OE1JNB	1,109,652	1482	97	259
W6OWD	1,225,854	1146	112	266	AD8O	1,309,950	1296	95	260	VE3MFA	935,881	1356	84	199	UK9AEC	335,491	629	55	142	BULGARIA				
N6DHV	1,061,788	1045	109	255	W8FN	542,724	694	81	192	VE3OCU	44,055	230	38	51	UK9SBI	224,740	488	51	119	LZ2KEF	2,142,584	2110	119	327
K6SG	1,015,668	1123	99	218	K8US	207,776	489	47	104	JAMAICA					UK9OBO	64,620	289	27	73	LZ1KKA	116,820	470	43	122
K6HIH	1,002,040	1073	110	218	WD8PNF	108,251	249	48	95	6Y5JW	774,408	2259	63	101	UK9WAT	14,212	150	11	23	LZ2KLR	29,002	269	11	25
K6DC	971,454	949	113	246	KA8HUZ	23,028	162	54	78	MEXICO					UK9ADS	8,181	107	10	17					
W6BIP	752,136	746	110	253	W8WE	19,754	129	37	46	XE2BC	3,460,606	4324	109	229	UK6FAA	28,440	240	12	33					
K6ANP	736,890	738	112	251	KF8H	1,683,968	1646	99	253	4A20	1,207,038	2687	78	125	UK6FAB	10,047	48	15	22					
N6RZ	695,358	755	110	216	K8RWL	1,436,292	1279	112	291	ALASKA					JAPAN									
W6GO	670,941	633	123	258	K7CS/Ø	501,084	629	90	189	889,344	1980	72	120											
W6UA	572,400	574	105	255	W8NA	406,350	545	84	174	846,745	1988	83	102											
AF6S	519,370	556	114	220	W8FF	217,170	381	62	128	WL7E														
KR6Q	434,775	661	85	170	K8ØFP	64,964	162	47	102	KL7AF														
KC6D	414,039	618	82	155																				
W6YX	395,136	616	91	133																				
W6BSY	253,228	383	82	154																				
K6FO	181,396	335	81	121																				
K6BST	136,920	354	53	87																				

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HAL 567-12 single line in, 12 lines out, complete with 2-sided plated-through G-10 board and all components. Uses seven 567's and three 7402's. PRICED AT.....\$39.95

HAL 567-16 single line in, 16 lines out, complete with 2-sided plated-through G-10 board and all components; includes 22-pin edge connector. Uses eight 567's and four 7402's. (See construction article in April 1981 Radio & Electronics for complete writeup.) PRICED AT.....\$69.95

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The Tuned Antenna Co. is the only manufacturer that specifies the gain of their 5/8 Wave HT Antenna in db at 1/4 wave and 5/8 wave over a rubber duck. These gain figures have been obtained from extensive field strength readings, using HT's and HT Antennas for the test . . . maximum effective radiated power is the result of efficient antenna design. Remember 5 watts into a 50 ohm dummy load with an swr of 1.1:1 = 0 erp.

Now you know why the word is out. The Super Stick II and RD2S Short Duck gives your HT the effective radiated power you need to make those long hauls. Join the tens of thousands of satisfied customers. Call one of our 112 dealers today. The perfect pair is a limited offer so call today.

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Say You Saw It In CQ

October 1982 • CQ • 35

W4FA presents the reasons for and the techniques of monitor modulation. It's not just for getting some pretty scope pictures as we talk.

Practical Ideas On S.S.B. Modulation Monitoring

Part I—Why And How To Measure Modulation

BY JOHN J. SCHULTZ*, W4FA

With the great proliferation of speech processing units for use with s.s.b. transmitters, it becomes more important than ever to have a good means of monitoring a transmitter so output distortion can be avoided. This allows maximum benefit to be derived from the speech processing being used without causing "splatter."

Undoubtedly, the best way to monitor the output of s.s.b. transmitters is with some visual presentation such as that provided by an oscilloscope. This article discusses some of the basics involved in monitoring the output of s.s.b. transmitters for distortion and then goes on to some practical ideas for getting the necessary equipment together for continuous monitoring of an s.s.b. transmitter.

Distortion of the type that causes "splatter" is generated when the p.e.p. capability of a transmitter is exceeded. It is not necessary to know the actual p.e.p. output of a transmitter just to monitor for distortion, but it is often possible to determine it in the process of setting up a system to monitor for distortion. And, of course, if a monitoring system indicates distortion at some power level far below the rated p.e.p. output of a transmitter, it should lead one to suspect a problem in some stage of the transmitter.

Assuming for a moment that we can properly display the r.f. output of a transmitter on an oscilloscope, various displays will be obtained, depending on the audio input to the transmitter. The input possibilities are speech, noise, and tones. Speech is too variable for test setup purposes. Noise can provide some useful information, but specialized test equipment is necessary. So, tones usually are used in testing an s.s.b. transmitter. Fig. 1 shows some of the displays that will be obtained from a "healthy" transmitter when anywhere from one tone to an infinite number of tones are used.

The two-tone test is the most commonly used because it provides a readily recognizable display and because a definite power relationship exists between p.e.p. and average power. One could use three or even more tones, but the pattern formed becomes confusing and the power relationship changes. For the two-tone test the average power is half the p.e.p., with p.e.p. being defined as the RMS power developed at the crest of the modulation envelope. For instance, if we had a calibrated oscilloscope and the peak-to-peak voltage of the two-tone pattern was 130 volts, the p.e.p. would be about 42 watts and the average power 21 watts for a 50 ohm system:

$$PEP = \frac{\left(\frac{130}{2} \times .707 \right)^2}{50}$$

The relationship of peak to average power being in the relationship of 2:1 only holds true for two tones. However, not all transmitters are designed to have a continuous power output of one half the p.e.p. rating, depending on power supply com-

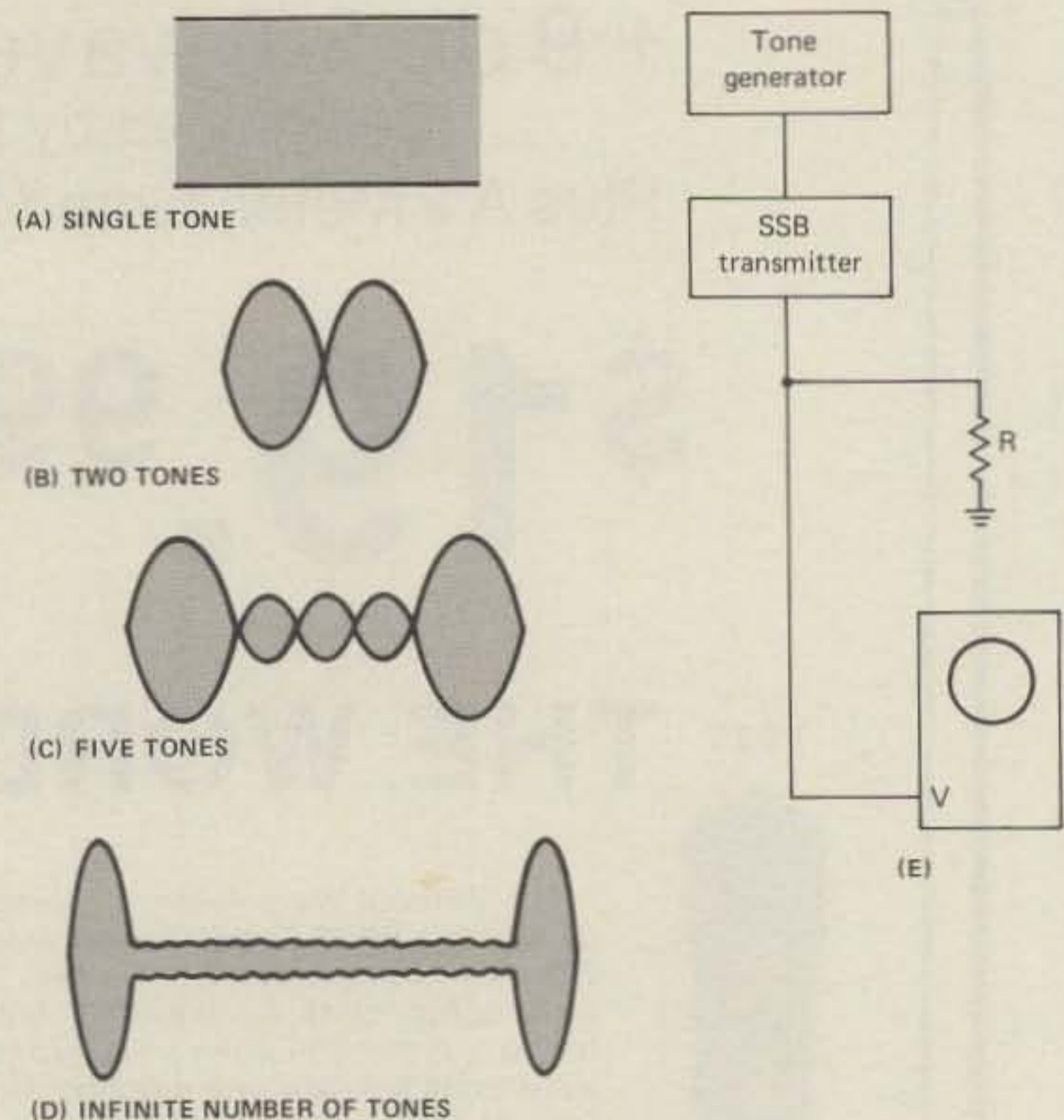


Fig. 1—The various oscilloscope display patterns that result from using different numbers of equal-amplitude, linearly mixed tones fed into the audio input of a properly adjusted s.s.b. transmitter.

ponents, heating of components, etc. Depending on how skimpily a transmitter is designed, the continuous power output rating may be only one fifth of the p.e.p. So, the p.e.p. level which can be generated using the two-tone test might be less than one expects, although this should be the exception rather than the rule with most present generation s.s.b. transmitters. However, even if one cannot measure the peak-to-peak voltage of the waveform, it does provide a visual peak reference on the oscilloscope which should not be exceeded when a more complex input, such as speech, is used with the transmitter.

A source of two tones is, therefore, a necessity if one is going to properly set up a system for monitoring possible distortion in an s.s.b. transmitter. Any tone generator which can generate two low-distortion tones which have approximately a 3:1 or less frequency ratio is suitable, so the main distortion products created still fall within the r.f. passband of the transmitter. The sharper the passband in a transmitter, the closer together the two tones should be, with ratios down to 1.5:1 being used.

A particularly good but relatively simple two-tone generator is shown in fig. 2. Two RC phase shift oscillators are used, one operating at approximately 700 Hz and the other at approximately 2000 Hz. Output stages are associated with each oscillator and provide some isolation for the oscillators and also perform the mixing of the two tone frequencies. If the components

*c/o CQ Magazine

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5 MODES: CW, Baudot, ASCII, memory keyer, Morse code practice. **TWO MODELS:** MFJ-496, \$339.95. 256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay. MFJ-494, \$279.95. 50 character buffer, 30 character memory, automatic messages.

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You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) text buffer makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the automatic messages, type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

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

A lot of thought has gone into human engineering these MFJ Super Keyboards.

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

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

Pots are used for speed, volume, tone, and

weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

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

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

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

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

MODE 4: MEMORY KEYS

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

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

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

CIRCLE 93 ON READER SERVICE CARD

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

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

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

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

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1 1/4"H (front) x3 1/2"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequential numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

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

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

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. \$29.95 (+ \$3).

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

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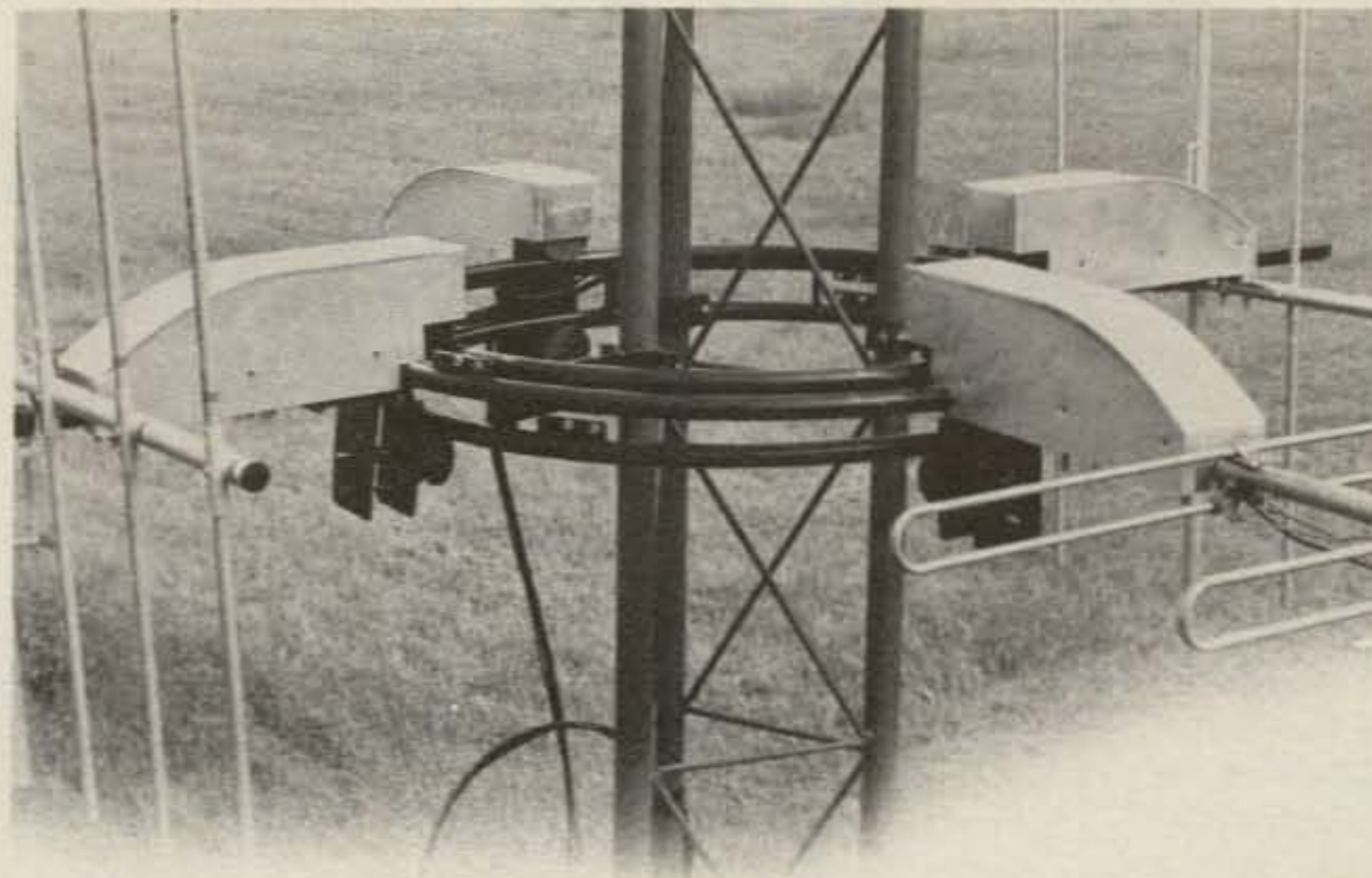
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DEALER INQUIRIES INVITED
CIRCLE 104 ON READER SERVICE CARD

Here's a way to give 75 meters a try with a simple and easy-to-build antenna.

The 75 Meter "City Lot Special"

BY TOM TORGERSON*, KA0JPT

If you live in the city on a small lot and are restricted to low heights for your antennas, but would like to put out a really good signal on 75 meters, this may be for you. Size versus performance, this antenna is hard to beat. The numerous requests for information and diagrams I have received while on the air with it prompted me to write this, for other amateurs may have use for it.

The highlights of the antenna are: (1) The smaller size—only 80 feet long, 30 feet wide, and 26 feet high. (2) It compares or exceeds performances against dipoles at 50+ feet and even a bobtail curtain. (3) It doesn't need to be "out in the clear" of surrounding objects to perform well; both sides of my loop are 15 feet from my neighbors' houses. (4) It doesn't require an elaborate, or any, earth ground. (5) Since it's low to the ground, it can easily be repaired from storm damage, and experimenters can get at it easily for different modifications. (6) It performs equally well day or night, since it has properties of both low- and high-angle radiation.

General Description

The heart of the system consists of two helically-wound verticals stacked one above another on one pole. The basic theory behind a helical is that you can greatly shorten the physical length of the antenna by coiling the wire used. A rule of thumb is that to see electrically a quarter wave, a half wavelength of wire should be used. For a 75 meter quarter-wave vertical I needed a half wavelength of wire, or 120 feet for each helical. The top of the helicals are connected to a loop which may be thought of as a huge capacitance hat. To lower the angle of radiation still further, two lengths of wire drop down from the loop at a distance not far from the helical connection points connected by a crossbar of wire. In effect, there are four parts vertical and two parts horizontal. This is worked against a floating ground located just under the loop on the

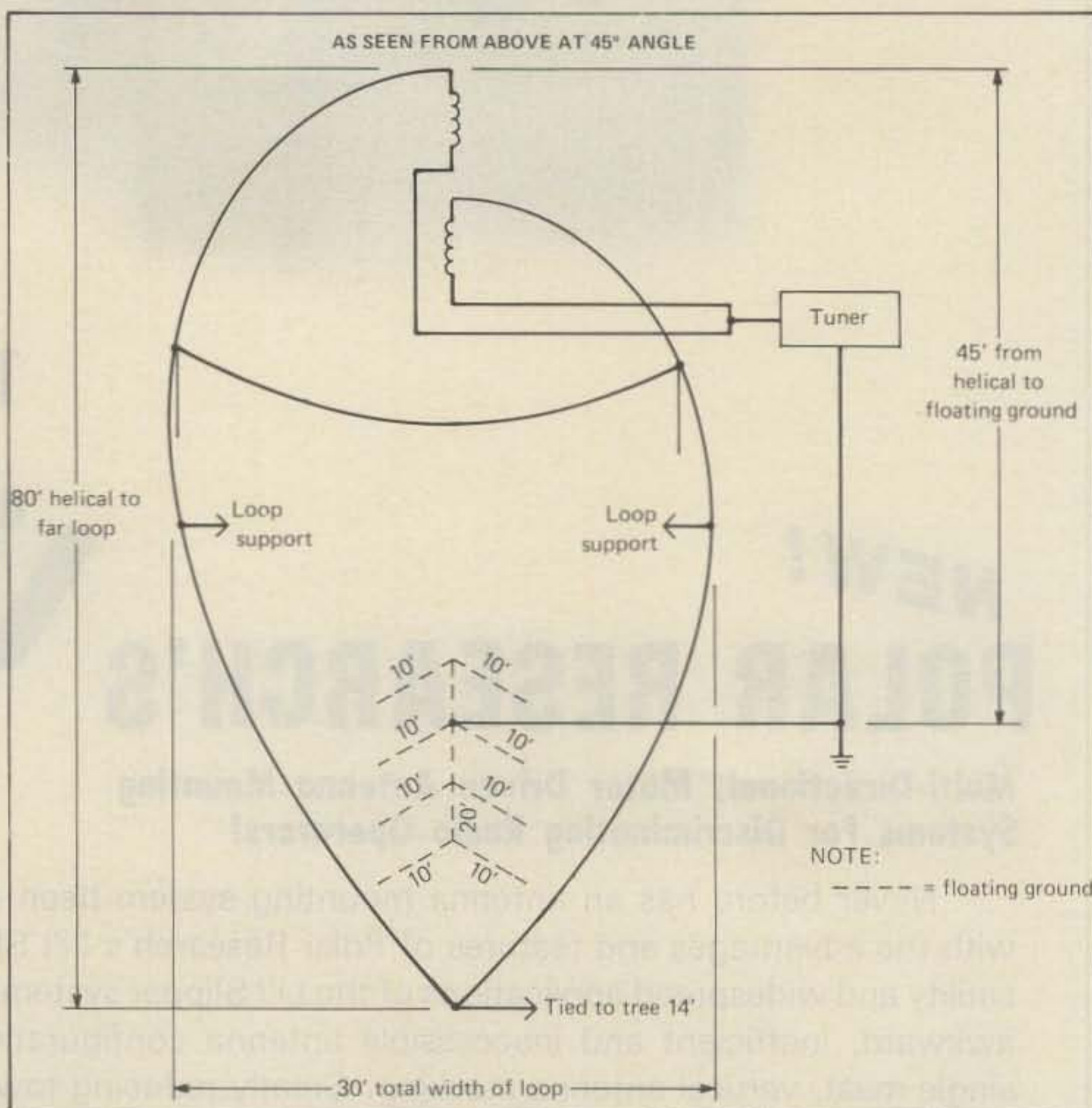


Fig. 1—The overall 75 meter "city lot special" antenna.

far side of the helicals. It is fed with thin lead to the helicals and regular stranded wire to the floating ground.

Details

The overall system is shown in fig. 1. The helicals close up in fig. 2 show the feeding method. Fig. 3 gives an alternative floating-ground construction. The total length of wire used, excluding lead-in, was 500 feet. Each helical required 120 feet, the loop 120 feet, the floating ground 100 feet, and the crossbar (fig. 4) 40 feet.

I used a 1 1/4 foot diameter 14 foot bamboo fishing pole for the helical supports, using 12 feet for the helicals and leaving the bottom 2 feet clear. The wire for the helicals is the same as for all other sections. I bought five rolls of 100 foot insu-

lated stranded wire from Radio Shack, which cost me around \$25. The larger the gage of the wire, the better, keeping in mind the particular diameter and length of your helical support pole. One point needs to be stressed here and that is that any section can be varied considerably in size as long as the basic configuration is followed. For example, the loop need not be exactly 120 feet; it could be, say, 80 to 160 feet, depending on what you have to work with in a certain section. The tuner will automatically phase the system together, since the radiated signal is a resultant component of (1) the helical verticals, (2) the loop, (3) the crossbar, (4) the structure of your floating ground.

I supported the helical pole by tying it to the back of a basketball hoop I happen-

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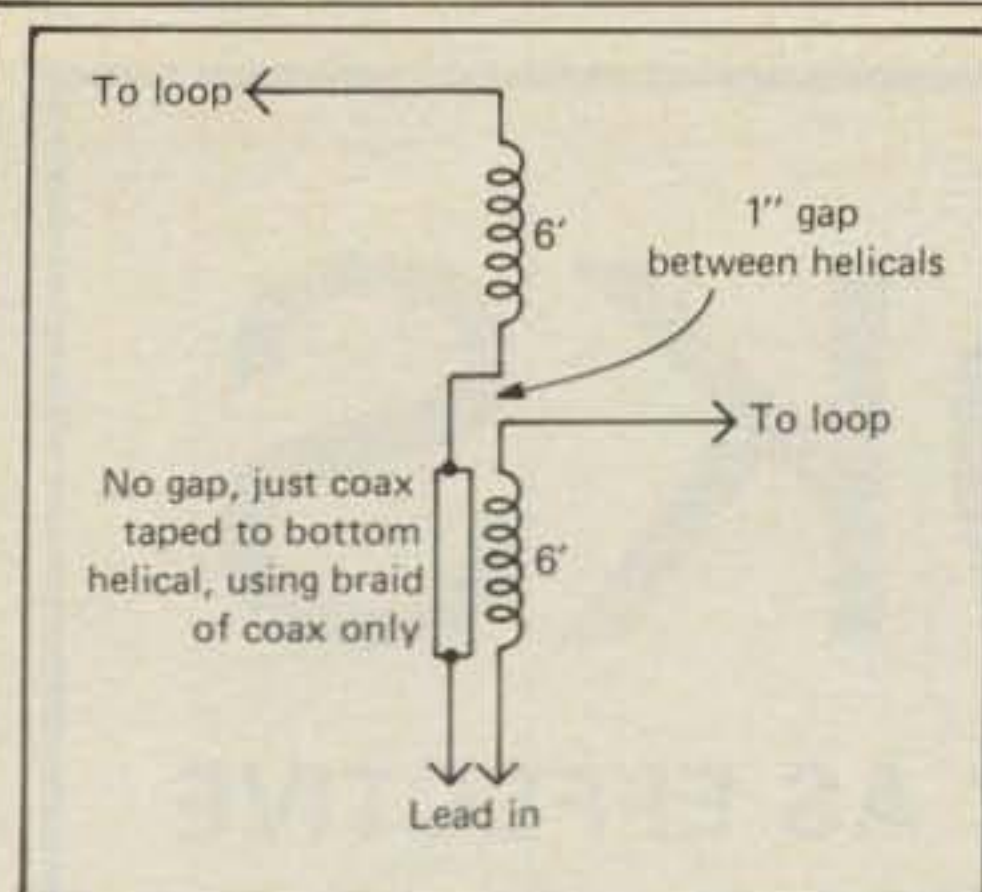


Fig. 2- Helical portion and feeding method.

lead-in is, in my case, near 25 feet using insulated stranded wire. It might be better to use the inside of regular coax, but I haven't tried that.

The antenna tuner can be most any homebrew or commercially made one, fed as a long wire. The helicals make for fairly critical tuner settings because of the inherent narrow bandwidth of any helical. I normally run 500 watts p.e.p. and find no problem with my helicals shorting or changing of s.w.r. after prolonged transmissions. If you are primarily interested in long-haul or DX work and aren't concerned with a loss in high-angle performance, try the following. It increased my east/west coast reports + 5 dB. Take

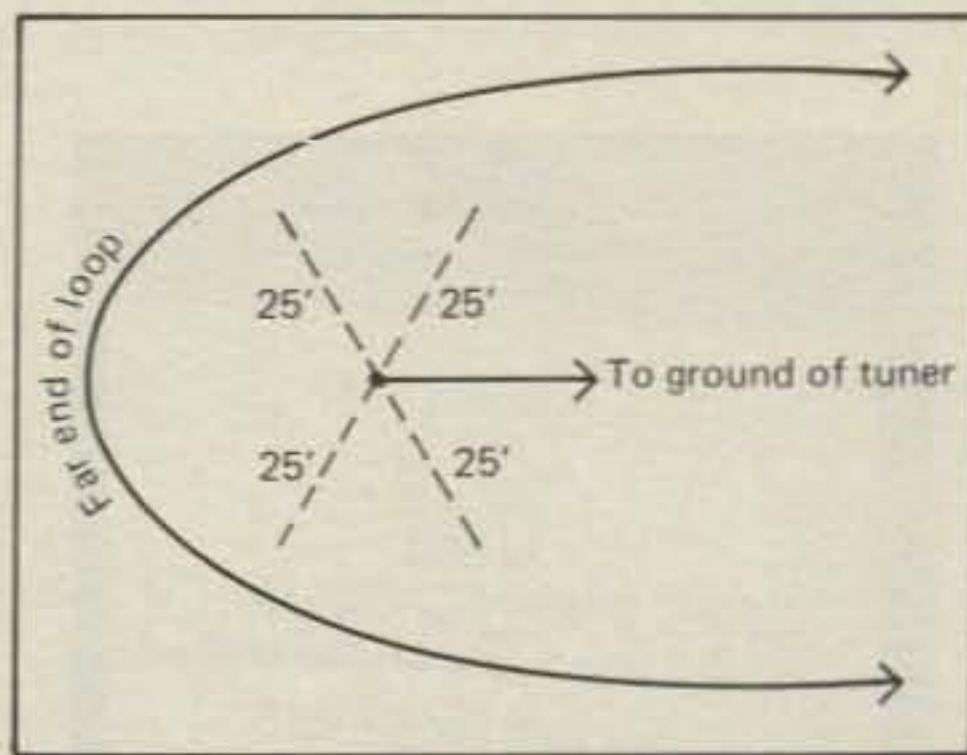


Fig. 3- An alternative method of constructing a floating ground.

ed to have on my garage. The vertical crossbar legs are held in place with 6 inch TV standoff insulators at the bottom of the outside of the top of my house at 26 feet, going to a tree tied at 14 feet high. The floating ground is in the attic of the house, which makes the floating ground about 20 feet high.

Fig. 1 shows the lead-in going at a right angle to the right, when in fact the feed line comes away at a right angle towards the tree and house. I wanted to make the figure easier to understand by going to the right. I used 96 feet of regular transmitting 72 ohm twin lead shorted together at the tuner terminal. The floating ground

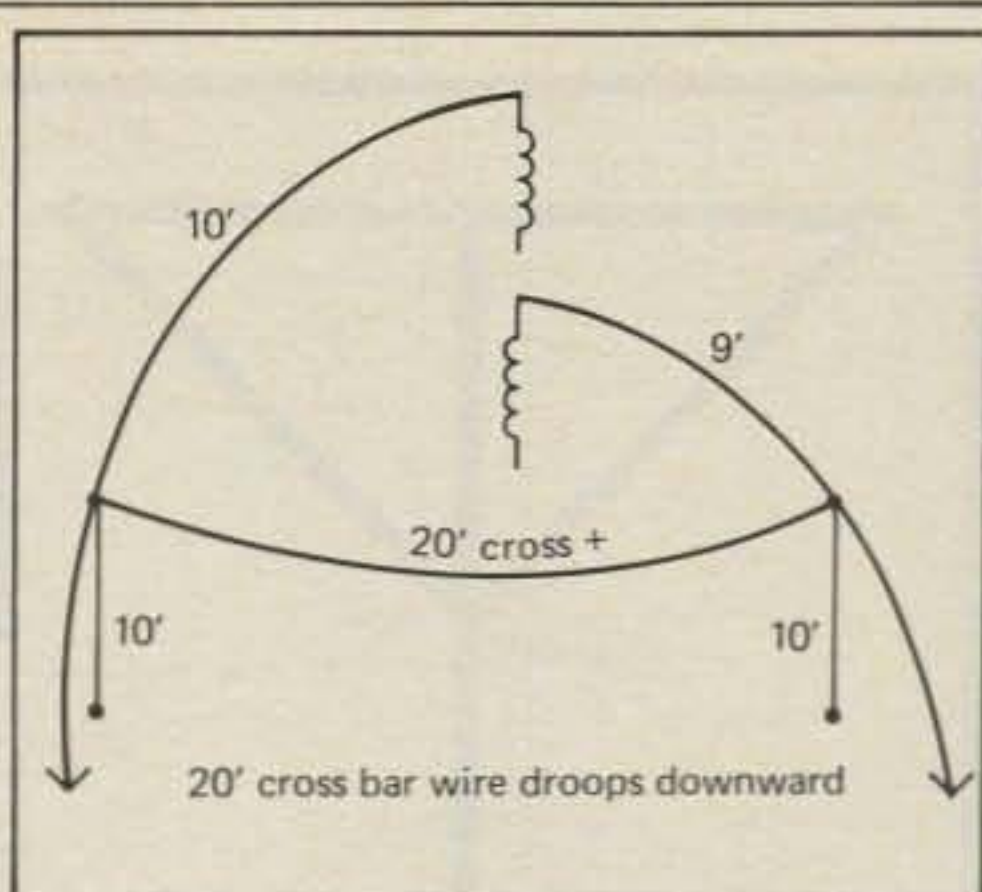


Fig. 4- The crossbar connection.

the cover off your tuner and with an alligator clip connect the floating ground to the hot lead going into the tuner from the transmitter side. Then connect an external earth ground to the tuner's chassis. The helical feed is the same.

In conclusion, I think if you try building this antenna, you will be more than pleased with the results. Once made, it's relatively easy to move to another QTH, since the helicals are already wound and the pole just needs to be put in place. Since there is so much latitude in the basic configuration, experimenters should have a field day modifying sections for maximum results.

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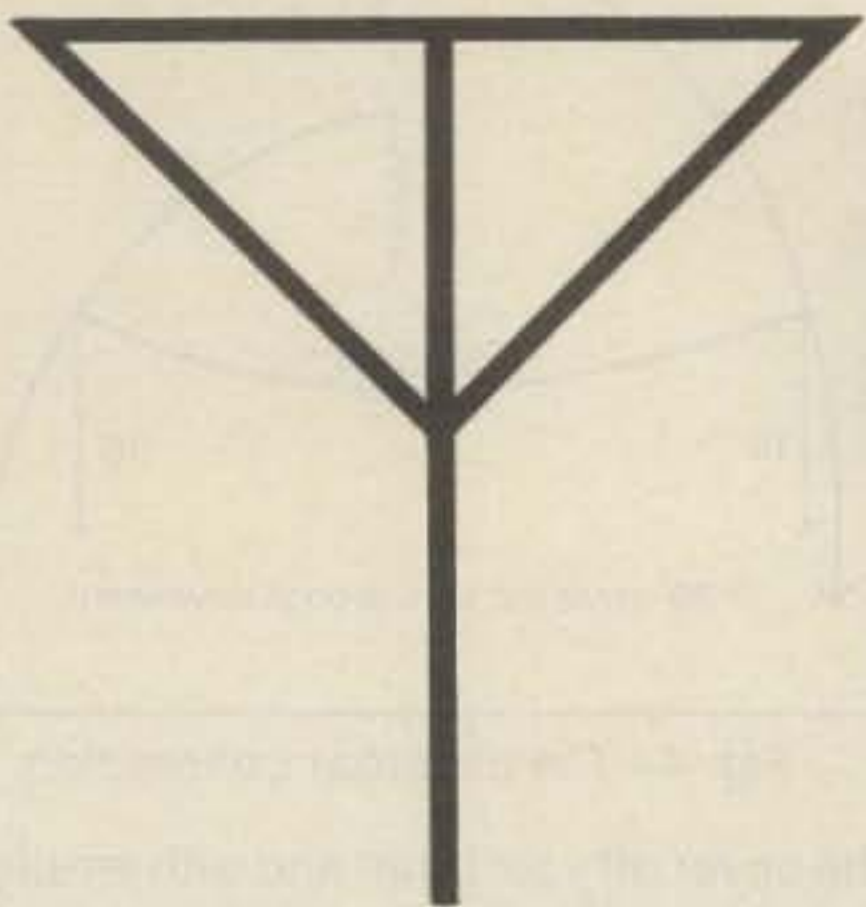
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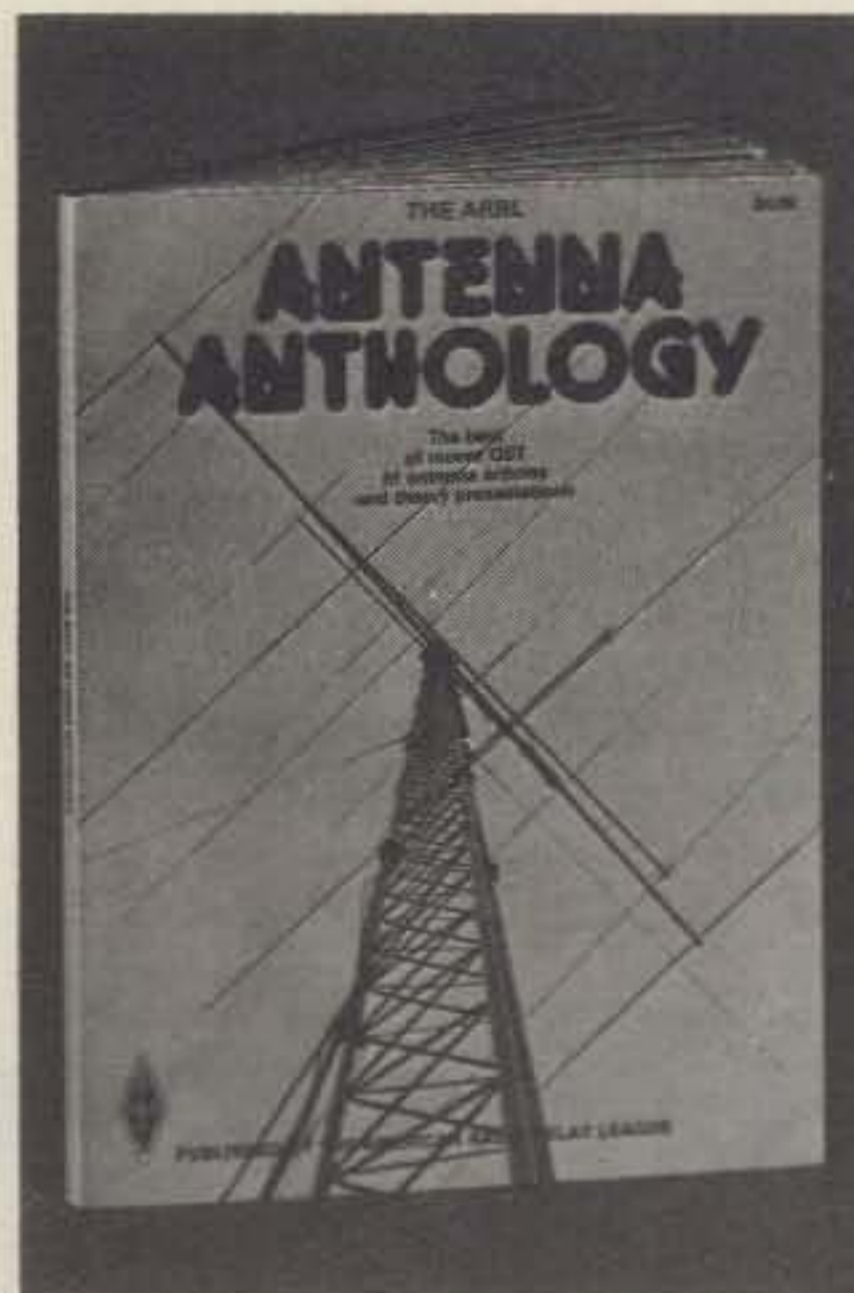
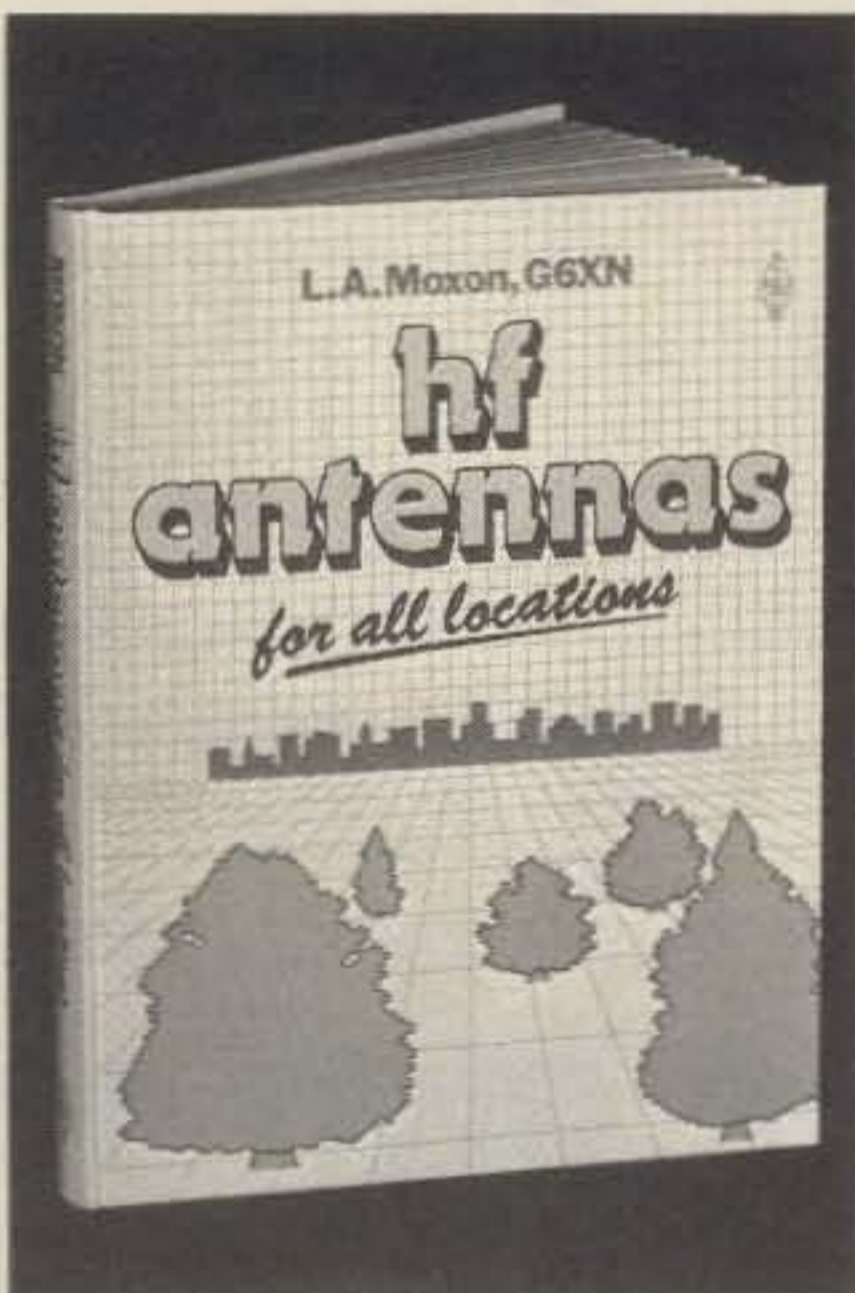
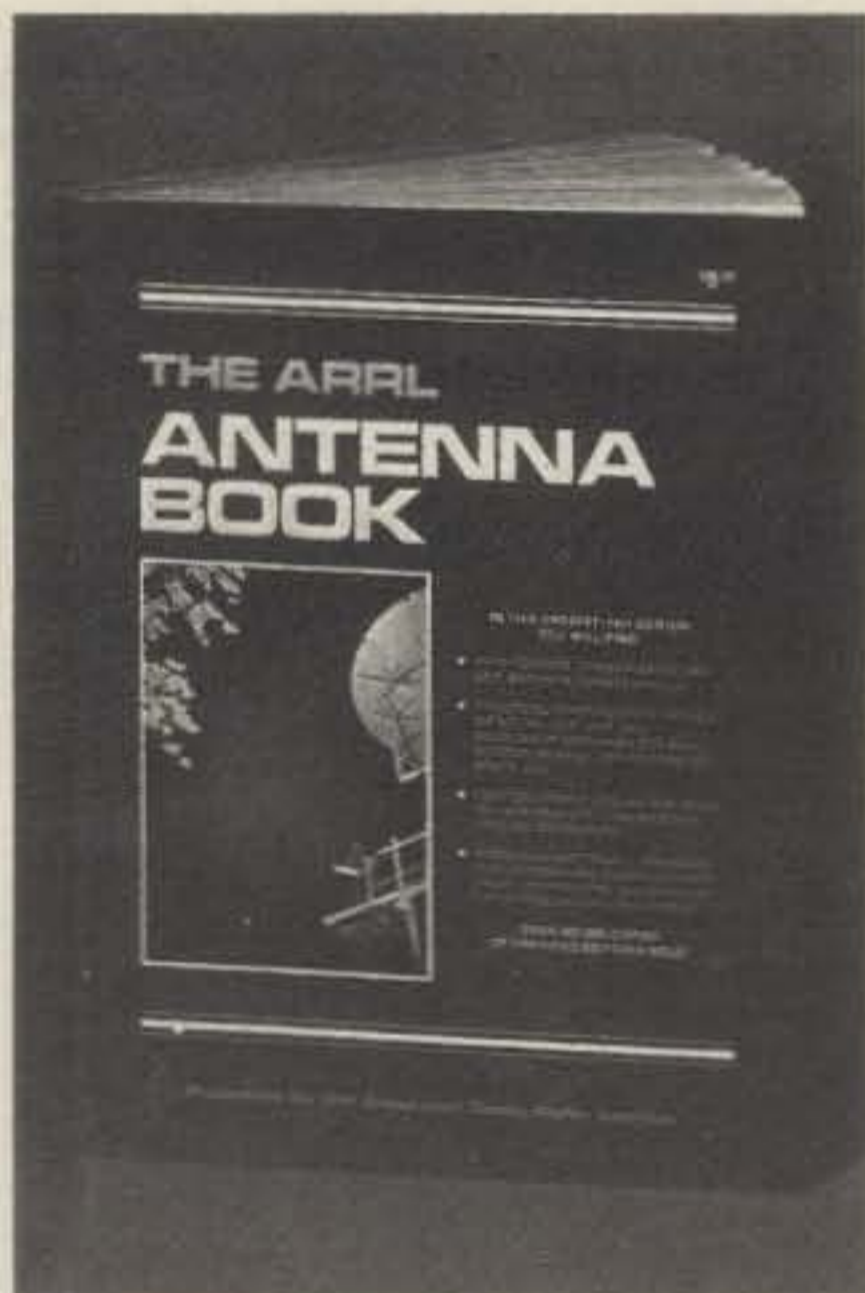
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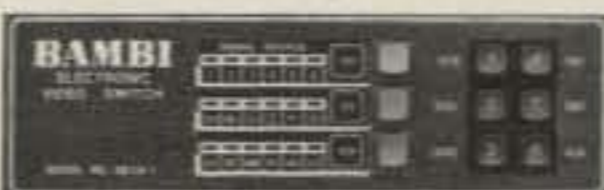
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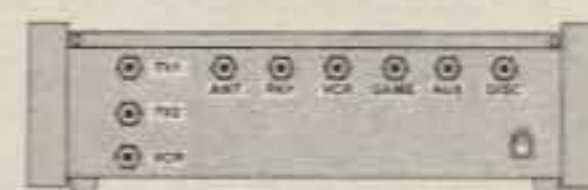
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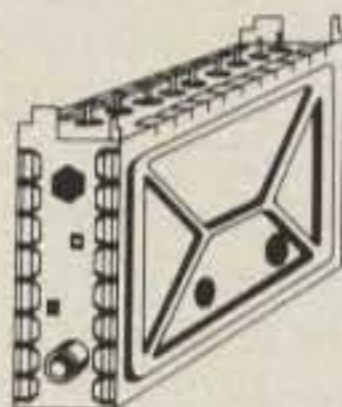
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WB9FRM gives us some helpful, hands-on tips for rolling our own PC boards.

A Printed Circuit Board Primer

BY ALAN MARCUS*, WB9FRM

I have rarely been successful in wiring electronic projects on perforated boards. The end result has always been messy, and often the contacts turn out to be intermittent. But, whenever I use a printed circuit board, the project works the first time. Unfortunately, finished PC boards are usually expensive, unavailable, or require the use of a good 35 mm camera and copy stand. I suppose that I'm like most amateurs who have spent over \$1000 for ham equipment. I'd rather not spend a few hundred more for photographic equipment. But I have found that making PC boards need not be expensive or difficult.

The non-photographic methods that you might want to try include: (1) using a resist pen; (2) placing tape pads and lines directly on the circuit boards; (3) making a negative without a camera.

The Resist Pen

The resist pen method works, but I feel it is a very poor method. A resist pen looks like a felt-tipped pen which, in fact, it is. However, resist pens contain an ink that is resistant to the acids used for etching circuit boards.

In the resist pen method, the circuit is drawn directly on the copper. As you might imagine, the ink does not always go on the boards evenly. Streaks are often apparent, and it is difficult to obtain an even, black appearance. This is, however, the least expensive way to make a circuit board. The pens generally cost less than two dollars.

If you insist on using this method, be sure to clean the board well first. You can do this by lightly rubbing the copper side of the board with 00 or 000 steel wool. Then handle the board by the edges so that fingerprints are not left on the surface of the board. Try to draw the circuit on the board just as it appears in the circuit-board pattern you are copying. If you are starting the circuit from scratch (that is, you're designing the circuit), follow the

directions about it in process (3), Making a Negative With a Camera. If you make a mistake with the resist pen, the ink will be difficult to remove. Use the steel wool to remove the portion you drew in error, and redraw the circuit correctly. Allow a few minutes for the ink to dry.

