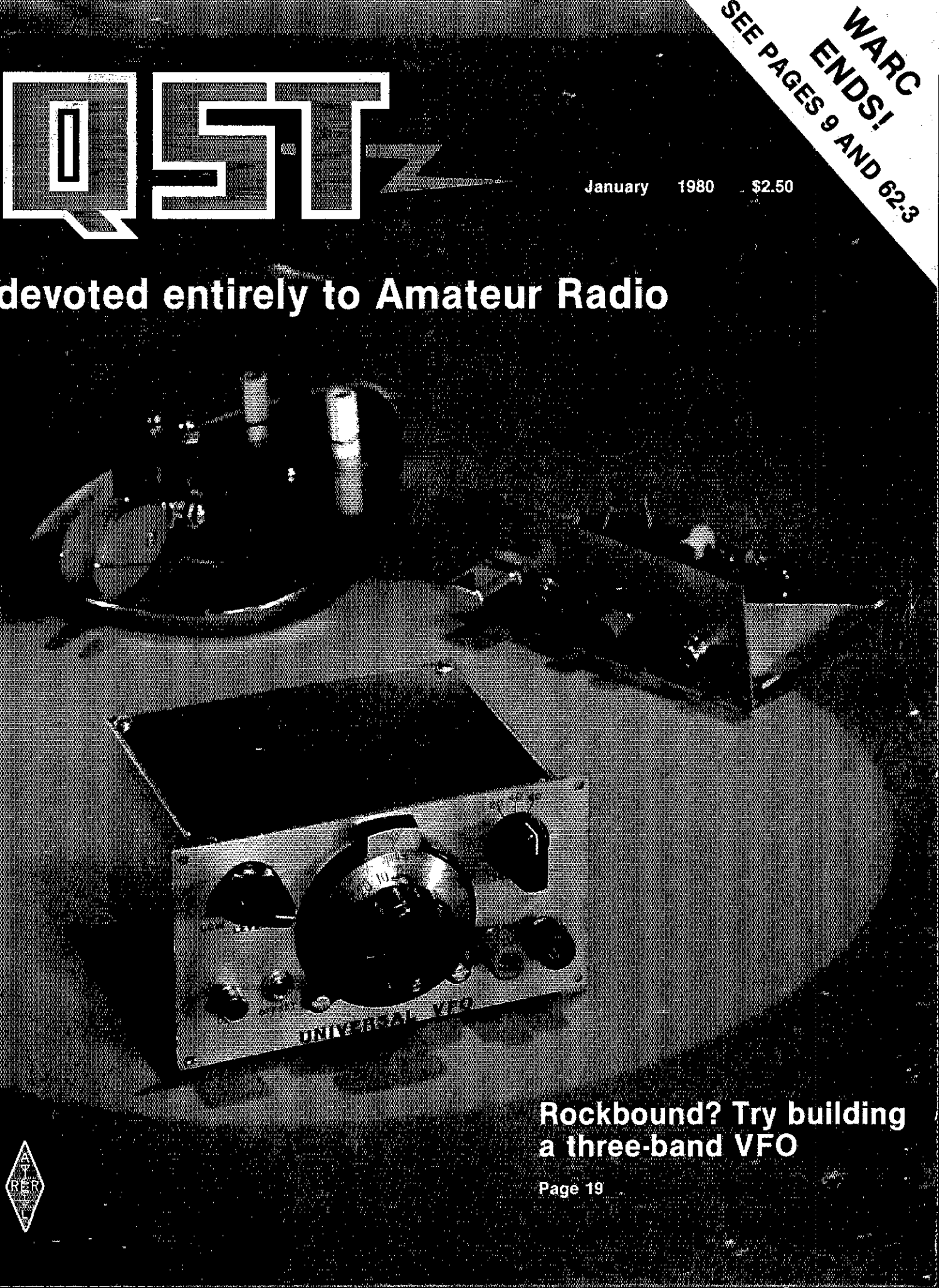
QST

January 1980 $2.50

devoted entirely to Amateur Radio

WARC ENDS!
SEE PAGES 9 AND 62-3



Rockbound? Try building a three-band VFO

Page 19

*Shown with accessory touch tone pad

PROVEN DEPENDABILITY

...THE TEMPO S-1 GREETS THE NEW YEAR WITH A SPECIAL LOW PRICE

By now most of you have heard the same words of praise on the air that we (gratefully) receive over and over. The quality that is built into the S-1 has been attested to by the outstanding performance and dependability of the thousands of units in daily use. It's simple to operate and the high level of innovative engineering that brought forth the Amateur world's first hand held synthesized radio also designed into this compact beauty exciting performance and features at a very affordable price. A price that also includes a ni-cad battery pack, charger, and a telescoping whip antenna. The optional touchtone pad shown in the illustration adds greatly to its conveneince. In addition we offer superior quality 30 and 80 watt solid state matching power amplifiers that give the S-1 the flexibility of operating as a portable, mobile, or base station rig.

Remember...the Tempo S-1 is the original and proven 800 channel synthesized hand held transceiver. Don't be fooled by substitutes.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or ±600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 500 ma-transmit
Batteries:	8 cell ni-cad pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5")
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES
Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES
Touch tone pad (not installed): $39 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VDC power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $149

Price... ~~$349.00~~ *Reduced to $299.00*
With touch tone pad... ~~$399.00~~ *Reduced to $339.00*

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders. The Tempo FMT-2 & FMT-42 (UHF) provide excellent mobile communication and features a remote control head for hide-away mounting.
The Tempo FMH-42 (UHF) and the *NEW* FMH-12 and FMH-15 (VHF) micro hand held transceivers provide 6 channel capability, dependability plus many worthwhile features at a low price. FCC type accepted models also available.
Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

The Tempo S-2... the world's first synthesized 220 MHz hand held transceiver. With an S-2 in your car or pocket you can use any 220 MHz repeater in the United States. It offers all of the advanced engineering, premium quality components and exciting features of the S-1. It is completely synthesized, offering 1000 channels in an extremely lightweight but rugged case.
If you're not on 220 it's about time you try it and this is the perfect way to get started. With the addition of a matching Tempo solid state amplifier you can use your S-2 as a powerful mobile or base station as well. It's all you really need. And if you already have a 220 MHz rig, the S-2 will add versatility you never dreamed possible.
Also... the price is right. The ni-cad battery pack, charger, and telescoping whip antenna are included. Although not a necessary option, the touch tone pad shown in the illustration adds greatly to its convenience at a low price.
The time has never been better to expand your horizons... there has never been a better little rig for 220 than the S-2.
Price...$349.00
With touch tone pad...$399.00

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NEW TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

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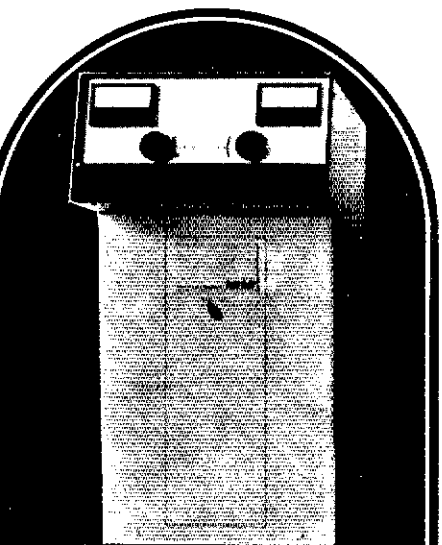

In a class by itself

2K-4A

If you want to move up to the very best, this is it. The 2K-4A offers engineering, construction and features second to none. Loafs along at full legal power for as long as you wish. $1195.

The **1KD-5** **...the newest member of the famous Henry Radio family of fine amplifiers. And we're still convinced that it's the world's finest linear in its class. The 1KD-5 was designed for the amateur who wants the quality and dependability of the 2KD-5 and 2K-4, who may prefer the smaller size, lighter weight and lower price and who will settle for a little less power. But make no mistake, the 1KD-5 is no slouch. Its 1200 watt PEP input (700 watt PEP nominal output) along with its superb operating characteristics will still punch out clean powerful signals...signals you'll be proud of. Compare its specifications, its features and its fine components and we're sure you will agree that the 1KD-5 is a superb value at only $695.**

The **2KD-5** **We have been suggesting that you look inside any amplifier before you buy it. We hope that you will. If you "lift the lid" on a 2KD-5 you will see only the highest quality, heavy duty components and careful workmanship...attributes that promise a long life of continous operation in any mode at full legal power. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. It operates with two Eimac 3-500Z glass envelope triodes and a Pi-L plate circuit with a rotary silver plated tank coil. Price $945.**

And don't forget the rest of the Henry family of amateur amplifiers...the Tempo 2002 high power VHF amplifier and the broad line of top quality solid state amplifiers. Henry Radio also offers the 3K-A and 4K-Ultra superb high power H.F. amplifiers and a broad line of commercial FCC type accepted amplifiers for two way FM communications covering the range to 500 MHz.

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Henry Radio

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EITHER WAY YOU GO...2 OR 6!

GO WITH QUALITY. GO WITH ICOM. GO WITH THE BEST.

The IC-251A is the newest addition to ICOM's all mode trans-ceiver line. Like the matching IC-551, the IC-251A has dual digital VFO's, three memories, scanning (even SSB), and many other features you only get from ICOM.

Both units include the no-backlash, no delay light chopper, similar to the IC-701, as a standard feature at no cost. Coupled to the microprocessor, this provides split frequency operation as well as completely variable offsets.

Check the specs, and you'll agree, either way you go, ICOM is simply the best.

SPECIFICATIONS

Listed below are some of the IC-551 specifications. **IC-251A's** specs are identical except where noted (in bold).

Frequency Coverage: 50~54MHz **(144~148.19MHz)**

RF Output Power:
SSB: 10W PEP
(1~10W adjustable) **(10W)**
CW: 10W
(1~10W adjustable) **(10W)**
AM: 4W
(1~4W adjustable) (—)
FM*: 10
(1~10W adjustable) **(1~10W)**

Sensitivity: SSB/CW/AM
Less than 0.5μV for 10dB S+N/N
FM*: More than 30dB
S+N+D/N+D at 1μV

Squelch Sensitivity: SSB/CW/AM
1μV
FM*: 0.4μV **(0.4μV)**

Selectivity: SSB/CW/AM
More than ±1.1KHz at -6dB **(1.2)**
Less than ±2.2KHz at -6dB **(2.4)**
(When Pass Band Tuning Unit is installed: less than 1KHz at -6dB)
FM*: More than ±7.5KHz at -6dB
Less than ±15KHz at -60dB

Dimensions: 111mm (H) × 241mm (W) × 311mm (D)

Weight: 6.1kg **(5kg)**

Spurious Response Rejection Ratio: More than 60dB

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM AMERICA, INCORPORATED

Sales Service Centers located at:

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Phone (206) 454-8155

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Dallas, TX 75234
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Bellevue, WA 98004

Please send me: ☐ IC-551 specifications sheet ☐ IC-251A specifications sheet ☐ List of Authorized ICOM Dealers

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January 1980
Volume LXIV Number 1

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THE COVER

Here's a 3-band VFO to match last month's solid-state QRP transmitter. See page 19.

Contents

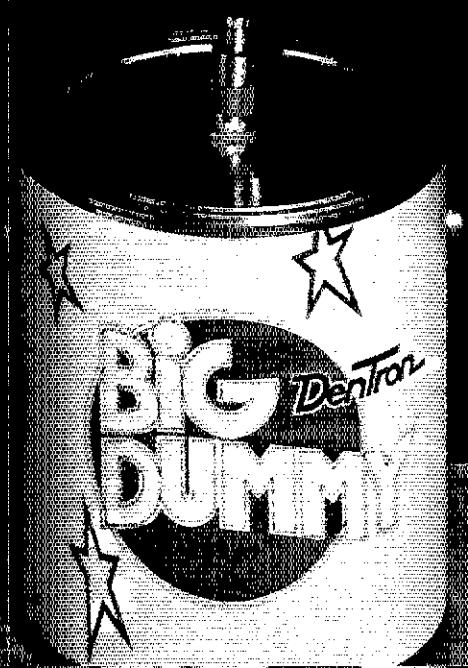
The Little Amplifier With The Big Reputation

In January 1979 the GLA 1000 was introduced. It was a unique linear design; tested not only in the lab but in ham stations across the country.