The board can most easily be etched by immersing it in a bath of ferric chloride. Dry chemicals are available, but they require mixing.

Ferric chloride can be obtained at Radio Shack and from Kepro Circuit Systems, Inc. (address given later). The etchant should be put in a non-metallic container. Plastic or glass bowls are fine. Although many PC board kits suggest that the board be placed in the acid right side up, I suggest that the copper side be placed down. **Remember to exercise caution. The acid could easily cause severe eye problems.**

The warmer the etchant, the less time the board will take to etch. Optimum temperature is 95 degrees Fahrenheit. I normally pour enough acid in an old jar and then submerge the jar in a little water in a sauce pan. This gives the effect of a double boiler. The pan is then placed on a hot plate or stove. Since the board will take between 20 minutes and 1 hour to etch, it is important to have new acid constantly come in contact with sections of the board. You make sure that this happens through a process known in the photographic trade as agitation. To agitate the solution, gently rock the bowl back and forth. You won't have to do this constantly, but the more frequently you do it, the faster the board will etch. After about 20 minutes, lift the board with an old wooden stick to see if the board has etched completely.

If any copper remains where the board should not have any, leave the board to etch some more. You will have to be very patient if you want good results. When the board has completely etched, fill the rest of the bowl with water, remove the board, and flush the board and bowl with lots of running water. Put the board aside to dry. When it is dry, drill the holes where you want them. Do not use a regular $\frac{1}{16}$ " drill bit. Many people try to drill holes that size because it is sometimes difficult to find small circuit-board drills. The drills

are available from Kepro, from some hardware stores, and from some electronic distributors. A #60 drill is a good all-around choice. If you have a very fast (20,000 r.p.m.) drill such as the Dremel or Weller tools, they are preferable to using a regular $\frac{1}{4}$ " drill, but either will work. When you have completed drilling the board, use the steel wool once more to clean the board. Now you are ready to mount the components and solder them in place.

The Tape Method

A slightly more expensive but much higher quality board can be made by using the tape method. Begin by purchasing a PC board layout kit. I use one manufactured by Kepro. The kit is available from Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624. Newark does have a \$25 minimum charge, but if you buy all of the PC board materials and some of your parts from them, you will probably exceed that minimum. They will also send you a catalog free of charge.

The Kepro Photo Layout Kit consists of tape dots, tape strips, graph paper, a sheet of clear acetate, red acetate, peel-off letters, and directions.

As in each of the methods mentioned here, it would be wise to plan your board on graph paper. The kit contains two sheets of $\frac{1}{10}$ " scale paper. When making your drawings, conserve as much space as possible. The difference between the amateurs and the pros seems to be how much space is used. I use the following spacing for component leads: $\frac{1}{2}$ " for $\frac{1}{2}$ watt resistors, $\frac{7}{8}$ " for 1 watt resistors, $\frac{1}{2}$ " for small glass diodes, and 1" for 2 watt carbon resistors.

Use a ruler to determine where each pad should be on the copper board (but try not to touch the board with your hands). Fold back one of the pad backing strips so that the edge of the pads have no backing. Place the edge of an X-Acto knife under a pad, and your thumb on the top, and lift the pad from the rest of the backing sheet. Place the pad over the location desired and firmly press the pad on the copper surface. If the pad wrinkles or tears, it can easily be removed the same way and a new pad put down.

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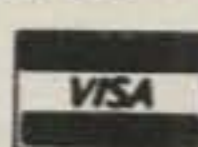
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Determine which pads should be connected. Using the X-Acto knife, lift a tape strip from its backing sheet. If too long a piece is taken, the strip may coil and stick to itself, so be prepared to cut off the length you need with a pair of scissors. Use the knife to press one end of the strip on the edge of a pad. The end of the strip should not cover the hole in the pad. Then press along the rest of the strip. If you would like the strip to curve, press and turn the tape very gradually. With practice, you will be able to make sharper radius curves. If the tape wrinkles quite a bit, remove it and try again. A few small wrinkles will not hurt.

Making IC pads is rather difficult with this method. Self-adhesive IC pads are available from Vector and several other suppliers, and these pads are preferable to trying to make your own from narrow tape strips. Once the board is designed, and the tape is pressed firmly in place, the board is etched as in the previous method.

Making a Negative Without a Camera

The last method, making a negative without a camera, is more expensive than either of the preceding methods, but it is much more accurate. And, as an added bonus, you can make as many boards of the same design as you like without going to much more work. The trick is to use Kepro's photo reversing film. Newark carries the film under stock number 19F2010. The film is relatively expensive, but two 10" x 24" pieces of film are included in the kit along with the developer and the directions.

The major difference in using this method and the tape-on-board method is that you begin by putting the pads and strips on the acetate sheet found in the layout kit. This is done exactly the same as is done on the copper board. When the acetate sheet has been taped with pads and strips, you are ready to put down the IC pad. In this process, however, I chose to use Datak's rub-on pads. They go on perfectly, but you have to put them in the right position the first time, or you'll ruin the pad. If you make a mistake, carefully scrape off the old design with a knife.

Datak makes another product that you may want to use to label your boards. They make rub-on letters. They work perfectly if you are careful. Datak products come from the Datak Corporation, 85 Highland Avenue, Passaic, NJ 07055.

The letters are placed on the acetate in the same fashion as is the design: so you can read it from left to right. The result is a positive, not a negative.

To make a negative, you will need to buy a #2 photoflood bulb. I bought mine at a neighborhood photographic store for \$2.35. You can put the lamp in any regular bulb socket, but you must be able to bring the lamp within 10 inches of the acetate.

The acetate is placed face up (right side up) on a piece of glass. I used the glass in the Kepro Photo Process Kit (Newark stock #19F2002). The kit also contains sensitized boards, developer, and etchant. Now, you must remove the negative film from its sealed envelope. However, the film is sensitive to fluorescent light and most bright lamps. I take the film out in the light of a flashlight covered with red cellophane. The cellophane is included in the kit. Place a sheet of negative film on the work table, roll up the rest of the film and put it in the bag, and seal the bag. Cut a piece of film that will make a negative the proper size. The sensitized boards are 3" x 6". It is rather difficult to do the cutting in dim light, but do the best you can.

The film is placed on the acetate so that the emulsion of the film is away from the acetate. The emulsion side is much duller than the other side. If in doubt, you can scratch the emulsion with a knife. Put another piece of glass over the film. Turn the whole package over. Then expose the package to the light of a #2 photoflood that is held just 10 inches away. The exposure time is 3 minutes.

After the exposure, remove the film in the light of your homemade safelight. Pour a little of the developer (it's rubbing alcohol) on the emulsion side of the film, and lightly rub the film with cotton balls. The imitation (nylon) cotton balls work just fine. Do not rub hard. After a minute or two, the emulsion will come off the film in all the areas where your final design will be. You may shine the flashlight quite close to the film now to make sure your entire design has appeared. When satisfied that it has, you may turn off the flashlight and turn on the room lights. Next, wash the film in cool running water to remove all of the developer. Then, put the negative away to dry. I dry mine by putting clip leads on the ends of the negative, and by hanging the wire over a nail in my workroom.

When the negative has dried, you are ready to make the finished board. Under your safelight, remove a presensitized circuit board. Be sure to seal the rest of the boards back in their original package. Put the board you are working on face up on the work table. Place the negative on top of the board so the negative looks the same as you want the finished board to look. Any printing should read from left to right just as it normally appears in print. Place the glass over the negative, place the clips on the edge of the board, and expose this combination to the photoflood. The lamp should be the same distance away, but the exposure should be for 6 minutes. The board is then inserted in a bath of developer solution. The immersion time is 2 minutes. The development should be done in dim light. When the board is removed from the developer, a slight image will be seen. As the board dries, the image will become more prominent. Let the board dry at least 2 hours. Professionals use an infrared oven to dry the boards in a few minutes, but room drying will work fine.



When the board has dried, put the board face down in the ferric chloride solution, and process the board as before.

After the board has been etched, cleaned, and drilled, you will be ready to mount components. I'm sure that you will be delighted with the results.

If, however, you want to try an even more exotic process, you might want to use the GC Electronics Company's product called Lift-It. The Lift-It process will permit you to copy articles directly from magazines. The Lift-It process is considerably more expensive than those processes described, but if you are copying a great many designs from magazines, you might want to try that process. And, if you want the ultimate in circuit-board processes, you'll go out and buy that \$1500 Nikon single-lens-reflex camera, a copy stand, and a good close-up lens. Until you do, I know that you'll enjoy the simpler processes I've outlined here.



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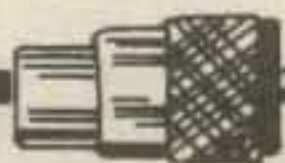
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THE ART OF VERY LOW POWER OPERATING

HW-8 Mods Revisited: CWF-3 Audio Filter

Alas, one of the drawbacks of including commercially produced items in an article is that while the article lives on, the commercial items fade away into oblivion. Thus has it been with the MFJ CWF-3 audio filter featured in the original series of modification articles. Luckily, R.T. Cronau checked with MFJ after purchasing the reprint series and discovered that the CWF-3 has been out of production for several years, and the only filter available in p.c. board form (wired and tested) is the CWF-2 super-filter for \$19.95. This filter could be used in place of the CWF-3, but its four sections far exceed the needs and abilities of the HW-8. So, I had better "fill in" the gap left by the CWF-3 by giving its circuit and a suggested construction approach on the Radio Shack DIP-1 p.c. board brought to our attention by NØARQ (see the QRP Column, CQ, May 1982, p. 98).

The c.w. filter circuit is shown in fig. 1. It uses the two sections of the popular "747" integrated circuit which comes in a 14-pin dual-in-line package. Two levels of filtering selectivity are available by selecting the filtered output from either one or both of the active sections with SW1. The filter center frequency is 750 Hz, which works well with the filter already in the HW-8. Cin/R1 provides input isolation, while C1/C2/R5/R2 and C3/C4/R8/R7 determine the filter center frequency and passband characteristics. Usually, one attempts to use components in these net-



The tidy desktop operating position of Rob Magro, KA2EGO. Rob, age 17, worked WAS and 26 countries in his first 11 months of operation.

works which are matched as exactly as possible, but for the present application exact matching is not a necessity. Five percent tolerance polystyrene capacitors at C1/C2/C3/C4 provide best accuracy, but silver micas will perform adequately. In fact, if the suggested construction approach is followed, silver micas will be necessary (disc ceramics will serve in a pinch) for fitting on the DIP-1 p.c. board. Likewise, ¼ watt resistors will be appropriate.

A suggested approach to construction is shown in fig. 2, which makes use of the Radio Shack DIP-1 (Archer Cat. #276-159) dual-in-line experimenters p.c. board; the unneeded half of the stock board is simply cut off. Fig. 2 shows the foil side of the DIP-1. Some simple modifications to the stock board are necessary, and consist of scraping away the foil material at the

shaded areas with the sharp tip of a knife, screwdriver, or file. Removing this foil material creates several extra pads at desired points. Second, several jumper wires are used to connect indicated pads. The jumper from pin 13 to R3 can be run on the underside of the board. Alternately, one could eliminate the jumper wire entirely, mounting R3 underside between pin 2 and pin 13 directly. Note that R6 is mounted underside between pin 5 and pin 12 pads. While I have not tested this arrangement, it should work without any problem. The CWF-3 has never been prone to feedback oscillation.

Details for inserting the filter into the HW-8 are covered in the August 1977 issue of CQ. I've had to do more reprints of the series of HW-8 articles, and these are once again available at \$7.00 for the batch. Proceeds above cost of printing and mailing the reprint sets support the cost of the DXCC QRPp Trophy program, as well as the FD Trophy program. The set includes the HW-8 test report (May 1977), modification series (August, October 1977), R.I.T. p.c. board clarification (Jan. 1981), and NØARQ's R.I.T. p.c.b. approach (May 1982). The HW-8 continues to be a very popular rig indeed, and I'd hesitate to say how many of the guys have modified their units according to the above series of articles, but a heck of a lot have. So far, only about three have contacted me about a problem with the R.I.T. circuit, and those problems were "freaks."

Let's turn over some of this month's space to you operators who have taken the time to send in a report about your activities.

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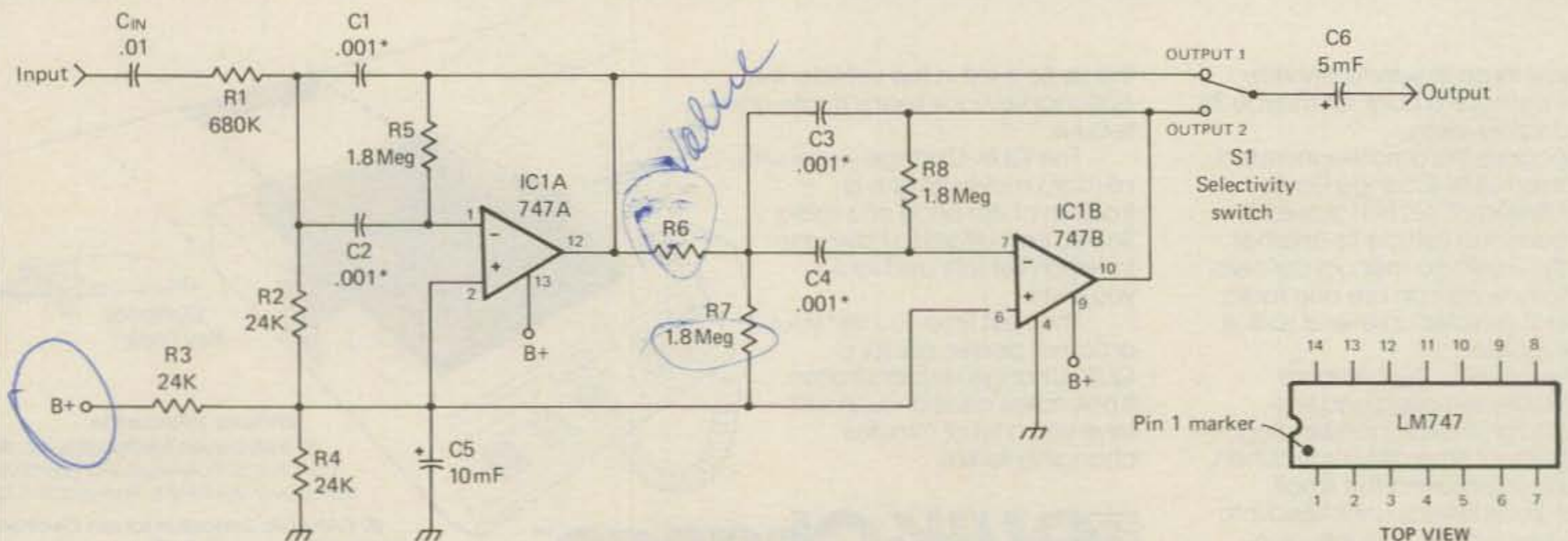
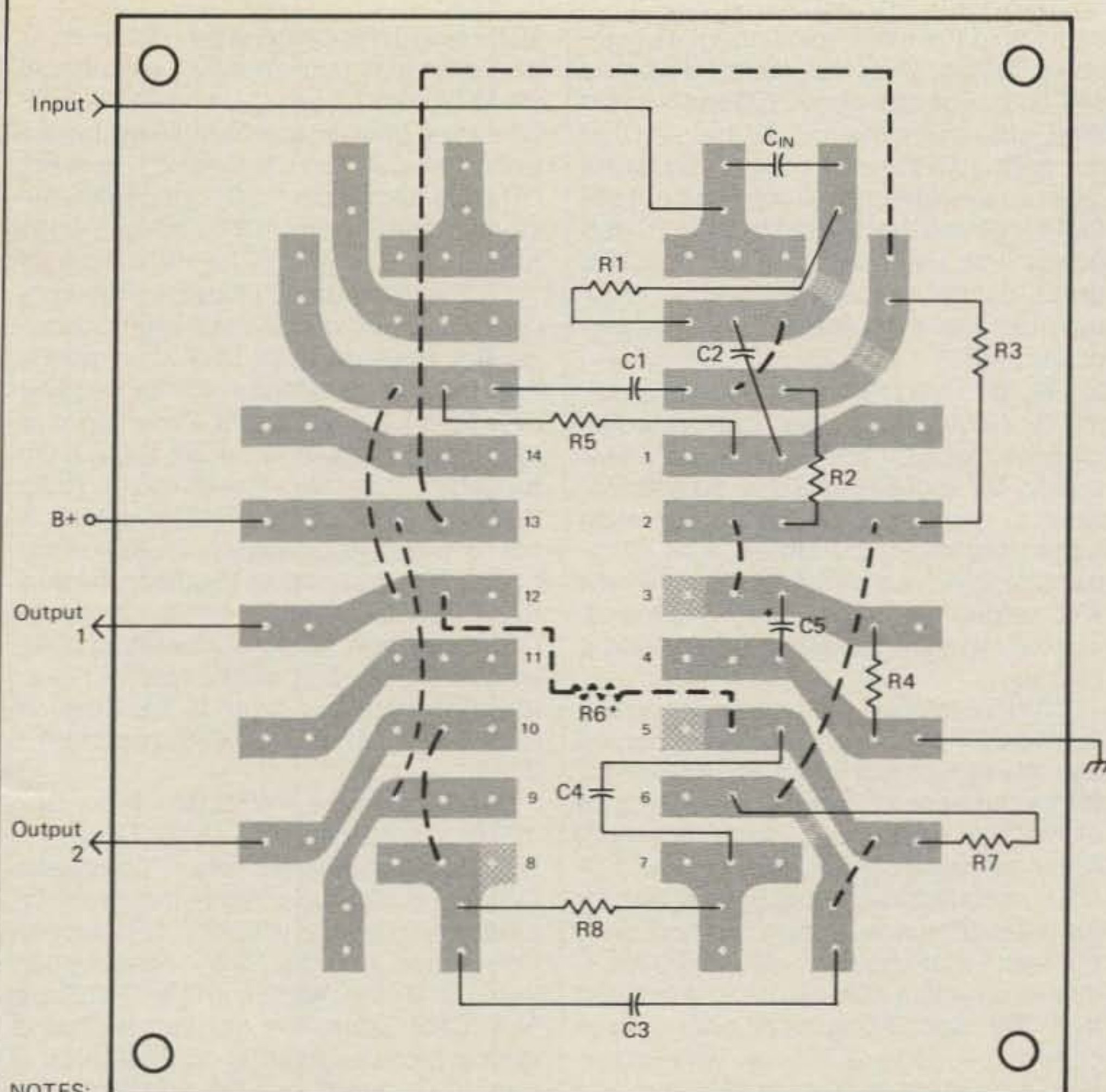


Fig. 1—The CWF-3 audio filter circuit. For best results, use 1000 pF polystyrene capacitors for .001* capacitors (C1-4); silver micas are adequate. Cin = .01 disc ceramic; C5, C6, miniature electrolytics. IC1 is CA747, LM747 type. R1-R8 = ¼ watt carbon.



NOTES:
 No connections at Pins 3, 5, 8, 11, 14.
 All dashed lines including R6 are on foil side.
 Remove shaded foil area with sharp tipped knife, screwdriver or file.

Fig. 2—Layout for the audio filter using Radio Shack DIP-1 (Archer 276-159) p.c. board.

DX Extras

De WA1YIO, Brad Hutton, RR 9 Box 223, Concord, NH 03301: "Just a note to let you know how much I enjoy reading your column in *CQ*. It was through your writings that I came to be quite fascinated with QRP operation. I bought an HW-7 at a flea market two years ago... naturally it didn't work quite right so it was some time before I made my first contact with it. I worked 20-odd states with it before deciding I had to have an HW-8. What an improvement over the HW-7! In just two weeks I've worked 31 states and 15 countries with it.

"DXCC QRPp is my goal, and it may take some time, but that's the fun of it. I have 5 Band WAS #693 and did that with dipoles and a Drake T-4XC barefoot. I have noticed that the fellows obtaining DXCC QRPp usually run the Argo and/or the HW-8 as a 'starter' rig. I generally (for the past six months) run my Drake T-4XC at 5 watts or less output showing on the meter of the MN-2000 antenna matching network. Can I legitimately (for award purposes) use this method to work toward DXCC QRPp? Of course, the HW-8 does not have 10 meter coverage, which is a serious drawback for obvious reasons. It can probably be done with the

HW-8, but it would take a long time and lots of patience, I'm sure."

The answer to Brad's question is "yes," the T-4XC may be used to make legitimate, valid contacts for QRPp awards as long as his output power does not exceed five (5) watts c.w., or 10 watts p.e.p., the internationally accepted QRPp (or QRP if you like) power limit. Measurement of output power should be on an accurate meter in such a case. Generally, the meter should have a separate, low power range not exceeding 20 watts full-scale for QRPp output measurements.

De K8LJQ, Jess B. Lebow, 355 Mower Rd., Pinckney, MI 48169: "All my QRPp operating is done on 40 and 15 meters at the 200 mw level. I am using the International Crystal oscillator/pax combo on each band. I started the project in 1975. I've worked 34 states on 40 using the vertical described below, and on 15, I've managed 25 states and 28 countries! WAC at this level has been achieved also.

"On 15, a TA-33 at 50 feet has produced RST's from 219-599 at the 200 mw level. (Hi!) Takes a lot of perseverance by the other operator to pull me through, and these operators deserve my gratitude. My vertical for 40m is a bit unusual, and is the result of about 7 years of experimen-



The "austere" operating position of Burt, WB4RLQ/TA2BAV, during his QRP stint in Ankara, Turkey. The HW-8 is at the left edge of the desk under the TA2BAV QSL card. One watt output netted 27 states and 38 countries during the 5 weeks of sparse operation.

tation for a sturdy and efficient system. Year after year, antennas came down in the wind and ice, etc., and it was back to the drawing boards. The end product of all of this misery is a free-standing 14 inch Heights aluminum tower 32 feet high.

"The tower is insulated at its base by three fiberglass rod insulators machined on a lathe to fit snugly inside the three legs of the tower and tower base. For the ground plane, I use 36 quarter-wave radials at 1 inch under the soil, and an additional 500 square feet of "chicken wire" (mesh-type fencing) at 1 inch under the soil. (This represents about what it takes, minus chicken wire, to achieve an efficient ground plane for a vertical—ed.) RG-8U coax is run along the ground to the antenna base, and a base loading coil provides the proper match point for the coax center conductor. With the radials buried, mowing the grass is no problem, and I'm careful mowing in the area of the coax. I picked up the sections of the tower at hamfests for about \$75, and a can of aluminum paint made them like new. The antenna works very well on 75 and 80 meters as a 1/8-wave vertical with appropriate base matching network. I never worry about it coming down in high winds now."

De KA2EGO, Rob Magro, 23 Bridge St., Milford, NJ 08848: "I am 17 years old and have been licensed for 11 months. I have been using an Argo 509, and I have found this small QRPp rig to be very exciting. As of yesterday, I worked my 50th state using only 5 watts and a CB vertical antenna. I am now applying for WAS QRPp. So far I have 26 countries with my rig and I can't wait to get the DXCC QRPp Trophy in the future! The key word in QRPp operation is 'patience.' I know the world can be worked very easily, and a true QRPper never gives up. So, all you beginner QRPers out there, don't give up. It just takes time!" (Well said, Rob!—ed.)

De WB4RLQ/TA2BAV, Burt A. Vander Clute II, 891 Southview Circle, Fayetteville, NC 28301: "Here is a quick review of amateur activity in Turkey (1980), in-

cluding my own QRP operation as TA2BAV/QRP while I was in Ankara. As evidenced by the enclosed photo (see elsewhere in this column—ed.), my efforts were rather austere. I used a souped-up version of the HW-8 and a 'half-dipole'—that is, half of the antenna was inside my apartment and half of it was suspended over a convenient tree outside my window. The really amazing thing is that it worked!

"I got bitten by the QRP bug as a result of a QSO with Chris, G4BUE. While I was 599 at G4BUE with 75 watts into an SB-102, Chris was 599 here with 1 watt! In fact, after he lowered power, he was still solid copy in Ankara with 100 mw. That was it. I ordered the HW-8 the following week, assembled and modified the rig (your series of articles acting as my guide), and got on the air. What supreme fun! Within the space of five weeks, averaging one hour per day, I managed to work 27 states (from TA2BAV), 38 countries, and WAC on 20 meters with 1 watt output to my 'half-pole.'

"Gene Tyree, N4ANV, was my QSL manager, and we still have logs if anyone reading this still needs a QSL—legal-size s.a.s.e. please. Others operating QRP out of Turkey include Halit, TA1HY, Kemal, TA1MD, Kadri, TA1KD, and Ruchan, TA2DX. Most of these QRP rigs are homebrew tube-type units, although a few HW-7/HW-8's are in use. It is extremely difficult for a Turk to get a commercial rig or even parts for construction projects. Any transmitter is highly valued by TA amateurs." Our special thanks to Burt for his rundown on TA QRP activity.

De WA3FNK, Tom Rhodes, 29 West Church St., Williamsport, MD 21795: "Felt it was about time to add my story to the ones I've been reading with great interest in the QRP column. CQ's treatment of the subject of low power is excellent, and you are to be congratulated on your efforts. After reading the DX column on a regular basis, I started to wonder if QRP

could hold the same excitement as high-power DXing. Over the years I'd worked 147 countries with about 300 watts input. Well, after three months, let me say that not only is QRP just as much fun, but a great deal like being a Novice again! I still feel a little sad that the old Novice 75 watt power limit went over the hill. It was a great teacher of many a big DXer of today. But that's progress. Novices need power, right?

"My original QRP attempts came during my Novice days after I purchased an old Heathkit AT-1 and Hallicrafter's Skybuddy. My success as a c.w. op was fair. Several months of 80 meter operation netted me about 20 states. I let my license expire for a while, and then my new XYL helped me prepare for my General. Started working DX about a year and a half ago.

"As I mentioned, I felt it was about time to give QRP a fair try about three months ago. My equipment was a Viking Navigator turned back to 2 watts output, and an old NC183D did a good job on receiving. Antennas are dipoles, a longwire, and an MFJ antenna tuner. I also have a TA-33Jr for the high bands. During the April QRP contest, I managed 7 states and 3 Europeans, all with a 40m dipole. I've learned that QRP and DXing have one thing in common—listening is very, very important. At present, totals are 42 states and 10 countries."

De KA4JGV, Jerry C. Bowers, 2516-C Celanese Rd., Rock Hill, SC 29730: "I wanted to drop you note to let you know that QRPp is alive in South Carolina. I purchased an Argonaut about two weeks ago and never dreamed the results would be so satisfying. To date, I've worked 14 states, including California, with 1 watt output. Maybe not very impressive to some, but I'm pleased! My current antenna is a 14AVQ with only two radials, but I hope to lay some more when weather permits."

That's space for reports this month. Let's round out with some notes.

Club and Activity Notes

Correction, QRP ARC I Membership Fee: In the May 1982 issue I erroneously indicated that the membership fee for joining the QRP ARC I is \$4.00. Tom Davis gave me a call and noted that while he appreciated the publicity, he has had to send a lot of applications back, asking for an extra \$2.00! I apologize profusely. The current fee is \$6.00, which includes a subscription to the very worthwhile quarterly newsletter which covers construction articles, club news, activities, etc. At present, address queries/applications to Ed Popp, K5BOT, 2212 Deadwood Drive, Austin, TX 78744.

Incidentally, in case you missed the May 1982 column, the big news from the QRP ARC I is that the 50 watt maximum power limit has been dropped. Before that happened, if you had to run over 5

watts output for e.m.e. work, net work, or whatever, you could not be a member of the QRP ARC I. Now even part-time QRP operators can join and partake in club activities. All club awards (WAS-QRPp, WAC, "Thousand-mile-per-watt," etc.) follow the standard definition of QRP/QRPp: 5 watts maximum r.f. output (10 watts p.e.p.).

QRP activity in the Houston area continues to grow, with the last report showing the Houston Area QRP Club with a membership of around 40! In reading over the club newsletters, I'm envious of the opportunity fellows down there have for getting together at meetings and club luncheons and the like. The newsletter is put out by Leo Delaney, KC5EV, who notes: "It never ceases to amaze me how many amateurs have been turning to QRP for a new world of operating challenges!" Indeed, it seems true of Houston! For more info, write to the Houston Area QRP Club, P.O. Box 383, Spring, TX 77373.

Fred Bonavita, W5QJM, P.O. Box 12072, Capitol Station, Austin, TX 78711, edits and publishes the "Southwest QRPer," a neat little newsletter which includes articles about QRP ("QRP Mobile Operating" and the like), construction items, and news about the QRP Gulf State Net (QRP-GSN). The net can be found during summer months on 7040 kHz, 8 p.m. CDT, and during fall and winter on 3560 kHz, 8 p.m. CST, Wednesdays, with K5BOT as NCS.

The group featured a special QRP workshop on February 20 in Austin, and it was a great success, with a total of 27 hams showing up. Seven drove all the way from Houston, one flew in from Dallas, with the remainder coming from the Austin area. The afternoon events included talks about various aspects of QRP operation which were recorded and will be run in subsequent issues of "The Southwest QRPer." The newsletter has slowly been growing into a little magazine. Fred has been quite active in organizing the QRP Forum for the 1983 ARRL National Convention in Houston. Excellent job on all fronts, Fred!

The following are some of the QRP activities to come:

(1) Sept. 11/12, 1982, G-QRP-C Activity Weekend.

(2) Oct. 16/17, 1982, QRP ARC I Fall Contest.

(3) Oct. 30/31, 1982, CQ WW S.S.B. Contest with special QRP section.

(4) Nov. 11, 1982, Combined G-QRP-C/QRP ARC I Activity Weekend.

(5) Nov. 27/28, 1982, CQ WW C.W. Contest with QRP section.

(6) Dec. 26/31, 1982, G-QRP-C Annual QRP Winter Sports.

Details on these upcoming events usually can be found in CQ's Contest Calendar column, as well as in the newsletters of the sponsoring clubs. Join in the fun with other QRP operators!

73, Ade, WØRSP

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Safety and precaution can add valuable years to your rig. W1BG has come up with a simple way of protecting tube-type transceivers from being damaged.

The Superfuse

A Multiple Fuse Adapter for Older Transceivers

BY PENN CLOWER*, W1BG

If your transceiver has a power line fuse, you probably feel that it's pretty well protected—and you're probably wrong. The reason is simple: a fuse sized to handle maximum transmit power is way too big to give much protection during reception. A 250 watt s.s.b. transceiver may draw 350 watts from the a.c. wall outlet when transmitting. To prevent nuisance fuse blowing, the a.c. line will be fused at a slightly higher level—maybe a 5 amp fuse which would allow a 575 watt power draw. When the transceiver is receiving, the power requirements are far lower. A lot can go wrong, seriously wrong, before that fuse blows. The device described here can save you a lot of money, time, and aggravation. Specifically designed for the older tube-type transceivers, it is a multiple fuse adapter which plugs in between the transceiver and its remote power supply. A suitably sized fuse is placed in each of the d.c. supply lines in addition to the normal a.c. fusing, and the entire supply is disabled if any fuse blows.

Multiple fusing this way has several advantages. Since each d.c. supply line is fused at just above its normal operating level, a component failure in a low-level circuit can cause shutdown before massive problems occur. No longer is a several hundred watt increase in power-draw necessary to turn off the supply. Since the various voltage supply outlets are fused individually, the particular fuse failing in the event of trouble can provide a valuable clue towards locating the problem. Finally, since the superfuse circuit fits between the transceiver and its power supply, the addition (or removal when you sell the transceiver) of the circuit is a simple no-holes modification.

It is relatively easy to provide real fuse protection for many of the older tube-type transceivers. Popular rigs made by Heath, Swan, National, Hallicrafters, Gal-



A rear view of my Tempo power supply showing the superfuse riding piggyback on the power output connector. The fuse holders are marked as to amperage and circuit fused. Also note the fused a.c. plug, which was added as a simple means for fusing each side of the input line. (W1GSL photo)

axy, and others all had external a.c. power supplies. This means the all-important interface between the supply and transceiver is accessible for modification. In addition, one side of the input a.c. line is routed through the transceiver for a.c. power control, so turning the a.c. off by opening that line is also a simple matter.

The circuit shown in fig. 1 was designed for my Tempo One, but with suitable power connectors and fuse sizes it could be used on any of the previously mentioned equipment. As shown, it fuses four circuits, but the number can easily be extended. The circuit is quite simple. Each fuse is shunted by a neon bulb in series with a resistor: if the fuse blows the bulb lights. The neon bulbs are grouped around a photo-transistor, and when a

bulb lights the photo-transistor turns on a Darlington wired transistor pair which drives a relay. When the relay pulls in, its normally closed contacts open the a.c. line feeding the power supply. A failure in any of the secondary circuits then cuts off the input to the entire supply. Of course, the power for the relay and the neon bulbs comes from that same power source, so what actually happens is that the superfuse chops the a.c. input to the supply on and off at about a 5 Hz rate as the various filter capacitors charge up and down. This cuts the average supply input power in half, thus protecting the other d.c. circuits and notifying the operator that a fuse has blown. The blinking panel lamps and clicking relay make it hard to overlook superfuse operation!

*459 Lowell St., Andover, MA 01810

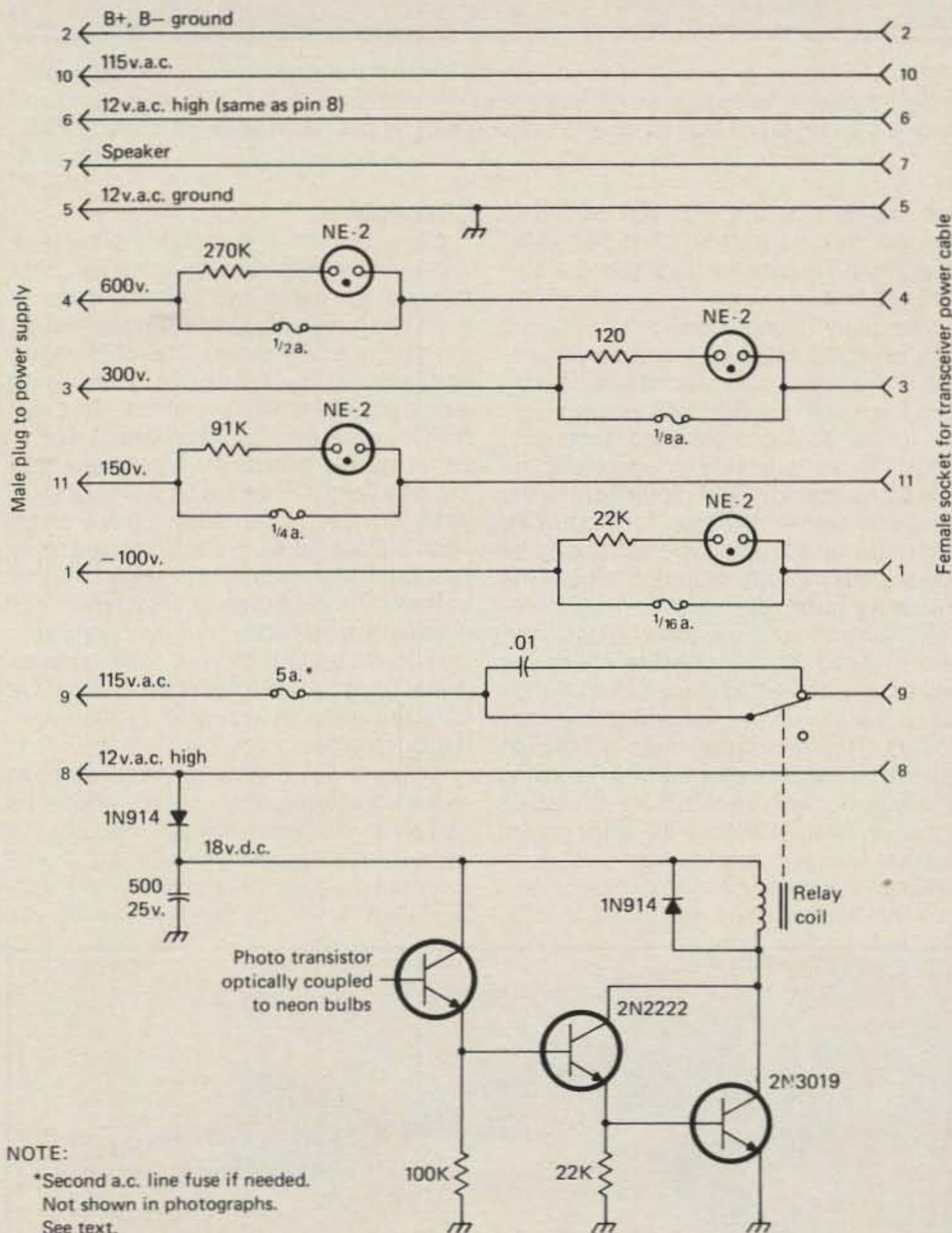
Construction

As can be seen in the photographs, my version is built as a plug-in module sized to ride piggy-back on the Tempo One power supply. It could also have been permanently wired into the power cable connecting the supply and transceiver. My unit was constructed in a 1 3/4" x 2" x 4" minibox. Everything fit inside, but it was a squeeze, and a larger box would have made construction much easier. A small circuit board is used to hold the handful of components. Layout is noncritical, although precautions should be taken to make sure that the various large supply voltages are safely separated from each other and the a.c. line.

The phototransistor is from PolyPaks. The catalog number 3277 is a bargain, having four transistors for a dollar, although in my case only three worked. That

transistor is in a clear plastic package and can be surrounded with the neon bulbs. Phototransistors with a built-in lens would be much more difficult to optically couple to all four bulbs! The transistor and bulbs have spaghetti covering their leads, and the entire group is wrapped with household aluminum foil and Scotch tape. The shiny foil surface improves the optical coupling between the bulbs and phototransistor and also prevents false triggering due to stray light. *Make sure that the foil and wire bulb leads do not touch each other.*

I found experimentally that a 3/4 mA bulb current would trigger the relay. To be on the safe side, the series resistors are selected to set the current at 2 mA if the fuse blows and the load is shorted. The required resistor is easily calculated: just assume the voltage across it is 60 volts less than the supply line being protected.



NOTE:

*Second a.c. line fuse if needed.
Not shown in photographs.
See text.

Fig. 1—Circuit of the superfuse. Note: the connector pin numbers and fuse sizes shown are for the author's Tempo One transceiver. Other transceivers will require different connector wiring and fuse values (see text). The transistors can be any medium-power, 100 mA, 1 watt switching types. The relay has a 12 volt coil with 5 amp contacts. The diodes can be anything rated at 100 mA, 50 p.i.v. or more.

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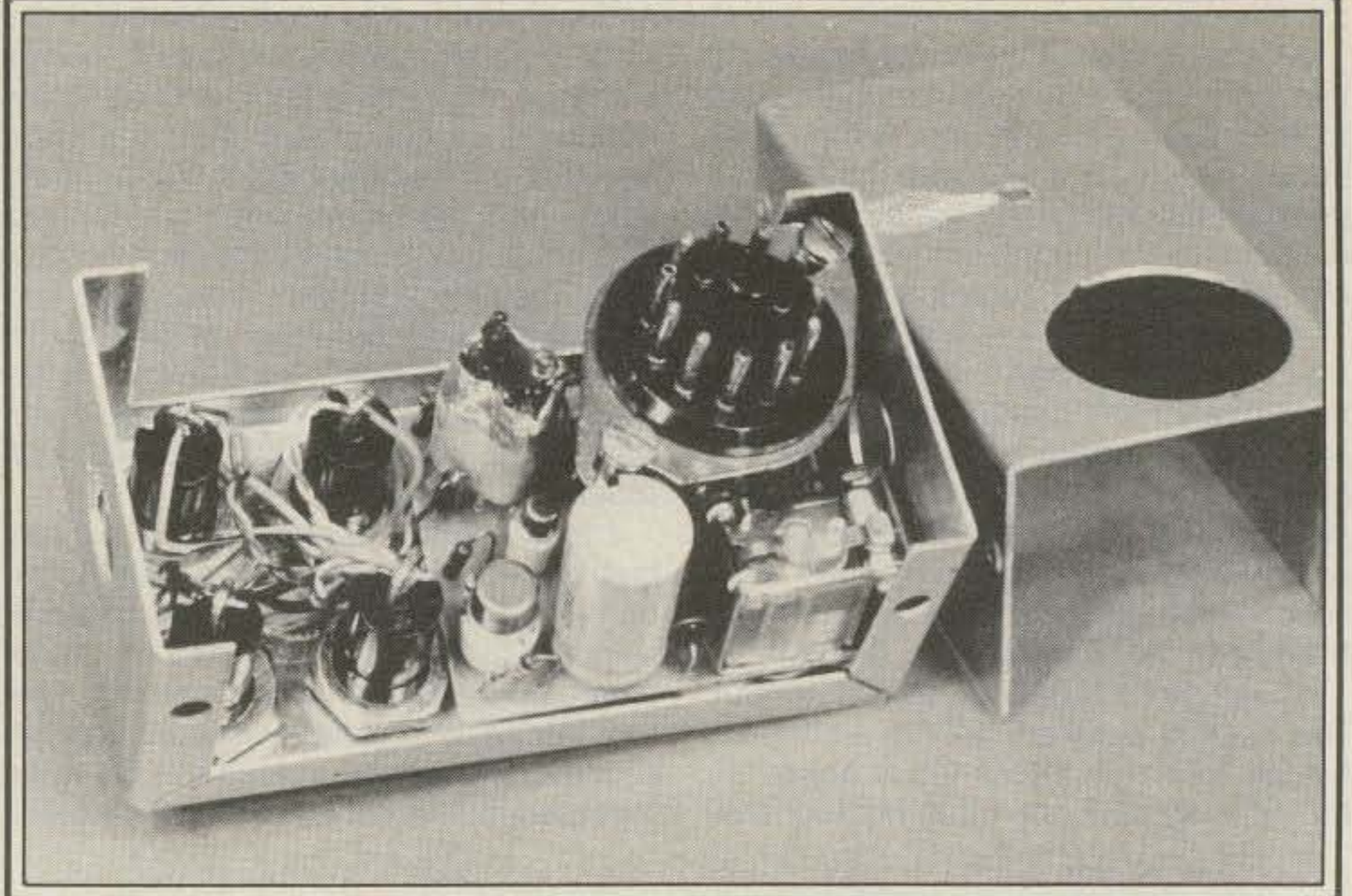
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Interior view of the superfuse. The neon bulbs are in the aluminum-foil-covered bundle on the PC board. Mounting everything in one half of the minibox makes a neat unit and avoids the hassle of long jumper wires connecting the two halves. (W1GSL photo)

For example, if the 600 volt output is shorted, the resistor will drop 540 volts, so a 270 K resistor will regulate the current at 2 mA.

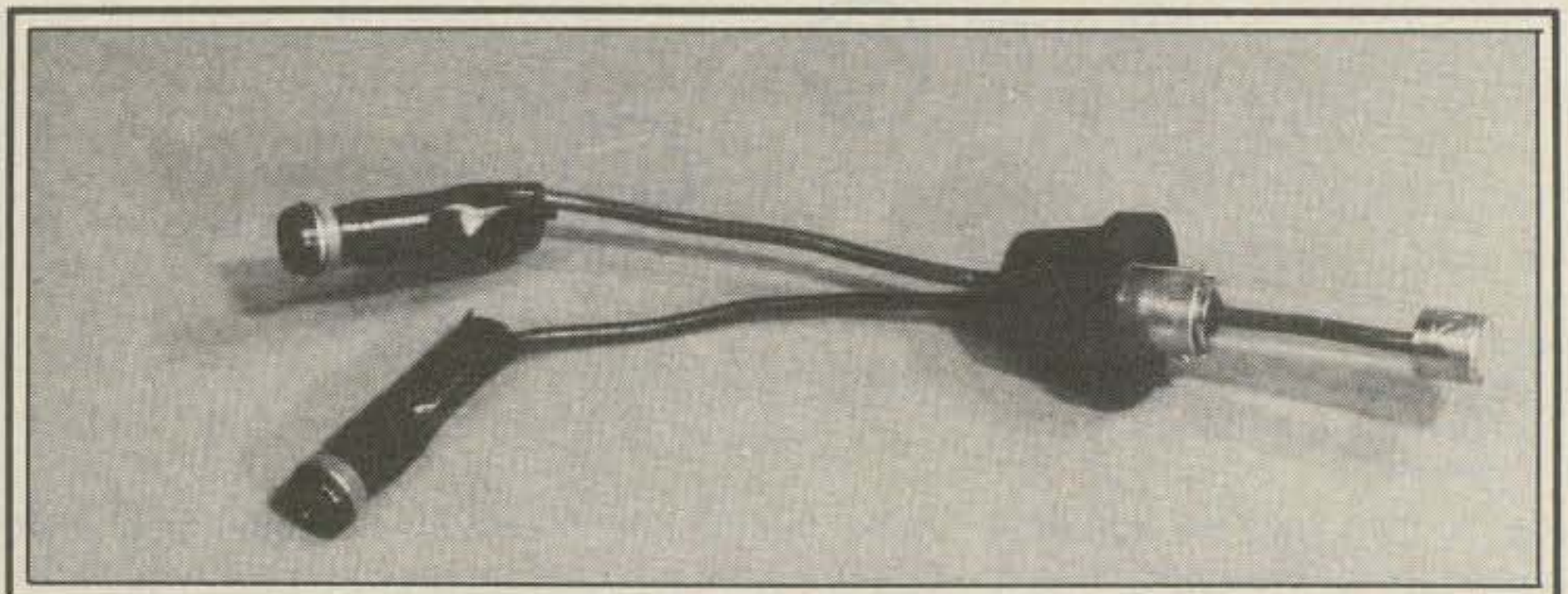
The relay should have a 12 volt coil with contacts rated at 5 amps or more. There are many suitable units on the surplus market in the \$2 to \$5 price range. The capacitor across the contacts prolongs the operating life by absorbing the make/break spark. The diode across the relay coil makes life easier for the driving transistor by clamping the voltage spike generated in that inductor when the transistor turns off.

Be sure to wire the fuse holders correctly. As a safety consideration, the power source should always be connected to the lug on the far end of the fuse holder. This gives the most protection against accidental shock when removing or replacing the fuse with a live circuit. As a bonus, it also defines the direction of current flow through the fuse and so increases the usefulness of a meter insertion tool which will be described shortly.

Checkout

Checkout of the completed superfuse can be done in several easy stages. First remove the fuses and use clip-leads to apply the proper supply voltages across the empty fuse holders. The bulb wiring and resistor sizes are correct if each bulb glows brightly when energized. Next, apply 12 volts a.c. to the appropriate pins of either power connector and check that 15 to 18 volts d.c. shows up on the 500 uF filter capacitor. Then power up one of the neon bulbs again and verify that the relay operates. The voltage on the bottom end of the coil should drop to 1.5 volts or less when any bulb is on. The relay coil in my unit draws around 150 mA, and the relay driver transistor will get warm unless it is fully saturated as indicated by a low collector voltage.

When those preliminary checks have been completed, the entire unit can be tested in the final arrangement. Put the circuit together as shown in fig. 1 and connect the superfuse to your power supply. Don't connect the transceiver yet,



A simple adapter for replacing a fuse with a milliammeter. Use it now to determine the best fuse sizes, and use it later (hopefully much later) as a valuable trouble-shooting aid. (W1GSL photo)

and leave the fuses out. Before plugging the power supply into the wall, take a clip lead and jump the a.c. line pins on the output side of the superfuse. This jumper takes the place of the **Power On** switch in the transceiver. Now connect the power cord to an a.c. outlet and check that the various high voltages come on.

At this point the d.c. operating voltages are connected to the input side of the fuse holders. The fuses are removed to simulate being blown, but the bulbs aren't lit because there is no return path to ground on the output side of the fuse holders. Take a jumper and carefully ground the output side of each fuse holder in turn to simulate a short in the transceiver. The relay should click the a.c. input line on and off about five times a second. **BE CAREFUL: Remember that these are serious voltages.** Make sure not to ground the power-supply end of the fuse holder, since that would short the supply and blow the a.c. input fuse and maybe some diodes. Use a well-insulated clip lead, and first attach one end to ground, then the other end to the fuse holders; that way the wire you're holding is always at ground potential.

When the circuit is checked out and operating properly, reinstall the fuses, remove the clip leads, and plug in the transceiver. The radio should work exactly as it always has. To check the protection circuit, simply unplug a fuse (the receiver B+ line is a good choice) while the transceiver is on. Since there is really no short to ground in this case, the neon bulb will not get the full 2 mA of design current. This might prevent the nice 5 Hz cycling seen earlier, but the superfuse should certainly interrupt the a.c. input in some manner. Don't run this test more than a few seconds. While this circuit gives added protection, there is no guarantee against damage from long-term operation. Remember that the purpose of the superfuse is to *limit* the damage a fault can cause before you shut off the power.

Choosing The Fuse Sizes

The best amperage size for the individual circuit fuses is between 1 1/4 and 2 times the normal current draw. If the instruction manual that came with your transceiver is as informative as mine is, it probably won't contain this basic information. Don't worry; there is a simple and useful tool you can make and use with the superfuse to solve this problem. Just use a spare fuse-holder cap, a blown fuse, and some lengths of wire to make a meter insertion aid like the one shown in the photograph. This adapter will prove to be a useful addition to your tool box, so take the time to do a neat job. I had some tip jacks, so I fancied mine up with meter jacks. The idea is to make it easy to insert a milliampere meter into the various d.c. lines in place of a fuse. A deluxe version might also include an inline fuse to replace the one removed from the holder,

but that really isn't necessary for these quick current measurements. Once you know the typical operating currents, fuses of the appropriate sizes can be installed in the superfuse.

Don't Forget the A.C. Fuses

If the transceiver power supply has a fuse in only one side of the a.c. line, then another should be added to complete the job. There are several ways to do that without visibly modifying the equipment. I took the easy way out and replaced the line plug with the double-fused plug shown in the photograph. This type of a.c. plug shows up occasionally at ham flea markets.

If the superfuse box is large enough, the second a.c. line fuse can be added there as shown in fig. 1. This solution requires that the original line fuse be in the

other side of the line, so you may have to make a quick modification to the wiring in the power supply. In the case of the Tempo One, this rewiring wouldn't have been necessary, and putting the second fuse in the superfuse would have been a snap if only I had had the room.

Sleep Easy

It is a sad fact of life that components sometimes fail in a way which puts unreasonable stress on the rest of the circuit. Fuses are used to limit the damage resulting from a component failure, but a single fuse in the a.c. line or a high-power transceiver can't always limit those losses at an acceptable level. Multiple fusing as used here can do a much better job of protecting your investment and also help to locate problems when a failure does occur.

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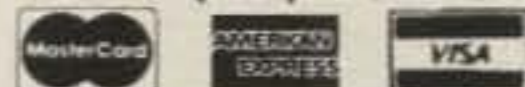
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**W0XI presents some food for thought for those
contesters who are also into computers.**

Here's A Start On That Contest Program

BY PHIL ANDERSON*, W0XI

```

10 REM *** CONTEST PROGRAM ***
20 REM * W0XI 7-14-82 *
30 REM * DUPLICATES, LOG *
40 REM * PRINT, AND LIST *
50 REM *** CONTEST PROGRAM ***
60 REM
70 DIM C$(200): DIM D$(200): J = 0
100 TEXT : HOME : PRINT "CONTEST MENU:": PRINT
110 PRINT "HIT (1) FOR DUP SEARCH..."
120 PRINT "HIT (2) FOR LOG CONTACT..."
130 PRINT "HIT (3) FOR PRINT LOG..."
140 PRINT "HIT (4) FOR LIST LOG..."
145 PRINT "HIT (5) FOR RETURN TO SYS"
150 PRINT : INPUT "ENTER CHOICE AND 'RETURN'..":N
160 IF N < 1 OR N > 5 THEN PRINT CHR$(7): GOTO 100
200 DN N:GOSUB 1000,2000,3000,4000,5100
210 GOTO 100
1000 REM
1010 REM *** DUP SEARCH SUBR ***
1020 HOME : PRINT "DUP SEARCH:": PRINT
1030 INPUT "ENTER CALL...":C1$: PRINT
1040 FOR I = 0 TO J
1050 IF C1$ = C$(I) THEN PRINT "###DUP###": GOSUB 5000: RETURN
1060 NEXT I
1070 PRINT "--- NOT A DUP ---": GOSUB 5000: RETURN
2000 REM
2010 REM *** LOG YOUR CONTACT ***
2020 HOME : PRINT "LOG CONTACT:": PRINT
2030 INPUT "ENTER CALL...":C1$
2040 INPUT "ENTER SECTION...":S$
2050 INPUT "ENTER TIME...":T$
2060 PRINT : PRINT "CHECK INPUT...":C1$: "":S$: "":T$
2070 PRINT : INPUT "INPUT OK (Y/N)...":Y$
2080 IF Y$ = "Y" THEN GOTO 2100
2090 GOTO 2000
2100 C$(J) = C1$:D$(J) = S$ + " " + T$:J = J + 1: RETURN
3000 REM
3010 REM *** PRINT LOG SUBR ***
3020 REM *** FOR MX-80 TYPE ***
3030 HOME : PRINT CHR$(4):"PR#1"
3040 PRINT "CONTEST LOG": PRINT
3050 FOR I = 0 TO J
3060 PRINT I,C$(I),D$(I)
3070 NEXT I
3080 PRINT CHR$(4):"PR#0": RETURN
4000 REM
4010 REM *** LIST LOG TO SCREEN ***
4020 HOME : PRINT "LOG LISTING - 20 CONTACTS:"
4030 PRINT : INPUT "ENTER NUMBER AT WHICH LIST STARTS..":N
4040 IF N < 0 OR N > 200 THEN PRINT CHR$(7): GOTO 4020
4050 HOME : PRINT "LOG LISTING..": PRINT
4060 FOR I = N TO J
4070 PRINT I:"":C$(I),D$(I)
4080 NEXT I
4090 INPUT "HIT (Y/N) FOR MORE..":Y$
4100 IF Y$ = "N" THEN RETURN
4110 N = N + 20
4120 IF N > 200 THEN RETURN
4130 GOTO 4050
5000 FOR K = 1 TO 1000: NEXT K: RETURN
5100 END
6000 REM
6010 REM *** LIST PROGRAM TO MX-80 ***
6020 PRINT CHR$(4):"PR#1"
6030 PRINT CHR$(9): CHR$(1): CHR$(1):"BON"
6040 LIST : PRINT CHR$(4):"PR#0": END

```

This listing is a contest program. While it is short and does not support storage of the contest information to diskette, it is a start and can be used as is for short contest segments. Try your hand at using it, and then perhaps expand it to your preferences.

The program is segmented into five sections: main body, dup search, logging of contact information, printing the log, and listing the log to screen. The main body is nothing more than a menu presentation of the other four choices. Those choices are set up as subroutines.

Statement 70 sets the program for 200 contacts; this can, of course, be changed to whatever your system will support in the way of memory. Two to three thousand should be no problem on the Apple. If you change things, make sure that you also change the error limits at statements

4040 and 4120. A limit or check at contact 200 should probably be placed at statement 2100 too.

On duplication (dup) search, the call is entered and is compared against every call in the C\$ array. If a dup is found, it is reported immediately. Either way, you return to the main menu.

At 2000 is the logging of contacts section. If you want to add signal report, just add another input statement and add that string to the total D\$ (for Data) report string at 2100.

Printing of the log starts at 3000. We have assumed that the printer will be an Epson MX-80. If your printer is not an MX, changes may be required here.

Listing of the log on the screen has some complications. If you have more than 20 contacts, which is likely 99% of the time, then you can only list 20 of them a time. So, we decided to let you list starting at any desired number; just hitting the return key then lists each 20 following. Hitting "N" returns you to the main menu.

CONTEST LOG

```

0 W0XI KS 115
1 WA5RGU TX 116
2 WBOSIM KS 116
3 W1AW CT 117
4 K2EEG NJ 118
5 G2KKM GERMANY 119
6 K3OLD MD 119
7 W5OLF TX 120
8 NOAPJ KS 120
9

```

If we were to expand this program, storage to diskette and some error checking of input data would be the first things to come to mind. **CAUTION:** With this current program, if you hit the reset key, all contact data is lost. So as you can see, this is a start on a more serious contest program and could be used in a pinch. Have fun, and let us know if you expand this substantially.

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58/U	20GA solid bare copper	foam	80% bare copper braid shield	.95	50	7c Per Ft.
58 A/U	20GA 18/33 tin copper	poly	90% tin copper braid shield	.197	50	8c Per Ft.

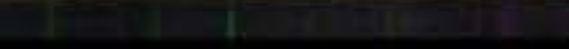
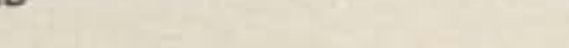
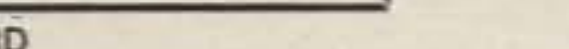
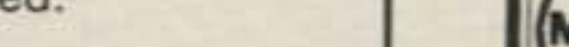
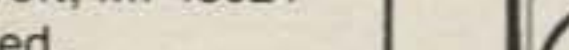
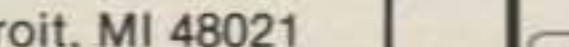
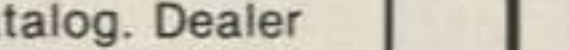
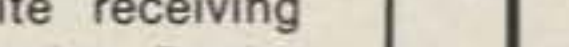
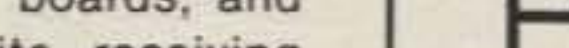
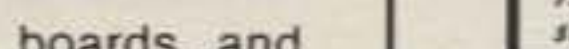
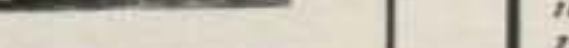
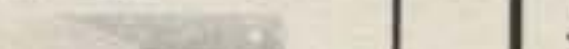
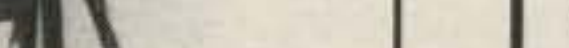
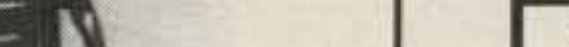
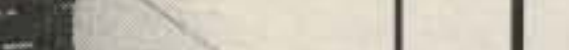
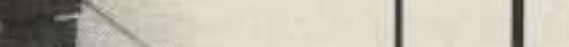
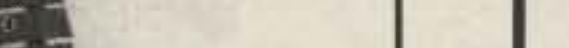
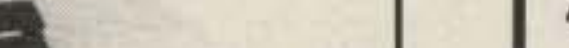
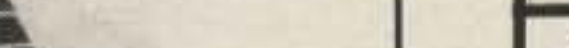
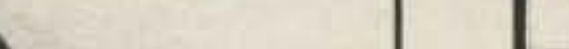
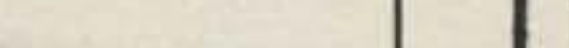
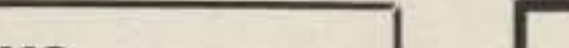
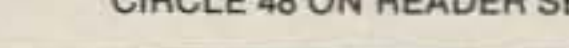
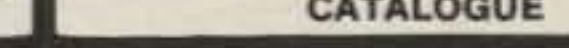
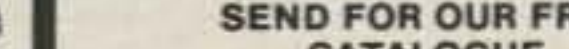
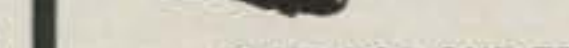
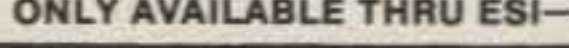
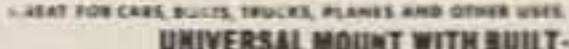
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TVI—Here We Go Again!

BY LEW McCOY*, W1ICP

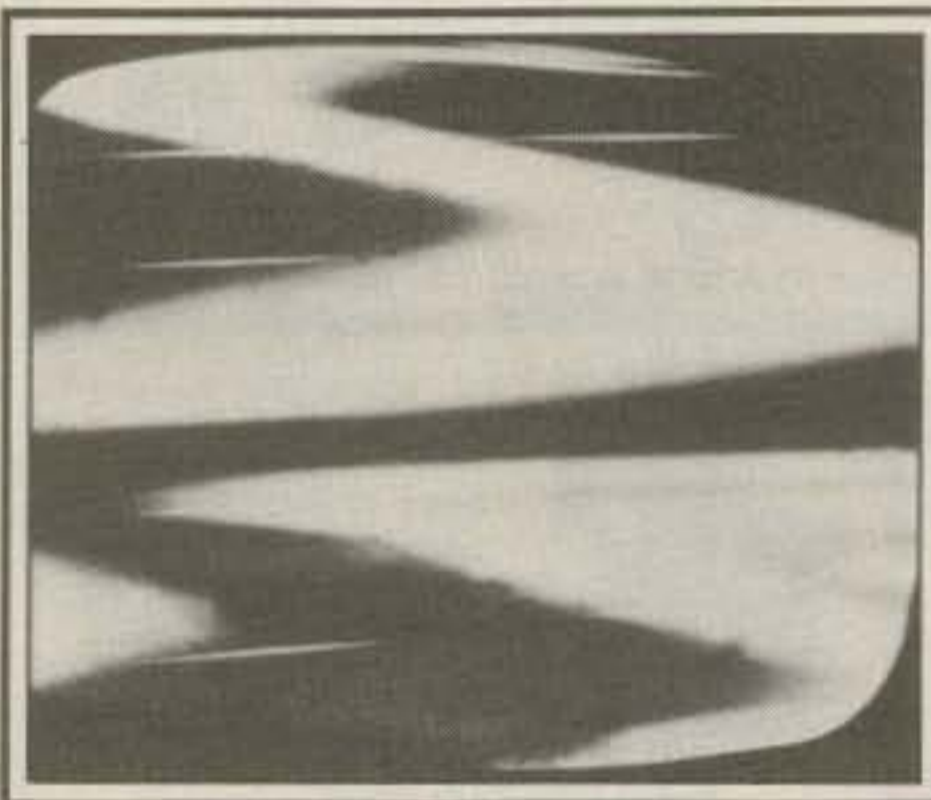
In the July issue of *CQ* in Ted Cohen's "Dateline . . . Washington, D.C." column, Ted, N4XX, made mention of "Low Power Television . . . An R.F.I. Disaster in the Making." Ted, who incidentally has a long and distinguished record in fighting RFI (radio frequency interference), pointed out that there are already 6500-plus applications on file with the FCC for permits to operate low-power TV stations—10 watts for low band (Channels 2 through 13) and 1000 watts for u.h.f. I had just read Ted's column and then picked up our local newspaper to read that a local radio station had just filed for a 10-watt permit to operate on Channel 2! (Ted, if you are reading this article, say a prayer for me!)

Ted is not a person who is inclined to overstate or understate the facts. However, I am. A "disaster" is a gross understatement in my opinion. Before we dive into this article describing TVI let me be immodest and give you some of my background on this subject.

In the late 40's when television first started up for the general public, I was living in a Chicago suburb, happily operating a kilowatt and chasing DX (W9FHZ). Television was available for viewing in local bars, usually featuring wrestling matches and boxing. (I didn't live near any bars, so I had no TVI. Occasionally, I visited one-to view TV, of course.)

During this period, my wife and I took a trip east to visit the in-laws, and when we returned two weeks later, lo and behold I found that my next-door neighbor and fishing buddy had bought a TV set! It is still amazing to me how a good friendship can quickly be ruined by a little TVI. In any event, I sold our home and moved to the Ozark mountains to get away from TVI—and that's a fact. Just ask my wife, who nearly became my ex-wife.

However, as I discovered, the Ozarks are great for DX, but it is really no place to try to make a living (at least legally). A job opened up at ARRL headquarters in West Hartford, Conn., and I applied for the position and was hired. At that time televi-



This shows what happens to a TV set when your harmonic or other signal is zero beat (or close to zero beat with the TV carrier frequency).

sion interference was something that was threatening the very existence of amateur radio. It was curable, but required some rather drastic measures on the part of amateurs and TV set owners. I was sent on the road to lecture on the causes and cures of TVI. Over a period of a few years I gave demonstrations in all of the then 48 states, covering some several hundred cities. Three huge packing cases were required to store and ship the two TV sets and transmitting gear.

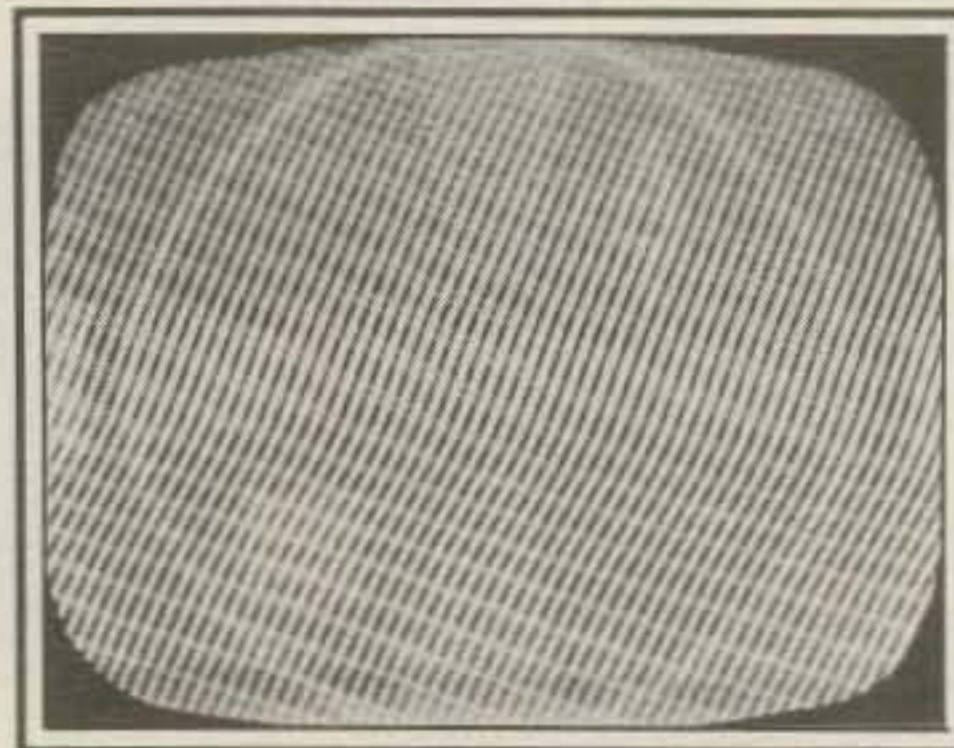
If all this seems drawn out, just bear with me for a few more sentences and I'll get to the point. Eventually I guess I helped convince enough hams and TV servicemen that TVI could be cured. In thinking back now about those years, I guess the only reason I had been picked as the emissary was that I had once been a professional magician! Here is the point: From that experience I have become somewhat of a half-baked authority on TVI and RFI. And, in the years since, I have written many articles on RFI, which leads us up to this article. Believe me, we do have a disaster in the making.

TVI in Recent Years

I know that I'll get arguments about this, but since about 1960 TVI has not really been a serious problem for amateurs. Before everyone goes for my jugu-



An example of cross-hatching interference due to the signal beat between the TV and spurious signals. With modulation the cross-hatching will vary in intensity.



Severe cross-hatching with a rather unsatisfactory TV picture, to say the least. Keep in mind that normally the average amateur would never experience such problems. However, 10 watt TV stations will make this a common problem.

lar, let me explain. Several things happened in amateur radio and the TV industry to ease the problem. We found out that we had to have completely shielded and filtered rigs in order to operate near a TV set. The TV set must be equipped with a high-pass filter to prevent fundamental overloading from the strong amateur signal. This was the start, and it did a job (except in fringe areas of TV stations that only provided weak TV signals). Better v.h.f. and u.h.f. transmitting tubes (and better antennas) were developed. Gradually,

*200 Idaho St., Silver City, NM 88061

the power output of TV stations increased until the normal TV station was transmitting many thousands of watts more than in the early days. Of course, the stronger the TV signal, the less chance for interference. Also, on the TV side, many set makers were installing high-pass filters as a precaution.

On the amateur side, we started running single sideband more and more until amplitude modulation was rare. What did this mean? In order to run s.s.b., the amplifier stages must be run in a linear fashion, Class AB1 or AB2, etc. The old-fashioned Class C operation, while more efficient, caused tremendous harmonic generation, hence more TVI. By going linear, harmonic generation didn't amount to much. In fact, many manufacturers of transceivers reduced shielding in their rigs (to our detriment). However, the FCC requirements are simply that any harmonic content from any low-band rig, 160 through 10 meters, only has to be down 40 decibels. In other words, running 1000 watts, FCC rules would okay a rig with one-tenth of a watt output in the TV channels; and take my word for it, a tenth of a watt could cause one nasty case of interference to a weak TV signal.

It was determined a long time ago that if a TV set was receiving a 1000 microvolt TV signal (incidentally, a weak, but good viewing signal), it could be interfered with by a 1 microvolt signal. In other words, visible cross-hatching could appear on the TV screen with that 1000 to 1 ratio. Before I go on, let me point out there are two basic types of TVI: the one caused by faulty design of the TV set, in that it cannot reject interference from signals that are on frequencies other than the TV channels; and the other, those signals generated by radio transmitters (called spurious signals) that fall in the TV channels and cause interference. The first, of course, is the fault of the TV set, and the other is the fault of the transmitter. There is another ground rule that should be thrown into this discussion. Most interference (over 90 percent) is caused by amateur operation in the 20 through 10 meter bands (and our new bands will also figure strongly in this area). Forty and 80 meter operation are not guilty of harmonic TVI problems except on rare occasions. V.h.f. and u.h.f. operation can cause TVI, but they are not the major problem (except 50 MHz operation and Channel 2) that exists from harmonics from 20 through 10. So our serious problems are the DX bands, plus 50 MHz operation interfering with Channel 2 (that is called adjacent channel overload, which is very serious, but it is the fault of the TV set design). We are getting into problems with cable television, so I'll touch on that, too.

Types of TVI

The problem is actually complex enough to attempt to break it down into sections. Let's consider low-band TVI

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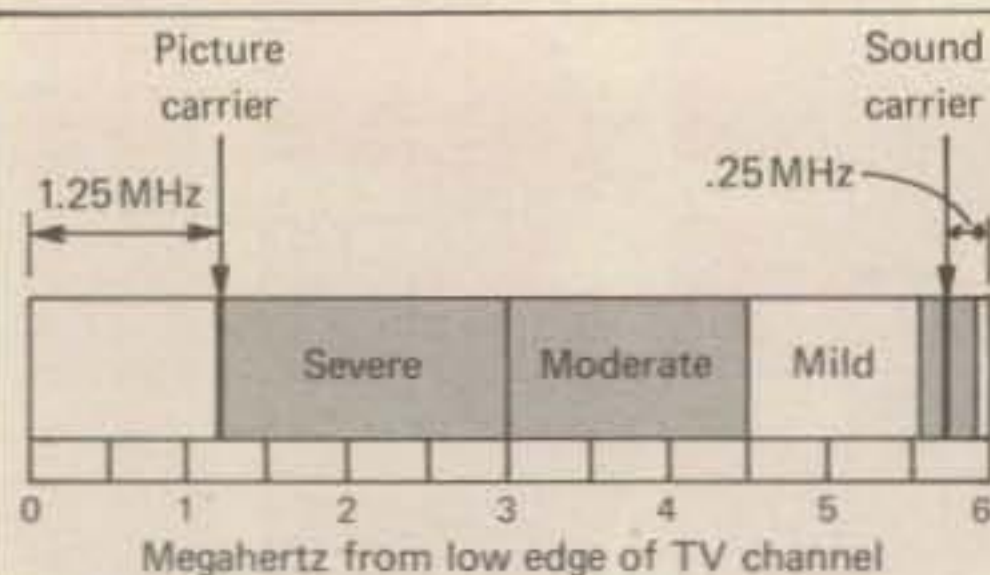


Fig. 1— This chart shows the frequencies involved in a TV channel. Any signal falling in the region close to the picture carrier will cause cross-hatching on the TV screen. The ratio of TV signal to spurious signal is important, but in dealing with 10 watt TV stations, most any spurious signal will create problems (see text). (Chart reprinted from ARRL Radio Amateur's Handbook, courtesy of the ARRL.)

Channels 2 through 13 first. Amateur harmonics are most likely to cause problems on Channels 2 through 6, and occasionally on Channels 7 through 13, although that is infrequent.

A TV channel is 6 MHz wide. The picture carrier itself is transmitted 1.25 MHz up from the bottom edge, and the sound carrier is transmitted 0.75 MHz down from the top edge. If we start at the bottom, Channel 2, we start at the top of the 6 meter band—54 MHz. Channel 2 would be from 54 to 60 MHz, and its picture carrier would be at 55.25 MHz. I won't bore you with mathematics, but let's take a quick look at what happens with harmonics. Any signal that heterodynes, or "beats," against the TV carrier signal can cause visible cross-hatching across the TV screen. How close the two signals are to each other is an important factor in determining the degree of interference. (See some of the accompanying photos.) However, any signal occurring from the edge of the TV channel to 3 MHz up from the edge can cause severe TVI. As you go up higher in the channel, of course avoiding the sound channel, the interference decreases. In fact, a strong harmonic can exist in the channel and cause little if any interference, but the signal placement is important.

Assuming a fourth harmonic from 14,050, we would have a harmonic in Channel 2 at 56.2 MHz. Remember our ratio of 1000 to 1. If the harmonic is, for example, 10 microvolts strong, and that isn't much of a harmonic, it would cause visible interference to a 10,000 uV TV signal, and that is a strong TV signal. As you can see, a 28 MHz second harmonic could cause havoc with a TV set tuned to Channel 2. That's why the CBers at 27 MHz have so many problems, even when they do run a legal 5 watts input! Fig. 1 is a drawing of a TV channel showing where the amateur harmonics could cause severe or moderate TVI.

Another type of amateur-caused TVI is the generation of v.h.f. parasitics from a low-band rig. The rig may be clean as far

as harmonics are concerned, but it can, and many do, generate v.h.f. parasitic signals. If this parasitic falls in the proper relationship, severe TVI results.

Still another form of amateur TVI is the generation of harmonics via a non-linear rectifier. Let's say your neighbor has a TV antenna fed with twin-lead, and it had been up for years. The wires are loose and dirty, etc. When such a setup is operated near a strong r.f. field such as an amateur rig, the fundamental r.f. signal is picked up by the TV system. Normally, if the TV set had a high-pass filter installed, the amateur fundamental would be knocked down. However, when a strong r.f. field hits the loose antenna connections, tiny arcs of r.f. exist. These act as diode-type, non-linear rectifiers which in turn generate harmonics. These harmonics are fed into the TV set, going through the high-pass filter and causing TVI.

A good friend of mine, Mort Waters, had a bad TVI problem develop when operating 80 meters. To be honest, I had never seen a severe case of TVI from 80 meter operation. Usually the harmonics are just too high in frequency to have enough strength to cause TVI. But Mort had a bad case of TVI.

To make a long story short, after much, much testing, it turned out that Mort had an 80 meter dipole using a balun at the feed point. The balun had gone bad, had broken leads in it, and was acting as a strong non-linear rectifier, of course radiating harmonics to beat the band. So even with a clean rig, non-linear rectifier harmonic generation is something we must guard against—particularly in weak signal areas.

We have three types of interference that can be the fault of the amateur and are his obligation to clean up. They are harmonics or spurious signals, parasitics (also spurious signals), and the generation of signals via non-linear rectifiers, if such signals are generated at and radiated from an amateur's own location. Let me make that clear: If such signals are generated because of loose connections, bad wiring, etc., in our station or home, then it is our obligation to clean them up. If they are generated from our fundamental in the neighbor's wiring, then it is his problem, but of course there is a public relations problem involved there. More on that in a moment. That about covers "our fault."

The TV Set, Cable Industry, and Who Knows Who Else's Responsibility

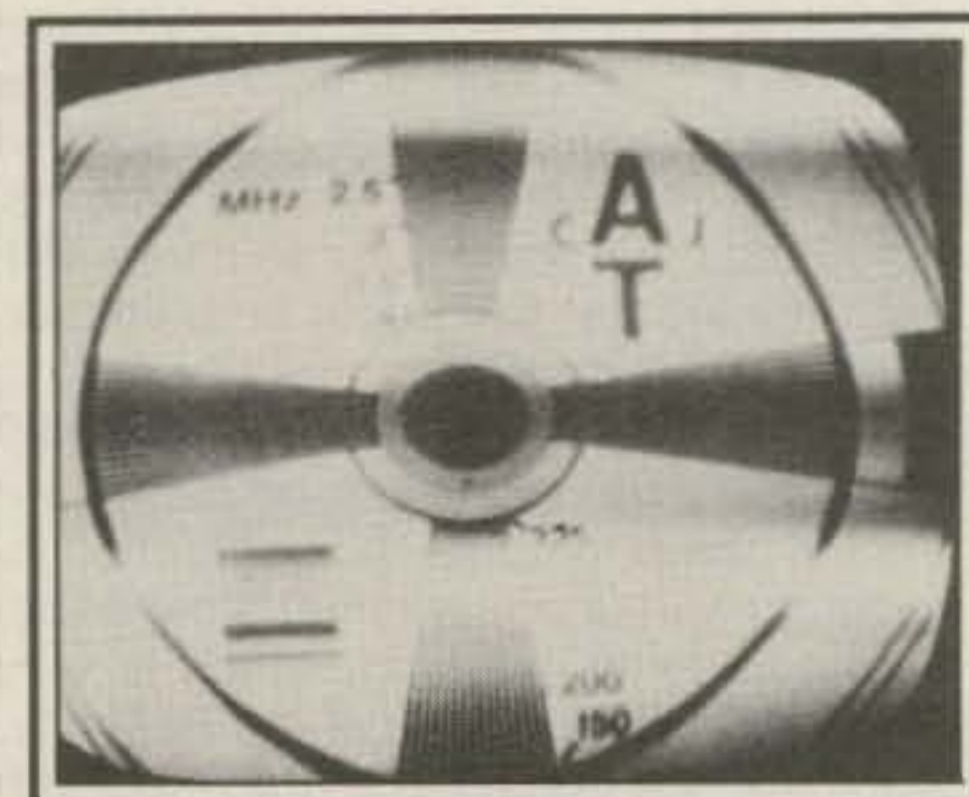
Of course, the end culprit is the TV set itself. Without it there would be no TVI. But let's face facts: It isn't going to go away. There are three important problems with the set itself. First, in order to avoid interference, it must receive a strong signal. How strong? For myself, I would be happy with anything over

10,000 microvolts. In most medium to large cities, such a signal is not hard to come by. In fact, if you can convince your neighbors to put up good outdoor antennas (they will receive better color), by all means do so. The best method of convincing the neighbors is to have a good set and TVI-clean installation to show in your own home. If you have a better picture than his, it is like your ham buddy getting an S7 when you are 40 over. He is going to do something about it!

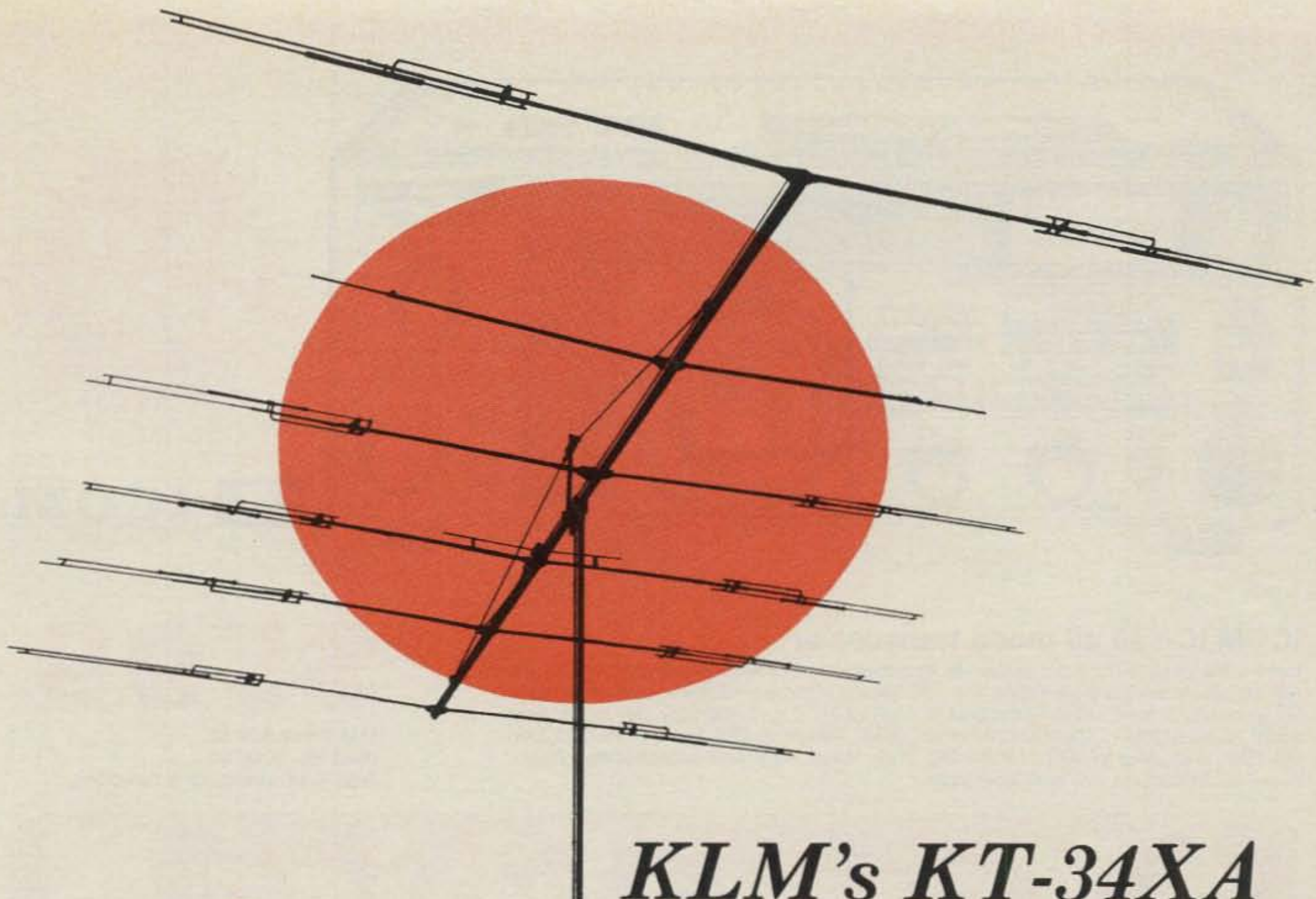
Many manufacturers (but not all) have built-in high-pass filters in their TV sets and many of those built in are minimal in performance. A high-pass filter is simply an electrical device that is installed on the antenna input of the TV set and will attenuate (stop) any signals below its cut-off frequency—usually around 40 MHz. In other words, it will stop your strong fundamental signal from getting into the set and smashing up the TV signal. Without the filter, your fundamental signal rides down the TV antenna lead, hits the first stage of the r.f. tuner, and drives it completely berserk. Instead of operating in a linear mode as it should, the r.f. (and following stages) generates strong harmonics and causes interference—usually on all channels. Keep in mind that while these harmonics are generated because of your fundamental signal, it is not your fault, but rather is the fault of the TV set. Usually, if a set has TVI on all channels, it means the cause is fundamental overloading and a high-pass filter is required (not your fault). So you have the three problems with the set: first, the need for a strong TV signal; second, a good high-pass filter; and third, the problem of non-linear rectification, which fortunately is rather rare.

Cable TV—Not a Salvation

When cable TV came along, we in amateur radio felt that we really had it made. Here was a system in which the TV signal was fed via a completely r.f.-tight system (coax, etc.) to the user's set. And for a while, it did help. However, the cable



This is the kind of interference one could expect with a harmonic that attenuated 40 dB—1000 times down! It is easy to realize that the TV set needs plenty of signal to work with in order to reduce this and the other types of problems discussed.

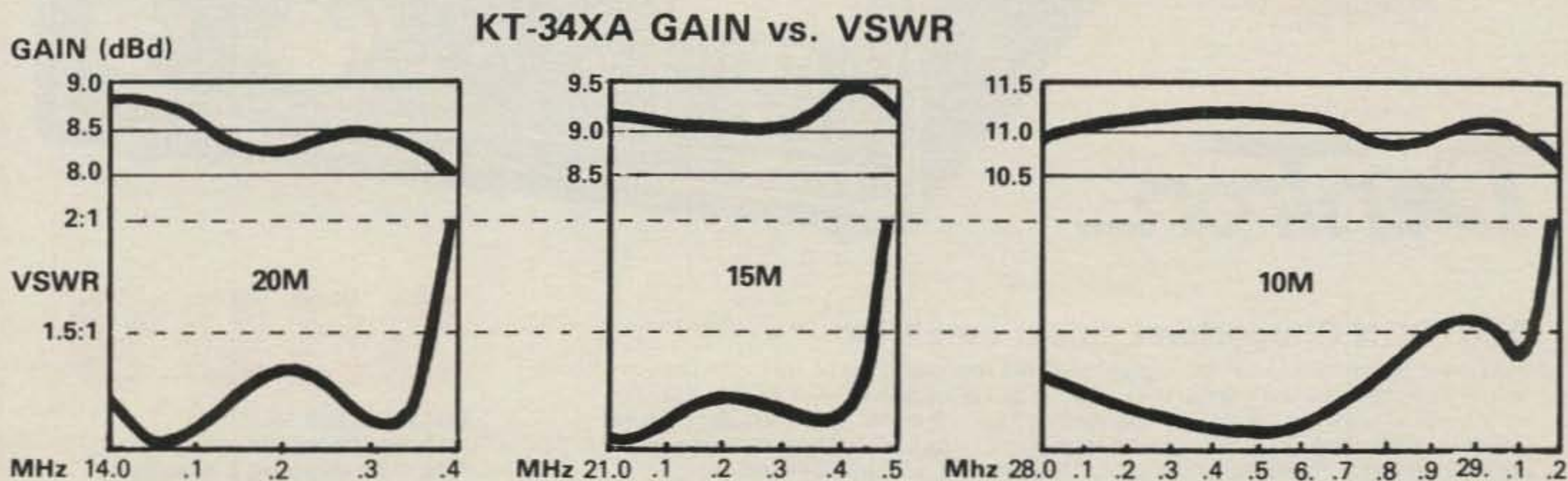


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Note: Customer provides all cables that run from downconverter outside to receiver inside (approx. cost \$80). Customer can use conventional TV set tuned to channel 3 or 4. With optional modulator.

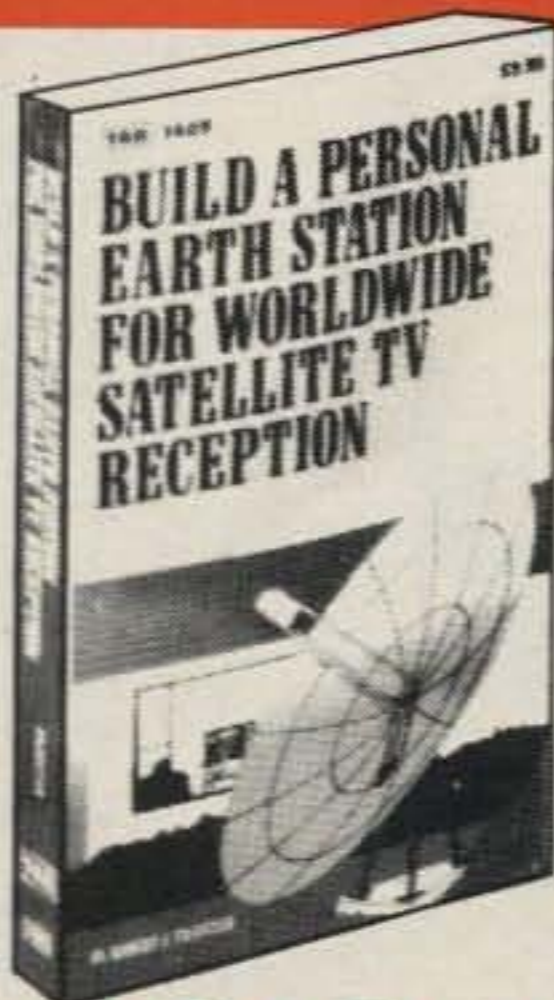


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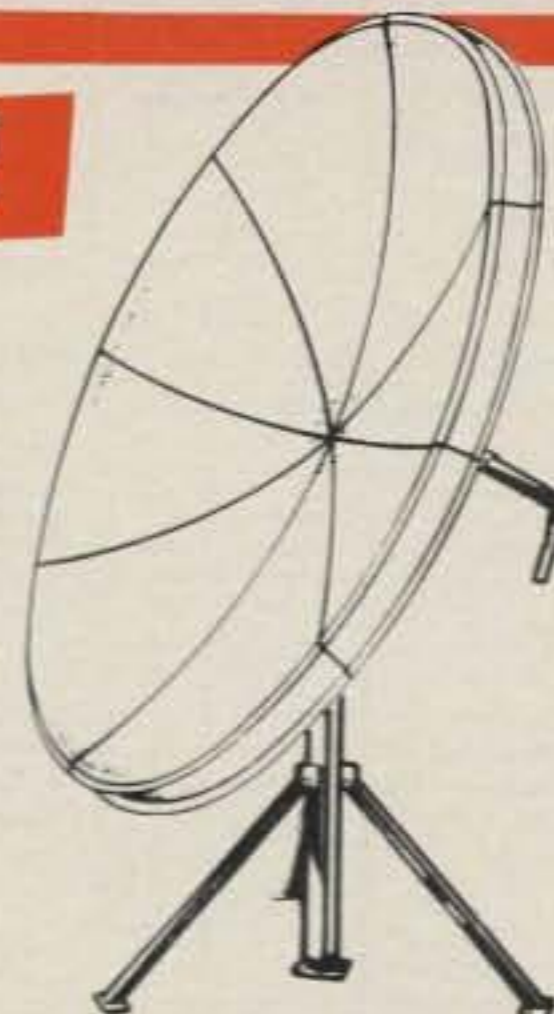


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CIRCLE 147 ON READER SERVICE CARD

owners are not inclined to up-date their systems as far as the feeds (coaxial lines to customers) are concerned. Coaxial lines and fittings disintegrate with the weather and are no longer r.f. tight. I know this only too well, because I am on a cable system and it is in very bad shape.

In addition, cable owners have been permitted by the FCC to add channels almost anywhere they want because cable is theoretically an r.f.-tight system. Some cable systems have added channels in our 2 meter band! This has caused havoc in many parts of the country because the systems are not well shielded. When you transmit on the channel frequency, you get into the cable system. Now you don't interfere with just one or two people, but rather scores of them. The answer to this problem is education of the cable owners in getting them to move the channel (this has been accomplished in several areas already). Some have shown responsibility and have moved the channels to a less-used part of the spectrum. In my area they were real smart. They moved one channel that was having problems—guess where. They moved right onto the local police frequency! So like I said, education is the problem here as it is with the general public concerning any form of TVI. And above all don't lose your cool! I can tell you stories of hams being shot at, beat up, homes burned, and on and on. I've been there. Handling TVI requires lots of tact and diplomacy. In fact, you are

better off having a third (disinterested?) party do the negotiating.

Last But Not Least—Your Rig

The answer to your station being clean hasn't changed in years. It consists of a tightly shielded rig and a low-pass filter. A low-pass filter is simply the opposite of a high-pass filter. It is designed to pass any frequencies lower than its cut-off frequency and to attenuate any frequencies higher than cut-off, which is usually just above 10 meters. A good low-pass filter will provide about 70 dB of attenuation. How much is 70 dB? Well, with 1000 watts output, the harmonics could be no stronger than 0.0001 watt! That shouldn't cause any TVI. However, the rig must be tightly shielded and all leads filtered in order to achieve that much attenuation. Any nearby non-linear rectifiers will generate stronger harmonics than those coming from your rig. On 50 MHz there are filters for adjacent channel interference if Channel 2 is your problem. I won't guarantee anything on 6 meters, but it is worth a try.

In recent years I have seen very few newer commercial rigs that are adequately filtered and shielded and that would handle fringe area TVI. Sure, they put a shielded box around the final amplifier (sometimes), but this is worth practically nothing for weak-signal TVI. For a low-pass filter to work, it needs a tightly shielded rig, or the harmonics simply will

flow around the filter to the antenna. Incidentally, although you may see it in other publications, the low-pass filter should be the last thing in the coax line to the antenna or just before a Transmatch, not right at the rig. Most of us use s.w.r. indicators, and nearly all of them contain diodes that can generate harmonics, so the filter should be in a position to stop them. Put the rig first, then the s.w.r. bridge, then the filter. Also, don't depend on Transmatches to help as far as TVI harmonics are concerned; they just won't cut the mustard on that score.

10 Watt TV Stations

Exactly what can you expect with a 10 watt station in your area? My guess is that most of the stations will be seeking channel space on Channels 2 through 6. Any of these channels pose a serious problem for us. In the early days of TVI we had problems with ignition interference from passing automobiles. Refrigerator butter keepers caused interference. Fish-tank thermostats were another problem. Oscillating hearing aids knocked out a picture. Anyone trying to receive TV near a hospital was in serious trouble from the various types of equipment used there. This was true of locations near some types of industrial plants or welding equipment. Neon lights caused bad problems. Always remember this: If there is any type of TVI occurring near you, the amateur, you are going to be blamed!

Why 10 watt stations when you probably have many channels available? Silver City, where I live, is a good example. Population about 12,000 with cable TV. We also have several translator stations. There are relatively low-powered stations transmitting the same programs as their parent station, as in our case Albuquerque (270 miles away) and El Paso (150 miles away). So why do we need another station when we already have about 20 or so available? Simple. And don't forget that it holds true for you. None of the stations we get carry local programming. I'll be honest. Frankly, I would enjoy watching our local football or basketball team. Lots of people would like to watch the rodeos, and we have many of them here. In other words, fellow amateurs, we have problems coming. A local station can make bucks with local programming. That's why there are some 6000-plus applications on file! It appears that we are going to have to toughen up our transmitter shielding and so on. I hope some of the Japanese and American manufacturers are reading this article!

What Disaster?