January 1980 . . . DenTron proudly introduces the new GLA 1000B. Our new improved GLA is built on a design whose strength and durability made it justly famous.

Because you asked for it, the GLA 1000B is bursting with exciting new features. We've added tuned input for solid state radios; front panel antenna switching for dummy load tune up; a technical design change providing longer tube life.

We think you'll agree, however, one of the most exciting features is the price. At $299.50 can you afford not to be heard?



Great Little

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FCC type accepted

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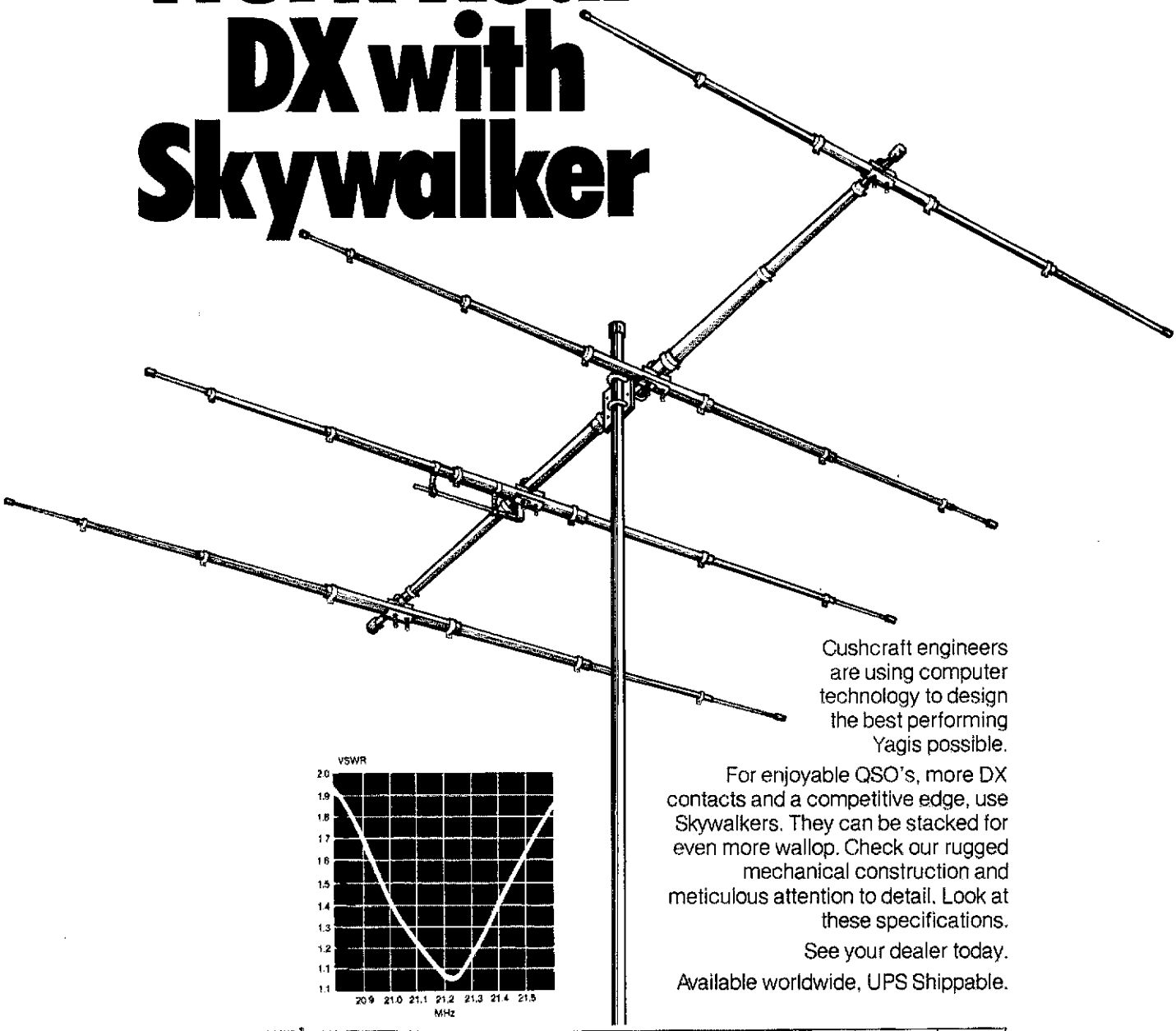
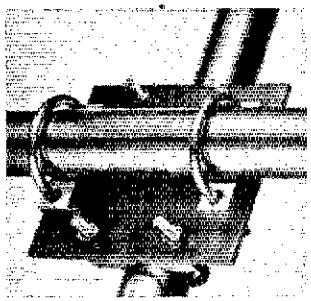


Cushcraft engineers are using computer technology to design the best performing Yagis possible.

For enjoyable QSO's, more DX contacts and a competitive edge, use Skywalkers. They can be stacked for even more wallop. Check our rugged mechanical construction and meticulous attention to detail. Look at these specifications.

See your dealer today.

Available worldwide, UPS Shippable.