Like I said, Ted, a 10 watt TV station on Channel 2 in Silver City, New Mexico! I would like you to be my guest and help me clean up the problem when it occurs. I frankly think you and I will end up at the local bar watching the local football game and getting smashed!

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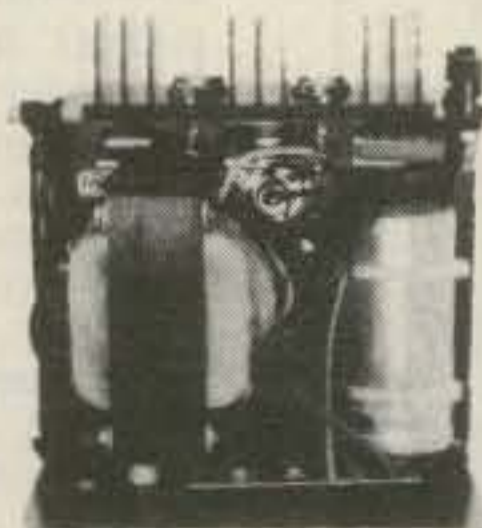
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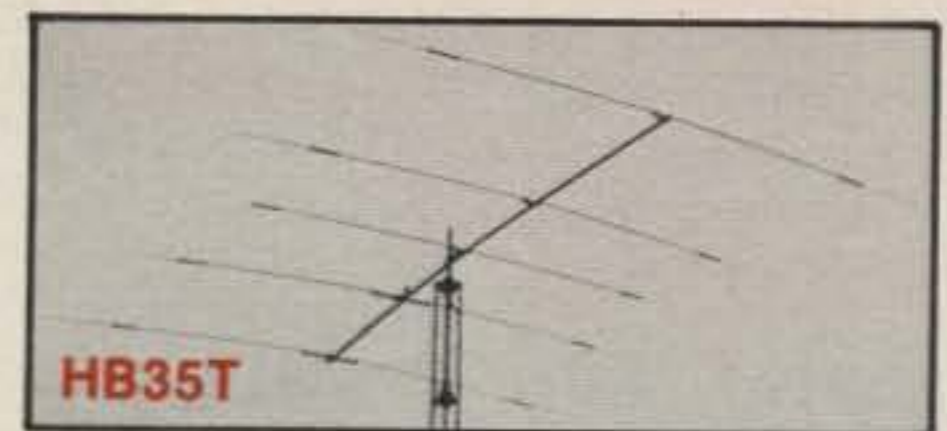
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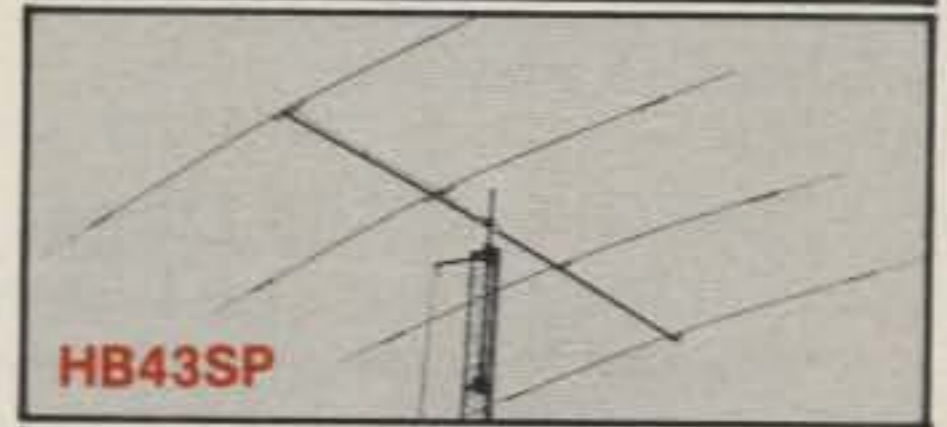
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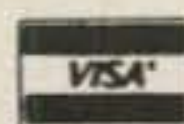
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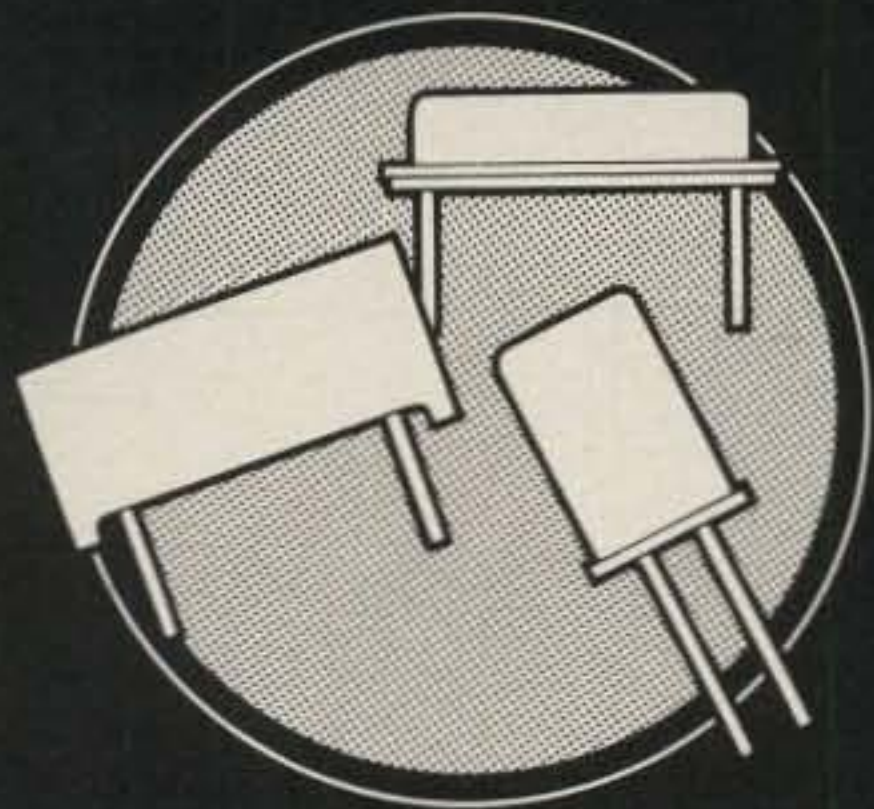
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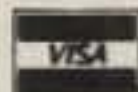
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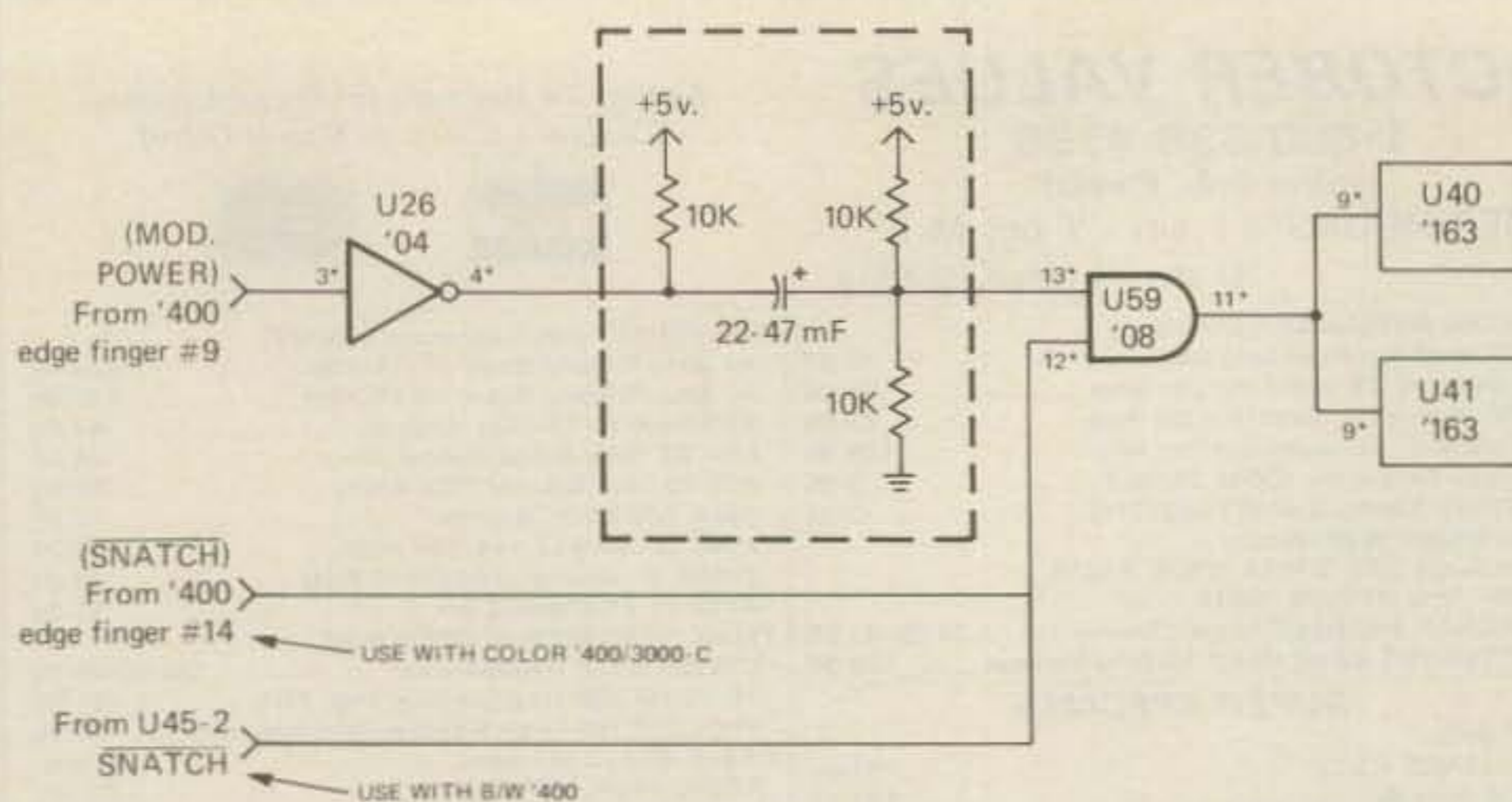


Fig. 1—Modification to '400 for transmitting the first SSTV frame in sync. This modification will reset the SSTV line counters U40 and U41 so that a vertical sync pulse is generated when switching to TRANSMIT MEMORY. Also, memory addressing is begun at the top of the SSTV picture. How to wire it: (1) The IC's indicated are on the '400 circuit board; (2) All pins marked with an asterisk (*) are to be lifted out and the connections shown are wired to these pins; (3) The parts in the dashed-line area are to be added as shown; (4) The 10K resistors can be 1/4 watt; (5) The 5v. and ground buss' at top and bottom of the IC sockets of the '400 board can be used to connect the 10K resistors.

shipped as educational matter?) Our junk box may be depleted, but the parts are being put to good use. Remember our call several years ago in *Worldradio* for SSTV gear to equip Norfolk and Pitcairn? Amateurs like yourselves responded in a personalized and personally gratifying manner, providing first-time visual capabilities for those areas. Such "projects" surely carry even more gratification than home-brewing a station accessory, etc. Visualize the isolated and sparsely

populated areas of the world which could benefit from descriptions of progressive farming, contour irrigation, etc., while considering the rewards if each of us helped a remote country/amateur acquire a link with modern technology. The clouds of world famine are gathering; the time is nigh. If we can serve this need singularly, fine. If it calls for establishment of an international society, so be it. Bear in mind that this is not a call for every foreign amateur to cry "help," but if there is

a need for assistance, we're confident that Slow Scanners can again provide such help. Meanwhile, SSTV developments will continue, and we'll all strive for its continued success . . . ISSS or not. Time will tell.

Apples and SSTV

A couple of months ago we briefly mentioned a new software/hardware package for Slow Scan operations with the Apple II computer, and promised more details later. This "Photocaster Package," available from Commsoft, 665 Maybell Avenue, Palo Alto, California 94306, is now going full swing, and its SSTV interest is growing quite rapidly. Essentially, Photocaster consists of a single pc board which plugs into the Apple II motherboard and an associated two-disc software package boasting some unique features. The system will run on an Apple II with 48K of memory and one disc drive. Black-and-white pictures are processed in the standard 128 by 128 pixels and 16 shades of gray, while subroutines remove noise, change contrast levels, add title/graphics, etc. Both transmit and receive capabilities are provided (similar to Robot 400 functions), and pictures can be stored on disc or directed to a popular Epson MX80 printer as desired.

Color SSTV operations are also included in the Photocaster package, but a certain amount of fine detail is sacrificed. Primary colors (blue, green, red/orange, and violet) are reproduced with a resolution of 140 by 192 pixels, while additional colors (yellow and cyan) and various in-

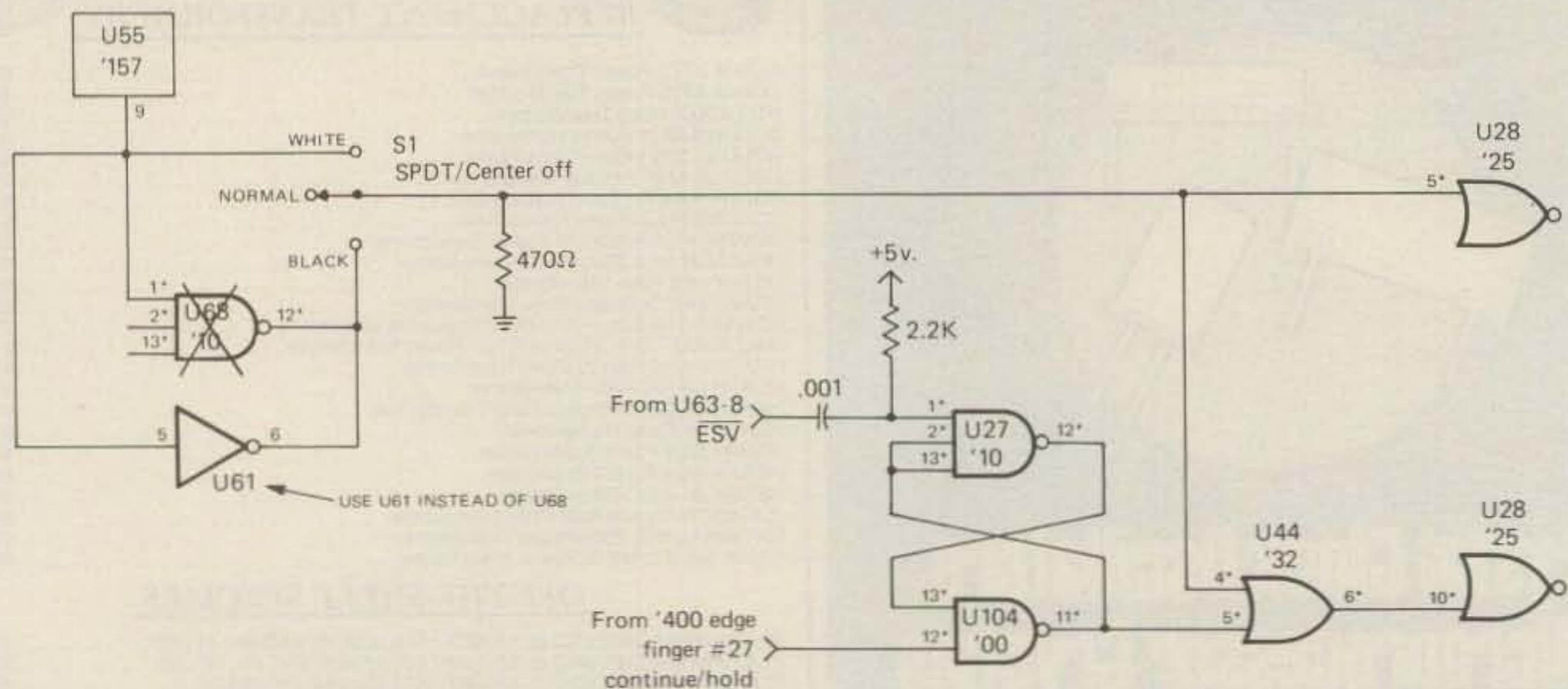


Fig. 2—Modification to '400/3000-C for superimposing camera/keyboard or received SSTV graphics. This mod will allow keyboard, computer, or camera graphics to be snatched and superimposed over existing pictures in memory. Also, incoming SSTV graphics may be overlaid on existing pictures. Lift out all IC pins marked with an asterisk (*). S1 is an SPDT switch with a CENTER OFF POSITION and can be mounted where convenient for operation. Wire the circuit per schematic. How to operate it: (1) S1 is set to the WHITE position if the graphics are white on a black background. S1 is set to the BLACK position if the graphics are black on a white background. The center position of S1 provides for normal operation with no overlay. (2) If a fast-scan graphics source is being used (i.e., computer, camera, etc.) set S1 to the proper position and snatch using the camera mode. (3) If a slow-scan graphics source is being used, set S1 to the proper position and put the CONTINUE/HOLD switch in CONTINUE. The slow scan graphics will begin scanning when a vertical sync pulse is received. After the first scan is received, put the CONTINUE/HOLD switch to HOLD. (Note: The circuitry of U27, U104, and U44 only allows SSTV to be scanned when a vertical sync pulse is received and the CONTINUE/HOLD switch is in CONTINUE.)

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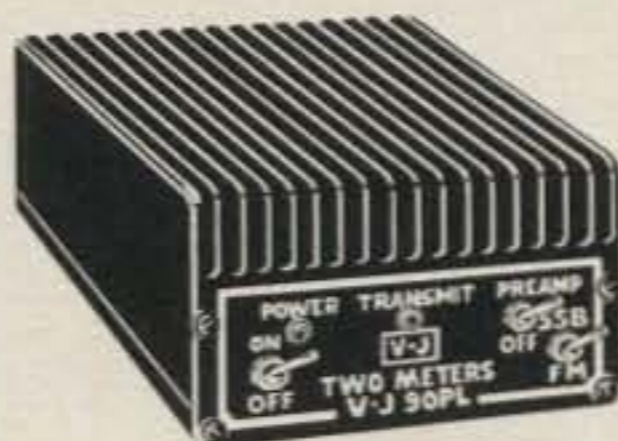
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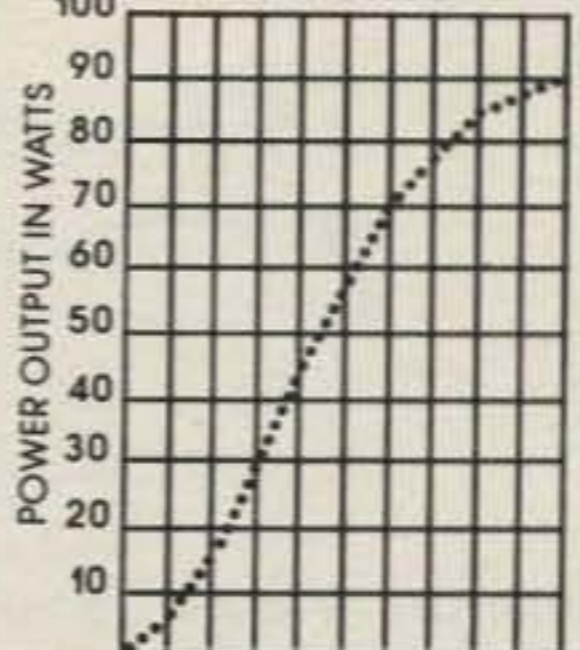
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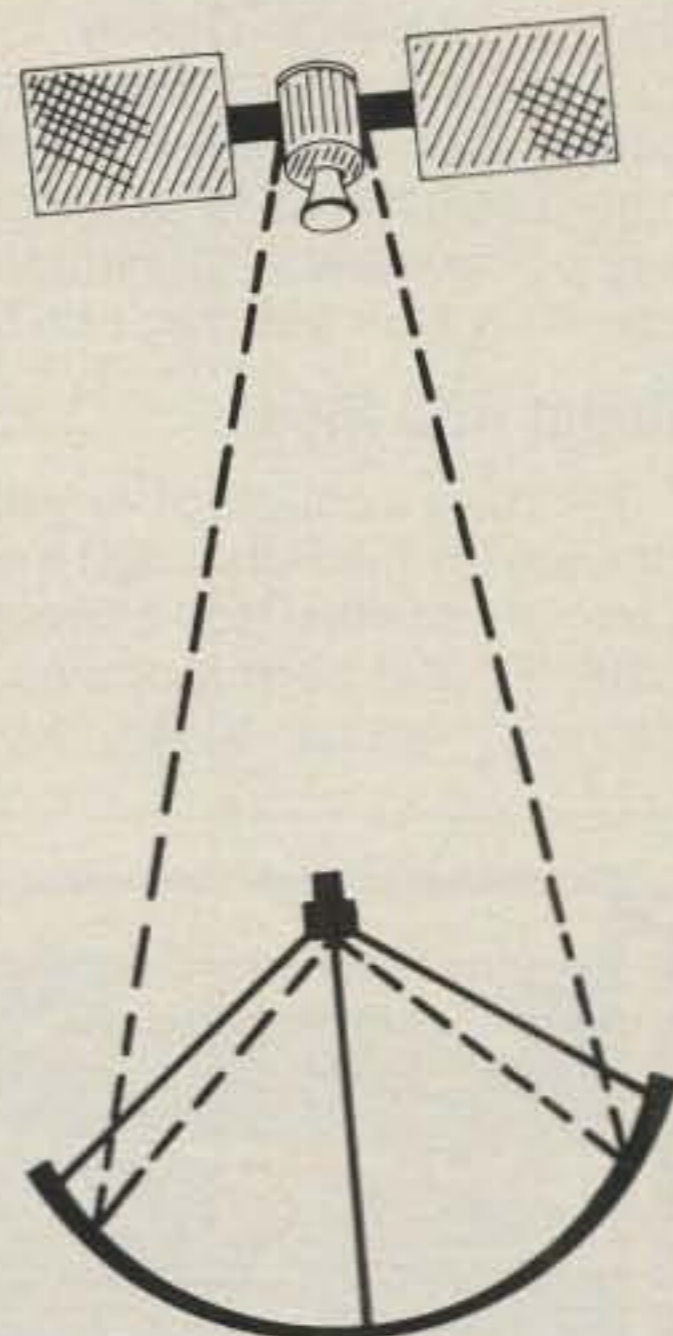
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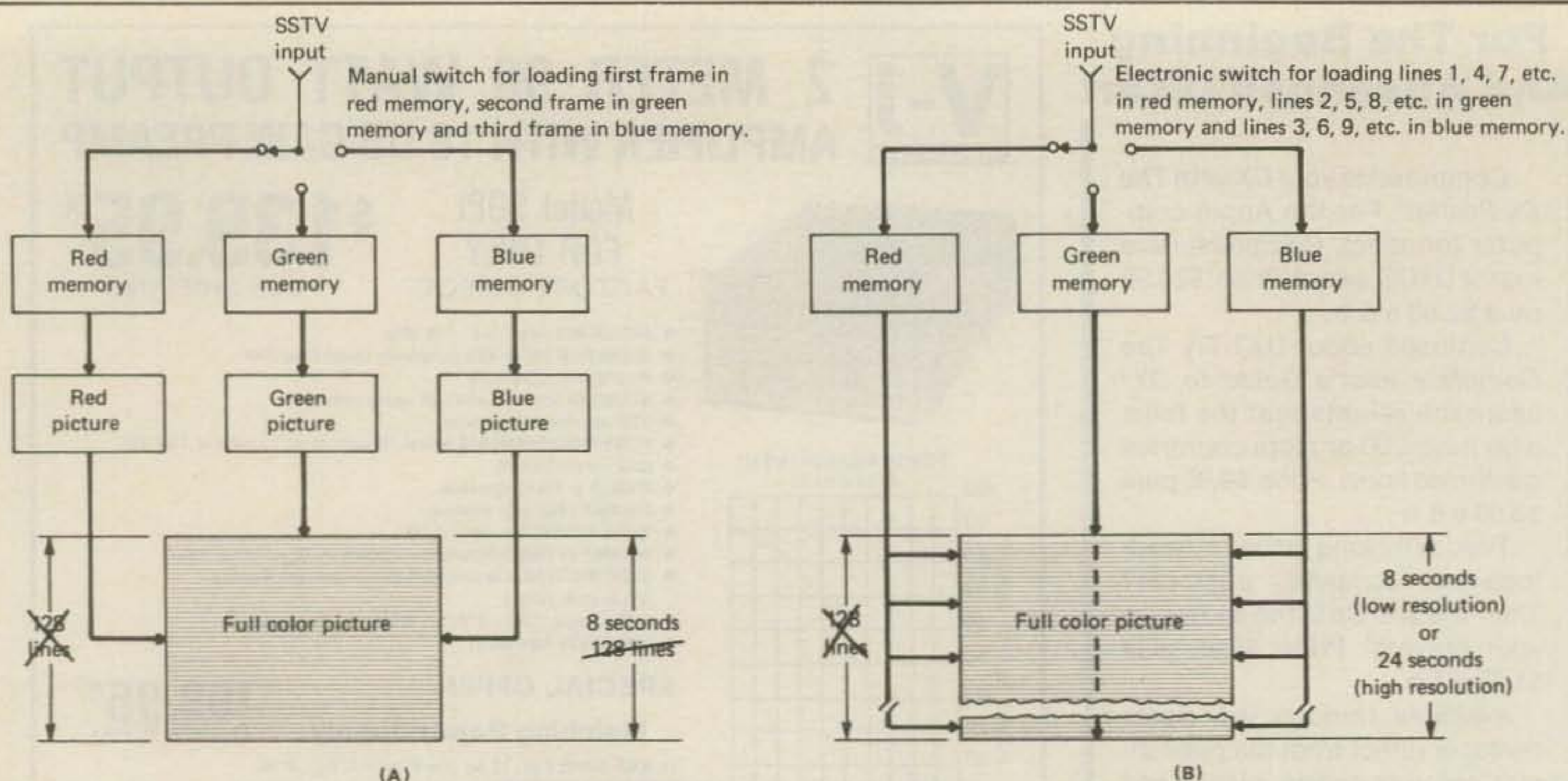


Fig. 3— Comparison of frame sequential (A) and line sequential (B), or single frame, color SSTV systems. Setup B is compatible with black-and-white units in 8 seconds, or it may be received in 24-second format provided 256 line mod is used and width control is set at maximum. Three horizontal pictures will then be displayed across screen, unless the "WA7MOV" mod is added (see text).

tensity levels are created by dot dithering. The final results are 8 colors and 16 levels of intensity. Two color formats are available with Photocaster: the popular R, G, B sequential frame method used daily on 20 meters, and an 8-second color method which can be used between two Apple II setups.

The complete Photocaster system is quite impressive. Quality for quality, it isn't quite equal to a commercial scan converter, but if one owns an Apple II (or if high-resolution SSTV color isn't an absolute prerequisite), the Photocaster package is an item that can't be overlooked.

Robot 400 Mods

We have a couple of very useful modifications for the Robot 400 in this month's column thanks to Howard McAfee, KD6HF, and Sam Mormino, WA7WOD. As you'll recall, these two gentlemen

manufacture the "super mod" color SSTV systems which can be installed in a Robot 400. Howard may not always be on the air, but he's continually devising new goodies and ideas for Slow Scan TV. One of his more recent projects, for example, has been a 24-second line-sequential full-color modification for use with triple memory (color) equipped Robot 400's. This very simple mod loads (or unloads) the three memories on a line-by-line basis rather than on a frame-by-frame basis. The mod can also be added to single memory (black and white) Robots for compatible viewing of 25-second color pictures in black-and-white form. Alternately, one can use the now-popular 256-line mod to view 3 horizontal pictures during the previously mentioned 25-second transmissions (a nice advantage for checking color balance, also).

Line-sequential color SSTV is looking

quite interesting at this time. It holds promise of close compatibility with black-and-white systems and should blend smoothly with computer-based converters (see fig. 3). In fact, Dr. Suding, W0LMD, has been transmitting both 8-second and 25-second line-sequential color from his computer, and we suspect Clay, K6AEP, may rig similar software for the TRS-80C color system. The close compatibility of this system for both analog and digital converters is quite encouraging. As one may logically surmise, 8-second line-sequential color has less resolution than 25-second line-sequential color. More details later.

A Closing Thought

That wraps up the happenings in this month's World of Video, gang, so we'll wish you a merry time and watch for your signals on 14,230 kHz. If you're an on-looker or newcomer to SSTV, I would like to encourage you not to become distracted or disillusioned by the experimental/developmental areas within Slow Scan (such as computer interfacing, color SSTV, etc.). Rest assured that the vast majority of active Slow Scanners are still involved in "good old video operations," and we all remember starting "from scratch" not too many years ago. Not only is there a substantial amount of relaxing enjoyment awaiting every amateur video enthusiast, but there is also equipment and modifications readily available to the increasing number of operators barely able to find a few minutes a day merely to get on the air and enjoy the exciting world of amateur radio. What else can we say except come on in; the viewing's great!

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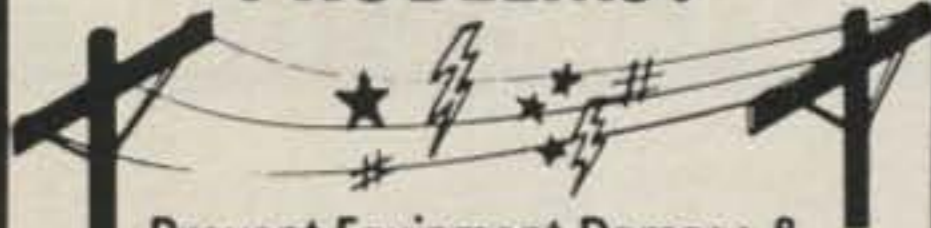
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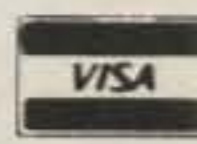
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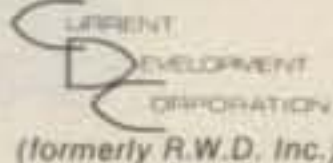
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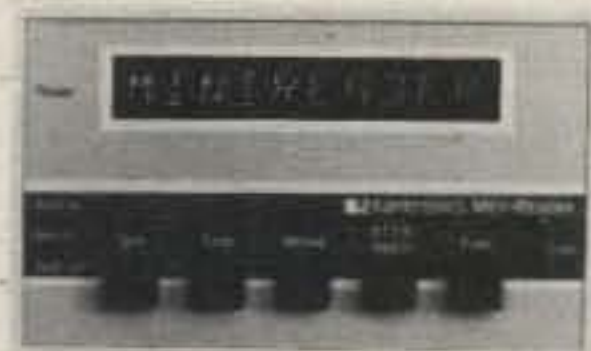
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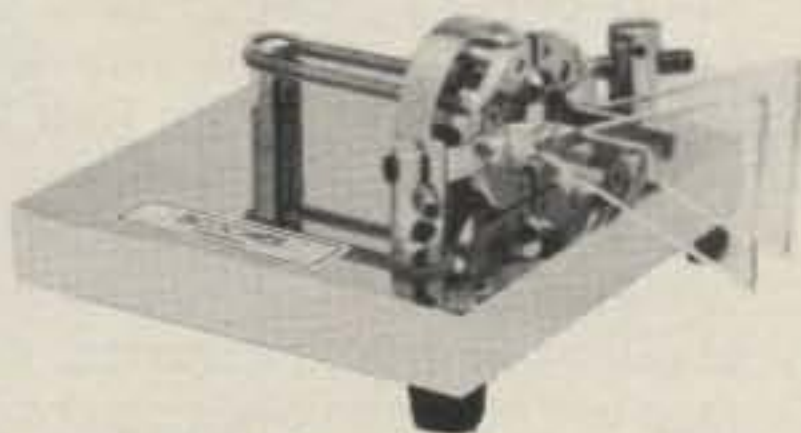
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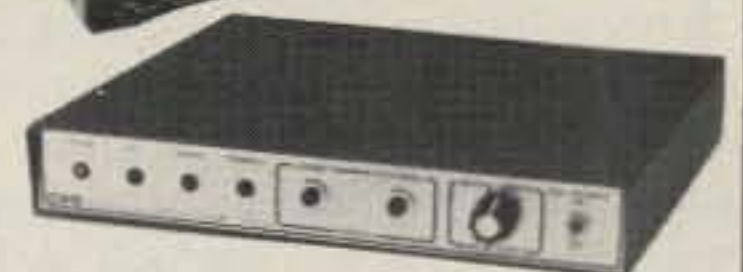


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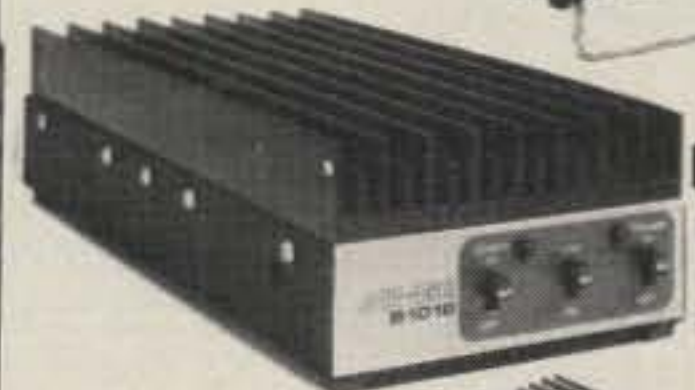


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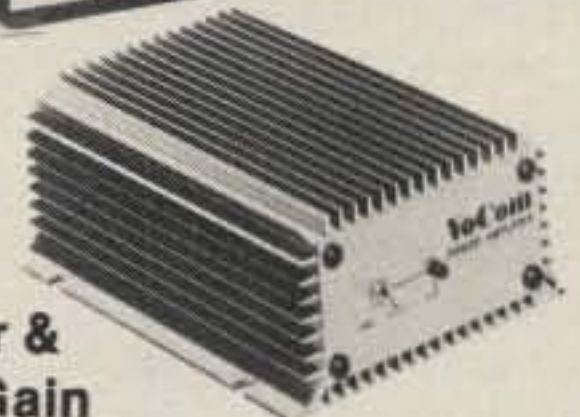
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Antenna Accessories for the Hamshack: Part I

It takes a lot more than just the antenna and transmitter to radiate a respectable signal; many components and accessories contribute to overall "signal success." In this series of articles, our columnist W8FX takes a look at them. Read on for the facts on checking out your station's r.f. performance.

There is a certain mystique about antennas that makes them fun to experiment with; indeed, successful antenna performance is both an art and a science. But there is more involved in such success than just the antenna. Certain accessory equipment is useful (and often necessary) for experimenting and solving antenna problems, but just how many antenna gadgets are needed to put out a good signal, and how does one use them?

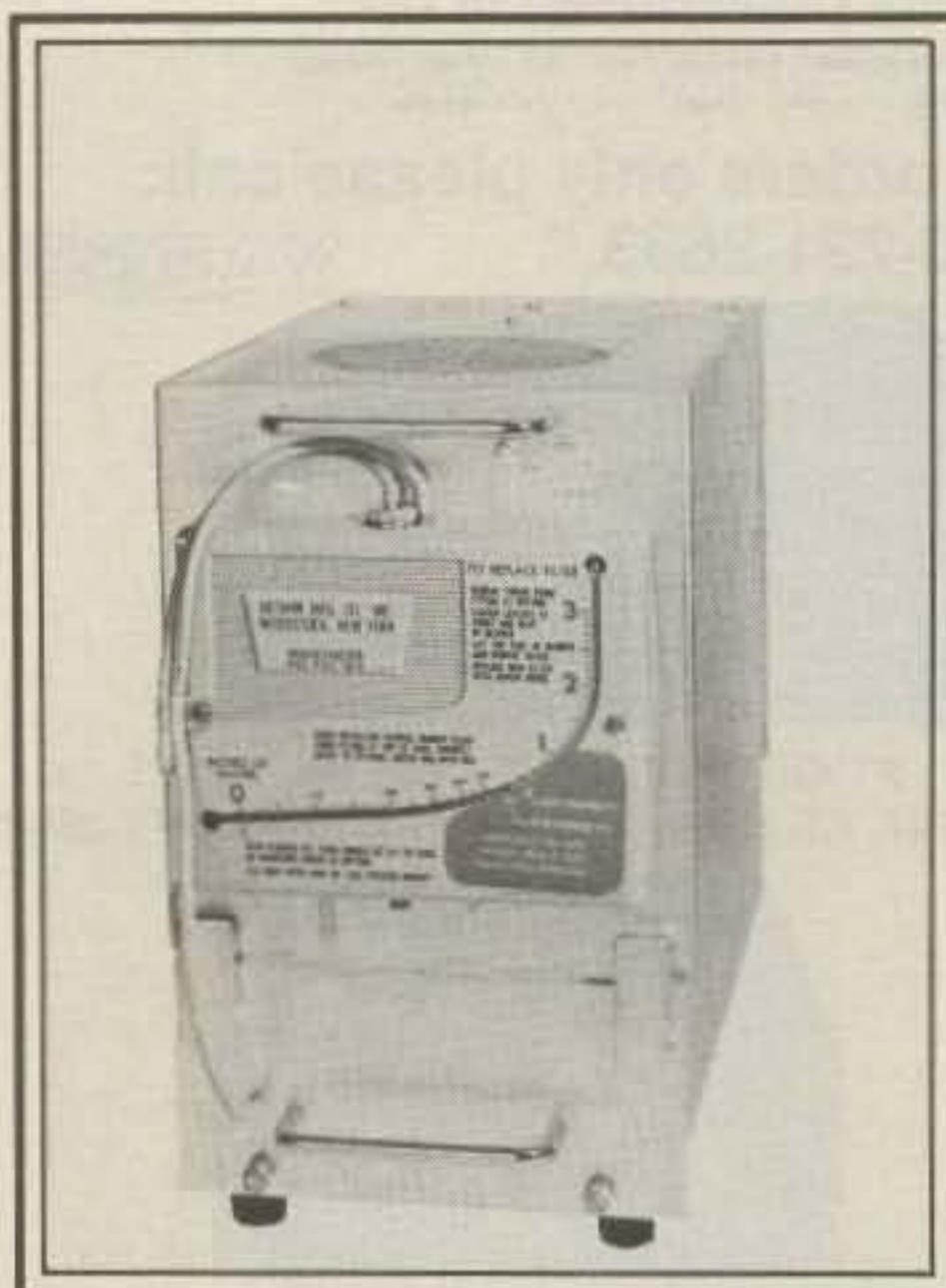
In this series we will examine r.f. antenna accessories and specialized test equipment. First to be covered will be *in-line* devices. These include dummy loads, wattmeters and r.f. ammeters, s.w.r. bridges, r.f. switching and lightning protective devices, baluns, r.f. transformers and transmatches, and r.f.i. filters.

Next to be covered will be the *peripheral* devices—those not directly in the path of r.f. from transmitter to antenna. These include field strength meters, antenna noise bridges, and grid-dip meters or oscillators. Finally, we will look at other types of r.f. test equipment, and have some words to say about maintenance and test equipment costs.

All this will take several months, so we'll begin with a look at the first category of accessories mentioned above, starting with the dummy load.

The Dummy Load

Let's talk about just what a dummy load is. It is simply a device that substitutes for an actual antenna. It has the power-handling capability to absorb the full output of the transmitter or transceiver under test. A properly constructed dummy load has the same resistance or impedance as the antenna it temporarily replaces, so the transmitter can be tuned up and adjustments can be made as



Very heavy-duty Rotron air-cooled dummy load is offered by Wawasee Electronics. The 50-ohm load operates over a range of 1.6 to 240 MHz, for an s.w.r. of 1.2:1. Although only rated at 200 watts RMS without blower in operation, the unit with blower running is rated at 4000 watts continuous p.e.p., or 2000 watts RMS. (Photo courtesy Wawasee Electronics)

though on the air. The dummy load, of course, should not radiate a signal, but instead should "simulate" the effect of the antenna.

The dummy load is so important that it's fair to say that you shouldn't put a signal on the air unless you possess one. When you first acquire your equipment, you should load it into a dummy load to familiarize yourself with your rig's operation, and to establish a sort of standard of performance for your gear, making note of transmitter dial settings and meter readings for future reference. Bear in mind that when servicing your gear you will need to use a dummy load for two reasons: first, so as not to unnecessarily clog the airwaves with test transmissions; and second, because practically all service procedures require that the equipment be connected to a dummy load for proper operation under test.

What constitutes a good dummy load? First and foremost, it should present a steady, purely resistive load to the transmitter, usually 50 or 75 ohms, at all power levels over the entire frequency range of the transmitter with which it will be used.

It should be shielded to prevent unnecessary radiation and possibly TVI. It should also be capable of handling the full power output of your equipment without overheating, and it should be connected to your rig by a short length of coaxial cable—preferably through a coax switch so that it can be switched in and out for tune-up and testing.

There are several types of commercial dummy loads that you can buy, or you can make one yourself. Most commercial units consist of either a heavy-duty air-cooled resistor capable of absorbing your transmitter's output, or a hefty resistor encased in a "paint can" full of non-conducting, high-temperature transformer oil (for heat dissipation). Some dummy loads also have a built-in d.c. sampling circuit so that you can get an indication of relative power output by connecting a d.c. voltmeter to it. A number of manufacturers offer r.f. power meters that terminate in a dummy load; they're handy instruments indeed. Heath, Bird, MFJ, Dentron, Barker & Williamson, and others all make a variety of highly useful and worthwhile units which you may want to consider purchasing. You'll find that the dummy load will not soon become obsolete, provided you acquire one that has adequate power-handling capacity for future station growth.

Let's stress again that the dummy load should present something close to a 50- or 70-ohm impedance and that it should not exhibit reactance—i.e., it should be a "pure" resistance. True, there must be some kind of conductor that connects the transmission line to the power resistor. At the lower h.f. frequencies, lead length isn't terribly important. But as we go to higher h.f. frequencies and to the v.h.f./u.h.f. ranges, the leads tend to act like inductors and capacitors. As a result, a dummy load that takes on the characteristics of a pure resistance at 80 meters may appear like a resistor in series with an inductor or capacitor on 6 or 2 meters; such effects become more marked as frequency is increased. Obviously, great care must be taken in the construction of homebrew units for v.h.f. and u.h.f. use.

In view of these considerations, what about using the common household lamp as a "cheap and dirty" dummy load? The fact is that the ordinary light bulb isn't a bad absorber of r.f. energy. There is no reason why you can't use the bulbs as "passable" dummy loads, at least at moderate power levels up to and includ-

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The dummy load is a virtually indispensable piece of r.f. test equipment in the shack; it allows you to make precise equipment adjustments over a prolonged period without generating unnecessary interference. Popular h.f./v.h.f. high-power unit by K4RLJ is shown here. Device is a sealed unit based on a non-corrosive chemical load. Previously marketed by SST, the small load is now distributed by Van Gorden Engineering.

ing 10 meters. Of course, the common light bulb has so many disadvantages as a dummy load that the "pro" wouldn't dream of pumping the output of his expensive world-class transceiver into it. But for casual check-out of a small QRP rig, it's hard to beat for convenience, simplicity, and low cost.

Don't try using the bulbs at high power levels or at v.h.f. They won't give a good account of themselves and may cause your equipment to be damaged. Recognize that as they heat up, they change impedance wildly. They also radiate excessively, particularly at the higher frequencies, and they can even change impedance while in use, making the load seen by your rig highly erratic. However, they do have the advantage that you can "guesstimate" your transmitter's output by visually comparing the bulb's brilliance with that of an identical one connected to the a.c. line. If you want to experiment with a light-bulb load, go ahead. Don't let this discussion put you down. For starters, try a bulb rated at about 70 to 85% of your transmitter's rated input power.

One caution: Be sure to shield your bulb. If it's unshielded, don't be surprised if others hear your test transmissions! Many hams, to their utter amazement, have "worked" hundreds of miles—unintentionally—on their breadboard light-bulb loads!

What about rolling your own dummy load? Frankly, if you're running high power, it's a sound idea to purchase one of the commercial units. Most contempo-

rary units are full-power wide-range loads; they can handle any legal amateur power level up to several hundred MHz. You can hardly duplicate them yourself at reasonable price levels. However, if you're running lower power, say up to about 100 watts or thereabouts, it makes sense to construct your own, since doing so entails a very simple project which can be accomplished for a few dollars. Let's talk about two simple loads which you can construct for your shack.

For working with very low power levels, such as the output of a mobile or hand-held v.h.f. transceiver, you can use a dummy load such as that shown in fig. 1. It should be useful in testing and adjusting the "typical" 10-watt class of v.h.f. transceiver. It is made up of two 100-ohm or 150-ohm, 2-watt resistors, depending on the load impedance you desire (50 or 75 ohms). I suggest mounting them, as shown in the illustration, to a PL-259 connector, regardless of the type of connector used on your rig. You can make or purchase an adapter connector to mate the PL-259 to other connectors which you may encounter on different makes and types of transceivers, such as BNC, Type F, RCA phono jacks, and Motorola automobile-radio-type fittings.

Another simple 75-watt load is shown in fig. 2. It is easily constructed, inexpensive, and can even handle 100-watt transmitters for periods long enough to make necessary adjustments and take power output readings. Its impedance is about 50 ohms, which is just right to match the output impedance of almost all pi-network transmitters (they are normally designed to work into load impedances ranging from about 30 to 100 ohms).

Construction is simple. The whole affair can be mounted in a small aluminum box, roughly 5" x 3" x 2". No special techniques are required. Just mount a standard SO-239 chassis-type coaxial connector to the minibox and neatly group the twenty-two (22) 270-ohm resistors around it in two bands of 11 resistors each. The two bands are connected in series-parallel as shown in the diagram to result in an "equivalent resistance" of approximately 50 ohms (49 to be exact!). This can be done in any number of ways, and so, no special physical arrangement of the resistors need be followed. Just make sure that they are mounted neatly, that their bodies don't touch one another (for heat dissipation), and that all connecting leads are as short as possible. I recommend drilling a number of ventilating holes (at least 10 on each side of the cabinet) to allow the heat generated by the resistors to dissipate. The unit is connected to the transmitter by a short length of 50- to 53-ohm coax.

Note that the r.f. ammeter indicated in the diagram isn't absolutely necessary, and it may be eliminated if you so desire. But it's handy because it allows you to measure your transmitter's output using

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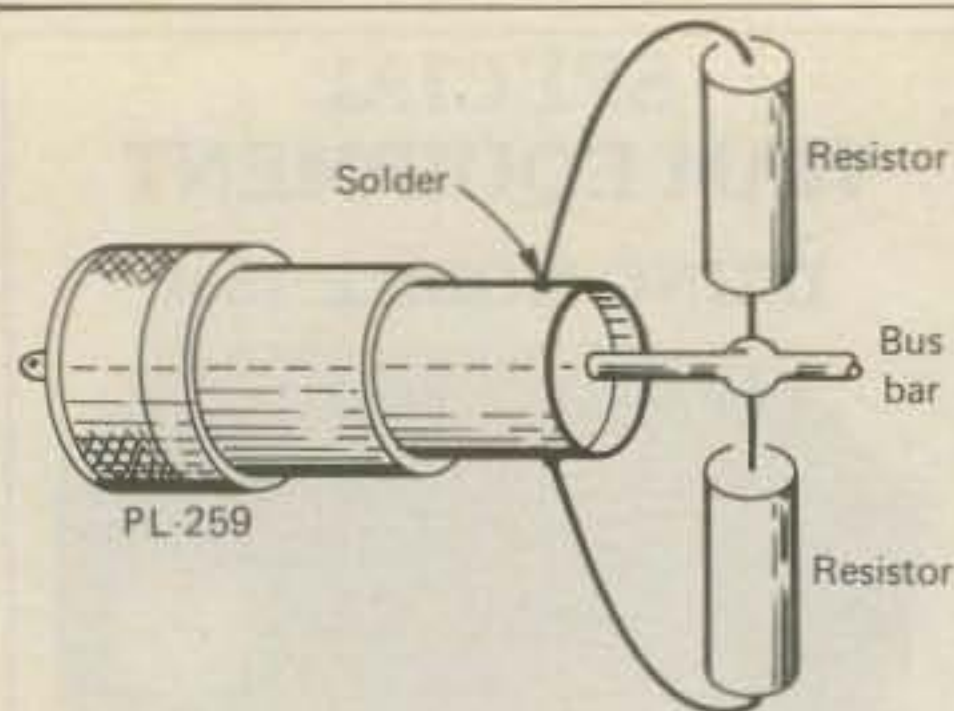
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For QRP transmitters and v.h.f. transceivers, a dummy load can be made for a dollar or two using nothing more than two carbon resistors and a PL-259 connector, as shown. It is made by soldering a piece of heavy copper wire or bus bar to the center post of a coax connector and installing two resistors between the bus bar and the connector's shell. For 70- to 75-ohm match, use two 150-ohm, 2-watt resistors in parallel; if what you prefer is a 50-ohm load, use two 100-ohm resistors. Be sure to use carbon and not wire-wound resistors; the latter will not work properly.

For tune-up, you can use your rig's internal metering, or you can use the r.f. probe of a v.t.v.m. clipped across the dummy load, tuning your gear for maximum meter deflection.

If you keep leads short, the dummy load shown here will work properly up to 2 meters, and will easily handle the output of 10-watt v.h.f. transceivers if used intermittently.

You can also make a medium-power dummy load for an h.f. transmitter using various combinations of resistors connected in series-parallel arrangements. One such load is shown in fig. 2.

Fig. 1—Inexpensive low-power dummy load.

a simple Ohm's Law calculation: power (in watts) is equal to current (in amperes) squared, and multiplied by resistance (in ohms). This is more clearly written using the equation P (power) = I^2R . We'll turn

next to the use of r.f. ammeters in the hamshack.

The R.F. Ammeter

A very basic piece of antenna test equipment is the r.f. ammeter. While most hams would agree that the most basic instrument is now the s.w.r. bridge, 20 to 25 years ago most amateurs relied almost completely on the ammeter as a yardstick of antenna matching, loading, tuning, and for power determination.

The r.f. ammeter is a device that indicates the radio-frequency current (in amperes) in an antenna circuit. Most are actually *thermocouples* used in conjunction with an ordinary d.c. meter. In operation, the thermocouple is heated by a resistance wire through which the r.f. current flows, causing a d.c. current to be generated, which in turn drives the meter. This allows the meter to indirectly indicate the amount of r.f. flowing through the circuit.

While the s.w.r. bridge is getting the play today, the r.f. ammeter is still very useful in tuning up antennas and in making power measurements. For example, if you're using parallel-conductor transmission line, such as open-wire line or twinlead, to feed a multiband antenna, the ammeter may be used in trimming or balancing the legs of the antenna for proper length. This is often required since nearby objects can unbalance the antenna so that even if it is resonant, it may not be electrically symmetrical. In doing this, two r.f. ammeters are usually used, one in each side of the feedline. Each leg of the antenna is cut (pruned) until the currents are approximately equal. This setup can also be used in conjunction with an s.w.r. bridge, which is inserted in the line between transmitter or transceiver and antenna coupler or balun. The antenna coup-

ler's adjustments are made for lowest indicated s.w.r., while the antenna itself is pruned for maximum (or equal) currents in the two legs of the transmission line, as indicated by the r.f. ammeters.

You may find other uses for the r.f. ammeter. For instance, it's possible to determine how *much* power is lost in the coaxial transmission line linking transmitter with antenna. This is done first by taking an r.f. current reading with the dummy load connected directly to the transmitter's output connector, then taking another reading at the far end of the transmission line with the dummy load connected at that point. The difference in the two readings represents the power lost in the transmission line.

Getting down to a more common situation, say you build and use the 50-ohm load described in fig. 2. If you read a current of 1 ampere flowing through your ammeter, plugging into the formula shows output power to be 50 watts, about right for a 75- or 80-watt transmitter. The size or rating of the r.f. ammeter you use isn't critical. In general, though, a 1-ampere meter should be okay for up to 75-watt (input) transmitters, while a 2- or 3-amp meter will handle more power than the dummy load we've built here can take. If you don't want to invest in an r.f. ammeter, there is also a provision in the load shown here for connecting a d.c. milliammeter (such as in your multimeter or v.o.m.) to the output jack for relative power output monitoring.

For maximum versatility, however, you'll probably want to use the dummy load in conjunction with an s.w.r. bridge/power meter for an indication of forward and reverse power. Since most power meters are designed to work into a known, predetermined load impedance,

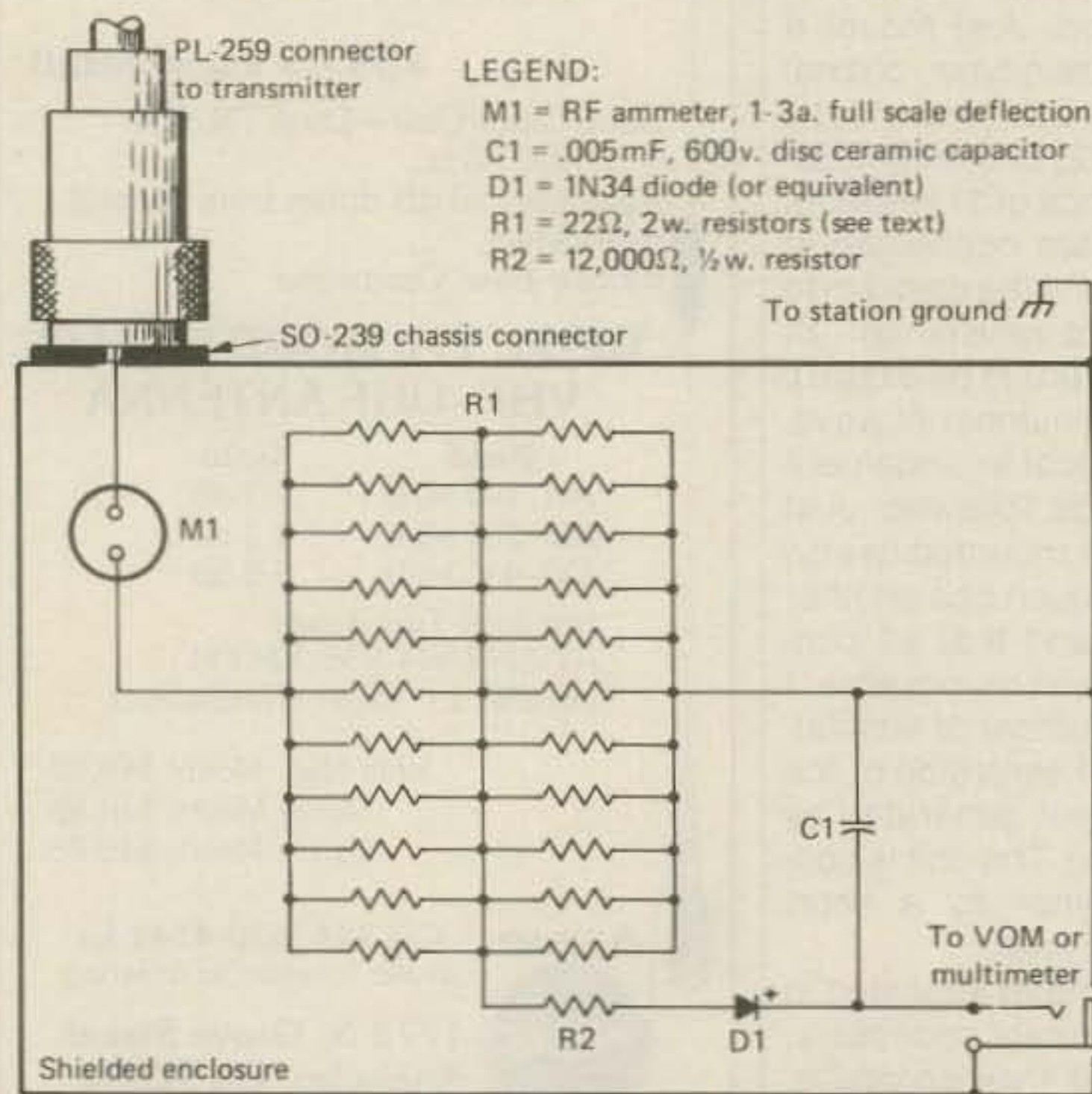


Fig. 2—A 100-watt dummy load (75-watt nominal).

The 50-ohm dummy load shown here can be used with transmitters of up to about 100 watts input to at least 30 MHz. An r.f. ammeter is connected in the line to allow you to calculate your transmitter's power output using the Ohm's Law relationship $P = I^2R$.

The combined resistance of the twenty-two (22), 270-ohm resistors works out to be 49 ohms, which makes a good impedance match for the "nominal" 50-52 ohm output of most modern transmitters. Since resistors combined in series are additive, while resistors in parallel are divisive, you can easily make up other values for your load if you wish. For example, you can adapt this load for 70-75 ohm use by instead using twenty-two 390-ohm resistors. Many other combinations can be worked out for other load values and for handling either higher or lower power levels.

No special procedures are necessary for construction other than keeping leads short and doing a good soldering job. An r.f. ammeter having a full-scale deflection of 1 to 3 amperes should fill the bill—and it can be eliminated if you have your own s.w.r./power meter or don't care to make current or power measurements. Or, you can connect your multimeter or v.o.m. to the output jack to measure *relative* power output.

The unit can be mounted in any convenient-size ventilated metal enclosure and connected to the transmitter through a short length of coaxial cable. After you finish construction, be sure to check the resistance of the completed dummy load for shorts (as read on an ohmmeter connected between the center pin on the input connector and the enclosure) *before* applying power. It should read about 50 ohms, or around 71 ohms if you designed the load for that impedance.



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CIRCLE 143 ON READER SERVICE CARD



A homemade low-power v.h.f dummy load is shown mounted to the side of a Sigma RF-2000 s.w.r. bridge/wattmeter. The dummy load shown in the photo differs slightly from that described in the text. In this one, it is mounted on an RCA-type phono plug which in turn slips into an RCA-to-coax connector adapter. In this way, the little dummy load can be used with transceivers having either RCA or standard coax fittings. Based on the author's article "Dummy Up for DX," which appeared in August 1978 CQ.

using the dummy loads described here will enable you to get a very accurate picture of your transmitter's output. You can check on the accuracy of your dummy load by switching to the reflected power function on your power meter or s.w.r. bridge; it normally will read below about 1.2 to 1.

Of course, after completing testing and tune-up with the dummy load, it's important to ensure that maximum power is being transferred to the antenna; it's the r.f. that jumps off your antenna that counts. This means that you should have a good impedance match between the transmission line and the antenna. A grid-dip meter or antenna noise bridge will help you to obtain a good match to the antenna, and an s.w.r. bridge left in the transmission line will allow you to keep a "running check" on your overall s.w.r. We will get to these instruments, but for the moment we'll focus on the major in-line devices. Next month, we'll continue with a discussion of wattmeters and s.w.r. bridges. See you then.

73, Karl, W8FX

Bibliography

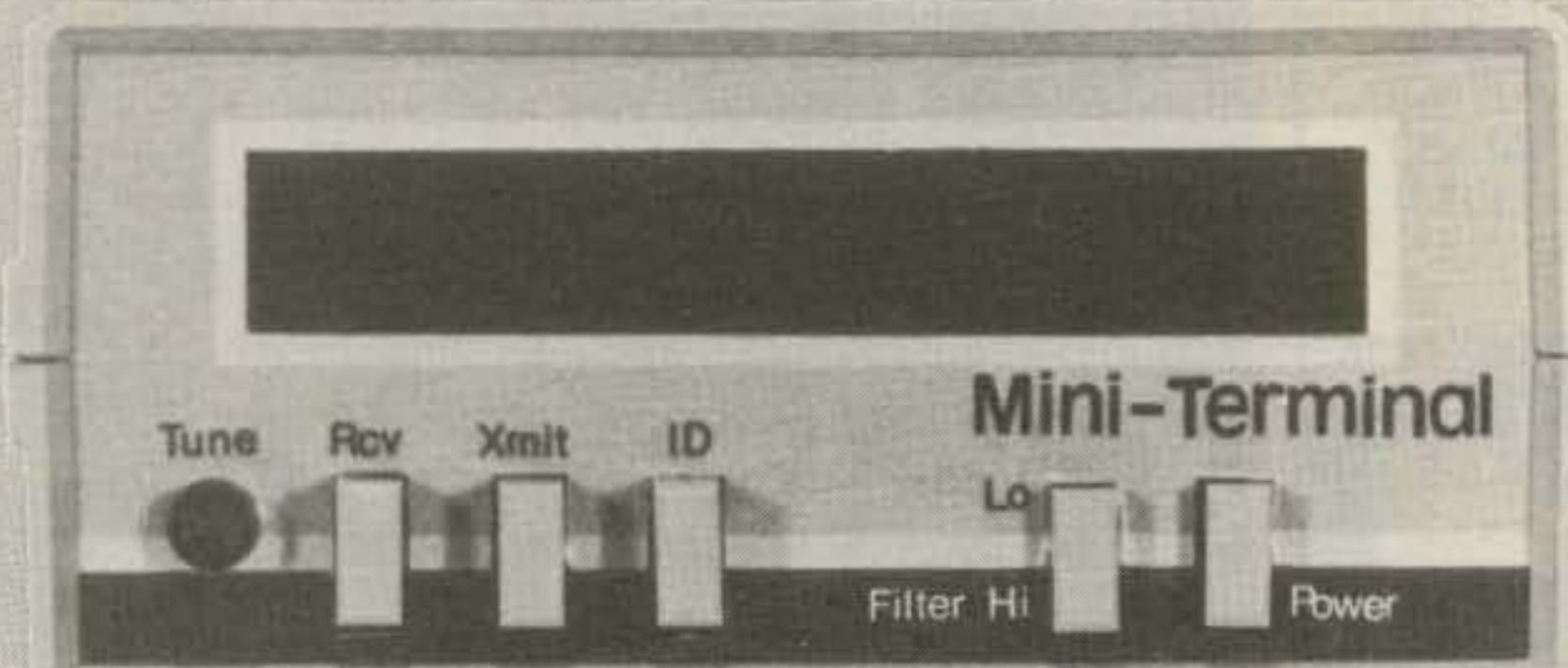
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Wildenhein, Bill, W8YFB. "Dummy Loads for Smart Operators," Ham Radio Horizons, October 1977.

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MODEL 370-30 Economy model vertical for 10, 15, 20 and 40 meter operation. High Q factory tuned traps. Overall height 21 feet. Can be used with or without ground radials. Model 370-32 — 75 meter add on kit. 75 and 80 meter operation optional with model 370-32 add on kit. Power rating 1 KW-2 KW P.E.P.

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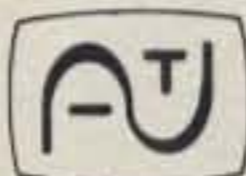


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CIRCLE 78 ON READER SERVICE CARD

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month as told by Clay:

Clayton N. Schlenker, W4XT All Counties #325, 5-8-81

"It seems like a long time ago (over 10 years) when I happened to have a QSO with John, W0QWS. I was so surprised when John called me by name! It turned out that John and I had QSO'd one time, many years before, and you know how County Hunters are—they make out a card and keep a record of everything! Anyway, John told me he was a County Hunter. I had just finished 5BWAS (#97) a short time before and was looking for another challenge. Thanks to John, who sent me a P.O. Directory, I was on my way.

"A special thanks to W6CCM, Dave and Barbara, for taking such good care of my cards. My records indicate that my return was at least 99.999%, which is exceptionally good! A special thanks to all those mobiles who made it possible, and those who went a little out of the way to get that last one.

"To my good friend Arnie, K9DCJ, and his good XYL who puts up with us, a special thanks for that last County, Dubuque, Iowa. Arnie drove down from Wisconsin on Sunday, 3 May 1981, and what an exciting experience that turned out to be. Just prior to our contact I heard Arnie working the county with a 5x7 signal. However, when I broke the Net to work Arnie, who was waiting on the County line of Dubuque and Jackson, it took me three tries to get my 5x7 report. Afterwards, I accused Arnie of turning down his audio gain to make it more exciting! At Arnie's suggestion I made a recording of that QSO and I greatly enjoy listening to it. I would recommend that others record their last County QSO.

"Thanks to you, Ed, and CQ magazine for the important part you play for all of us. I haven't decided whether or not I will do it again, but regardless, I'll be on to give out good old #325."

Awards Issued

Ken Wosika, KB7QO, added to his fine collection USA-CA-2500, 3000, and All Counties endorsed All 14, All Phone, All Mobiles.

Jim Emerson, WB6GMM, added USA-CA-2500, 3000, and All Counties to his fine collection, endorsed All S.S.B., All 14, All Mobiles.

Dean Cowden, KK0V (ex-W0CJG), qualified for USA-CA-3000 and All Coun-

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



Clayton N. Schlenker, W4XT, and his neat, well-equipped radio room.



Johanna, 2½ years old, second Op. at SM0BZH.

ties endorsed Mixed to complete his collection.

Rick Harris, AI5P (ex-WA5VKJ, WB5YEF, W5-10353), who got USA-CA-500 in January 1978, came through with his paperwork to finish USA-CA-1000 through All Counties endorsed Mixed.

Clyde Jones, WA3HMJ, waited until he had them All and collected USA-CA-500 through All Counties endorsed All S.S.B.

Willis Gordon, K5WQM, also waited until he had them All to get USA-CA-500 through All Counties endorsed Mixed.

John Sebastian, N8BGF, keeps plugging away and claimed USA-CA-3000 endorsed All S.S.B., All Mobiles, All 20.

"Red" Robert, W5VGF, had me send him USA-CA-2000 endorsed All A-1.



DK4SY, USA-CA-500, #2 to DK4.

Bud Lafferty, W0UBT, wrote for USA-CA-500, 1000, and 1500 endorsed Mixed.

Bill Hudzik, WA2UDT, acquired USA-CA-1500 endorsed Mixed.

Les Flake, K8KIR, won USA-CA-1000 and 1500 endorsed All A-1.

The United Nations Amateur Radio Club, 4U1UN, picked up USA-CA-500, 1000, and 1500 endorsed Mixed.

Don Colzze, WB2MZI, gained USA-CA-500 and 1000 endorsed All S.S.B., All 20.

Jon Fogdall, N0AGW (MARAC Secretary), was issued USA-CA-500 and 1000 endorsed All S.S.B., All 14, All Mobiles.

USA-CA-500 Certificates, endorsed Mixed, go to:

Seppo Lilja, SM0BZH (ex-SM4BZH, SM5BZH, SM6BZH, and SM4BZH/MM).

Leon Bishop, KV5F.

Adolf Keppler, DK4SY (#2 to DK4).

Mike Lowe, G4KHB.

Mary Ann Crider, WA3HUP.

Davor Milosevic, YU2TS (#7 to YU).

USA-CA-500 Certificates, endorsed ALL CW, sent to:

Akira Inage, JA5MG (#1 to JA5).

Tadashi Kondo, JA7ARM.

John Aakre, LA5SH.

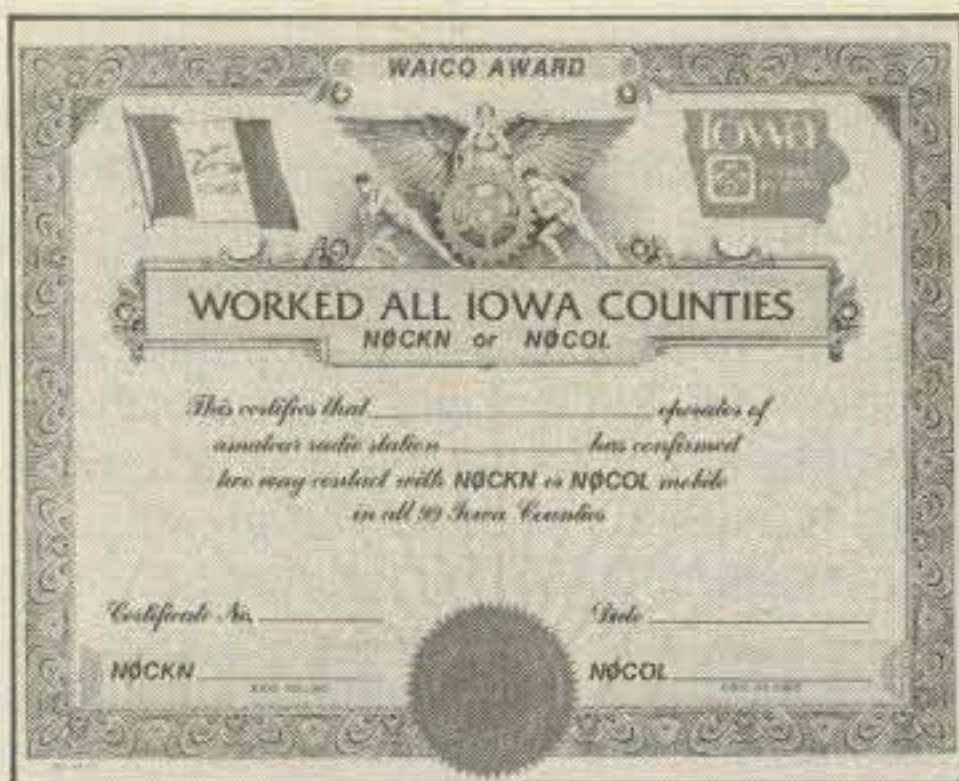
USA-CA-500 Certificates, endorsed All S.S.B., requested by:

Jacques Davy, FM7AV (F5JY), #1 to FM7.

Elicio Munoz L., XE1OX, #5 to Mexico.

Dr. Michael Friedrich, DJ5TH.

Yasu-Tada Ninomiya, JH8GWW, also endorsed All 10 meters.



Worked All Iowa Counties with N0CKN or N0COL.

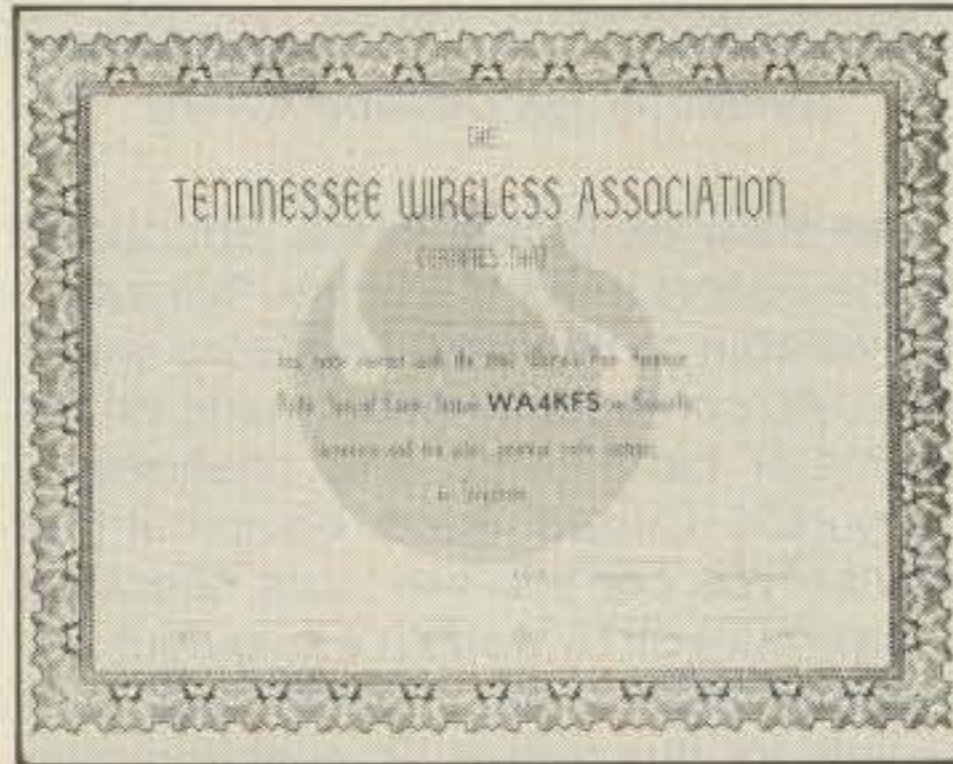
Worked All Iowa Counties. Issued in two classes to all amateurs for contacts with N0CKN, Jerry Pollard, or with N0COL, YL, Gwen Tolsdorf, in all 99 Iowa Counties. C.w. and s.s.b. endorsements available. Look for N0CKN and N0COL regularly on 14336 with c.w. contacts made on 14070 on request. QSLs not required; just send log extract with county, date, UTC, RS/RST. No partial lists, please. No fee. Contact N0CKN/N0COL, P.O. Box 3121, Des Moines, Iowa 50316.

The Diplom Interessen Gruppe (DIG). They also have a very fine awards program. For full details, send s.a.e. and several IRCs to DJ8OT, Eberhard Warnecke, Postfach 101244, D-5620 Velbert 1, West Germany.

The Six Meter International Radio Klub (SMIRK). They have a fine 6 meter awards program with some 6 different awards. Send an s.a.s.e. to Jeffrey K. White, WD8OXK, P.O. Box 767, Athens, Ohio 45701 for full details.

The Central States VHF Society. They have three new colorful awards for the v.h.f./u.h.f./s.h.f. bands. For full information, send a legal-size s.a.s.e. (with two stamps on it) to Bob Taylor, WB5LBT, 10715 Waverland, Baton Rouge, Louisiana 70815. (Thanks to WA1JXN for this data.)

mining and steel works. About 100 amateurs are active in this area. The award is available to amateurs and s.w.l.'s—for those outside Belgium and on the h.f. bands you need to contact 5 stations in the "Black Country" area. Contacts from January 1, 1982 are valid, any band, any mode. Send list of the contacts (call, date, time, frequency) and three IRCs to Philippe O. Dumont, ON5IP, 489, route de Beaumont, B-6030 Marchienne-Au-Pont, Belgium.



Worked the World's Fair Certificate.

Worked the World's Fair Certificate. The Tennessee Wireless Association, sponsor of WA4KFS, offers this certificate under the following rules: Work the World's Fair Station, WA4KFS. Submit a GCR list of confirmed contacts with ten other Tennessee stations. There is no limit as to band, mode, or date. Include a check for \$2.00 processing fee to Sarah Hickey, N4EFA, 10712 Mercury Drive, Concord, Tennessee 37720. WA4KFS is a working special events station located at the World's Fair. It operates daily from 1400-0200Z, the open hours of the Fair. WA4KFS operates c.w. at 20-30 kHz above the lower band edges, and s.s.b. at 15 kHz above and below the band edge between the General and Advanced portions of the phone bands and on 28585-28615 kHz. The station also works RTTY

and SSTV on the usual frequencies. QSL via W4PKM. (Thanks to AA4AK for this data.)

Notes

A lot of data, maps, etc., received from KH6MD seem to indicate that the spot from which most operations have been made as Kalawao County, Hawaii, have actually been (unintentionally) in Maui County. More about this later.

If you worked special event station W5RIN September 25 and 26th, you can receive a Spindletop Award. This operation was sponsored by the Beaumont ARC during the "Glady's City Boom Days" 81st Anniversary of Spindletop, home of the Lucas Gusher. Certificate and brochure on the history of Spindletop for a large s.a.s.e. (including contact number) to BARC, P.O. Box 8358, Lumberton, Texas 77711. (Thanks to Brenda, N5EKG, for this data.)

Dutch Certificate Guide lists particulars of more than 75 certificates and awards available from The Netherlands. The cost is U.S. \$3.00 in Europe and U.S. \$4.00 elsewhere (plus postage). Order from VERON Amsterdam, P.O. Box 9, 1000 AA Amsterdam, The Netherlands; or John Hofstee, VE3IZH, 425 Boyne Avenue, Listowel, Ontario, Canada N4W 3K5.

If you worked WB2BBD/2 in Cortland County, N.Y., during the CW County Hunters Contest, July 24 and 25th, it was Art Phillips, WA7NXL. Please QSL to his home QTH, P.O. Box 201, Flagstaff, Arizona 86002.

To celebrate the 25th Anniversary of the Communications Club of New Rochelle, N.Y., an award was offered for one contact with one member or one contact with the club station, K2YCJ, September 4, 5, and 6th. Send QSL's and an s.a.s.e. (4" x 9 1/2") to Don Colozze, WB2MZI, 2727 Gifford Avenue, Bronx, N.Y. 10465.

73, Ed, W2GT



Belgian DPN Award.

The Diplome du Pays Noir (DPN). This award is issued by the radio amateurs of the Charleroi area associated with the UBA (Belgian Society of the IARU). The Belgian area is called the "Black Country" because the principal activity is coal

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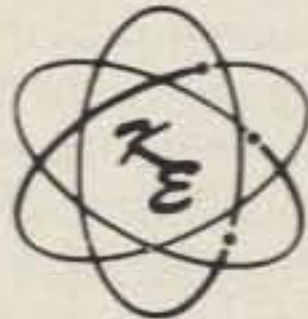
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*Education Technology & Services, see page 81 October 1981 issue of Ham Radio Magazine.

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CIRCLE 18 ON READER SERVICE CARD

dateline... Washington, D.C.

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

FCC Commissioners Vote 7-0 To Begin Development Of No-Code Amateur License

As should be well known by now, FCC commissioners unanimously voted on 1 July 1982 to initiate action on a no-code license for the amateur service. To this end, the Commissioners directed the Private Radio Bureau (PRB) to prepare a Notice of Proposed Rule Making (NPRM) in this matter for release later this year.

According to James McKinney, Chief, PRB, the Commissioners were presented with four options:

1. Develop an "experimenter's license," with a technical exam similar in complexity to the current Novice exam. (Rejected)

2. Develop a so-called "high technology" license similar to the Canadian digital license. This license would require the applicant to pass a difficult technical exam on digital theory, among other things. (Approved for inclusion in the NPRM)

3. Develop a subset of the current Technician class license, using the same technical exam but requiring no knowledge of Morse code. Licensees would have all Technician privileges above 30 MHz. (Approved for inclusion in the NPRM)

4. Do nothing. (Rejected)

The deletion of the five-word-per-minute code test and use of the current Technician class technical exam was a PRB proposal. It was set forth for three reasons:

1. It was the most practical way to implement a no-code license at an early date;

2. With 74,000 Technician operators already licensed, the Commission did not want to take privileges away from anyone through the creation of new subbands for no-code licensees;

3. The Commission did not want to create an entirely new class of license.

The Office of Science and Technology (OST) supported the PRB approach, but OST also wanted the high-technology, digital class license to be considered as an alternative. As noted above, both of these proposals will be included in the NPRM.

According to sources within the Com-

mission, release of the no-code NPRM is unlikely until the President signs into law the new amateur licensing procedures embodied in Senate Bill S. 929 (the Goldwater Bill) and House Resolution HR 5008 (a similar bill in the House of Representatives). In addition, release of the NPRM may be delayed until the WARC-79 Treaty is ratified by the U.S. Senate.

Former Operator Imprisoned for Unlicensed Operations

Richard A. Burton, a former amateur radio operator, was found guilty by a Federal judge on charges of using profane, obscene, and indecent language over the radio, and of unlicensed radio operations. U.S. District Court Judge Manuel L. Real, who handed down the decision of guilty on two counts of broadcasting obscene language and four counts of operation without an FCC license, sentenced Burton to serve six months in jail.

Burton, 38, made the unlicensed radio communications from his residence in Reseda, CA, during November 1981, January 1982, and April 1982.

The FCC had suspended Burton's radio operator's license in September 1981, finding that he had violated several FCC Rules and Regulations (including the broadcast of obscene, indecent, and profane language). According to the Commission, Burton continued making such broadcasts, and so, in April, he was arrested and his equipment seized. In May 1982, a Federal grand jury returned a seven count indictment on the charges, and the case went to trial in June.

On 28 June 1982, Judge Real sentenced Burton to eight years imprisonment, with all but six months of the sentence suspended. Burton was also sentenced to five years of probation and was ordered to perform 1500 hours of community service work upon his release.

In commenting on the stiff treatment of Burton, U.S. Attorney Steven S. Trott stated that he "... hopes the sentence will be a deterrent to those operators who abuse their privileges." A similar thought was expressed by Richard Smith, Chief, Field Operations Bureau, FCC, who said: "We are deregulating the various radio services wherever possible. But what few rules we do have must be complied with, and we intend to see that this happens!"

Burton should have begun to serve his six-month jail sentence on 6 July 1982. However, an appeal was expected.

FCC Revokes Amateur's Station and Operator Licenses

Assistant Chief FCC Administrative Law Judge Thomas B. Fitzpatrick has revoked the license for amateur radio station KB6TG, licensed to Kenneth L. Gilbert, Monterey, CA. The judge also suspended Gilbert's operator's license for the remainder of its term.

In an initial decision issued in May 1982, Judge Fitzpatrick concluded that evidence showed Gilbert to have repeatedly and deliberately interfered with other amateur radio operations during March 1981. These offenses alone were serious enough to merit revocation and suspension of the station and operator's licenses. However, the judge found that during that same time period, Gilbert violated another Commission Rule by transmitting indecent language.

The proceeding was initiated in September 1981 by the FCC's Private Radio Bureau, which ordered Gilbert to show cause as to why his licenses should not be revoked and suspended.

CQ Presents Exclusive with Representative of the National Cable TV Association

As part of its continuing program of publishing the latest word on matters of vital interest to the amateur service, this month's issue of CQ contains an exclusive interview with Wendell H. Bailey, a spokesman for the National Cable Television Association (NCTA). The subject of the interview is cable television interference (CATVI), an issue of concern to both the cable television industry and amateurs alike. Discussed with Mr. Bailey are topics such as the nature of the CATVI problem, cable TV standards, steps the NCTA have taken (and are taking) to resolve CATVI problems around the country, and suggestions as to how amateurs can assist in bringing CATVI problems to an early resolution.

If you live in an area served by cable television, or if such service will shortly be provided to you and your neighbors, you will not want to miss this important

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exchange on CATV with one of the cable television industry's most knowledgeable representatives.

Subaru Admits Its Automobiles are Susceptible to R.F.

According to *AMATEURADIO*, a publication of the Public Information Office of the ARRL, the Customer Relations Manager of Subaru Atlantic, Inc., C. Lynn Swinney, has advised potential customers not to buy a 1982 Subaru if they intend to install "CB's, HAMS's (sic) Garage door openers, etc."

The problem with the 1982 models is that the electronically controlled carburetor and the electronic control module are susceptible to strong radio frequency fields. A warning to this effect is included in the owner's manual, but Subaru sales personnel and some service managers know little, if anything, about the problem.

It is unfortunate that Subaru hasn't taken action to correct the problem on all its 1982 model-year cars! For regardless of whether the r.f. signal is generated in the car or by a transmitter in a nearby automobile, the 1982 Subaru can still be expected to malfunction in the presence of a strong signal.

Given the diversity of mobile radio transmitters used today, it would be in the customer's and Subaru's best interests for this manufacturer to correct his electronic design deficiencies at the earliest possible date.

Commission Ponders Action on Power Measurement Technique and Use of Digital Codes

As this is written, two items of concern to the amateur service are "on circulate" within the Commission:

1. Measurement of Power Output. The Commission is considering the release of a Notice of Proposed Rule Making (NPRM) which would propose that the method used to measure transmitter power be changed. Specifically, the proposal would be to measure p.e.p. output power versus d.c. input power.

2. Use of Digital Codes above 50 MHz. The Commission is considering the release of a Report and Order which would, with few exceptions, permit amateurs to use almost any digital code in their work above 50 MHz. Limitations would be placed, however, on the bandwidths used.

According to James McKinney, Chief, Private Radio Bureau, FCC, it is expected that both items will be approved and released by the time this issue is mailed.

Because amateurs will be called upon to comment on the proposed method for power measurement, Steve Lett, an Engineer with the Private Radio Bureau, encourages readers to give thought to their submissions. Said Lett: "Objective, well-documented responses which educate the FCC's staff on the amateur's position

best serve the interests of both the Commission and the amateur service."

AMRAD Continues H.F. Packet Radio Experiments

Earlier this year, AMRAD members Dave Borden, K8MMO, and Paul Rinaldo, W4RI, made a successful two-way 1200-baud packet radio contact on 10 meters between two northern Virginia suburbs. The contact, which lasted over two hours, was marked by high background noise levels on both signals. Regardless, most packets were received without "retries." This was true of both long and short packets (the latter being up to two lines in length). Previous experience had indicated that packets should be kept shorter than half a line.

Receiver tuning was found to be somewhat critical. However, once tuned, receiver stability was such that no retuning was necessary for about 45 minutes. Signals were relatively steady in strength, with only slow, flat fading observed at times.

Anyone interested in working Washington, D.C., on 10 meters using packet switching is urged to call W4RI days or evenings at (703) 734-0878.

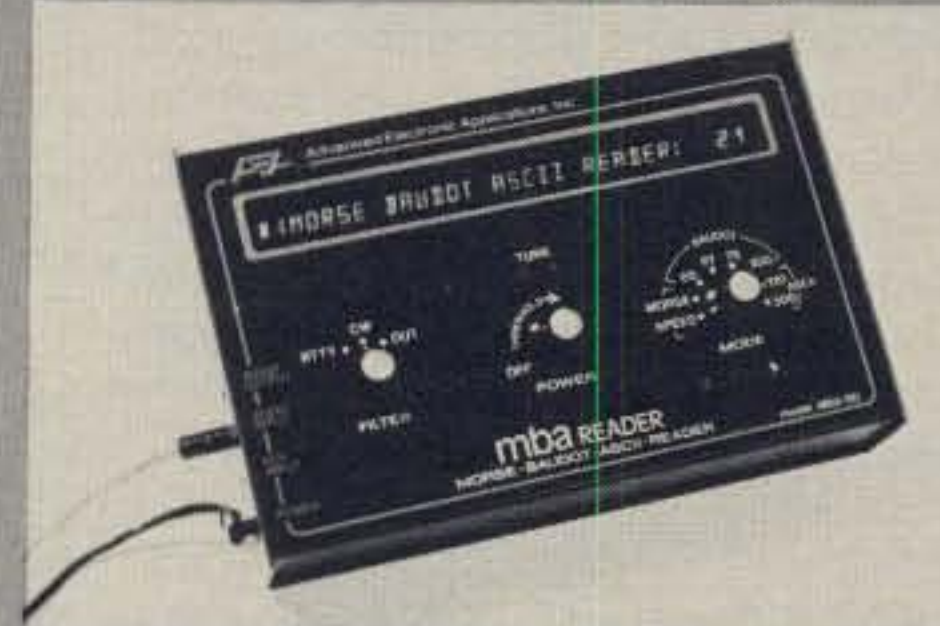
For more information on AMRAD experiments in packet switching, and on the packet switching activities of groups around the U.S. and Canada, contact: Mr. Paul Rinaldo, President, Amateur Radio Research and Development Corporation (AMRAD), 1524 Springvale Avenue, McLean, VA.

UoSAT Rescue Involves Major Resource

According to *AMSAT Satellite Report*, a publication of the Radio Amateur Satellite Corporation, a new attempt will be made to overcome the persistent commanding problems experienced to date with UoSAT. The effort, which will involve a government-owned dish operated by SRI International in Menlo Park, CA, is intended to restore control of the first amateur scientific satellite. Readers will recall that in mid-April, a command software error resulted in both the 2 meter and the 70 cm beacons being commanded "on" simultaneously. The presence of both beacons effectively desensed both command receivers (one each on 2 meters and 70 cm), and controlling the spacecraft thereafter has proven impossible.

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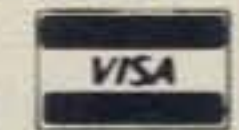
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The SRI dish is indeed impressive. When operated at 435 MHz, the dish has a gain of 42 dBd. To translate this into power figures, 750 watts fed into the dish will produce an effective radiated power of nearly 12 megawatts! One AMSAT pundit, who shall remain anonymous, noted that "At these flux levels, UoSAT will respond to command . . . or incandescence . . . or both. The only real question is which will occur first!"

For more information on the UoSAT satellite, and on other AMSAT activities, contact: The Radio Amateur Satellite Corporation, P.O. Box 27, Washington, D.C. 20044.

Cable Systems Not Always at Fault in Cases of CATVI

We've said much in this column about the problem of interference to, and from, cable television systems. This so-called "cable television interference" (CATVI), however, is not always the result of a poorly shielded drop on a cable distribution system.

Readers should remember that despite the use of proper engineering techniques by the cable company, and despite the operation of an amateur transmitter in accordance with good engineering practices, some television receivers on the market today are still susceptible to fundamental overload.

If you are experiencing CATVI, work with the engineering staff of the cable company to isolate the problem. If the cable system's drop line is not leaky, try using a high-pass filter on the television receiver affected. Substitution of another TV receiver is also recommended. Chances are good that under such tests, the affected TV receiver will be found susceptible to overload. In such cases, the responsibility for correcting the receiver's design deficiencies rests with the manufacturer.

H.R. 5008 Clears House Committee

Early in June 1982, House Resolution H.R. 5008 (the FCC's "Track 1" legislation) passed the House Energy and Commerce Committee. The bill, sponsored by Representative Wirth, is similar to Senate Bill S. 929, which was sponsored by Sen. Goldwater.

The House bill is now expected to obtain House passage with a minimum of difficulty. Further, owing to the similarities between H.R. 5008 and S. 929, little if any delay is expected when the two bills go to House-Senate conference.

The House and Senate bills contain numerous provisions which are important to the amateur service, including:

- Enabling legislation which would give the FCC the authority to set r.f.i. susceptibility standards for electronic home-entertainment devices;
- Provisions which would enable am-

ateurs to give both code and technical exams for all classes of amateur licenses;

- Authorization for amateurs to assist the FCC in monitoring for violations of the Commission's Rules and Regulations.

Barring any last minute problems, it is expected that the President will sign these and other proposed measures into law before year's end.

AFCEA'S 1982 Luncheon Breaks All Records

With attendance up over 30% from last year, 180 amateurs, spouses, and friends enjoyed what many have called "the best Amateur Luncheon ever!"

Meeting on June 15th at the Sheraton Washington Hotel as part of the Armed Forces Communications and Electronics Association's (AFCEA's) 36th Annual Convention, the attendees—representing the Federal government, industry, and the military—were first treated to a hot entree prepared and served by the hotel's expert staff. Following the introduction of the head table and of everyone present, Stu Meyer, W2GHK/4, presented David Talley, W2PF, with a certificate marking Dave's 65th year as a licensed amateur (1917-1982).

As in previous years, representatives from the FCC were invited to review issues of significance to the amateur community. In order of their presentations, the following individuals summarized FCC actions and/or concerns on the items noted:

Michael Kennedy, Office of Science and Technology

- Amateur access to the new WARC bands at 10, 18, and 25 MHz. (Basically, Mike indicated that the Commission could not proceed with such allocations without ratification of the WARC Treaty by the U.S. Senate.)

- Spread spectrum. (The review covered recent AMRAD tests and replies to the FCC's Notice of Inquiry on spread spectrum modulation techniques.)

Richard Smith, Chief, Field Operations Bureau

- Enforcement. (Dick indicated that enforcement activities against unlicensed operators, as well as against amateur operators who violated the Commission's Rules, were proceeding at a record pace; in most cases, fines of up to \$2000 have been imposed, though one amateur now faces a maximum sentence of eight years imprisonment and a \$60,000 fine.)

- R.f.i. standards. (It was Dick's hope that the passage of "enabling" legislation on r.f.i. would be sufficient to cause television receiver manufacturers to improve the immunity of their sets to strong, "out-of-band" signals.)

James McKinney, Chief, Private Radio Bureau

- CCIR. (Jim acknowledged the impor-

tance of the CCIR to the frequency allocation process of the ITU, and specifically, reintroduced Mr. Richard C. Kirby, W0LCT/HB9BOA, Director of the International CCIR.)

- Access to the new WARC bands. (Jim took the position that the new 10 MHz band could be opened to U.S. amateurs at this time.)

- Amateur exams. (Comments touched on elements of bills before the House and Senate [H.R. 5008 and S. 929, respectively] which would enable amateurs to give exams for all grades of amateur licenses.)

- H.f. expansion. (Indications are that the FCC's position on expansion of the 20 meter phone band should be out later this year.)

- No-code amateur license. (This item is recognized as being highly controversial. However, Jim only noted that one did not have to possess a knowledge of Morse code to make significant contributions to the amateur service.)

Edward Minkle, Managing Director, FCC

- Congressional inquiries. (Ed reminded those present that letters to their Congressmen regarding FCC business ended up on the desks of the various bureau chiefs within the FCC for answers.)

- Letter of congratulations to David Talley. (Ed read a letter from FCC Chairman Mark Fowler congratulating Dave on 65 years in amateur radio.)

The comments by FCC personnel were followed by brief remarks by Perry Williams (W1UED, ARRL Washington Area Coordinator), David Sumner (K1ZZ, newly elected ARRL General Manager), and Alan Dorhoffer (K2EEK, Editor, CQ).