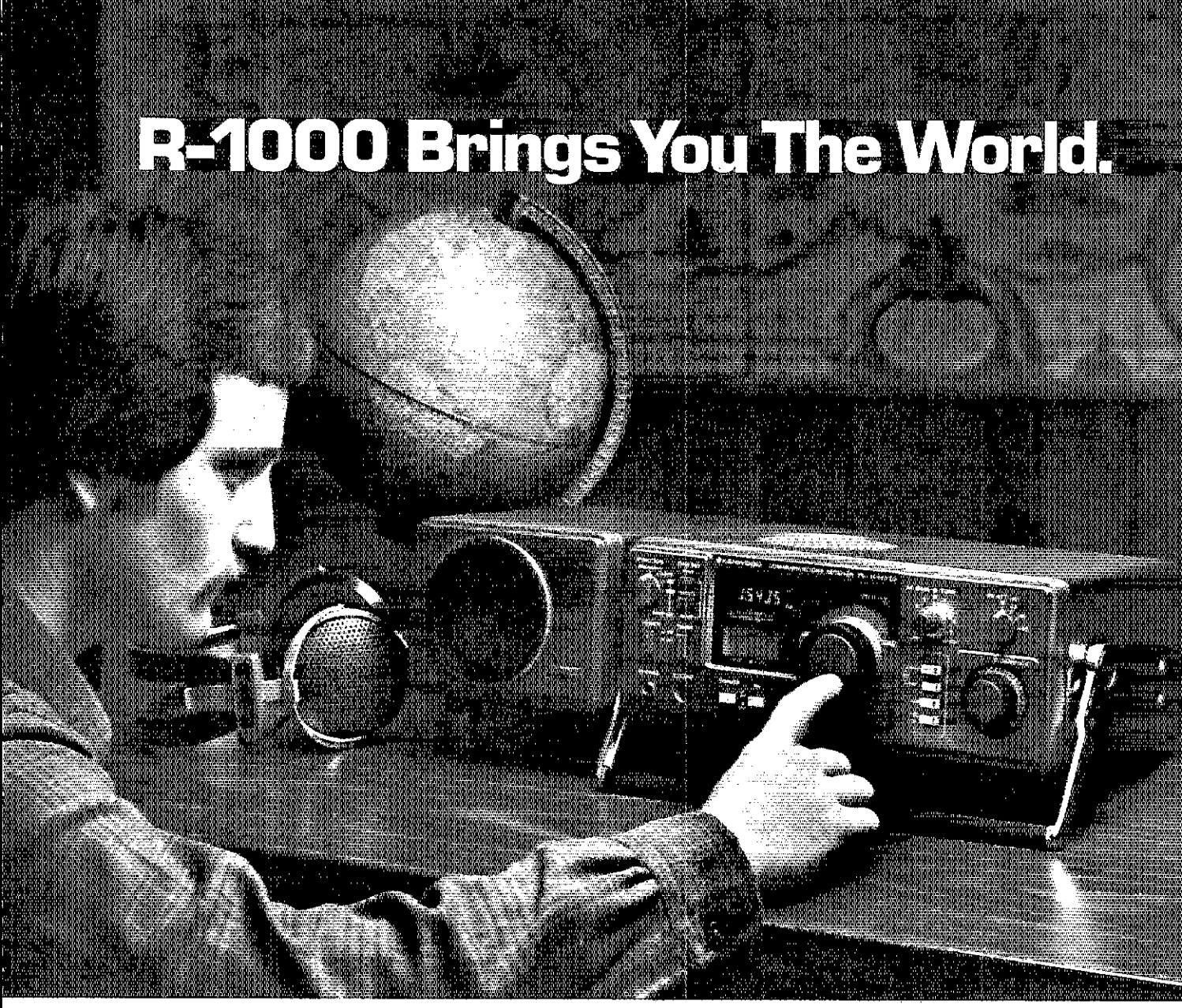
MODEL	BAND	ELEMENTS	LONGEST ELEMENT	BOOM	BEAM WIDTH	TURNING RADIUS	WEIGHT
20-4CD	20	4	35ft 10in	32ft	57°	23ft 4in	50lbs
20-3CD	20	3	35ft 8in	18ft	56°	20ft	30lbs
15-4CD	15	4	23ft 4in	20ft	57°	15ft 6in	25lbs
15-3CD	15	3	23ft 2in	14ft	56°	13ft 6in	20lbs
10-4CD	10	4	17ft 5in	16ft	57°	14ft 3in	18 lbs
10-3CD	10	3	17ft 8in	10ft	56°	10ft	11lbs

MATERIALS: 6063-T832 hard drawn aluminum

cushcraft CORPORATION

The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

R-1000 Brings You The World.



Now, a high-performance, easy-to-operate Communications Receiver with single-knob tuning system and digital frequency display!

Up-to-the-minute events and information from anywhere in the world, including foreign shortwave broadcast (music, news, propaganda, etc.), emergency ship communications and other marine traffic, standard AM broadcast, Amateur Radio Operators, all 40 CB channels, military and government messages, long-distance industrial communications, standard time/frequency signals...and other exciting transmissions...it's all yours through the R-1000!

Highly accurate, sensitive, selective, and stable, the R-1000 has a unique fast-tuning system that covers the shortwave bands, plus medium-wave and long-wave frequencies. Even SSB communications signals are received perfectly.

Its many features include:

- Continuous frequency coverage from 200 kHz to 30 MHz
- 30 bands, each 1 MHz wide
- Accurate five-digit frequency display and illuminated analog dial
- Built-in quartz digital clock and ON/OFF timer
- Up-conversion PLL circuit and wideband RF circuits provide exceptional performance and easy operation without the need for bandspread, preselector, or antenna tuning
- Multi-modes...AM (wide and narrow), SSB (USB and LSB), and CW
- Three built-in IF filters...for SSB and CW (2.7 kHz), for AM narrow (6.0 kHz), and for AM wide (12 kHz)
- Effective communications-type noise blanker (superior to noise limiter)
- Step attenuator (0-60 dB in 20-dB steps) to prevent overload
- Recording terminal (built-in timer controls recording time through remote terminal)
- Tone control for best audio response
- Built-in 4-inch speaker for quality sound reproduction
- Illuminated S-meter
- Dimmer switch to control panel lights and digital display intensity
- Adjustable bracket for optimum operating angle
- Three antenna terminals for high-impedance wire leads and a 50-Ω coaxial lead

Optional Accessories:

- SP-100 matching external speaker
- HS-4 and HS-5 headphones

The exciting R-1000 is designed specifically for those who demand the highest quality and it's *available only* through selected communications equipment specialists.

Write or call today for more information and for the address of your nearest Authorized Kenwood Communications Dealer.