Finishing off the festivities was a drawing for 30 door prizes, including a pair of gold-plated Eimac 8874 tubes; numerous antennas; handbooks on general radio techniques, antennas, propagation, and packet switching; free subscriptions to CQ and to *The Long Island DX Bulletin*, numerous *Callbooks* (both domestic and foreign); and items such as a 24-hour digital clock. These gifts were donated by the following people or organizations:

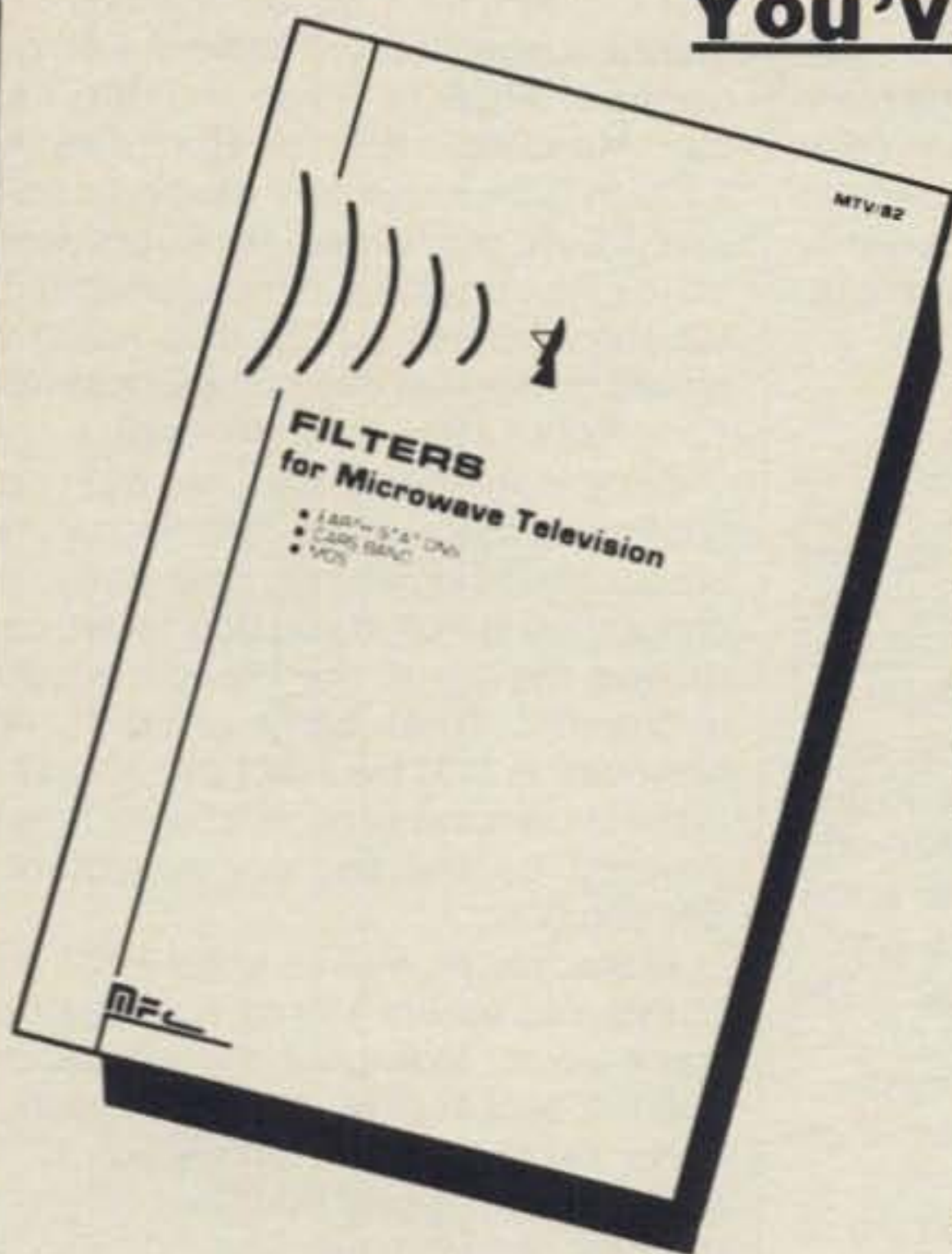
- The American Radio Relay League
- The Comm Center (Laurel, MD)
- CQ magazine
- Electronic Equipment Bank (Vienna, VA)
- ENSCO, Inc.
- *The Long Island DX Bulletin* (H. McCoy, W2IYX, Huntington, NY)
- Roy Rosner (handbook on packet switching)
- Varian-Eimac

At the completion of the luncheon, attendees had an opportunity to see displays of the latest r.f. and computer-based equipment available from The Comm Center and the Electronic Equipment Bank.

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Amateur Luncheon, takes this opportunity to thank Col. "Bud" Deem and his AFCEA Operations Staff for their invaluable assistance in arranging this year's luncheon. Appreciation is also expressed to Ms. Mary Ellen Stoner of the Electronic Equipment Bank for her assistance throughout the luncheon.

See you at next year's Amateur Radio Luncheon?!

AMRAD Recognizes Science Fair Winners

At its June 1982 meeting, the Amateur Radio Research and Development Corporation (AMRAD) recognized three northern Virginia high school Science Fair winners for their technical excellence. Award winners and their projects were:

- Thomas Falstreau, KA4JXF—Computer Aided Instruction;
- Steven B. Waltman—A Computer-Controlled Nuclear Magnetic Resonance Spectrometer;
- J.B. Wilson—Paddle Battle, A Computer Game.

In addition to receiving a year's membership in AMRAD, the three winners each received a subscription to a radio or computer magazine of their choice.

AMRAD also recognized eleven other students who received Honorable Mentions in the Science Fair competition.

The AMRAD Award Meeting is an annual event held to honor high school students who demonstrate special skills in electronics and computer technology. The meeting also serves to introduce many of the students to amateur radio.

Phase III Operations Manual in Development

As noted in an *AMSAT Satellite Report*, Dick Peacock, W2GFF, is making excellent progress on the preparation of a Phase III Operations Manual. Dick is acting as editor for the comprehensive text, which will provide practical instructions and information on how the Phase IIIB satellite works. Also to be included are specific operating techniques, tips, and general considerations on using the new breed of amateur satellite.

The manual is expected to answer many of the "how to" questions most likely to be asked by the neophyte as well as by veteran satellite operators. Publication is expected in early 1983, shortly after the Phase IIIB launch.

Solar Houses All A-Buzz

According to an article in *Science News*, inverters used to convert d.c. to a.c. in solar homes are a constant source of radio-frequency interference (r.f.i.) in and around such homes.

John W. Adams of the National Bureau of Standards in Boulder, CO, found that the inverters emit r.f. radiation over a

broad range of frequencies, including the a.m. broadcast band.

At this time, the problem is not considered serious because few homes are equipped with photovoltaic solar systems. However, Adams felt that the manufacturers of inverters used in solar homes should be aware of the problem so that appropriate steps could be taken to shield the devices and filter their output.

Commission Takes Action on Military Restricted Areas

According to John Johnston, Chief, Personal Radio Branch, PRB, FCC, the Commission, on 1 July 1982, approved the areas around two Air Force bases in Alaska and North Dakota as "Military Restricted Areas." This means that amateurs in these areas who seek to use more than 50 watts input on the 420-450 MHz band must coordinate their activities with both the Air Force and the appropriate FCC Engineer-in-Charge. The Commission took this action to protect 420-450 MHz air defense radar systems from interference caused by amateur operations.

The Commission also expanded the restricted areas previously defined around two Air Force bases in California and Maine.

AMSAT Seeks Executive Director/General Manager

The successful launch of the Radio Amateur Satellite Corporation's first Phase III satellite in early 1983 will bring unprecedented growth to this primarily volunteer-managed organization. As such, the Corporation will require a full-time, professional Executive Director/General Manager.

The successful candidate will:

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Send resumes to: Search Committee, Attn.: Roy D. Rosner, AMSAT, P.O. Box 27, Washington, D.C. 20044.

Washington Man Fined More Than \$100,000 in Pay-TV Piracy Case

According to *The Washington Post*, a Washington, D.C., "entrepreneur" was

ordered to pay more than \$100,000 in damages for selling devices to intercept the microwave signals of a local Home Box Office (HBO) outlet. Specifically, a federal judge ordered William Early, the owner of AIDA TV Sales and Service, to pay Marquee HBO of Rockville, MD, \$102,375 because it is illegal to sell or use private microwave receivers designed to pick up signals in the Multipoint Distribution Service (MDS). The ruling was based on Section 605 of the Communications Act of 1934 (as amended).

Early contended that he was doing nothing wrong since the signals are broadcast everywhere. Said Early: "My contention is that, if you don't want me to receive the signal, then keep it out of my bedroom." What Early failed to note, however, is that the HBO signals are not in the Broadcast service, and so, they are covered by the secrecy provisions of Section 605.

Marquee, as well as other HBO distributors, has recently hired investigators to track down individual "video bandits" and the suppliers of unauthorized microwave receivers. The conviction of William Early suggests that their efforts are not only showing success, but also, that the courts will sustain their argument that HBO signals are not in the public domain.

Oregon County Imposes Curbs on Radiation

As noted in *The Wall Street Journal*, Oregon's Multnomah County recently set the tightest broadcast radiation standards in the U.S. The new rule is designed to ensure that health hazards resulting from r.f. heating effects are eliminated.

The new rule limits the r.f. energy at ground level near antenna structures to 50 microwatts per square centimeter of exposed surface, with the measurement averaged over a period of one-half hour. This is far more stringent than the 1000 microwatt standard suggested by the American National Standards Institute; the 1000 microwatt level is also under consideration by the National Institute of Occupational Safety and Health. Technical advisers of Multnomah County had suggested a radiation limit of 200 microwatts, identical to that adopted by the state of Massachusetts.

The Multnomah County regulation was intended to address r.f. radiation hazard problems in the 30 to 300 MHz range. The ruling, effective 31 July 1982, exempted all amateur radio operations.

Your Washington Editor thanks the following individuals for their contributions to this month's column: Mr. Joe Casey, Chief, Investigations Branch, FOB, FCC, Mr. Larry Clance, Esq., Attorney Advisor, FOB, FCC, and the San Francisco Regional Director of the FCC, for their contributions to this column.

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2 Presettable Speeds, Instant Recall	No	No	Yes
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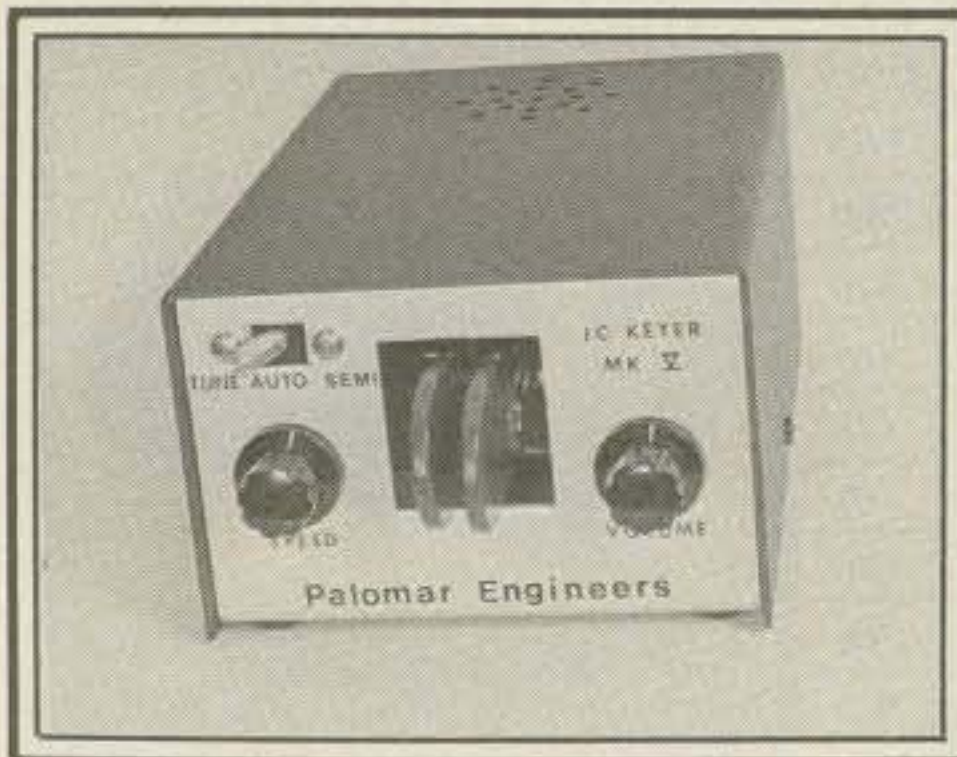
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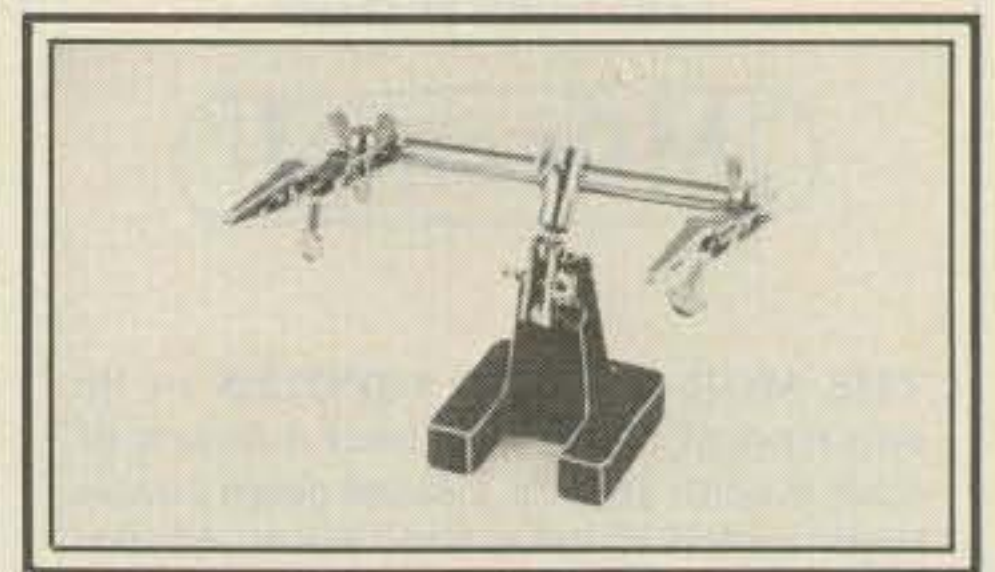
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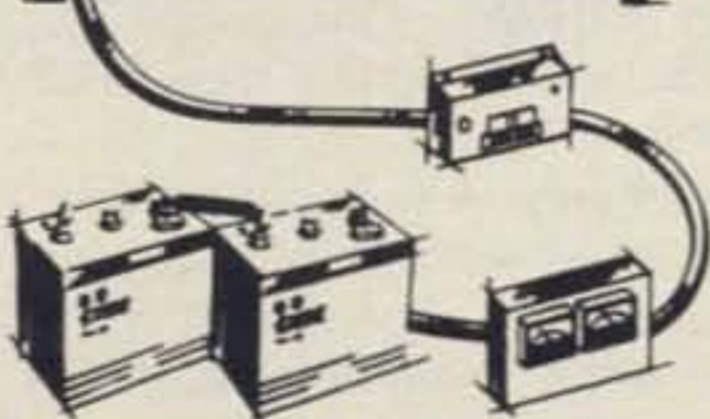
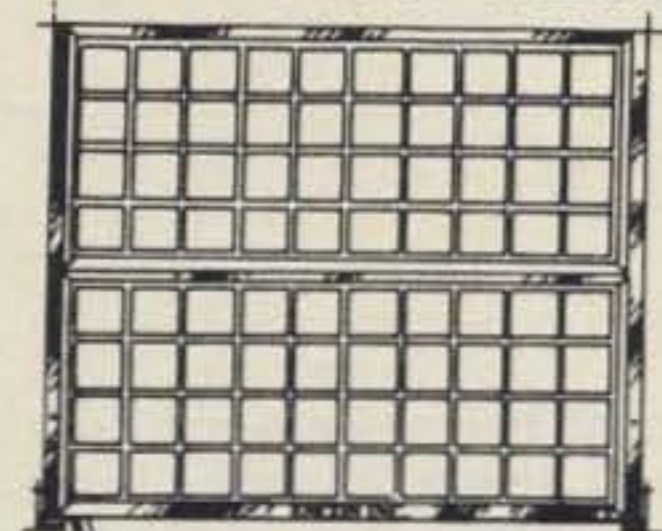
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Shortwave Listening—Part VI of VI

This is the concluding part of this shortwave listening article. The previous parts provide the introduction, plus coverage of the legality of eavesdropping, variety of transmissions, radio waves, selecting listening frequencies, publications, tapes, clubs, equipment and accessories suppliers, receivers, loudspeakers, earphones, antennas, and ground. You are urged to read the entire article to derive maximum benefit from it. Despite the length of this article, it is just a brief introduction to the field of shortwave listening. There are classes of shortwave listeners, just as there are classes of amateur operators; there are also several special-interest groups.

Signal Reporting Codes

SINPO. Many broadcast stations prefer to receive reception reports in a simplified and standardized system known as a SINPO report, which has the following meanings:

(a) Signal strength (S-QSA) is rated:
5—Excellent 2—Poor
4—Good 1—Barely audible
3—Fair

(b) Man-made interference (I-QRM), atmospheric/noise (N-QRN), and radio wave propagation (P-QSB) are each rated:

5—None 2—Severe
4—Slight 1—Extreme
3—Moderate

(c) Overall merit (O-QRK) is rated:
5—Excellent 2—Poor
4—Good 1—Unusable
3—Fair

As an example, a SINPO report of 54354 indicates that the received signal had (S-5) excellent strength, (I-4) suffered from slight man-made interference, (N-3) had moderate atmospheric noise (static), (P-5) had no fading characteristics, and (O-4) had good overall merit.

SINPFEMO. This signal reporting code is more detailed than the SINPO code, which makes it more useful to stations receiving these reports. The meanings are as follows:

Strength
5—Excellent 2—Poor
4—Good 1—Barely audible
3—Fair

Interference
5—Nil 2—Severe
4—Slight 1—Extreme
3—Moderate



Twelve-year-old Russ Alman, KA8OCR, who lives in Rockford, Michigan, obtained his Novice license around Christmas 1981 to surprise his grandmother, WA1WGX, and grandfather, WN1TKD, Charlotte and Harold Alman, who live in Medway, Massachusetts; he works them on a schedule, along with a Canadian amateur he met on the air. Russ has contacted amateurs in 18 countries and 46 states. He worked almost 600 contacts in this year's Novice Roundup contest. Russ shares this station with his proud father, Phil, KO8T. He operates a pair of Kenwood twins and enjoys using the Grandmaster memory keyer purchased for contest usage. His antennas include a KLM KT-34-XA triband Yagi-Uda, Hy-Gain HyTower vertical, and several dipoles. Russ has his code speed up and he hopes to upgrade to the General license the next time the FCC conducts examinations at Grand Rapids.

Noise
5—Nil 2—Severe
4—Slight 1—Extreme
3—Moderate

Propagation Disturbance
5—Nil 2—Severe
4—Slight 1—Extreme
3—Moderate

Fading
5—Nil 2—Fast
4—Slow 1—Very fast
3—Moderate

Excellence of modulation
5—Excellent 2—Poor
4—Good 1—Very poor
3—Fair

Modulation depth
5—Maximum 2—Poor or none
4—Good 1—Continuously overmodulated
3—Fair

Overall rating
5—Excellent 2—Poor
4—Good 1—Unusable
3—Fair

Older Reporting Systems. Several other signal reporting systems have been used

in the past, but they are no longer recommended. These outdated systems include FRAME, RAFISBENQO, RISAFMONE, and Q-signals (see SINPO references).

QSL Cards. A fascinating side interest associated with shortwave listening is the exchange of confirmation cards. The three letter Q-signal QSL means "I acknowledge receipt --", when used during the exchange of messages by radio. Consequently, the cards used to acknowledge/confirm receipt of a station's radio transmissions are called QSL cards. These cards are both interesting and attractive; they are available from many commercial, private, and government stations.

Card Size. QSL cards should be 3.5 by 5.5 inches to be accepted for overseas mailing. If you have them printed by a QSL printer, be sure to specify these dimensions or you may get cards that are other sizes. The Post Office refuses off-size cards (addressed to overseas addresses) and returns them to the senders. A top-quality card is often alleged to improve the return ratio of QSL cards, but an accurate and complete report is more important to the transmitting station than the appearance of a card. Be honest in your reports, because an incorrect or flattering report is of no value to the station which receives it. Also, incorrect reports will probably be recognized as such by experienced operators.

Displaying QSL Cards. Received QSL cards are displayed to best advantage in the clear-plastic card display holders manufactured specifically for this purpose. These holders keep cards clean, allow easy rearrangement, and preclude the need for thumbtack holes or tape spoiling the appearance of your cards. QSL holders are advertised in amateur publications and they are sometimes available at local electronics stores.

QSL Data. Your card should contain space for the SINPO, SINPFEMO, or other report. It should also show your name and address. The make and model (or a brief technical description) of your receiver and antenna should appear on your card. To avoid confusion, it is best to indicate all times in UTC—Universal Time Coordinated (ex-GMT, Greenwich Mean Time)—which is the same everywhere on earth. It is good to have a 24-hour clock set to UTC near your receiver. You must indicate the exact fre-

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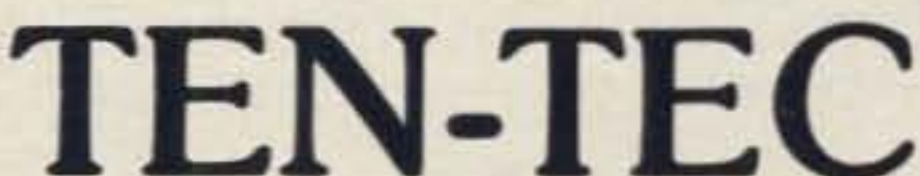
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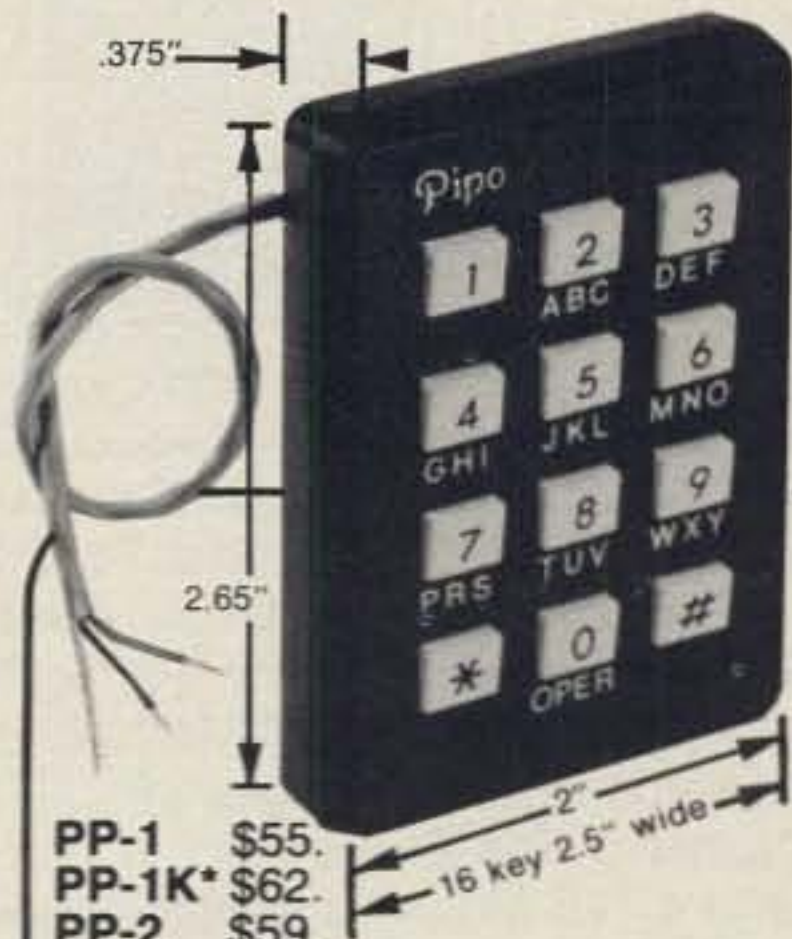
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quency, date, program content, and time of each transmission being reported on your QSL card. Send the completed card to the station which transmitted the signal and you have a good chance of receiving a return QSL, plus additional information about their station and/or country. A typical QSL card is shown in fig. 1. The material on the front side of such cards is usually printed over an appropriate picture or design.

Shortwave Listener Carl Welsh
2814 Empire Avenue
Burbank, California 91504
United States of America
Lat. 34°12.3"N Long. 118°21.3"W

(FRONT SIDE)

This card confirms that Radio Station _____
was heard SINPO _____
@ _____ UTC _____ 19 _____ on
_____ kHz. The program heard was _____

Receiver = Ten-Tec 544
Antenna = 70 foot random-wire with
MFJ-943 tuner
remarks: _____

(REVERSE SIDE)

Fig. 1—Typical s.w.l. QSL card.

Stamp Collecting. Since shortwave listeners frequently receive QSL cards from stations in foreign countries, it is natural that many listeners develop a side interest of collecting stamps. If you do not collect stamps yourself, you will be able to make some of your stamp collecting friends happy! If you want to expedite a quick response, you can purchase International Reply Coupons at your Post Office and include them with your foreign cards. These IRCs can be used to purchase postage throughout the world.

IRC's are particularly essential if you want to receive QSL cards from foreign amateurs. A good way to improve your chance of getting a QSL card from a foreign (DX) station is to include a self-addressed and stamped envelope (s.a.s.e.) with the QSL card you send. Attach correct foreign postage stamps to your s.a.s.e. to make it easier for the other person to send a card to you. All she/he has to do is to slip the QSL into your envelope, seal the envelope, and mail it. Foreign postage stamps are available from sources such as George N. Robertson, W2AZX, 7661 Roder Parkway, Ontario, NY 14519. Other foreign stamp sources can be located by perusing amateur radio publications.

Logs

Many shortwave listeners maintain a permanent record of the stations they hear. This record sheet is called a log,

and the bound pages of log sheets are known as a log book. S.w.l. log books can be purchased from many sources. Some of the most useful log sheets are provided by s.w.l. clubs. Some s.w.l.'ers print their own log sheets to match their specific needs. Make sure that your log sheets have spaces for all the entries you need to properly fill in QSL cards, plus other information you may want to retain. It is a common practice to mark an asterisk beside each log entry when one sends a confirmation (QSL) card and to encircle the asterisk when the return QSL is received.

Amateur Radio

During your shortwave listening activities, it is inevitable that you will overhear amateur radio operators. There are licensed amateurs in every country in the world, no matter how small or poor it might be in technical development. You may be surprised to hear free-world amateurs in contact with amateurs in Communist countries, but such operation is both legal and commonplace.

Reports. Amateurs originated the practice of swapping QSL cards to verify two-way radio contacts. Amateurs have a ready supply of colorful and interesting QSL cards and several are pleased to respond to your s.w.l. QSL card. However, a SINPO or SINPFEMO report would be a complete mystery to most amateurs because they use a different report system.

This is Russ Latimer, VE1BPP, who helps make it easier for American Novices to contact Nova Scotia. He is a retiree who particularly enjoys ragchewing (chatting), handling messages, and working Novices. Russ only operates code, even though he has full operating privileges with an Advanced amateur radio certificate. His work experience included 12 years as a Radio Officer aboard Canadian merchant ships. Russ holds a 30 w.p.m. (words per minute) Morse code certificate, but he will slow down (QRS) to whatever speed is needed to complete contacts with newer operators. His station includes a Ten-Tec Omni-C Transceiver and a 115 foot long multiband dipole about 50 feet above the ground, which also happens to be 142 feet above sea level. He has had more than 200 DX (foreign) contacts in less than 2 years as an amateur. If you would like to contact Russ on a prearranged schedule, send your callsign and schedule data (date, time, and frequency) to 63 Johnstone Avenue, Dartmouth, Nova Scotia, Canada B2Y 2K6, or call 1-902-466-7135.



Amateur code reports use the following RST (Readability-Strength-Tone) system, and amateur voice transmission reports use the RS (Readability-Strength) portion of the same system.

R-S-T Signal Reporting System

R (Readability)

- 1—Unreadable
- 2—Barely readable—some words distinguishable
- 3—Readable, with much difficulty
- 4—Readable, with almost difficulty
- 5—Perfectly readable

S (Strength)

- 1—Faint—Barely perceptible
 - 2—Very weak
 - 3—Weak
 - 4—Fair
 - 5—Fairly good
 - 6—Good
 - 7—Moderately strong
 - 8—Strong
 - 9—Extremely strong
- #### T (Tone)
- 1—Extremely rough hissing note
 - 2—Very rough a.c. note, no musical note
 - 3—Rough low-pitched a.c. note, slightly musical
 - 4—Rather rough a.c. note, moderately musical
 - 5—Musically-modulated note
 - 6—Modulated note, slight trace of whistle
 - 7—Near d.c. note, smooth ripple
 - 8—Good d.c. note, a trace of ripple
 - 9—Pure d.c. note

Notes:

(1) Code reports use a 3-number R-S-T report. For example, RST 579 means a received code signal which is perfectly readable (R-5), moderately strong (S-7), and has a pure d.c. note (T-9).

(2) Voice reports just use the readability and strength portions of this system.

Amateur Bands

The most commonly used amateur bands are shown in Table I. Amateurs assign a convenient designation to each band instead of the exact one, just as is done by international broadcasters on their bands. For your convenience, the American voice portion of each ham band is indicated separately in this table. Emission segments are not the same in all countries.

Band Designation (meters)	Entire Band (MHz)	Voice Portion (MHz)
160	1.8–2.0	1.9–2.0
80	3.5–4.0	3.8–4.0
40	7.0–7.3	7.2–7.3
20	14.0–14.35	14.2–14.35
15	21.0–21.45	21.25–21.45
10	28.0–29.7	28.5–29.7
6	50.0–54.0	50.1–54.0
2	144.0–148.0	144.1–148.0

Table I—Frequently used American amateur radio bands.

Single Sideband. As you listen on the amateur bands, you will notice that very little amplitude modulation is used, because most ham voice operation (on 80–10 me-

ters) has switched over to the more efficient and longer range single sideband voice emissions. If your receiver is set to "a.m." mode, a single sideband transmission will be very garbled. Modern receivers have an "s.s.b." mode and it should be used for s.s.b. reception. If your receiver does not have an s.s.b. mode, but does have c.w. (code) reception capability, just move your switch to c.w. and you can use the internal beat frequency oscillator (BFO) to reinsert the carrier needed to listen to s.s.b. signals. With your receiver set for code reception, you can tune in s.s.b. signals for optimum voice quality by carefully adjusting the receiver's fine tuning (bandspread) control or (if there is one) the BFO/PITCH control.

Amateur Band Receiving Conditions. As is true with international broadcasting, the higher frequency amateur bands (20, 15, and 10 meters) are best during the day and during the summer, whereas the lower ones (160, 80, and 40 meters) are best at night and during the winter.

Amateur Publications. If you become (or are) a shortwave listener who develops interest in the amateur radio service, there are several publications available to you, including the following monthly publications:

CQ, 76 North Broadway, Hicksville, NY 11801

Ham Radio, Greenville, NH 03048

QST, American Radio Relay League, 225 Main Street, Newington, CT 06111

Worldradio, 2120 28th Street, Sacramento, CA 95818

73, Peterborough, NH 03458

Several of the companies listed in the publications' coverage in this article also have amateur radio books available.

Amateur Radio Clubs. If you become even more interested in amateur radio, you should attend a few meetings of your local amateur radio club. Many amateur clubs conduct licensing programs. Your local electronic stores should be able to provide meeting information on local clubs. Many amateurs display call signs on their car license plates, and they can be approached for information about local amateur radio activities. The best single source of information on amateur radio is the American Radio Relay League, 225 Main Street, Newington, CT 06111. The ARRL represents American amateurs and provides many aids for both beginning and experienced amateurs.

Getting Started as an Amateur. It is a natural reaction to want to contact distant stations heard on the air. This is a very logical extension of shortwave listening. The amateur radio licensing structure makes it easy for anyone to get on the air with a beginner's (Novice) license after just a brief training time. The Novice license examination includes a test of code receiving and code sending abilities at a very slow speed (5 words per minute), plus a simple quiz on basic radio fundamentals



Ben Franklin, KA4MIU, operates from Mt. Washington, Kentucky. He has been active on the air more than two years now, and he has contacted 47 states and 12 countries so far. He still needs contacts with Alaska, Hawaii, and South Dakota to earn the WAS (Worked All States) award. Ben used a Heath HW-16 Transceiver for awhile. His present station includes a Ten-Tec Century 21 Transceiver, 80/40 meter dipoles, and a triband Hy-Gain TH-3JR Yagi-Uda. He is a member of the Bullitt Amateur Radio Society and QRP Amateur Radio Club International.

and regulations. Novices are granted a five-year, renewable license which permits them to make medium-power (250 watts, input) code contacts on special segments of the 80, 40, 15, and 10 meter amateur bands. These segments are 3.7-3.75, 7.1-7.15, 21.1-21.2, and 28.1-28.2 MHz, respectively. If you are practicing slow-speed code reception as part of your s.w.l. activities, these are prime frequencies to find those who send slow enough to be understood by a beginner. The Novice license is available to anyone who does not hold any class of amateur radio license, regardless of any amateur license she/he may have held in the past.

Upgrading to Higher Amateur Licenses. Many Novices bypass the Technician class of amateur license and they move right up to the General class ticket. The General license is also good for 5 years, provides excellent operating privileges (on voice, code, teletype, TV, etc.), per-

mits high power (1000 watts, input) transmissions, and is renewable. The General ticket is the prime objective of the beginner and one can be justifiably proud of earning this license. Once one has earned the General license, she/he is urged to upgrade to the Advanced (and finally) the Extra licenses to have increased operating privileges. It is not difficult to become a licensed amateur radio operator, and it is exciting to work amateurs in hundreds of other countries. Amateurs are allowed to operate from ships, cars, airplanes, and other crafts, as well as from fixed locations.

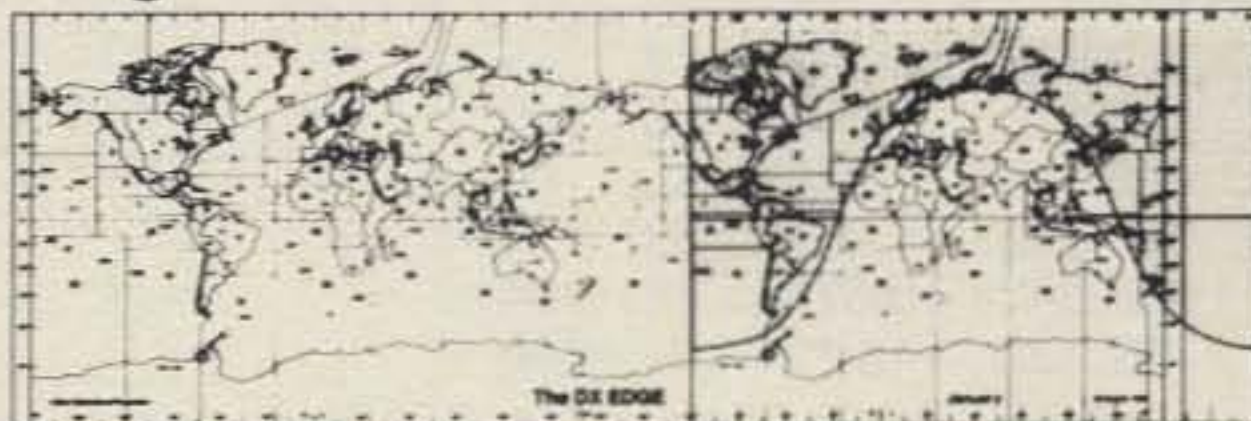
Summary

If you are not yet a shortwave listener or an amateur, I hope this article prompts you to become both. The world is truly at your fingertips in both cases. I have tried to provide reasonably complete coverage of important subjects without being too technical to be easily understood. Radio and electronics are simple; they just involve putting known formulas to work in practical ways. After you set up your equipment, I hope it serves as a bridge between your home and people all around the world.

If you are a shortwave listener, but not an amateur, I hope you have learned a few ways to improve your station and operation. I also hope you will decide to expand your radio activities by becoming an active amateur radio operator. I believe that the best prospective amateur is a shortwave listener.

If you are an amateur, but not a shortwave listener, I hope this article causes you to start doing some serious shortwave listening. Amateur radio and shortwave listening are very compatible; increased proficiency in either one can enhance one's enjoyment of the other. In most cases, amateur radio equipment can be used to do some shortwave listening without being modified. Many modern transceivers have spare bands that can be used for shortwave listening simply by adding correct crystals.

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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	KV4FZ('76)	37,584	380	11	37
3.5	KV4FZ('75)	275,319	1,297	23	80
7.0	ZL1BIL('81)	443,646	1,245	33	90
14	VP2KAA('81)	2,011,185	4,186	37	150
21	VP2KAC('81)	1,783,500	3,941	37	137
28	OH2MM/CT3('79)	1,827,150	4,068	37	113

AFRICA

1.8	No Entrant				
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8CR('74)	253,528	639	31	103
14	CR6WW('74)	1,058,446	2,152	35	132
21	EL2AV('81)	1,404,936	3,087	35	117
28	OH2MM/CT3('79)	1,827,150	4,068	37	113

ASIA

1.8	4X4NJ('81)	3,942	55	6	21
3.5	VE3MR/4X('71)	197,106	742	22	69
7.0	4Z4DX('81)	241,368	721	26	87
14	VE3BWK/4U('78)	1,061,634	2,532	39	122
21	4S7AAG('81)	918,925	2,897	38	137
	(Opr. OH2BCP)				
28	4X0U('80)	1,187,200	2,555	37	123
	(Opr. 4X4UH)				

EUROPE

1.8	UP2BAW('81)	20,091	525	7	30
3.5	I3MAU('75)	113,535	778	18	69
7.0	I6NOA('81)	292,152	1,042	35	113
14	I5NPH('80)	1,062,936	2,429	37	134
21	YU3TU('81)	1,312,793	2,644	40	141
	(Opr. YU3ZV)				
28	9H1EL('81)	1,355,760	3,662	36	132

NORTH AMERICA

1.8	KV4FZ('76)	37,584	380	11	37
3.5	KV4FZ('75)	275,319	1,297	23	80
7.0	VP2KAE('81)	432,942	1,600	27	91
14	VP2KAA('81)	2,011,185	4,186	37	150
21	VP2KAC('81)	1,783,500	3,941	37	137
28	KV4FZ('79)	1,482,525	4,079	39	126

OCEANIA

1.8	KH6CC('79)	2,975	63	9	8
3.5	KH6XX('77)	116,416	606	28	40
7.0	ZL1BIL('81)	443,646	1,245	33	90
14	KG6DX('81)	923,510	1,909	39	128
21	KP4KK/DU2('81)	1,413,042	3,675	38	104
28	KH6XX('80)	1,762,332	4,212	37	106

SOUTH AMERICA

1.8	HK4EB('76)	3,672	34	4	9
3.5	4M3AZC('80)	181,794	760	19	63
7.0	CX4CR('76)	363,110	1,125	30	80
14	FY7AK('76)	1,415,329	2,950	36	127
	(Opr. F5QQ)				
21	YV3BJL('81)	1,231,630	3,100	35	102
28	ZZ5EG('81)	1,760,130	3,760	37	125

Single Operator/All Band

AF	EA8AK('81)	9,974,811	5,506	152	457
AS	4X0U('81)	3,497,208	2,774	116	313
	(Opr. 4X4UH)				
EU	G3FXB('79)	4,708,014	3,710	116	341
NA	HI8PGG('81)	9,009,721	7,190	131	392
	(Opr. N1GL)				
O	KH6XX('81)	5,713,434	4,912	131	262
SA	9Y4VT('81)	11,085,529	6,680	140	419
	(Opr. N6AA)				
QRP	I5NSR('81)	670,133	959	83	230

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	50	6	10
9Y4VT	3.5	257	14	43
(1981)	7.0	363	22	63
11,085,529	14.0	1,800	34	111
	21.0	1,103	33	89
	28.0	3,107	31	103
	Total	6,680	140	419

Multi-Operator/Single Xmtr.

AF	9L1CA('78)	7,367,846	5,393	118	340
AS	R6F('79)	9,029,396	5,643	137	411
EU	I4RYC('80)	9,918,368	5,997	139	453
NA	HI8XWP('79)	9,872,267	7,603	134	417
O	KC6ZR('80)	7,605,360	6,197	137	283
SA	FY7BC('78)	8,989,695	6,125	124	371

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	-	-	-
I4RYC	3.5	73	10	51
(1980)	7.0	306	18	59
9,918,363	14.0	1,259	38	114
	21.0	1,370	38	114
	28.0	2,989	35	115
	Total	5,997	139	453

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77)	21,351,898	10,290	153	544
AS	EX9A('78)	15,364,080	9,233	164	519
EU	YU3EY('79)	16,646,364	9,562	153	528
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KH6XX('79)	21,990,252	10,989	184	494
SA	P41C('81)	41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

Club record: Frankford Radio Club ('79) 173,821,640

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And - Save even more - include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

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HF6V	80-10 mtr. Vertical	\$129
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RM KIT	Roof Mount w/Stub Tuned Radials	\$ 39
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40-2CD	2-El. "Broad Band" 40 mtr. Beam	\$279
A3	3-El. Triband Beam	\$179
A4	4-El. Triband Beam	\$229
A743/A744	40 mtr. Add-on Kit for A3/A4 Antenna	\$ 69
R3	New Motor Tuned 20/15/10 mtr. Vertical	\$229
AV5	80-10 mtr. Trap Vertical	\$ 95
20-3CD	3-El. 20 mtr. Beam	\$179
20-4CD	3-El. 20 mtr. Beam	\$239
15-3CD	4-El. 15 mtr. Beam	\$ 99
15-4CD	4-El. 15 mtr. Beam	\$109
10-3CD	3-El. 10 mtr. Beam	\$ 76
10-4CD	4-El. 10 mtr. Beam	\$ 89
A50-5	5-El. 6 mtr. Beam	\$ 65
424B	24-El. 432 MHz "Boomer"	\$ 63
214B	14-El. 2 mtr. "Boomer"	\$ 69
214FB	14-El. 2 mtr. FM "Boomer"	\$ 69
228FB	23-El. 2 mtr. FM "Power Pack"	\$189
32-19	19-El. 2 mtr. "Super Boomer"	\$ 83
220B	17-El. 220 MHz "Boomer"	\$ 75
ARX2B	2 mtr. "Ringo Ranger II"	\$ 36
ARX450B	450 Mhz "Ringo Ranger II"	\$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	\$ 63
A144-10T	10-El. 2 mtr. Satellite Antenna	\$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	\$ 69
A432-20T	20-El. 432 MHz. Satellite Antenna	\$ 45
A14T-MB	Dual Antenna Mounting Assembly	\$ 25

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TH7DXS	New Broad Band 7-El. Triband Beam	\$379
TH3MK3S	3-El. Triband Beam	\$219
TH3JRS	3-El. Triband Beam	\$159
TH2MK3S	2-El. Triband Beam	\$139
HY-QUAD	2-El. Triband Quad	\$279
402BAS	2-El. 40 mtr. Beam	\$199
205BAS	5-El. 20 mtr. "Long John"	\$299
155BAS	5-El. 15 mtr. "Long John"	\$179
105BAS	5-El. 10 mtr. "Long John"	\$119
204BAS	4-El. 20 mtr. Beam	\$229
203BAS	3-El. 20 mtr. Beam	\$139
153BAS	3-El. 15 mtr. Beam	\$ 79
103BAS	3-El. 10 mtr. Beam	\$ 59
DB1015AS	3-El. 10/15 mtr. Beam	\$159
64BS	4-El. 6 mtr. Beam	\$ 55
66BS	6-El. 6 mtr. "Long John"	\$109
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18AVT/WBS	80-10 mtr. Trap Vertical	\$ 95
214	14-El. 2 mtr. Beam	\$ 35
28DQ	80/40 mtr. Trap Dipole	\$ 49
58DQ	80-10 mtr. Trap Dipole	\$ 99
BN86	80-10 mtr. KW Balun	\$ 19

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5BTV	80-10 mtr. Vertical	\$ 99
G6-144B	2 mtr. Base Vertical	\$ 69
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KT34XA	6-El. Tribander	\$469
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7.2-3	3-El. 40 mtr. Beam	\$449
7.0-7.3-4A	4-El. 40 mtr. Beam	\$629
144-148-13LB	13-El. 2 mtr. Long Boomer	\$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	\$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	\$ 99
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TA-33	3-El. Triband Beam	\$199
TA-33 Jr.	3-El. Triband Beam	\$149
S-402	2-El. 40 mtr. Beam	\$279

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Alliance HD73 (10.7 sq. ft. Rating)	\$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	\$ 45
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Tailtwister (20 sq. ft. Rating)	\$249
HYGAIN HDR-300 (Most HD. Rotor for BIG Arrays)	\$439
8 COND (2-#18 GA./6-#22 GA.) Rotor Cable	\$0.19/ft.
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HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	\$259	
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	\$289	
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	\$319	
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	\$349	
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3/8 EE (3/8" Eye & Eye Turnbuckle)	\$5.50	
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	\$6.50	
1/2 EE (1/2" Eye & Eye Turnbuckle)	\$8.50	
1/2 EJ (1/2" Eye & Jaw Turnbuckle)	\$9.50	
3/16" Preformed Guy Grip	\$1.65	
1/4" Preformed Guy Grip	\$1.85	
6" Diam - 4 ft. Long Earth Screw Anchor	\$12.50	
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5000 Guy Insulator (5/32" or 3/16" Cable)	\$0.95	
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CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	KV4FZ('76)	42,800	390	13	37
3.5	CT3/OH1TV('77)	223,364	1,066	19	57
7.0	KP4AST('73) (Opr. WA4PXP)	447,421	1,479	32	95
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	LU8DQ('81)	1,359,711	2,993	37	116
28	LU8DQ('79)	1,033,399	2,775	34	93

AFRICA

1.8	EA8AK('81)	41,470	242	17	41
3.5	CT3/OH1TV('77)	223,364	1,066	19	57
7.0	5A1TW('64) (Opr. N2AA)	227,814	918	22	64
14	CR6IK('74)	925,386	2,021	38	116
21	TJ1AW('70)	549,888	1,447	35	93
28	FR0MM('79)	978,012	2,590	36	90

ASIA

1.8	4X4NJ('81)	18,252	178	10	29
3.5	UA9TS('81)	122,567	622	17	56
7.0	JE3MCC('81)	240,700	833	30	70
14	UA9ADQ('81)	447,874	1,412	34	88
21	4Z4NUT('80)	519,831	1,500	34	83
28	4X4UH('80)	554,645	1,772	32	83

EUROPE

1.8	G3SZA('79)	21,960	283	12	33
3.5	I4IND('81)	172,782	1,113	19	68
7.0	YU2CDS('79) (Opr. YU2RQX)	361,680	1,204	32	88
14	OH8SR('81)	672,600	2,151	34	86
21	YU3ZV('81)	732,096	1,957	37	107
28	DK3GI('79)	592,848	1,584	31	101

NORTH AMERICA

1.8	KV4FZ('76)	42,800	390	13	37
3.5	KV4FZ('75)	190,082	789	24	77
7.0	KP4AST('73) (Opr. WA4PXP)	447,421	1,479	32	95
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	VP2KAC('80) (Opr. N4RJ)	1,075,407	2,955	36	105
28	KV4FZ('79)	653,072	2,384	32	87

OCEANIA

1.8	VR3AH('78)	20,310	238	12	18
3.5	VR3AH('76)	178,560	956	24	40
7.0	AH6Z('78)	387,750	1,382	30	64
14	KG6DX('81)	525,420	1,289	37	102
21	KH6XX('78)	816,102	2,311	38	81
28	KG6DX('80)	801,876	2,367	35	79

SOUTH AMERICA

1.8	YV1OB('81)	25,806	258	11	23
3.5	N4JI/HC1('77)	77,748	463	21	36
7.0	CV4DL('75) (Opr. CX1BBL)	230,040	1,020	24	57
14	PJ9CC('80) (Opr. K4BAI)	1,209,022	2,914	34	105
21	LU8DQ('81)	1,359,711	2,993	37	116
28	LU8DQ('79)	1,033,399	2,775	34	93

Single Operator/All Band

AF	CT3BZ('81)	5,701,590	4,706	111	294
AS	UF6CR('81)	4,613,355	3,927	104	301
EU	EA2IA('81)	3,057,204	3,078	110	318
NA	KP4RF('78) (Opr. N6CJ)	4,908,186	3,797	135	379
O	N6BT/AH0('81)	4,241,746	4,083	121	228
SA	9Y4VT('80) (Opr. N6AA)	6,116,945	4,505	128	329
QRP	YU3BC('80)	702,765	996	85	230

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	91	6	9
9Y4VT	3.5	420	18	53
(1980)	7.0	846	22	62
6,116,945	14.0	1,046	28	71
	21.0	1,089	28	67
	28.0	1,013	27	67
	Total	4,505	128	329

Multi-Operator/Single Xmtr.

AF	EA9EU('80)	5,077,696	3,884	116	326
AS	RG6G('80)	9,720,528	5,358	164	462
EU	YU3EY('81)	7,674,190	4,051	150	345
NA	NP4A('79)	7,982,576	6,100	141	385
O	5W1AZ('76)	2,534,416	3,043	108	176
SA	P41E('81)	8,059,296	5,055	148	388

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	117	9	31
RG6G	3.5	566	22	68
(1980)	7.0	1,161	32	87
9,720,528	14.0	1,122	36	96
	21.0	1,245	35	100
	28.0	1,138	30	80
	Total	5,358	164	462

Multi-Operator/Multi-Xmtr.

AF	EA8CR('78)	17,734,970	9,799	142	463
AS	EX9A('78)	8,721,019	6,882	137	384
EU	OH3AA('81)	9,301,635	6,682	148	447
NA	NP4A('80)	17,627,820	10,846	171	487
O	ZK2RU('81)	5,191,542	4,646	123	256
SA	PJ2CC('79)	20,045,952	11,786	154	422

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	81	6	10
PJ2CC	3.5	704	18	53
(1979)	7.0	1,768	25	76
20,045,952	14.0	3,442	33	95
	21.0	3,244	38	100
	28.0	2,447	34	88
	Total	11,786	154	422

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RG8/u Regular .66VF 8237	8	2-16 (26 x 30)	32c/ft.
RG 213 Non-contaminating 8267	8	6-16 (16 x 30), (1 17)	43c/ft.

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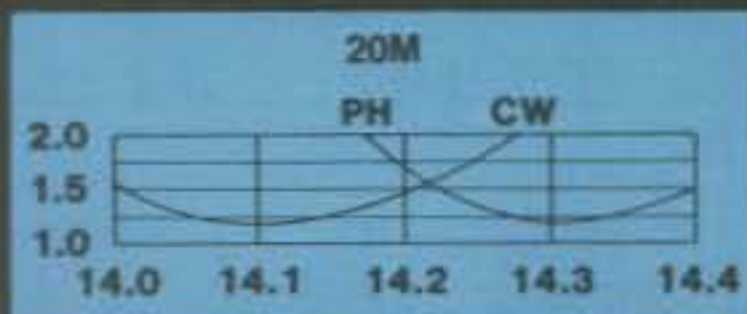
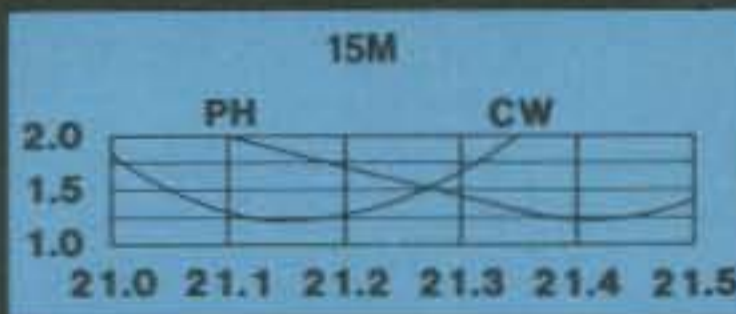
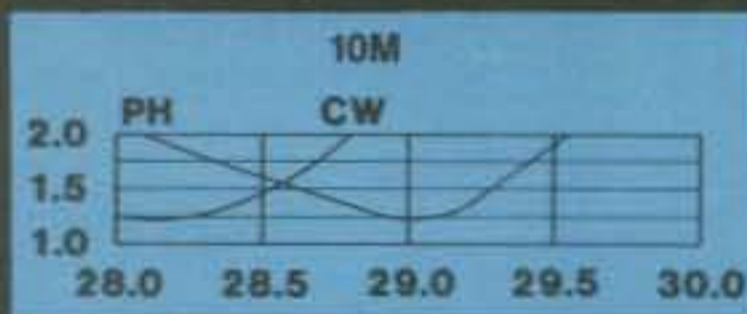
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CQ World-Wide DX Contest All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1PBW('76)	7,280	100	10	30
3.5	W1CF('78)	114,227	435	23	80
7.0	KØRF('81)	150,810	474	32	78
14	W4AXE('70) (Opr. WA4PXP)	595,725	1,068	39	156
21	N7DD('81)	923,945	1,998	36	121
28	N7DD('80)	754,536	1,730	36	113

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	5	2	3
K1AR	3.5	55	13	33
(1981)	7.0	80	20	50
3,554,880	14.0	487	35	111
	21.0	590	34	107
	28.0	977	36	116
	Total	2,194	140	420

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	7	5	5
K5GA	3.5	39	15	37
(1978)	7.0	173	21	64
4,150,306	14.0	549	39	125
	21.0	619	35	103
	28.0	1,057	33	111
	Total	2,444	148	445

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1,646	40	152
	21.0	2,198	40	144
	28.0	1,354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K1PBW('76)	22,626	157	15	39
3.5	W1ZM('81) (Opr. K1ZM)	151,497	610	22	71
7.0	KØRF('81)	337,280	949	31	93
14	N7UA('80)	626,400	1,634	34	101
21	K6EWL('81)	454,648	1,140	35	101
28	N4ZC('81)	382,182	1,048	32	99

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	8	7	8
K1GQ	3.5	208	18	61
(1981)	7.0	425	24	76
3,276,768	14.0	576	32	85
	21.0	428	31	80
	28.0	473	26	80
	Total	2,111	138	390

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	17	9	16
N4AR	3.5	67	16	62
(1981)	7.0	461	28	92
4,564,350	14.0	755	34	110
	21.0	499	33	101
	28.0	686	32	97
	Total	2,485	152	478

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	14	27
W2PV	3.5	427	18	70
(1981)	7.0	1,101	30	103
10,431,729	14.0	1,389	35	118
	21.0	1,228	35	103
	28.0	1,050	34	106
	Total	5,267	166	527

Club Record: Frankford Radio Club ('79) 173,821,640

NEWS/VIEWS OF ON-THE-AIR COMPETITION

It has been proposed by our 160 Meter Contest Director, Don McClenon, N4IN, that a change be made in the scoring of our World-Wide 160 Meter DX Contest.

With the many changes on 160 in recent years, both in the U.S. and overseas, the scoring in our contest has become a bit antiquated, and a change is justified to bring it up to date. Don has proposed the following: Contacts between stations in own country, 2 points. Between stations in another country but the same continent, 5 points. Between stations in another continent, 10 points.

The multiplier would remain as is, each state, Canadian province, DX country.

This should make the scoring more equitable world wide. The Europeans stand to gain by this change, but state-side will have a slight reduction in their scores. The losers will be stations in the Caribbean areas, but they will still have the advantage of all those 5 pointers north of them.

There will still be some inequities, but keep in mind that this is a world-wide contest and making it equal for everybody would create very complicated scoring. We would like to have your opinions and suggestions before we put this in effect for the 1983 contest.

There is still no Trophy for the World Top score in the Phone Contest. Any donors? (Please contact me, W1WY.)

It is our sad duty to report another Silent Key, Mr. 160, Charles M. O'Brien, W2EQS/W9NFC, on June 13th. Charlie was associated with our 160 C.W. Contest from its inception back in 1960, and continued as its Director until 1974 when he became W9NFC. In later years Charlie's only interest was 160, and he was one of the elite few who made DXCC on the Top Band. May he rest in peace.

A final reminder: Deadline for material for the January issue is October 15th and November 15th for the February issue. And please send it to my home address. 73 for this time, Frank, W1WY

CQ World Wide DX Contest

Phone: Oct. 30-31 C.W.: Nov. 27-28
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Complete rules were in last month's issue. Basically, they are the same as they have been for many years, so it would serve little purpose to review them again.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Oct. 2-3	California QSO Party
Oct. 2-3	VK/ZL/Oceania Phone Contest
Oct. 2-4	SWOT Open QSO Party
Oct. 9-10	VK/ZL/Oceania C.W. Contest
Oct. 9-10	GARTG SSTV Contest
Oct. 10	RSGB 21/28 MHz Phone
Oct. 9-11	SWOT Open QSO Party
Oct. 9-11	Rhode Island QSO Party
Oct. 16-17	Boy Scouts Jamboree
Oct. 16-17	Pennsylvania QSO Party
Oct. 16-17	CLARA AC-DC Contest
Oct. 16-17	ARCI QRP C.W. Contest
† Oct. 16-17	WA-Y2 DX Contest
Oct. 17	RSGB 21 MHz C.W. Contest
Oct. 20-21	YLRL Anniv. C.W. Contest
Oct. 23-24	Maryland/D.C. QSO Party
Oct. 30-31	CQ WW DX Phone Contest
Nov. 3-4	YLRL Anniv. Phone Contest
Nov. 6-7	ARRL C.W. Sweepstakes
Nov. 7	Czechoslovakian Contest
Nov. 13-14	European RTTY Contest
Nov. 20-21	ARRL Phone Sweepstakes
Nov. 27-28	CQ WW DX C.W. Contest
Dec. 4-5	ARRL 160 Meter Contest
Dec. 11-12	ARRL 10 Meter Contest

† Not official.

There are some minor modifications in paragraphs VIII, IX, and XIII. Awards will now be made to each call area in Japan. The African and a portion of the Carib./C.A. trophies are available to all comers. The disqualification clause has been rewritten and now clearly states the penalties. I suggest you read the rules again. I reviewed them last month.

Mailing deadline for the Phone entries is December 1st, and this year they go to Bob Cox, K3EST, 6548 Spring Valley Drive, Alexandria, VA 22312. They can also go to our home office, CQ magazine, 76 N. Broadway, Hicksville, NY 11801.

California QSO Party

1600-2159Z, Sat./Sun., Oct. 2-3

This year's party is again sponsored by the Northern California Contest Club.

Operating time is limited to 24 out of the 30 hour contest time for single operator stations. Off times must be clearly indicated on the log and must be at least 15 minutes long. Multi-operator stations may use the full 30 hours.

The same station may be worked once per band, per mode, simplex only. CA mobiles that change counties are considered new stations.

Exchange: QSO no. and QTH. County for

CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts, 3 points for c.w. QSOs.

The multiplier for CA is the number of states (50) and VE call areas (8) worked. Out-of-state stations use CA counties (maximum of 58 possible).

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28060. S.S.B.—1815, 3895, 7230, 14280, 21365, 28560. Novice—3725, 7125, 21125, 28125. Try c.w. on the half hour, 160 at 0500Z.

Awards: Certificates to the highest scorers in each CA county; in each state, VE province, and DX country; and to each station scoring 100 or more QSOs. Trophies to the top scoring single operator in CA and out-of-state station, and the highest scoring expedition to a CA county.

Indicate each new multiplier on your log as it is worked. Include a summary sheet showing the scoring and other information. A large s.a.s.e. will get you a copy of the results.

Mailing deadline is November 1st to NCCC, c/o Kip Edwards, W6SZN, 1928 Hillman Ave., Belmont, CA 94002.

Side Winders on Two QSO Party

Sat.—Mon., Oct. 2-4 and Oct. 9-11
0000 to 0600 UTC both weekends

This is the 5th QSO Party for the SWOT A.R.C. open to all licensed amateurs.

Single operator only, phone or c.w., no repeaters. A station is counted once only and must be made from one geographic location. Mobiles operating from more than one county must submit their highest score.

Exchange: Call, RS(T), ARRL section, and county (or equivalent). Members will also include their membership number.

Scoring: Contacts with a SWOT member count 2 points; all others 1 point. Multiply total by number of different counties worked.

There was no mention of any awards, but you can build up your county total.

It is not necessary to submit a log, but be prepared to send one if requested. However, your entry should include a detailed summary with the following information: Name, call, address, ARRL section, SWOT number, number of SWOT contacts, number of non-member contacts, total counties, and final score.

Mailing deadline is November 1st to Jerome Doerrie, K5IS, Rt. 2 Box 72, Booker, TX 79005.

Inquiries about membership should be sent to George Bretz, KB5SV, 3530 Livingston, Ft. Worth, TX 76110.

VK/ZL/Oceania DX Contest

Phone: Oct. 2-3 C.W.: Oct. 9-10
1000 GMT Sat. to 1000 GMT Sun.

Stations in the rest of the world will be concentrating on working stations in Oceania with emphasis on VK/ZL for their multiplier.

The following rules apply to areas other than VK/ZL.

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

Scoring: Two points for each VK/ZL contact; 1 point for contacts with other Oceania areas.

Final Score: Total QSO points from all bands multiplied by the sum of VK/ZL call areas worked on each band. (Single band logs also accepted.)

Awards: Attractive colored certificates to the top all-band scorers, both phone and c.w., in each country and each call area of Japan, U.S.A., and U.S.S.R. Additional awards if returns warrant.

Logs: Date/time in GMT, station worked, number sent/rec'd, band, and QSO points. Underline each new VK/ZL call area worked on each band. Use a separate sheet for each band. Include a summary sheet showing the scoring, name and address in block letters, and a signed declaration that all rules and regulations have been observed.

S.W.L. Section: Log VK and ZL stations only. Include call of station being worked and RS(T) and serial number of VK/ZL station being logged. Log and scoring same as indicated for the transmitting stations. Phone and c.w. scores are combined for the final score.

Logs must be in the hands of the Committee by January 31, 1983. This year they go to NZART Contest Mgr. ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, October 10

It's the world working the British Isles on 21 and 28 MHz in this one. There are seven countries in the British Isles: G, GD, GI, GJ, GM, GU, and GW. There is a total of 42 prefixes when the numerals are included (G2, GD3, GI4, etc.).

The same station may be worked on each band for QSO and multiplier credit. Both single and multi-operator (multi must use both bands).

Following are the rules for areas other than the British Isles.

Exchange: The RS report plus a progressive contact number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of prefixes worked on each band (maximum of 42 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed.

Logs containing more than 5 unmarked duplicates will be disqualified.

There is also an s.w.l. section. Only British Isles stations are to be logged. Scoring is the same as indicated above.

Note: In the column headed "station being worked," the same callsign may only appear once in every five contacts except when the logged station is a new multiplier for the receiving station.

Awards: There are two trophies for the British. Overseas stations will be awarded certificates to the winners in each continent.

Separate logs are required for each band. Include a summary sheet showing the scoring, a list of prefixes worked, and a signed declaration that rules and regulations have been observed, plus your name and address in block letters.

Logs from overseas must be received by December 1st. This year they go to RSGB HF Contest Committee, c/o Dr. E.J. Allaway, G3FKM, 10 Knightlow Road, Birmingham B17 8QB, England.

There were 44 overseas entries in last year's 21/28 MHz SSB Contest, of which 7 were from the U.S. and Canada. They finished in this order: VE1CEG, AE4Y, KN2N, N2LT, KA1UE, WA4VEK, and W4KO. VE1CEG was 3rd world high, and according to last year's rules should be a certificate winner. (This year's awards are made on a continental basis.)

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, October 17

Like the 21/28 MHz SSB Contest, activity in this one is between the British Isles and the rest of the world.

Competition is limited to single operator stations only. There is a separate section for QRP in which power input must not exceed 10 watts.

The following rules are for areas other than the British Isles.

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

Scoring: Each contact with a British Isles station is worth 3 points. Multiply total QSO points by the number of B.I. prefixes worked—G2, G3, GD3, etc., a maximum of 42 possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

Awards: Certificates to the 1st, 2nd, and 3rd place winners in the British Isles and to leaders in each overseas continent.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs from overseas must be received no later than December 31st. This year they go to Mr. J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, B95 5NW, England.

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The 21 MHz 1981 CW Contest had a much better turnout, 116 entries, but only 4 were from this side of the pond. They finished in this order: K2PZ, VO1AW, W1CNU, and W1OPJ, none of which qualified as certificate winners under last year's rules. K2PZ placed #23 world wide. (Awards will also be made on a continental basis for this contest.)

GARTG SSTV Contest

0600 to 0600 UTC, Sat.-Sun., Oct. 9-10

This is the third world-wide SSTV contest sponsored by the German Amateur Radio Teleprinter Group.

Use all bands, 3.5 through 28 MHz, in that portion of the band reserved for SSTV. A 6 hour off time must be taken at any time during the contest.

Exchange: Call sign, RST, message number (001, etc.). GARTG members will also include their membership number. Exchange must be made exclusively in the SSTV mode.

Scoring: Contacts on 80, 40, and 20 meters, 1 point; on 15 meters, 2 points; and on 10 meters, 5 points. Add 50 bonus points for each contact with a GARTG member station. Same station may be worked on each band.

Multiplier: Each country (WAE and ARRL list) and each call area in JA, PY, VE/VO, VK, W/K worked on each band.

Final Score: QSO points \times countries \times continents plus bonus points.

There is also an s.w.i. division with the same scoring as outlined above. S.w.i. logs must contain both the report sent and received by the station logged.

Awards: Free 1 year subscription to "RTTY," official organ of the GARTG, to the 3 top scorers.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc.

All entries must be received by December 10th and go to Contest Manager, Wolfgang Punjer, DL8VX, P.O. Box 90 11 30, D-2100 Hamburg 90, Fed. Rep. of Germany.

Rhode Island QSO Party

1700 to 0500 GMT Sat.-Sun., Oct. 9-10
1300 to 0100 GMT Sun.-Mon., Oct. 10-11

This one is sponsored by the East Bay A.W.A. The same station may be worked on each band and on each mode. R.I. stations may contact other in-state stations for QSO points.

Exchange: RS(T) and QTH. City or town for R.I.; state, province, or country for others.

Scoring: Phone contacts are worth 2 points, C.W. 3 points, and Novice/Tech. 5 points.

R.I. stations multiply total QSO points by the number of states, VE provinces, and DX countries worked. Others by the number of different R.I. cities and towns

worked for their final score. (There are 39 cities and towns in R.I.)

Frequencies: C.W.—1810, 3550, 3710, 7050, 7110, 14050, 21050, 21110, 28050, 28110. Phone—3900, 7260, 14300, 21360, 28600, 50.110, 144.2, and 146.52. Use of FM simplex encouraged. (No repeaters.)

Awards: Certificates to top scoring stations in each R.I. county, and each state, province, and country. Also to the winning Novice and Technician in R.I. and out of state. And to the club in each state, province, and country with the highest aggregate score (minimum of 3 logs per club).

Include a summary sheet showing the scoring the other essential information, and an s.a.s.e. for a copy of the results.

Mailing deadline is November 15th to East Bay A.W.A., P.O. Box 392, Warren, RI 02885.

Scouts Jamboree On The Air

Starts: 0001 Local Time Sat., Oct. 16
Ends: 2359 Local Time Sun., Oct. 17

This is the 25th annual Jamboree sponsored by the World Bureau of Scouts celebrating the 75th anniversary of its founding. Activity is world wide and includes not only Scout units, but Girl Scouts and Guides, too.

This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings.

Amateurs can invite members of Scout units or individuals to visit their stations or clubs and see how ham radio operates. If you do not know any radio amateurs, write to: ARRL, Att: Carol Colvin, AJ2I, 225 Main Street, Newington, CT 06111, and Carol will help you find a nearby ham (include an s.a.s.e.).

No specific exchange, no scoring, and no logs are required. However, participating post-card-size certificates issued by the World Scout Bureau are available from the JOTA Coordinator, W2GND/K2BSA. They may be requested before the JOTA weekend for distribution and included with your QSL's of JOTA contacts. Send a large s.a.s.e. to W2GND; 20¢ postage for 8 cards, 17¢ for each additional 8.

Suggested Frequencies: Phone—3940, 7240, 14290, 21360, 51150. C.W.—3590, 7030, 14070, 21140, 28190. Also Novice bands, SSTV, and RTTY.

There is also a QSL card contest. Suggest you write to W2GND for additional details. Stateside participants send reports to Harry A. Harchar, W2GND, 216 Maxwell Ave., Hightstown, NJ 08520.

Pennsylvania QSO Party

1700-0400Z Sat.-Sun., Oct. 16-17
1300-2200Z Sun., Oct. 17

This is the 25th annual party sponsored by the Nittany A.R.C. of State Col-

lege, PA. The same station may be worked on each band and mode for QSO points. Penn. stations may also work other Penn. stations for QSO and multiplier credit. Mobiles may be worked in each county change.

Exchange: RS(T), 3 digit QSO number, and QTH. County for Penn.; ARRL section for others.

Scoring: One point for s.s.b. contacts, 1.5 points for c.w., 2 points for c.w. on 80.

Penn. stations multiply total by ARRL sections + Penn. counties + 1 DX country worked. Others use Penn. counties for their multiplier (maximum of 67).

Penn. mobiles calculate their total score from each county and add totals for their final score. Stations on county lines will give out one number, but the two counties count as separate multipliers.

Frequencies: C.W.—40 kHz up from bottom of each c.w. band. S.S.B.—3980, 7280, 14280, 21380, 28580. Novice—10 kHz from bottom of each Novice band.

Awards: Certificates to section winners and to the top 10 Penn. stations (minimum of 10 QSO's). Plaques to winners in both eastern and western Penn., out of state and mobile stations, and multi-operator entry. (Top club?)

Include a summary sheet with your entry showing the scoring, check list of counties or sections worked, and any interesting comments. A dupe sheet is required if you make 100 or more contacts. Also, enclose 37¢ in stamps for a copy of the results.

Mailing deadline is November 15th to Douglas R. Maddox, W3HDH, 1187 S. Garner Street, State College, PA 16801.

C.L.A.R.A. AC/DC Contest

Starts: 1800Z Sat. October 16
Ends: 1800Z Sun. Oct. 17

Sponsored by the Canadian Ladies Amateur Radio Assoc., this contest is open to both YL's and OM's.

Each station may be worked twice, once on c.w. and once on phone, or on two different bands, c.w. or phone.

Exchange: RS(T), QTH, name, and call.

Scoring: For CLARA members, 1 point per QSO, (YL or OM) 3 points for each contact with a bonus station. (YL's will identify if they are a bonus station.)

Non-members work YL stations only. Scoring same as above.

Multiply total QSO points by number of Canadian provinces/territories worked.

Frequencies: Phone—3775, 3900, 7150, 14160, 14280, 21300, 28488, 28588. C.W.—3690, 7035, 14035, 21035, 28035.

Awards: CLARA winners, first place, CLARA pin and certificate. Second and third place winners a certificate. Non-member winners, first place, plaque and certificate. Second and third place certificates (YL or OM). All entries are eligible for a mini prize drawing.

Mailing deadline for logs is December

31st to Lynn Boothroyd, VE3LQL, 673 Tackaberry Dr., North Bay, Ontario, Canada P1B 8R1.

ARCI QRP C.W. Contest

Starts: 1200Z Sat., October 16
Ends: 2400Z Sun., October 17

This is the Fall edition and 21st anniversary of the QRP Amateur Radio Club International. The contest is open to members and non-members. Participants may operate a maximum of 24 hours.

Exchange: RST and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with a member count 5 points, with a non-member 2 points, with stations other than W/VE 4 points, with Novice/Techs. 3 points.

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

There is a power multiplier:

- 4 to 5 watts output— $\times 2$.
- 3 to 4 watts output— $\times 4$.
- 2 to 3 watts output— $\times 6$.
- 1 to 2 watts output— $\times 8$.
- Less than 1 watt— $\times 10$.

The following bonus multipliers are also available: $\times 2$ is using solar or wind power, $\times 1.5$ for battery power. Must be used for duration of contest.

Final Score: Total per band score. QSO points \times (states + provinces + countries) \times power multiplier \times bonus multiplier if any. Add totals from each band worked for final score.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice—3710, 7110, 21110, 28110. VHF/UHF contacts must be made direct.

Awards: Certificates to the highest scoring stations in each state, province, and country, and to the top overall Novice or Tech.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information, and a large s.a.s.e. for copy of the results.

Logs must be received by November 20th and go to William Dickerson, WA2JOC, 352 Crampton Dr., Monroe, MI 48161.

WA-Y2 DX Contest

Starts: 1500Z Sat., October 16
Ends: 1500Z Sun., October 17

This activity is usually held the third full weekend of October each year to commemorate the anniversary of the founding of the German Democratic Republic.

Use of all bands, 3.5 through 28 MHz, both phone and c.w. However, the first 10 and last 25 kHz of all bands are to be kept free of contest operation.

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

There are three classes: single operator, multi-operator, and s.w.l.

Exchange: RS(T) plus a 3 figure QSO number starting with 001. The Y2 stations will also include 2 figures identifying their district (Kreiskenner).

Scoring: Each Y2-Y9 contacted is worth 3 points.

Multiplier: Number of different districts worked on each band (maximum of 15 per band). A district is identified by the last letter in the call, A through O, not by the number in the call.

Final Score: Sum of QSO points multiplied by sum of different districts worked on each band.

S.w.l.'s get one point for each Y2-Y9 reported, including the RS(T), district, and call of station being worked. Rest of scoring same as above.

Awards: Certificates to the top scoring stations in each section of each country.

Use a separate log sheet for each band and include a summary sheet showing the scoring, a list of districts worked, the usual signed declaration that all rules and regulations were observed, and your name and address in block letters.

Entries must be postmarked no later than 30 days after the contest. They go to Y2 Contest Bureau, RKDDR, Hosemannstr. 14, DDR 1055 Berlin, German Democratic Republic.

YLRL Anniversary Party

C.W.: Oct. 20-21 Phone: Nov. 3-4
1800 to 1800 GMT Wed./Thurs.

This is the 43rd annual party run by the YL Radio League, and it is open to all YL's around the world.

All bands may be used. Phone and c.w. are separate contests and require separate logs.

Exchange: QSO no., RS(T), and ARRL section. DX stations indicate country.

Scoring: One point per QSO between stations within an ARRL section and between DX stations. Two points if QSO is between a DX and ARRL section station. The same station may be worked once only regardless of the band.

Multiplier: Is derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on c.w., 300 watts p.e.p. on s.s.b.

Final Score: Total QSO points times ARRL sections and DX countries worked, times the power multiplier.

For each duplicate contact that is removed from the log in the course of checking, a penalty of 3 additional and equal contacts will be exacted.

Awards: Only YLRL members are eligible for the Cup and the Corcoran and Hager Awards. Non-members will receive certificates.

Logs must be postmarked no later than November 14 and received by December 15th. This year they go to Sandi Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

1981 VK/ZL Contest Results

C.W. U.S.A.		S.S.B. U.S.A.	
W0KEA	AB 12,396	W0KEA	AB 22,211
W1EVT	" 10,793	AI9J	" 16,531
AI9J	" 8,064	K6BPY	" 11,565
W8UVZ	" 7,747	WB9MSV	" 3,676
WB4RUA	" 5,280	K8CFU/4	" 3,510
K9PQG	" 5,148	N2LT	" 3,063
N2LT	" 4,582	N4MM	" 2,600
K9GM	" 4,088	LU3YL/W4	" 2,244
W5OB	" 3,416	K9AB	" 1,170
K9AB	" 2,992	W4PTT	" 1,036
W6MYP	" 1,600	K3ND	" 900
AI6Z	" 1,600	W8UVZ	" 648
W6NNV	" 1,440	W3ARK	" 594
W1END	" 1,280	W3ICM	" 154
K2LP	" 988	K8VIR	20 2,160
W3ARK	" 728	KF1B	" 60
AA6EE	" 702	W9QWM	10 238
W3TV	" 480	KD4PP	" 140
W9QWM	" 440		
N0CKC	" 240		
WA0TKJ	10 280		
		Canada	
		VE7WJ	AB 3,902
		VO1AW	20 40
		Columbia	
		K3ZO/HK3	AB 1,892
		Panama	
		HP1AC	AB 912
		Columbia	
		K3ZO/HK3	AB 884
		Argentina	
		LU1EWL	AB 40

Winners are not indicated, but according to the rules, the leaders in each call area should receive a certificate.

Maryland/D.C. QSO Party

1800Z Sat. to 2100Z Sun., Oct. 23-24

This year's party is once again being sponsored by the Columbia A.R.A. of Maryland.

The same station may be worked on each band and mode for QSO credit, and MD/DC stations can work other in-state stations.

Exchange: QSO no., RS(T), and QTH. County for MD/DC; state, province, or country for others. (Baltimore and Wash. are independent cities.)

Scoring: MD/DC stations multiply total QSO's by sum of MD counties, states, provinces, and DX countries worked. Others multiply total MD/DC QSO's by MD counties and independent cities worked (maximum of 25).

Multiply your final score by 1.5 if you run 200 watts or less.

Frequencies: C.W.—60 kHz up from low end of band. Phone—3950, 7250, 14290, 21390, 28590. Novice—3720, 7120, 21120, 28120.

Awards: Certificates to winners in each category.

Dupe sheets are required for entries with over 200 contacts. Maintain a continuous log for phone and c.w., and indicate which category on your entry—phone, c.w., or mixed mode—you are entering.

Mailing deadline is November 30th to Columbia A.R.A., Att: Robert K. Nauman, WA3VUQ, 4017 Font Hill Drive, Ellicott City, MD 21043.

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1982 CQ World Wide DX Contest will be held on the following dates:

Phone Section: 0000 GMT Sat., Oct. 30–
2400 GMT Sun., Oct. 31
C.W. Section: 0000 GMT Sat., Nov. 27–
2400 GMT Sun., Nov. 28

For the 32nd consecutive year, this month's Propagation column is devoted to a special, comprehensive forecast for use during the Contest sections, both Phone and C.W.

Looks Great for the Contest

Unless nature plays a last-minute trick in the form of a radio storm, this should be another great Contest period. Sunspot activity, while on the decrease, is expected to be in the 115 range. While this is lower than the levels observed during the 1979–81 Contest periods, it is still in the exceptionally high range. Because of the non-linearity of the ionosphere during exceptionally high periods of solar activity, conditions on the h.f. bands this year should be quite similar to those observed during the Contest periods of the past four years. In short, barring the development of a radio storm, get ready for another exciting DX contest.

Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot numbers, reports a monthly mean sunspot number of 110.4 for June 1982. This results in a 12-month running smoothed sunspot number of 138, centered on December 1982. This is a decline of one unit from November's reading. The sunspot cycle is measured by the value of smoothed sunspot number.

Band-by-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected on each amateur h.f. band from mid-October through mid-December, and centered on the 1982 Phone and C.W. Contest periods. For a more detailed circuit-by-circuit forecast, refer to the DX Propagation Charts appearing on the following pages.

10 meters: Good, solid openings should be possible to just about every corner of the world during the daylight hours, and the band may remain open to southern

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1982

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 10, 20-21, 28	A	A	B	C
High Normal: 7-8, 14, 17, 19	A	B	C	C-D
Low Normal: 4-6, 9, 11-13, 16, 18, 22-24, 26-27, 31	A-B	B-C	C-D	D-E
Below Normal: 2-3, 15, 25, 29-30	B-C	C-D	D-E	E
Disturbed: 1	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 poor to blackout (D-E) on Oct. 1st, fair-to-poor (C-D) on the 2nd and 3rd, good-to-fair (B-C) from the 4th through the 6th, etc. Some radio storminess is expected during a part of the Contest period (Oct. 30–31), with conditions varying between low and below normal.

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

and tropical areas into the early evening. DX openings should begin an hour or so after sunrise, towards Europe, Africa, and the east, as well as in a southerly direction towards the Caribbean and Central and South America. Signals should peak in intensity towards Europe and the east an hour or so before Noon, towards Africa about an hour or so after Noon, and towards the south during the late afternoon. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening hours. Exceptionally strong signal levels can be expected on many openings, particularly when conditions rise to High or Above Normal.

15 meters: This band should be jumping with signals during most of the daylight hours. Excellent propagation conditions are expected from shortly after sunrise through the early evening hours. The band could remain open well into the evening towards southern and tropical

areas. Peak openings should occur towards a specific geographical area about an hour or so after the peak has occurred to the same area on 10 meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. Fifteen meters is likely to be the best DX band during the daytime hours, but at times it will be a toss-up with 10 meters.

20 meters: Expect good-to-excellent DX openings almost around the clock. Signals should peak from all directions for about an hour or two after sunrise and again during the late afternoon and early evening. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are High Normal or better, the band should remain open for DX during most of the night. Expect long-path openings on this band for about an hour or so after sunrise and again for an hour or so before local sunset. Signal levels are expected to be exceptionally strong during peak propagation periods on 20 meters. This should be the band that will produce the longest period for DX openings, the strongest signals, and openings to more areas of the world than any other single band during the Contest periods.

40 meters: This should be a prime DX band during the hours of darkness as summer static fades into oblivion. DX openings should begin during later afternoon, continue through the hours of darkness, and last until an hour or two after sunrise. The band should open first for DX towards Europe and the east during the late afternoon. Signals should increase in intensity as darkness approaches. During the hours of darkness expect good DX openings to most areas of the world. Signals should peak from an easterly direction about midnight, and from a westerly direction just after sunrise. Excellent openings towards the south should be possible throughout most of the nighttime period. Forty meters is likely to be the best band for DX during the hours of darkness, although at times it may be nip and tuck with 20 meters for this honor.

80 meters: While not quite as good a nighttime band as 40 meters, expect some good DX openings on this band to many areas of the world during the hours of darkness. The band will open later, close earlier, and be somewhat noisier than 40 meters. Signals should peak towards Europe and the east around midnight, and towards the west just before

11307 Clara St., Silver Spring, MD 20902

sunrise. Expect good openings towards the south throughout most of the night.

160 meters: Considerably decreased static levels and longer hours of darkness in the Northern Hemisphere should welcome back DX openings in this band during the hours of darkness and into the sunrise period. Because of relatively high signal absorption and the lower power levels used in this band, openings will often be weak and noisy, but some fairly good ones should be possible. Best bets are for openings towards Europe and towards the Caribbean and Latin America from the eastern half of the country, and towards the Far East, Australasia, the South Pacific, and Latin America from the western half of the country. DX openings to other areas of the world may also be possible. The best propagation aid for this band (and for 40 and 80 meters as well) is a set of sunrise and sunset tables, since DX signals tend to peak when it is *local sunrise* at the *easternmost* point of a path.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from 6 through 160 meters is expected to open from each time zone area in the continental USA to the major DX areas of the world. The information contained in the charts, while useful during the Contest period in their present format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules. Experience gained during previous Contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

The following is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the Contest periods, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending upon the storm's severity. The storm's influence will generally extend outwards from the polar regions, the more severe the storm becomes. Under storm conditions, expect considerably fewer openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper

Time EST	Optimum Band (Meters)	Areas To Which Band Is Expected To Be Open
00-02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02-04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04-06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06-08	20	Most of Europe. South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08-10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10-12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12-14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14-16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16-18	20	Most of Europe, Eastern Mediterranean, and the Middle East. All of Africa, and Central and South America. A few Australasian areas.
18-20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20-22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22-00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

**Similar work plans can be devised for single-band operation or for openings to specific DX areas.*

Table 1- Sample multi-band work plan for Eastern USA QTH. *

latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on 40, 80, and 160 meters are likely to become erratic as well. During certain types of storms, conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on 40, 80, and 160 meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on 10, 15, and 20 meters during the daylight hours. Check the 40, 80, and 160 meter bands for possible openings to some areas of the world during the hours of darkness.

A Last Minute Forecast made at press time for the Phone section of the Contest appears at the beginning of this column. A similar forecast for the C.W. section will appear in next month's column. For updated geomagnetic and solar data during the Contest period, check the National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts (transmitted simultaneously on 2.5, 5.0, 10.0, 15.0, and 20.0 MHz) contain the latest available geomagnetic K-figure and the level of 10.7 cm solar flux. They also contain a short-term forecast of geomagnetic and solar conditions given in subjective terms. Fig. 1 can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected h.f. ionospheric conditions. The hourly forecasts broad-

cast on WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning 303-497-3235 at any time. This is a service provided by the NOAA Space Environment Services Center, but the call is not toll-free. Direct inquiries to the duty forecaster at the Center can also be made 24 hours each day, 7 days a week by calling 303-497-3171 (collect calls will not be accepted).

Updated day-to-day forecasts for the h.f. bands, made three weeks in advance, can be obtained through the MAIL-A-PROP subscriber service. For further information and subscription fees contact MAIL-A-PROP, Dr. David D. Meisel, 54 Westview Crescent, Geneseo, NY 14454.

V.H.F. Ionospheric Propagation

October looks like a good month for ionospheric propagation on the v.h.f. bands. The continuing high level of solar activity, along with seasonal changes in the ionosphere, should produce some fairly good DX openings on the 6 meter band during the daylight hours. The best times for such openings, and the areas of the world to which they may be possible, are shown in the accompanying DX Propagation Charts with a **. Generally speaking, openings from the eastern half of the country towards Europe and Africa may be possible before noon. The best chance for 6 meter openings towards the Caribbean and Central and South America from all areas of the USA should be from

October 15 - December 15, 1982
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3)† 11-15 (2)† 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	15-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-02 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

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

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

HOW TO USE THE DX PROPAGATION CHARTS

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

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

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

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

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

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

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

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

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

October 15 - December 15, 1982
Time Zone: PST (24-Hour Time)
WESTERN USA TO:

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

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

*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 Propagation Index of (2), or higher.
†Indicates best times to check for 6 Meter F-2 layer DX openings. While such openings will not occur frequently, some may be possible when day-to-day conditions are HIGH NORMAL or better.

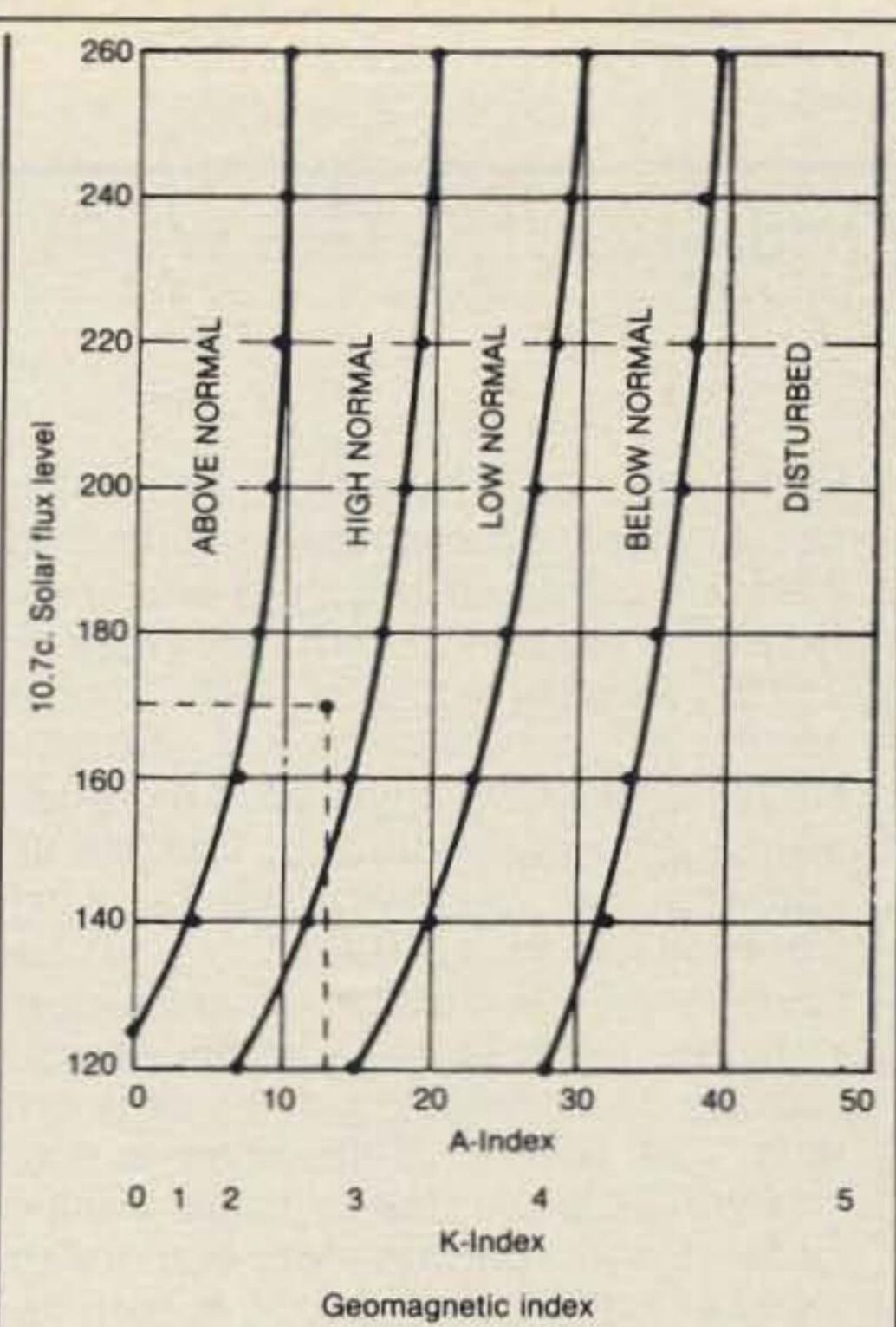


Fig. 1 - Intersection of given values of solar flux and geomagnetic activity determine expected h.f. ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal condition.)

an hour or two after sunrise through the early afternoon. In the western half of the country, look for openings towards the South Pacific, Australasia, and the Far East during the late afternoon hours.

Trans-continental and 6 meter openings over shorter distances are also expected during October and the fall and winter months. Check for such openings during the early afternoon hours.

Orionoids, a major meteor shower, is expected to begin around October 20th

and last for about two days. Expect as many as 25 meteors an hour to enter the earth's atmosphere during the peak of this shower. This should make possible some fairly good meteor-type ionospheric openings on the v.h.f. bands.

There is usually a seasonal increase in auroral activity during October. This should result in an increased number of auroral-scatter-type openings on the v.h.f. bands. There are also increased chances for short-skip sporadic-E propagation during periods of auroral activity, particularly on 10 and 6 meters. Check the Last Minute Forecast appearing at the beginning of this column for the days that are expected to be Below Normal or Disturbed. These are the days upon which auroral activity is most likely to occur during the month.

C.W. Contest Forecast

This month's DX Propagation Charts are valid for both the Phone and C.W. sections of the 1982 Contest. Be sure to keep them handy for use during next month's C.W. section as well. Short-skip Propagation Charts for use during October appeared in last month's column.

More radio amateur activity in more areas of the world takes place during the CQ World Wide DX Contest than at any other time. For this reason, the Contest offers an excellent opportunity to verify the accuracy or inaccuracy of the CQ Contest predictions and forecasts. Reports received from participants in previous Contests have contributed significantly to improving these predictions during the past 31 years. Comments or observations concerning this year's Contest would be appreciated, and should be sent directly to me, W3ASK. Good luck in the 1982 Contest!

73, George, W3ASK

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To get the beam of some medicinal star;
Or in your anguish run
The gauntlet of all zones to an ultimate one.
Fever and chill punish you still,
DX has no zone to work against your will...*

One of the better things about newly minted DXers is that usually they are devoid of any question but to ask where the DX is. But let them work a handful, maybe even gain the DXCC status, and they are filled with questions. These can be trying times to any ancient DXer within reach. Perhaps even to those not too ancient. Last week one was up the hill to ask some questions. Some of the questions had been asked before.

"Tell me something," this QRP DX type asked, "isn't there a bit of inconsistency in the DXCC country list criteria, and do you think we might ever run out of new DXCC countries?" We were thinking that is was almost inevitable that this one would come with his questions; we had recently seen his call listed as a new DXCC member. One always gains status when gaining membership in the DX Century Club. Only the deserving are found there. But for now we had before us a couple of sticky questions; we thought that we could answer them. But, then again, we sometimes suspect that perhaps the years may provide the answers but not the solutions. So we asked, "Inconsistencies? Like what?"

It was evident that this QRP had come prepared. "Well, how about some of the ZL-islands such as Chatham and Auckland? Seems that when I measure the distance, these islands are only about 300 miles offshore. How come they count as DXCC countries when Bounty Island, which is just about as far from New Zealand, does not? Isn't that an inconsistency? And how about Jarvis Island? And come to think of it, how about . . . ?"

We were holding up our hands at that point, for we suspected that the how-abouts might be long and we wanted to take them one or two at a time.

"You will have to understand," we cautioned, "that DXing is a thing both ancient and honorable. For sure, there is

nothing else within amateur radio which has an older or more revered past. And there are still some among us who knew Guglielmo Marconi, Hiram Percy Maxim, and the young Sam Canter. And in DXing, ancient and honorable as it is acknowledged to be, there is the even more ancient and honorable tradition that tells us that what was will always be, that what you once had for a DXCC counter will be yours forever, and that what was proper in the past will be eternally proper, though possibly inconsistent with current criteria." We paused at this point to note how the QRP was taking things, leaning close to ask, "Certainly you can understand all of that, can't you?" Apparently from the look on his face he did not, but we had no intention of letting him off easily. One must always be vigilant and wary of any possible heresy which might diminish one's DXCC total. And any new DXCC type must learn sometime that the road to the Honor Roll is strewn with rocks and ruts and pitfalls, and at this time we were going to chart a few for him.



Georges, F2CL, who now is making the very rare Crozet Island available to the multitudes as FB8WG. QSL's go to Georges de Marrez, Santa Severa, 20228 Lurt, France. (Photo via Jack, W2LZX)

"As for those islands off the coast of New Zealand," we continued, "the answer is very simple. Your current Rule 2-B of the Country Criteria was written in 1963. Before that time a 225 mile rule applied to all offshore islands, 225 miles being the required offshore distance from the mainland for a country to qualify for DXCC country status. To answer your question, before 1963 Chatham, Kermedec, Auckland, and Campbell were DXCC counters because there had been amateur operations from those islands. There had not been any operation from Bounty Island. So when 2-B was added in 1963 to delineate things a bit further, it became necessary that there be 500 miles between islands in an island group to qualify for additional DXCC status. But as Auck-

land, Chatham, Kermedec, and Campbell Islands were already on the DXCC country list, they were grandfathered into the system. They qualified then; they would not qualify now. But Bounty had not qualified then because of no amateur operation; it cannot qualify now. Isn't that rather simple to understand? And the same applied to Jarvis and a lot of other islands.

"And it was further decided," we continued, "that actually New Zealand is really an island group and should not be considered the mainland. You must keep in mind that an island is a body of land smaller than a continent and surrounded by water. Conversely, a continent is a body of land larger than an island surrounded by water—Europe for example." We thought for a moment. "Better make that Asia . . . or better yet, South America. Wait! Let's say Australia. That one certainly is too big for an island, although a bit on the small size for a continent."

We were feeling pretty good about ourselves at this point, for we were thinking that we had been a bit dazzling with our display of obscure and abstruse DX knowledge. But hardly dazzled was the QRP. His eyes were blank, his jaw hung slack. We shook him gently. "Awake!" we said. "Do you understand all of that?" We were hoping for the best, but all we got was a blank look.

"Maybe it will come to me later," he said, "maybe much later."

For awhile we thought that things might be looking bleak for the future of DXing, but hardly a minute had passed before he recovered and was back at us. "But what good is the criteria if it is not always applied equally," he demanded. "It is inconsistent, I say, and I just don't understand how you can stand there and try to explain it as being all right." He was leaning closer to lend emphasis to his words. "And a bit glibly, I might add," he continued.