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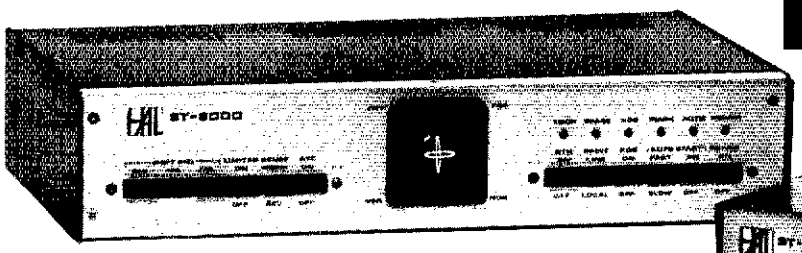
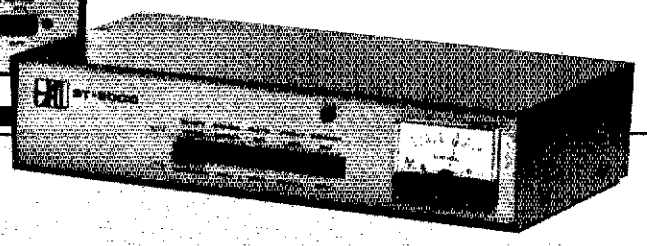
Even WEAK SIGNALS print clearly with a HAL Demodulator.

ST-6000 Demodulator $595.00



ST-5000 Demodulator $225.00



Pulling in weak or distorted signals with a HAL Demodulator is no problem. Even if the band is crowded.

With high-gain, wide-bandwidth limiters and extremely linear active detector circuits, both the ST-6000 and ST-5000 Demodulators convert RTTY tones into strong, readable signals that display bright and clear.

Tones necessary for transmitting RTTY are conveniently generated and receive filters and transmit tones are accurately set and matched to assure on-the-money transceive operation.

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Internal Loop Supply • Internal AFSK Generator with CW ID Tone • Internal Tuning Indicator • Autostart Motor Control • Line/Local Loop Control • TTY Machine Compatibility • RS-232 type DATA Interface • "High" or "Low" Tones • 120/240, 50/60 Hz Power • Normal/Reverse Switch • 170 and 850 Shift • Active Discriminator • Metal Cabinets for RF Shielding.

Special Features of the ST-6000:

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Eastern Massachusetts — Richard P. Beebe, K1PAD, 82 Wyman Rd., Billerica 01821 (617-667-5609)
Maine — Edward B. Bristow, Jr., WA1MUX, Box 187, Route 4, Skowhegan 04976
New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — John Titterington, W1EOF, 45 Mountain Ave., Riverside 02915 (401-438-3619)
Vermont — Robert L. Scott, W1RNA, 9 Large St., Swanton 05488 (802-868-4944)
Western Massachusetts — Arthur Zavarella, W1KK, 1702 Main St., Agawam 01001

Northwestern Division

Alaska — Fred S. Wegmer, KL7HFM, 1910 Rosemary St., Anchorage 99504
Idaho — Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
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Oregon — Dale T. Justice, K7WWR, 1369 N.E. Sunrise Ln., Hillsboro 97123 (503-648-8232)
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Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 11874, Reno, NV 89510 (702-322-7988)
Pacific — J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Arthur P. Samuelson, W6VV, 440 Davis Ct. #811, San Francisco, CA 94111 (415-986-3129)
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Utah — Royce Henningson, K7OEO, P. O. Box 1267, Moab 84532 (801-259-5018)
Wyoming — Chester G. Stanwaity, W7SDA, 353 S. Ferris St., Powell 82435 (307-754-3624)

Southeastern Division

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Canal Zone
Georgia — Edmund J. Kosobucki, K4JNL, 5526 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Frank M. Butler, Jr., W4RH, 323 Elliott Rd., S.E., Fort Walton Beach 32548 (904-244-5425)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
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Orange — Roy C. Zukerman, AC6H, P. O. Box 8305, Fountain Valley, CA 92708 (714-962-8318)
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Santa Barbara — D. Paul Gagnon, N6MA, 3800 So. J St., Oxnard, CA 93030 (805-484-1951)

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Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Roger D. Coday, N5FN, 213 Ave. G, RFD 4, Brazoria 77422 (713-798-7920)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

New Ham Bands — No Longer a Dream

On pages 62-63 you will find a preliminary report of the results of the 1979 World Administrative Radio Conference (WARC-79). The conference finished its work in early December, after more than 10 weeks of strenuous work in Geneva by nearly 2000 delegates from more than 140 countries.

It was a difficult conference. For the first time in 20 years, the entire radio spectrum was examined with the objective of revising the allocations to various services as necessary, to take account of the changing requirements of the world telecommunications community. The world has changed a great deal in those 20 years. Most of the African continent has moved from colonial to sovereign status; the use of satellites has become widespread; new allegiances between countries have developed along geographical or ideological lines, or both.

While the subject of WARC-79 was highly technical, decisions were not always made on technical grounds. In some cases, the decisions of the Conference will be difficult, if not impossible, to implement in practice.

In this context, it is with considerable pride that we report to you the results of WARC-79 — and it is pride which we hope you will share. As you will see from the preliminary report, and from the more-comprehensive report which will appear next month, the Amateur and Amateur-Satellite Services emerge from the Conference in very good shape. We fared well in the uncertain WARC environment. There were setbacks, to be sure, but they were more than offset by the gains.

In particular, we are proud to report that a dream has become a reality. Six years ago a small group (including this writer), commissioned by the U.S. Government to do a study of the amateur spectrum needs for the next two decades, believed that there was a good argument to be made for new amateur bands near 10, 18 and 24 MHz. From that beginning, which was reported in the *QST* editorial of December 1974, the idea sprouted. It was carefully nurtured: It grew in strength through formal adoption as a WARC objective by the three IARU regional divisions; it was advocated in visits to dozens of countries by IARU officers and staff; it was given added impetus by the report of the 1978 CCIR Special Preparatory Meeting for WARC-79.

The idea bloomed into full flower in November, when by majority decision of Working Group 5BB the following new allocations for the Amateur Service were recommended to Committee 5 and were adopted by that Committee, and subsequently by the entire Conference: 10.1-10.15 MHz, shared with the Fixed Service on a secondary basis; 18.068-18.168 MHz; and 24.890-24.990 MHz. We may be able to operate at 10 MHz as early as January 1, 1982, but the two new exclusive bands will not be available until existing Fixed Service stations are reassigned elsewhere in the spectrum, perhaps not until mid-1989, perhaps on some limited basis as much as five years earlier. To be sure, we had hoped for wider bands; we had hoped for an exclusive allocation at 10 MHz. But given the pressures on the spectrum from a multitude of directions, the fact that we obtained anything at all in the way of new allocations (and lost *very* little) testifies to the value which is placed on our Service by the world's telecommunications community.