If we were not DXers it might have been possible to take offense at the tone of his voice, but we did not. We just moved in a bit closer to work on converting him, for we knew that any new DXer once converted stays converted forever.

"How come you haven't mentioned 4U1ITU?" we asked, "and how about 4U1UN and 1A0KM? You've worked those, haven't you? And are you now saying that to be always consistent you are willing to give up those counters?" The results were immediate. His face flushed and his voice broke with agitation.

"Heck no!" he declared vehemently.

77 Coleman Dr., San Rafael, CA 94901

The WPX Program

Mixed

990 JF1SLN 992 KC0CP
991 JA3IEF 993 WB5BIR

S.S.B.

1507 OE1WO 1511 I7IEH
1508 JR6LLN 1512 GI4NKE
1509 WD8IDD 1513 XE1AZ
1510 Y26DO 1514 K8ZZW

C. W.

2153 K2PK 2156 DL3DD
2154 KC2PL 2157 K9AYK
2155 DF5UT 2158 EA7AJY

VPX

226 IN3-59358

Endorsements

Mixed: 450 N3KR, OE1WO, 500 OE1WO, 600 WB3DNA, 700 VE2FOU, 750 W9RY, YU2CQ, 800 KO8T, OE1KJW, YU2CQ, 850 W2KE, 900 IT9QDS, 1050 I2DMK, SM6ID, YU2CAL, 1100 SM6ID, 1950 YU4HA, 2000 YU4HA.

S.S.B.: 350 JR6LLN, XE1AZ, OE1WO, 400 K8ZZU, 450 JA9DDM, VE1ACK, K8ZZU, 500 W3ARK, 550 W3ARK, 600 W3ARK, 750 IV3YRN, DF7QD, 800 IV3YRN, 850 W3YRN, VE1YX, 900 I1HAG, 950 PY3BXW, KC4OV, 1000 WA1JMP, PY3BXW, 1050 WA1JMP, PY3BXW, 1550 I8KDB, 1800 K2POA.

C.W.: 350 K2PK, DF5UT, SM5DAC, DL3DD, K9AYK, 400 K2PK, DF5UT, DL3DD, K9AYK, SM5DAC, 450 K2PK, DL3DD, W6JIE, 500 K2PK, DL3DD, DL9FM, GM3YTS, 550 K2PK, DL9FM, AG5C, GM3YTS, 600 K2PK, DL9FM, AB4D, GM3YTS, 650 AK9Z, 750 K9WA, 800 K9WA, WA1JMP, 850 K9WA, W1DMD, 900 K9WA, K9UE, 950 DL7MQ, 1550 N6JV.

10 meters: GW3SB, W3ARK, DF7QD, KL7AF.
15 meters: VE2FOU.
20 meters: WA2CNF, XE1AZ.
40 meters: UB5-0683.
160 meters: W4BQY, UB5-0683.

Asia: W6MUL, OE1WO.
Europe: K9AYK, Y26DO.
No. America: OE8MOK.
So. America: KA3A.

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

"I've got just 102 countries worked, and if I should lose those three I'd probably be off the DXCC listing. I worked hard for those countries and my DXCC certificate, and no one is going to get even one away from me without a fight. Never!" There was hardly anything else we could say on the matter. This one certainly looked as if he had been converted.

Most DXers have run this track somewhere along the way, and sometimes you will note the reaction of this QRPer in others. When one is young, DX or otherwise, there are a number of things to bring on an attack of righteous indignation. But when one gains in the accumulation of the years, wisdom often comes. And though the inconsistencies may bring some questions at times, usually the reason will be realized with time. And when the reason is known, who would want to change what so many have cherished over the years?

As has been said before, DXing is a state of mind in a moveable feast. DX and DXing are full of tradition, and few if any DXers would be willing to give up even a deleted country without a fight. Those who may come late to the feast should

honor and revere the traditions. For one thing, anyone late on the scene will find scant fraternalism extended when an argument is made that some of our DXCC counters are less than 24 carat in purity.

But we still had the QRPer on our hands and even though he may not have welcomed or understood all the answers, he was still one who came seeking some clues to the Eternal Enigmas of DXing.

"Look at it this way," we said, trying anew. "It has been said that he who has many has no excess and he who has little will never lack. And as for running out of new DXCC countries, they never have and probably never will. Don't ask why. Just remember that that is the way it has always been, and that is the way it will always be. And that is a DX tradition!"

JH1WKS/J2IX

Back in the May issue we ran an item about JH1WKS, Chiyono Suzuki. Along came Bill Chambers, W7BYK, with an excerpt from the old 'R9' magazine and in the 1934 issue there was Suzy, even then working DX on 40 meters. The article back almost 50 years said that Suzy was then the only YL amateur in Japan.

Suzy was the sister of J1DN, who was a well-known JA DXer back a half century; he unfortunately became a Silent Key early in the thirties in a typhoid epidemic. Still active on the DX bands, many have worked Suzy on c.w., her preferred mode.

BY1PK

Kan Mizoguchi, JA1BK, was in China last May. Kan represented the JARL in a visit to Beijing and the China Ministry of Communications. One objective of the visit was to get more activity from BY1PK for the deserving. Kan advised the Chinese authorities that there were at least 50,000 anxious DXers lined up and waiting to work BY1PK.

JA1BK was on the West Coast after his China trip. He was here attending the annual Semiconductor Show in San Mateo. Kan reported that he visited some of the pre-war operators, including XU8TC, during his Beijing visit. A visit was made with the current operators at BY1PK and suggestions were made to help increase the QSO rate. This included operating contest style and aiming for a QSO rate of around 300 per hour and spreading the listening area out, possibly up to 50 kHz.

Kan reported in May that only three of the seven operators initially chosen for training were qualified operators, these being Tong, Guo, and the YL Jiao. Operations up to the time of the visit had been only on c.w.; the JA's donated two electronic keyers, but if and when they would be put into use was not known. The presently qualified operators will be moving out to other provinces to put other stations on the air and to train more operators. Call letters will be similar to that cur-

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This is Tong, one of the operators at BY1PK. This photo was taken by JA1BK, Kan, during his visit to the Ministry of Communications in Beijing in May. Kan was seeking to help bring increased activity from mainland China and to offer any needed technical assistance to the BY amateurs. (Photo via JA1BK)

rently heard: 'B' the China prefix, 'Y' indicating a club station, the number for the province, and the last two letters for the city in which the station is located.

Sometime soon, possibly this month, a new building in Beijing will be completed for use by BY1PK, and a move will be made from the initial facilities. The new building is expected to have two rotary beams going shortly after the station is moved to the new quarters.

The equipment in use during Kan's visit was a Yaesu FT-107 transceiver with a Dentron MLA 20006A KW amplifier. This setup caused some t.v.i. with the station operating full-bore, so power has been reduced to around 400 watts. The station also has a Kenwood 600 all-band receiver and a Chinese-built all-band receiver resembling a recent RCA model. BY1PK is using a TH6DX for the higher frequencies with a cage antenna for 40/80. As of the time of Kan's visit, there was no v.h.f. or u.h.f. activity going in China.

The present operating frequencies available for Chinese amateurs were given as: 3.5-3.6 MHz, 7.0-7.1, 10.0-10.150, 18.0, 24.0, and 28.0-29.7. This list does not show the 20 meter band nor the 15 meter band, both of which have seen c.w. activity by BY1PK. So it may be best to use it for guidance while watching for 20/15 meters around 50 kHz above the band edge or a bit lower. S.s.b. apparently is not used because the operators are not skilled in the English language, and thus c.w. is expected to be the mode for some time to come. Some reports say s.s.b. may be heard early next year.

Various sure-fire QSL routes are given, so there is a choice. The address of the station is Box 6106, Beijing, People's Republic of China. Some recommend enclosing two IRCs because of the postage rates, although one IRC is supposed to be good for one first class mail rate in all countries of the world. As opportunities such as this are welcomed by Slim, he

has been more than active in this instance. Send a card for a Slim contact and you get a nice picture postcard in return, this to soften the message that you worked the ubiquitous one.

Whatever the problems, the signs are that BY1PK may be around for some time, although late in June some reports said that the station went QRT in April, and others said that they worked the station in May. Kan did feel that the signs are good and amateur stations will be heard from the Peoples Republic of China in increasing numbers.

Prefixes—Brazilian Islands

LABRE, the Brazilian amateur society, recently announced a new table of allocations for the Brazilian off-shore islands. The new table also provides for license class identification. Brazil has license classes of A, B, and C.

The islands and their suffixes are Fernando de Noronha, PY0F; Martin Vaz, PY0M; Atoll de Rocas, PY0R; Sao Pedro/Sao Paulo, PY0S; Trindade, PY0T.

Not all of these are DXCC counters, but the alert and deserving types will find the counters easily. For classes A and B, the call will be the island identifier followed by one or two letters. PY0SAA, for example, will identify the island as well as the class of license. For class C there is a reversal with either W, X, or Y following the 0 and then the identifier letter for the island (PY0WT for Trindade).

Visitors to Brazil looking to operate from any of the islands should forward an application to LABRE (Liga de Amadores Brasileiros de Radio Emissao), CP 07004, CEP. 70000 Brasilia, DF Brasil. Send a copy of the original license, identification card, or passport with \$2.00 for the necessary Communication Ministry fees.

Italian Prefixes

A couple of months back we ran the list of Italian call prefixes intending to identify the offshore islands. We got a couple of the mainland prefixes mixed in with the islands, and for those who have been lost since, here are the prefixes which are mainland areas and not islands: IX1, Valle d'Osta; IN3, Trentino, Alto Adige; IV3, Friuli, Venezia Giulia. Otherwise, everything else is fine as you saw it in May CQ. It also might be noted that last year a reciprocal licensing agreement was signed between Italy and the U.S. ARI, the Italian Amateur Radio Society, will assist anyone looking for a permit for a short visit or a license and Italian call sign if a resident. Write to Manuel F. Calero, I4CMF, Associazione Radioamatori Italiani (ARI), Reciprocal Licensing Department, Via Giorgione, 16, I-40133 Bologna, Italy. The telephone number is (051) 389502. There! All you need to straighten out the Italian licensing allocations and the route to a reciprocal license.

HZ1AB

Bob Walsh, WA8MOA, has been working for ARAMCO for the last couple of years and in between other matters has been engaged along with others in rehabilitating HZ1AB. During a recent vacation in the states, Bob mentioned that among other things there is an interest in filling in some blank spots on past HZ1AB operations.

Bob would like to get some photocopies of old HZ1AB QSL cards, especially those before 1977. For the shack there they would like copies of any old photos of activities at HZ1AB as well as some information on anyone who operated the station in the past. A photo of past operators would also be welcomed.

The address for HZ1AB is correct in the current Call Books. If you want to write Bob directly, try sending a note via Bob Walsh, c/o ARAMCO, Box 8581, Dhahran, Saudi Arabia.



Here is Mike Smedal, A7XD, at the operating position of his station in downtown Doha, Qatar. Note the absence of clutter, the casual dress, and the air conditioner. No stray wires even showing, all of which attests to the technical proficiency of the operator. Mike previously was EP2LI in Iran and figures to be in Qatar for several more years. (Photo via W7OM)

Qatar

Mike Smedal, A7XD, is the first outsider to be granted a Qatar license since that Arabian Gulf country became independent of British rule 10 years ago. Previously, the country had the MP4Q prefix and even previous to that Mike was signing EP2LI in Iran.

Should you wonder what one does in downtown Doha when the bands are not open, you might scan the roll-call on the gear in the photo. From the top, a McKay DP-40 pre-selector, an MFJ-1030BX active receiver pre-selector, an ICOM 701, and ICOM IC2KL, these being a transceiver and linear. Then another Alpha 77SX linear. For antennas Mike has a TH7DX, a 40 meter vertical, and an 80 meter sloper. Mike also has a Macrotronics M80 RTTY converter, a Radio Shack microprocessor, an Epson MX80 printer,

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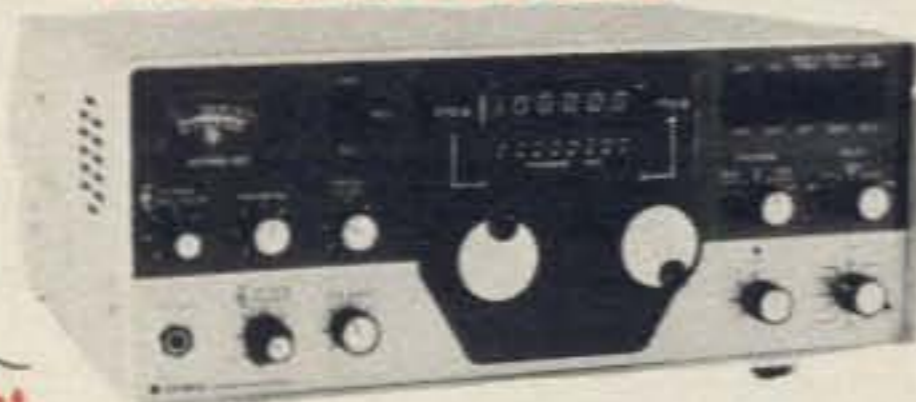
YAESU FT-707



TRIO-KENWOOD 930S



ICOM IC-720A

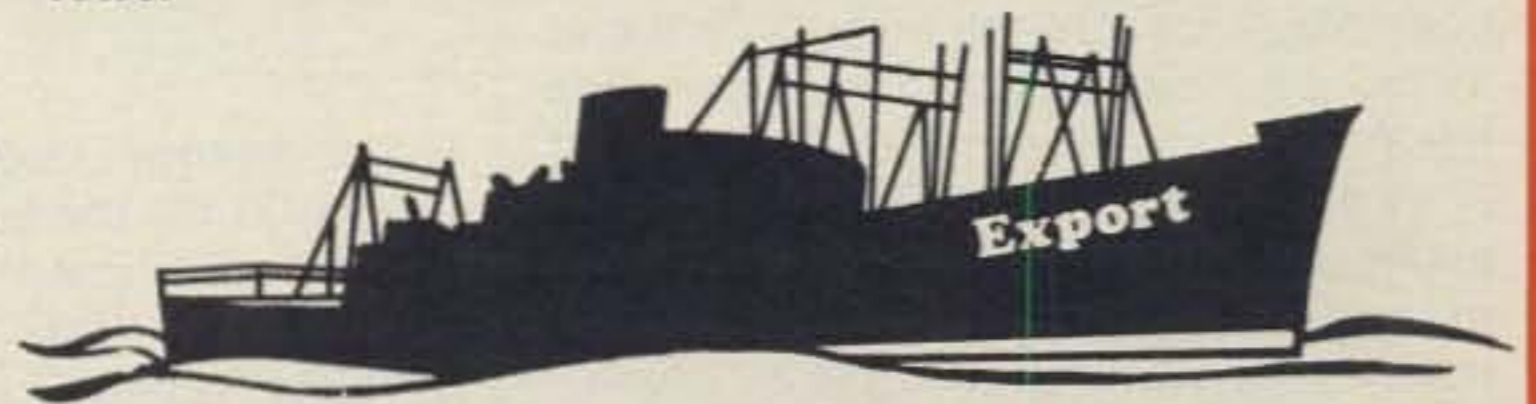


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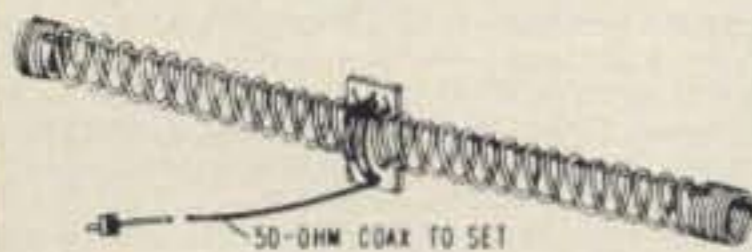
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plus a lot of accessory gear. He hopes soon to be on satellite. A look at the photo of Mike at his operating position at AX7D indicates the technical excellence of his operation.

Heard Island

Recently a query came on the last operation on Heard Island. Though a number have aimed in that direction, the 6 month operation of VKØHM back 12 years or so seems to have been the most recent; prior to that in 1969 there was a brief one.

When? It looks like the coming February is getting more solid all the time. It will be Spring there on Heard, and the Wireless Institute of Australia is well along in its organization efforts.

Here in the states, the Northern California DX Foundation and the International DX Foundation have each pledged \$10,000 towards the effort, this to meet part of the costs of the efforts and to provide a good start in the fund raising. It is reported that the 'ANACONDA II' has been chartered in Australia. Plans have been made for three operators on the effort plus possibly a fourth from the scientific/mountaineering portion of the effort.

VKØHI is expected to be the call sign and is planned to be on the air for at least four weeks. Those who want more information might drop a note to Bob Schenck, N2OO, who is handling the IDXF publicity and who has a 42-page booklet on Heard, giving its history, geography, weather, and allied information. You can get the book for \$10.00 for non-IDXF types or \$5.00 for IDXF members.

Getting back to the funding, all this is being handled by the Wireless Institute of Australia. The address for this Heard Island fund is Heard Island Fund, c/o Wireless Institute of Australia, Box 10, Perth 6005, Western Australia, Australia.

All of this may help you in planning your 1983 vacation. Keep in mind that every time there is a Heard Island operation because the U.S. Coast Guard stops there, NASA has a scientific station, or Australia sends a scientific/mountaineering effort to its island, the less need there is for another trip. A Heard in the hand is worth a decade of waiting.

Shortly Noted

Those who worked GB4GM during the August operation at the four extreme points of mainland Scotland should QSL via RSGB. This was an effort of the Clyde Valley DX Group there in Strathclyde.

The EJ-prefix was used by the Irish amateurs a couple of months back to mark the Golden Jubilee of the EI society. Tom O'Connor, EI9U, is the new president of the IRTS, the Irish Radio Transmitters Society.

The Dutch Certificate Guide is available from VE3IZH, John Hofstee, at 425



What does the true-blue Heard Island operator look like? Here is Bill Rohrer, VKØWR, who was on the USCGS Southwind at its stop at Heard back in 1969, and who put VKØWR on the air for a few days. Skeptical? Look at that name tag! You don't see many VKØ Heard QTHs! (CQ staff photo)

Boyne Avenue, Listowel 1, Ontario. Send US \$4.00 for the extensive listing. More than 75 certificates are described.

Long-time DX editor Alan Leith, VE3FRA, is wise to the ways of avoiding postal roadblocks. The Canadian DX Report shows in the states with a U.S. postmark. If you want more information on this DX bulletin, modeled along the lines of Geoff Watts' long-published "DX News," drop a line to Alan at 10 Fairington Crescent, St. Catharines, Ontario, Canada L2N 5W3.

SMØAGD, Erik Sjolund, currently in the far Pacific, was not able to make the T31/KH1 stop as planned back in June, but thought it might be possible later in the summer.

If you are still puzzling over some of the strange prefixes you caught during the summer, 4D was a Philippine prefix to mark the 50th anniversary of amateur radio in the islands. AM/AN/AO was used by the Spanish amateurs during the World Cup soccer matches. DPØLEX is a West German Antarctic base at Atka Island and often heard Thursdays, 14210/2000Z. RX7 was used to mark the 250th anniversary of the Kazakh Republic in the USSR. RKØ2 is the Russian satellite and you can look for it at 29578 kHz. CJ5 was used in Saskatoon in early July; that's in Saskatchewan. 8J8XPO was a special call heard until August in Japan. QSL to the JARL.

The DXCC Advisory Committee voted to recommend that Serrana Bank, Bajo Nuevo, and the 8ZR Neutral Zone be deleted. Most of these plus others should have run through the route by now.

Soma Wickremasinghe, 4S7YL/ex-8Q7AC/VS9YL, became a Silent Key in

The WAZ Program

10 Meter Phone

205	JA1CHN	208	JH1IED
206	SMØDRB	209	K1AS
207	F5VU	210	J11QPU

15 Meter Phone

135	JABUJY	137	KM6B
136	IØRIZ		

20 Meter Phone

411	KSØZ	414	WB7CLU
412	SM6BGG	415	IØRIZ
413	WØZH		

40 Meter Phone

19	4Z4DX	20	IØRIZ
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80 Meter Phone

21	IØRIZ
----	-------

10 Meter C.W.

37	JA2EKR	38	AF5M
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15 Meter C.W.

71	JH1XUP	72	J11QPU
----	--------	----	--------

20 Meter C.W.

172	JA3DAY	174	K6QC
173	W7TE		

40 Meter C.W.

36	SM4BNZ
----	--------

All Band WAZ

S.S.B.

2475	KA3DDT	2484	JA7TAP
2476	NBATR	2485	W4BIM
2477	HB9BMR	2486	K8ZZU
2478	JH1KRC	2487	OZ1BOD
2479	K4DLI	2488	OZ1BNZ
2480	IØJKN	2489	DJ9AL
2481	I2YJO	2490	PT7WA
2482	JA1NAQ	2491	J11QPU
2483	W9CRN	2492	JA9ISK

C.W. and Phone

5395	NR4B	5403	K4QMU
5396	OZ1EOE	5404	HK3YH
5397	LA8KD	5405	HK3YH
5398	OE3OLW	5406	E8VV
5399	JA4ESR	5407	KG7A
5400	DK5IZ	5408	JH1HIK
5401	DJ2VB	5409	JA1GRH
5402	WA4PSF		

All Phone

580	N4WJ
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Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Hajsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

late spring. A51PN is reported in some areas as off the air since last December but was also reported in the SEANET in June. Says he has too much work to do much operating. Maybe we should not have run that last item in among some Silent Keys. Pradhan is only quiescent. But also listed among Silent Keys has been Jesse Bieberman, W3KT, long noted for the W3KT QSL Service. Jesse was at the International DX Meeting in California this spring. V. Belopusov, UA3CA, and V. Rybkin, UA3DV, of the Central Radio Club Box 88 staff also were Silent Keys in early summer. W8HMI (ex-TU2AU/601AU/JY1AU/FL8AU/5U7AU) also was on the listing, as well as HS1WR, General Kam

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CIRCLE 60 ON READER SERVICE CARD

Chotikul, and Jim Lawson, W2PV. With all of those listed, the reading sometimes makes one feel a bit old . . . or older.

Northern California DX Club

Nearing a half-century of existence and often referred to as the oldest DX Club, the NCDXC with close to 400 members moved to continue its active life with election of another slate of officers for the work ahead. Eric Edberg, W6DU, is the new President; Ron Panton, W6VG, is back as Vice-President; Charles Patterson, K6RK, was reelected Treasurer; and Josephine Clarke, WB6ZUC, was brought back for another term as Secretary.

Bouvet

A January effort is planned by a group of German amateurs who are reported to have received permission to land on the South Atlantic island and to have licenses to operate. The callsigns 3Y0A and 3Y0B are reported as being assigned to the group who is working to raise the necessary funds for a three-week stay on the island. The costs will not be cheap; a suitable vessel has been located and will run about \$45,000 to charter for the trip. Other expenses, including gear for the planned five or six operating stations, will run around \$48,000 and possibly \$50,000 when things get on track. Dieter Loeffler, DK9KD, is handling the fund raising, and anyone interested in helping can address

CQ DX Awards Program

S.S.B.

1150	EL2AO	1155	K8ZZU
1151	WB3IHQ	1156	AI9R
1152	WB4NDX	1157	YU1DZ
1153	I2TZK	1158	KC4OV
1154	JR7ICN	1159	W4BIM

C.W.

546	XE1XF	547	AI9R
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S.S.B. Endorsements

310	DL9OH/318	275	K8CMO/297
310	VE3MJ/317	275	YU1DZ/293
310	VE3GMT/316	275	WB3DNA/285
310	YV1KZ/316	275	KC8JH/282
310	W4DPS/315	275	AI9R/276
310	N4PN/315	250	W4BIM/273
310	W0SFU/313	250	I0SGF/254
300	ZL1BIL/306	150	VE2PD/159
300	WB4NDX/304	28 MHz	ZL1BIL
300	W6DN/300	28 MHz	AI9R
		3.5/7 MHz	ZL1BIL

C.W. Endorsements

310	K4CEB/313	250	XE1XF/253
300	W4OEL/306	200	AI9R/237
300	K1MEM/300	28 MHz	AI9R
250	G2FFO/258		

The number of active countries is now 318. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply.

him at Postfach 620.260, 5000 Koeln 60, West Germany.

3B8DA may be going to Rodriguez next month, and the November operation will be on all bands, 10 through 80, on this 3B9 trip. Ron Hill, K6OZL, who has been working as a radio officer on some large tankers, was reported a couple of months back as headed for Chagos to sign VQ9XX for a couple of months, maybe even four or so. QSLs go to N6BFA.

5B WAZ No. 37

Milan Dlabac, OK1AWZ, has joined the list of DXers who work just about everything around, Milan picking up 5B WAZ #37 this spring.

First licensed in October 1967, Milan holds the highest Czech amateur license, allowing him to use 500 watts d.c. into the p.a. Living near Prague, Milan is a test engineer for a broadcast station there. Married, there are two boys in the family, Peter and George. While primarily working s.s.b., Milan also used the c.w. mode especially on 40/80.

With 308 DXCC countries worked on mixed modes, Milan has 5B DXCC #297, 5B WAS #33627, and 5B WAZ #37. Other awards he holds are WAP, 5BWAC, USA-CA, WAWK/CA, DUF exc., WPX, and a handful of others.

Antennas include a 75-foot vertical with 36 radials for 40/80 meters, a 4-el Yagi at 65 feet for 20 meters and a 5-el Yagi at 70 feet for 15 meters, and a 3-el wide-spaced Yagi for 10. The gear includes a Yaesu FT-901DE.

5B WAZ No. 40

Ossi Leivas, OH3YI, has attained one of the most difficult awards in amateur radio, 5B WAZ. First licensed back in 1962, Ossi is Administrative Chief at a savings bank. Behind the title, Ossi says that he is "... the number two boss."

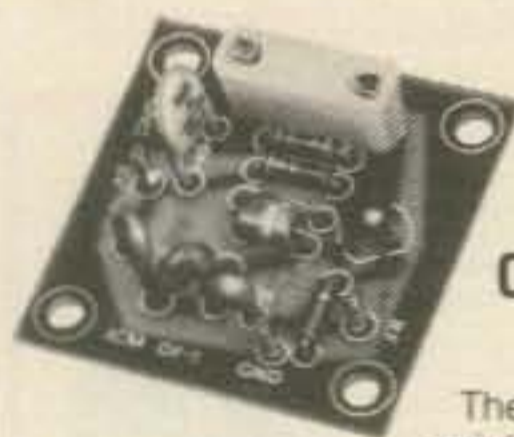
OH3YI is single, is 38 years old, and holds the Finnish Extra Class license. Primarily he works in s.s.b., but he does jump into the c.w. action when it means a new one or there is a jumping c.w. test going on. Equipment is the Drake T4XC and R4C along with a Heath SB-220 linear.

Ossi got into radio on his own; no members of his family are engaged in the higher pursuits. He graduated with a degree in economics and administration. Just take a look at the photo and you will see the face of a determined DXer.

The last two worked for the 5 Band Award were VO2CW and KH6XX, both of these on 80 meters. The last QSL cards to arrive were from Zone 29 for a 20 meter QSO and from Zone 23 for QSO's on 20 and 15.

OH3YI belongs to none of the local clubs and also does not check the nets, DX or otherwise. Sometimes he gets into the contests, working 20 meters at

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MIXED

2300	YU2DX	1600	N6JV	1262	IN3ANE	1001	YU3APR	768	W0JIE
2230	F9RM	1584	DJ7CX	1240	K6ZDL	956	LA7JO	765	A18M
2090	K6JG	1555	N2AC	1238	K5DB	923	WB8YQX	757	AJ60
2025	K6XP	1542	N4NO	1235	KF2O	921	YU2CBK	738	WD9IIC
2016	N2VV	1504	N9AF	1220	K9BG	901	I2MQP	727	K7CU
2009	W2NC	1493	W8CNL	1205	DL1MD	893	JA1KRU	722	W6OUL
1954	VE3GCO	1448	YU7AW	1200	W8RSW	879	N4IB	707	YU4HA
1853	N4MM	1419	W9FD	1198	JH1VRQ	865	DA2DC	703	VE2FOU
1762	YU7BCD	1415	AA4A/B	1170	SM3EVR	865	WB8ZRL	700	I1ZQD
1759	W4BOY	1370	I6SF	1149	YU1OBA	850	KA3A	700	NN4Q
1723	W3PVZ	1325	N6AV	1145	N6AW	826	K2QF	650	KJ7N
1718	W7LLC	1307	W0SFU	1129	W7CB	820	K7AGJ	638	K9TI
1713	N4UU	1283	WA1JMP	1100	K8LJG	804	KO8T	630	OE1KJW
1711	W9DWO	1282	N6FX	1056	N6JM	800	W6YMH	618	JA9FAI
1675	K5UR	1269	PA2TMS	1002	KL7AF	793	DK2BL	618	K8HF
1637	N6CW								

S.S.B.

2140	F9RM	1336	W9DWO	1072	DL1MD	914	WA4OIB	743	PY4OD
2039	I0ZV	1276	OZ5EV	1062	PY3BXW	901	G4CHP	716	EA3KW
1868	I0AMU	1262	N4UU	1060	DJ7CX	901	I1MOP	700	N4IB
1797	K6XP	1250	N2SS	1044	W2CC	900	N2AC	681	W3GXX
1796	K6JG	1234	PA2TMS	1037	OE2EGL	883	KC8CC	668	DK4AP
1782	K2POA	1201	AA4A/B	1014	N6FX	851	I8KCI	652	KB2DE
1646	N4MM	1201	WD8MGQ	1011	KF2O	833	TG9GI	650	OE8MOK
1609	ZL3NS	1190	YU7AW	1005	ZP5RS	828	I0RIZ	629	YU3APR
1551	I1ZSQ	1189	HP1JC	996	JH1VRQ	820	WA2FKF	619	VK3NDY
1551	I8KDB	1170	WA4QMQ	990	KC4OV	810	I6NOA	611	JH5FOO
1427	K5UR	1154	I6ZJC	981	W6YMW	805	KL7AF	606	VK6YL
1421	YU7BCD	1134	N4NO	967	W2NC	802	I4LCK	606	W8RSW
141C	I0MBX	1121	DJ6VM	922	CT1UA	750	WB8ZRL	602	W0LU
1357	W0YDB	1108	W4BOY	922	TG4NX	750	AC2J		

C.W.

1823	W8RSW	1420	YU7BCD	1316	N4MM	1069	LZ1XL	799	JH1VRQ
1784	W2NC	1415	N4UU	1315	K5UR	1056	N6FX	750	KL7AF
1715	W8KPL	1376	N2AC	1312	W9FD	1000	VE7CNE	735	DL1MD
1599	ON4QX	1375	G2GM	1258	VO1AW	965	JE1JKL	731	AA4A/B
1586	WA2HZR	1350	W9DWO	1225	DJ7CX	930	N4YB	690	DJ1YH
1562	N6JV	1344	W3ARK	1136	YU7AW	853	DJ3LR	689	KA3A
1553	K6JG	1330	VK4SS	1127	W1WLW	827	I1YRL	682	JA5MG
1511	K2VP	1324	N4NO	1122	I6SF	804	KF2O	605	VE2FOU
1475	K6XP	1317	W4BOY	1077	K6ZDL	800	K8LJG	600	OE1KJW
1467	DL1QT								



Ossi Lehvas, OH3YI, winner of 5B WAZ #40 and an always active Finnish DXer. A bank official, Ossi made the award without the assistance of nets, but an extensive antenna system did help... a lot!

OH3AA in the CQ WW CW Test in 1981. He is the DX Manager of SRAL, the Finnish Amateur Radio League. He also holds 5BDXCC #215.

The antennas are an inverted Vee for 80, a dipole and vertical for 40, a 4-element beam at 75 feet for 20, a 3-element beam at 90 feet for 15, and a 4-element beam at 65 feet for 10 meters.

Ossi started DXing back in 1965 and little has gotten by him since then. Anyone with No. 40 5B WAZ is testament to that!

QSL Information

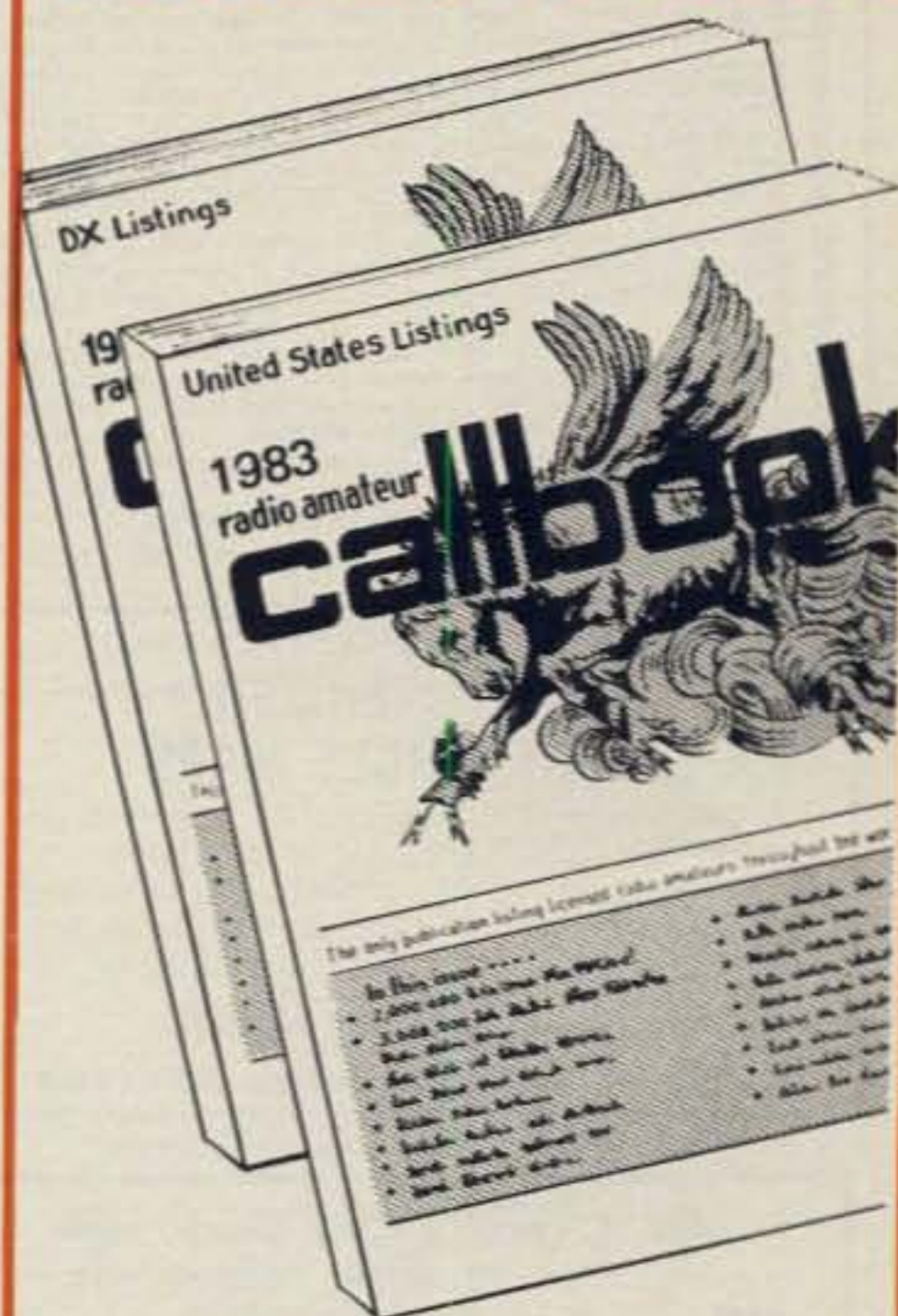
AM3SF to EA8SF
 AM03SF to EA8SF
 AM05BYU to EA5BYU
 CU5UA to CT1UA
 DA1WA/DH0 to KN6G
 H5AIR to ZS6BSK
 H44SH to AD1S
 PA3AAN to WD8MGQ
 UY4L to UA4LM

V9ADX to ZS6GH
 VK0DX to VK7LJ
 VQ9XX to N6BFA
 YV1CD to WA1RO1
 YV10QU to WA1RO1
 ZL1AEO to WB8WMS
 4D9RG to DU9RG
 OH0XZ to Box 39, SF-00801,
 Helsinki 80 Finland (March
 26-29, 1981 only)

W2YTO advises he is no longer the QSL Manager for VU2YK or VU2RAK. Too much of a problem in getting logs. Any cards for these stations are being returned.

The W3YT QSL Service ended with the passing of Jesse Bieberman, and no further business is being handled through that route.

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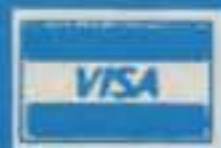
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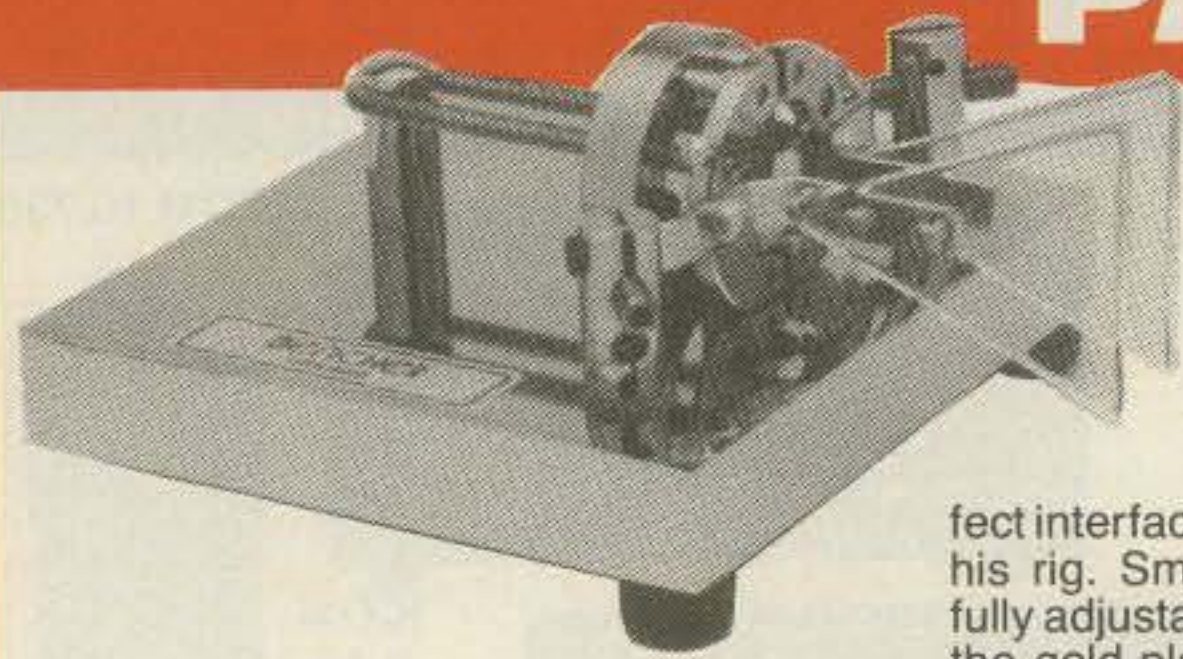
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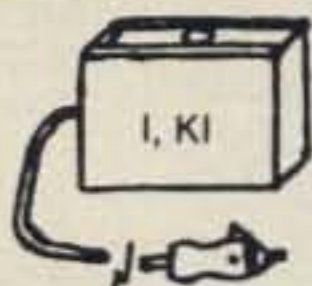
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PB-1.5	1.5:1	75 ohms
PB-2	2:1	100 ohms
PB-3	3:1	150 ohms
PB-4	4:1	200 ohms
PB-5	5:1	250 ohms
PB-6	6:1	300 ohms
PB-7.5	7.5:1	375 ohms
PB-9	9:1	450 ohms
PB-12	12:1	600 ohms
PB-16	16:1	800 ohms

350 watts PEP. 1.7 to 30 MHz. Low cost. High performance. Just right for transceivers. Small (3/4" x 3/4" x 1 1/2"). Light weight (1 1/2 oz.). Easy to attach to antenna. No connector needed. Waterproof. All stainless steel hardware — won't rust.

Now you don't have to compromise! Why connect your 50 ohm cable to a 75 ohm dipole? Use a PB-1.5 between them to get a perfect match (see table for specifications). For your 100 ohm quad use a PB-2! For your 300 ohm folded dipole use a PB-6! Whatever balanced antenna you use there is a PB balun to match it.

Get the balun advantages — less noise on receive — better antenna pattern. If you thought baluns were only 1:1 look at the PB table and select what you need from eleven different impedance ratios.



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Model 1K

1 Kw Cw, 3 Kw PEP input.
1:1 or 4:1



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Model 2K

2 Kw CW, 6 Kw PEP input.
1:1 or 4:1



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Beam Balun

2 Kw CW, 5 Kw PEP input.
1:1 or 4:1. Mounting Bracket
for 2" Boom

Palomar Engineers' "white" balun series for high power. The choice of the big DX'ers and the commercial services. Wide bandwidth and high efficiency provided by heavy ferrite toroid cores. Full 1.7-30 MHz bandwidth. Over 98% efficient. Non-saturating design. Teflon insulated wire — no arc-over. Epoxy filled — waterproof. All stainless steel hardware — no rust. Conservative design — easily take rated power. **The only balun with a full ten year warranty against burnout, arc-over or construction defects.** How many lightweight baluns have you burned out already? Install the balun that will stay up there working year after year.



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World Class Performance and Features

The FT-ONE is the culmination of an all-out design project by Yaesu's top engineering team. Working without the usual cost constraints, Yaesu's design group is proud to unveil the instrument they "always wanted to design," a revolutionary blend of computer and RF technology.

GENERAL COVERAGE, ALL SOLID STATE

The FT-ONE is a full-coverage all-mode transceiver, equipped for reception on any frequency between 150 kHz and 29.99 MHz, with transmit coverage on all nine present and proposed amateur bands. In countries where permitted, the FT-ONE may be programmed to transmit throughout the 1.8-29.99 MHz range.

KEYBOARD FREQUENCY ENTRY

Fully digitally synthesized, the FT-ONE uses a front panel keyboard for initial frequency entry. Frequency change is then accomplished via the main tuning dial or the pushbutton scanner, with tuning in either 10 Hz or 100 Hz steps possible. Truly the contesters' dream, the FT-ONE permits extremely fine tuning and instantaneous band change with equal facility.

DUAL VFO SYSTEM

Ten digital VFO's with memory are provided, in conjunction with an A-B selection scheme that allows instant recall of any transmit, receive, or transceive frequency desired. For split-frequency operation, such as on 7 MHz SSB, the operator may select TX on VFO-A and RX on VFO-B, automatically storing the calling and listening frequencies for each pile-up. For net operations, a non-volatile memory board is available as an option, to eliminate the possibility of dumping memory.

FULL CW BREAK-IN

Recent advances in solid-state technology have finally made full CW break-in reliable enough to be incorporated into a Yaesu product. Now you can select traditional semi-break-in (for use with amplifiers not equipped for full break-in) or full high-speed break-in. When using amplifiers so equipped, the keyer output lead may be interrupted via a rear panel jack and routed to the break-in sequencing input on your amplifier.

SWITCHING REGULATOR POWER SUPPLY

Extremely compact and light in weight, the switching regulator power supply reduces substantially the space required to produce the operating voltages used in the FT-ONE. Highly efficient and uniquely stable, the switching regulator supply provides superb reliability in a field of design long neglected by amateur manufacturers.

ELITE CLASS PERFORMANCE FEATURES

In addition to the full break-in and superb receiver filters, Yaesu's design team packed the FT-ONE with subtle virtues that others might have overlooked. Rear panel jacks allow the use of both an external receiver and an independent receive antenna, such as a 160 meter Beverage. While scanning, automatic halting on a received signal may be programmed. . . perfect for watching a band for openings. If you're a DX-peditioner, an optional Curtis 8044 keyer board is available, so you won't need an external keyer that only wastes suitcase space. And if your amplifier fan is louder than it should be, there's even a microphone squelch (AMGC) to reduce background noise pickup between words and sentences!

ONE YEAR FACTORY WARRANTY

Because of the level of attention to design detail, parts selection, and factory quality control, your FT-ONE is backed by a one-year *factory* warranty for the original purchaser at retail. Prompt and meticulous attention to your warranty needs will be provided by our Ohio And California Service Centers. In addition, all units sold in the United States will be inspected and tested after clearing Customs, and will include a Service Manual in the purchase price.

GAIN/INTERCEPT OPTIMIZED RECEIVER FRONT END

Utilizing up-conversion with a first IF of 73 MHz, the FT-ONE RF amplifier stage uses push-pull power transistors configured to produce a typical output intercept of +40 dBm. The first mixer utilizes a diode ring module followed by a low noise post amp, for optimum noise figure consistent with modern day intercept requirements. The result is a receiver with a typical two-tone dynamic range well in excess of 95 dB (14 MHz, CW bandwidth). Additional gain tailoring is provided via a PIN diode attenuator controlled from the front panel.

FILTERS READY FOR COMPETITION

Three filter bandwidths are available for CW operation (two for FSK!), using optional 600 Hz or 300 Hz crystal filters. Filter insertion losses are equalized for constant IF gain. Both IF Shift and Variable Bandwidth are provided, and two CW filters may be cascaded, for competition-grade selectivity. For SSB work, the Variable Bandwidth feature eliminates the need for costly 1.5 kHz or 1.8 kHz filters, as any intermediate bandwidth may easily be programmed using the standard, cascaded SSB filters. To top it all off, a high-performance audio peak and notch filter is standard equipment.

EXPANDED OPERATING DISPLAYS

Digital displays for the VFO Frequency, memory channel, and RIT offset are provided for quick frequency identification. The large front panel meter provides easy viewing of transceiver operating parameters, including final transistor collector current, input DC voltage, FM discriminator center tuning, speech processor compression level, and forward/reflected relative power.

NOT AVAILABLE AS OPTIONS

It's hard to believe that other manufacturers still insist on making such essential items as a noise blanker or speech processor extra-cost options. We find that these are less expensive to incorporate and more reliable in operation when installed on our assembly line. No AC power supply is available as an option for the FT-ONE, either; it's equipped for operation from 100/110/117/200/220/234 volts AC, or 13.5 volts DC. And it goes without saying that there will not be an external VFO offered for the FT-ONE — we're confident that ten VFO's are quite enough!

**Experience the FT-ONE in your Authorized Yaesu Dealer's showroom today.
This may be the last Amateur transceiver you will ever own.**

Warranty policy available upon request. SASE, please.

Specifications subject to change without notice or obligation.



FT-ONE



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Enjoy ICOM's new AT500 Antenna Tuner: The perfect companion for the ICOM HF series. Providing 160-10 meter coverage, including the new WARC bands, the IC-AT500 accepts up to 4 antennas and automatically selects the proper one for the band in use.

Silent automatic band-switching with the IC-701, IC-720A or IC-730 (w/EX202), the IC-AT500 provides advanced features not found in ordinary antenna tuners: Preset capability allows a "lookahead" tuning to preset each band to a near matched condition without application of RF. This allows the receive function of the transceiver to perform at peak performance without application of RF power (causing RFI).

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The IC-AT500 is designed to match coax fed antennas with 3:1 or less VSWR, allowing your

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