Our new bands are the result of effort and support by literally hundreds of dedicated people, amateurs and non-amateurs alike. We could not begin to recognize all of their contributions at this point; some must of necessity remain unsung heroes. It was a team effort, built upon the record of Amateur Radio accomplishment and discipline which stretches over three generations.

Is our work over? Not by any means. There will be future conferences, future challenges to our allocations, and future opportunities to expand them. The WARC-79 experience gave us a number of ideas of how to strengthen our future support, and some projects have to be begun almost immediately if we are to do as well (or better) next time.

We look forward to those challenges!
— *Richard L. Baldwin, W1RU*

League Lines...

The new film, "The World of Amateur Radio," is not yet available for booking from League hq. But copies may now be purchased at cost from Dave Bell Associates, Inc., 3211 Cahuenga Blvd. West, Hollywood, CA 90068. The prices are: Tape -- VHS $30, Betamax $30, 3/4-inch U-Matic $40; film -- color-sound print $95. These prices include shipping and handling.

With all the amateurs who contribute so much to the Amateur Radio Service, usually with no thought of compensation, we thought it was time to provide a little recognition to some of them. At the behest of the Board of Directors, a new column, "QST Profiles," appears in this issue (page 76) for the first time. We will bring you biographical information on, and interviews with, Amateur Radio operators who are involved with interesting projects or have accomplished something out of the ordinary. We solicit your suggestions for candidates, but please keep in mind that the column will appear only about six times each year.

Don't forget that the newly revised ARRL Numbered Radiogram List goes into effect January 1. These standard-message texts are designed to promote brevity and efficiency in traffic handling. The updated list appeared on page 27 of December QST but individual copies are available by sending Hq. an s.a.s.e. and requesting form CD-3. This form also contains the ARRL recommended message precedences.

Happy New Year! Want to know what's in store for 1980? Check out the Calendar of Events on page 92. Perhaps you'd like the latest U.S. frequency allocations, or information on how to renew a license. You'll find that on page 91. Both pages are perforated, in case you'd like to keep them separately.

Good news for our blind and physically handicapped readers! Beginning with the March 1980 issue, QST will be converted from cassette to flexible disc. Regular readers of the cassette edition will automatically become subscribers to the new flexible-disc edition. You should experience less delay receiving the new edition. The magazine will be mailed direct from the producer to your address. Your cooperating library has more information about this and many other magazines available through the Library of Congress national braille and talking-book program.

Because of a critical personnel shortage, the Headquarters Technical Department is temporarily unable to accept technical information service (TIS) phone calls. Answers to TIS letters will be very slow until staff vacancies are filled. Openings still exist for technical editors and lab technicians. Please contact W1FB or K1TD at Hq. if interested.

An assistant is needed in the Public Service Branch of the ARRL Communications Department. This position requires an amateur license, knowledge of traffic/emergency operating and good writing ability. Contact K1XA at Headquarters for details.

The launch date of AMSAT-OSCAR Phase III-A has been set for May 30, 1980. The launch "window" will be 1200 to 1700 UTC. Final apogee figure is 35,786 km. Kick motor firing is scheduled for orbit 66 -- "get your kicks on 66!"

Amateurs in radio broadcasting: You can obtain a 13-week series of five-minute programs on Amateur Radio for unsponsored free use. Send two 1200-foot, 7-inch reels of standard broadcast-quality tape to Steve Brown, WD8QJB, Parkland College, 2400 West Bradley Ave., Champaign, IL 61820. Allow a couple of weeks for response.

ARRL Offices will be closed this year on the following dates: Tuesday, January 1; Monday, February 18; Friday, April 4; Monday, May 26; Friday, July 4; Monday, September 1; Thursday, November 27; Thursday, December 25 and Friday, December 26. Headquarters tours are conducted at 9, 10 and 11 A.M., and 2, 3 and 4 P.M., Monday through Friday.

A Universal Digital Frequency Readout

Weary of counting frequency calibration marks on your analog readout VFO dial? Why not go digital? Here is a simple-to-build four-digit frequency display.

By Alfonso Torres,* KP4AQI and Gerd Schrick,* WB8IFM

Digital frequency displays for amateur equipment have been available for a number of years. Most circuits have been designed for use with specific pieces of equipment. The complexity of these designs is reflected on the price tags — around $200. On the other hand, a straight frequency counter can be purchased for under $100. Some amateurs use these counters to indicate their operating frequency. This works fine for a cw transmission; however, an ssb signal tends to "juggle" the numbers. And, on receive, there is nothing to be measured!

This article describes a relatively inexpensive and simple-to-build digital readout that is adaptable to almost any piece of amateur equipment which is of the superheterodyne variety.[1] It can also be used as an ordinary frequency counter. The design has evolved over more than six years of building similar circuits. This design makes use of CMOS, TTL and low-power Schottky devices.

The measurement principle is simple; the frequency of the VFO is counted and the frequency of the i-f is added or subtracted from the VFO count (depending on the equipment frequency-mixing scheme). The frequency dial of the equipment is either complemented or replaced by the digital readout. Although the circuitry described has the potential of being

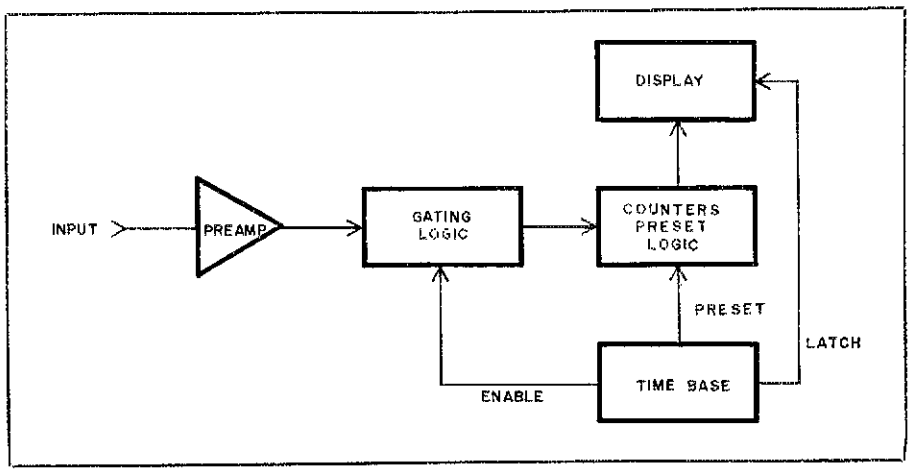


Fig. 1 — Block diagram of the Universal Digital Frequency Readout.

*c/o Torrestronics, Inc., 4850 Hollywreath Ct., Dayton, OH 45424

[1]Editor's Note: It should be noted that this digital display may not be more accurate than the analog VFO dial since other oscillators within the equipment that affect the actual frequency of operation are not counted.]

squeezed into a small space within existing equipment, it was decided to build the unit in a separate enclosure. This allowed for the use of larger size circuit boards, which are easier to assemble. After all, working on crowded IC circuitry is not everyone's cup of tea!

The Circuit

A block diagram of the digital frequency display is shown at Fig. 1 and the detailed schematic at Fig. 2. The preamplifier/buffer consists of a two-transistor circuit (Q1 and Q2) which provides gain, isolation and an impedance match between the input and the first TTL counter. A combination common-emitter and common-collector circuit, using 600-MHz f_t transistors, provides a counter sensitivity of 30 mV up through 50 MHz.

The particular time-base scheme used in this display required that a divide-by-eight "prescaler" (U5) be used. This arrangement has the advantage of reducing the last-digit flicker by slowing down the operation of U14 through U17.

The heart of the readout consists of the counter, preset, latch and display circuitry. Four counters (U14 through U17) are connected in cascade to form a four-decade ripple up/down counter. Thirty-two diodes and as many individual pc-board switches permit the use of any two preset intermediate frequencies which can be selected by a front-panel switch. The counter outputs are connected to U10 through U13 which contain latches and seven-segment LED drivers. Three MAN 72 and one MAN 52 are used for the display. These are seven-segment, common-anode LED type readouts.

U1 functions as the time-base oscillator with the 2.4576-MHz crystal and associated components. Several stages of oscillator buffering are provided by gates in U1. The output of the oscillator is applied to a divide by 16 (2^4) IC and on to a CMOS divide by 2^{14} IC. Thus the crystal frequency is divided by a total of 2^{18} or 262,144. U4, a 68-pF capacitor and the transistor inverter generate the preset, latch and count information from the 2^{12}, 2^{13} and 2^{14} divisions of the divider chain. A 3:4 counting duty cycle results and the crystal frequency can be computed in the following manner;

$$F_{xtal} = \frac{1}{n} \times \frac{3}{4} \times 100 \times 2^{18}$$

where

n is the prescale factor,
3/4 indicates the counting duty cycle,
100 is the resolution (100 Hz) and
2^{18} is the oscillator division factor.

Listed in Table 1 are the crystal frequencies and display update rates for given prescale factors. A 3:4 counting duty cycle is assumed. Any of the combinations, of course, could be selected.

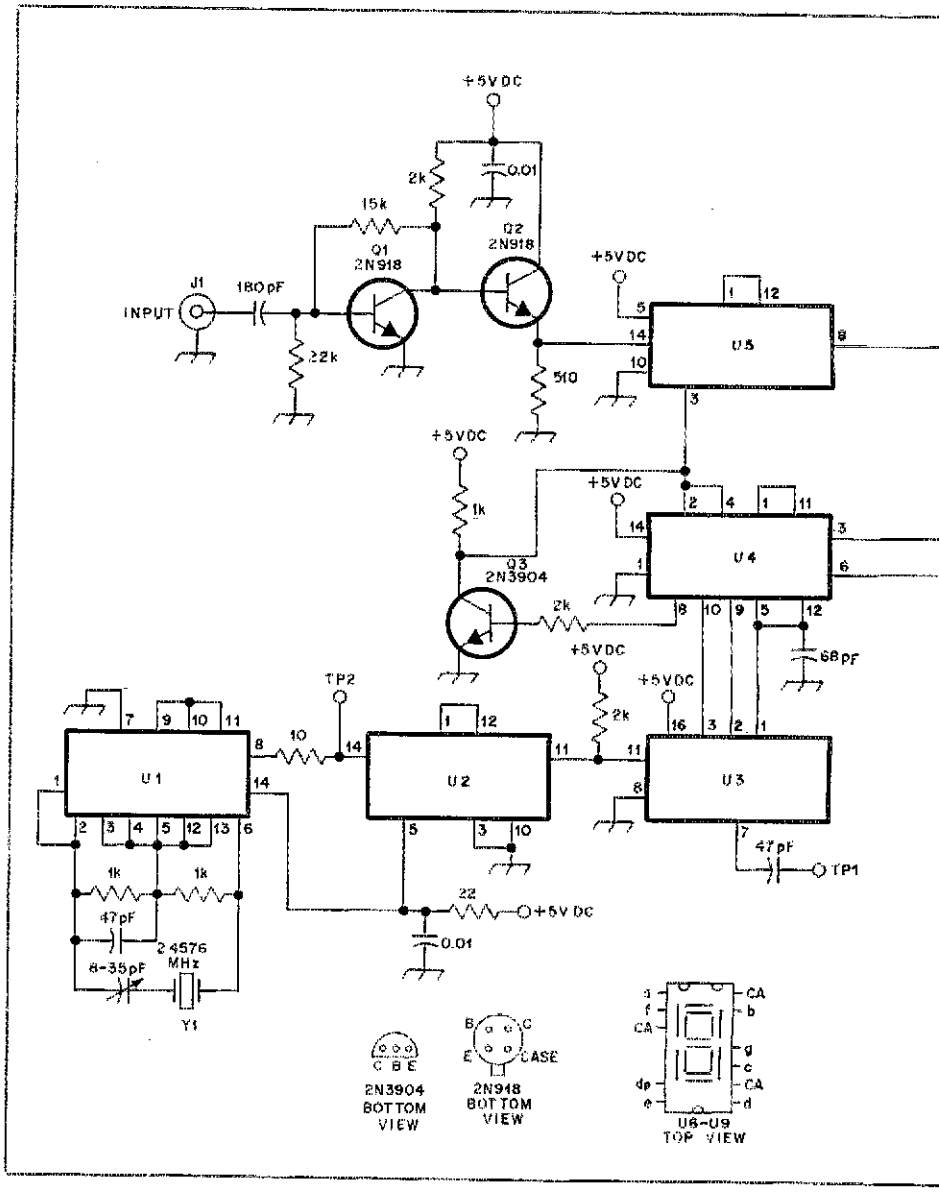


Fig. 2 — Schematic diagram of the digital frequency readout. Component values shown on the schematic but not called out in the parts list are for text or parts placement reference only.
F1 — Fuse, 1/2 A.
J1 — Phono jack.
S1 — Toggle switch, spst.
S2 — Toggle switch, spdt.
S3-S6, incl. — DIP switches, 8 spst sections per switch.

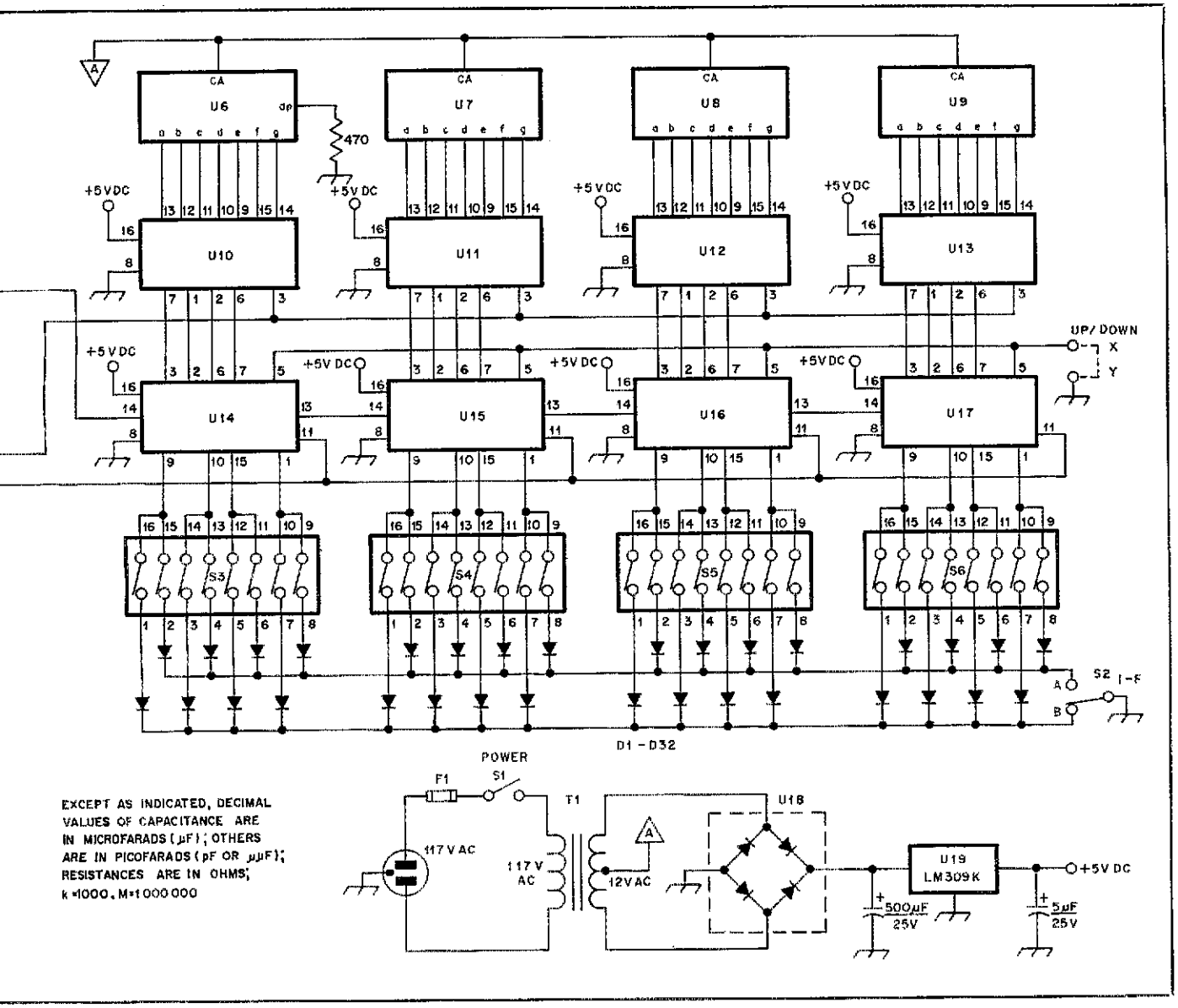
For prescale factors up through n = 5, the update rate is sufficiently fast so that no latching would be needed; instead, the counters could provide storage during their off-count time. Using prescale factor of six through 10 an intermediate storage/latch becomes mandatory or an intolerable amount of flicker would result. However, even a prescale factor of n = 10 resulting in 7.5 readings per second is still quite fast, and thus the readout follows nicely even when the frequency of operations is changed rapidly.

The crystal chosen for a prescale factor of eight is of the same type used in the Fairchild F8 microprocessor. Stability of this crystal, which in turn determines the accuracy of the readout, is quite good with a maximum frequency deviation of 0.01 percent between 0 and 70°C. This would translate to a frequency deviation of 300 Hz on the 15-meter band for a change in room temperature of 10°C or 18°F.

The power supply consists of a 12.6-V ac center tapped, 1.2-A transformer, full-wave bridge-rectifier assembly, filter capacitor and three-terminal regulator. Logic and switching circuits are provided with regulated 5 V dc. The displays are supplied with 6.3-V rectified full wave dc from the center tap of the transformer. A 1/2-ampere fuse protects both supplies. Maximum direct current drawn from the power supply is 600 mA and this occurs when all four digits are lit up with the numeral eight.

Construction

The majority of the components that



T1 — Transformer, 117-V ac primary, 12.6-V ac secondary, 1.2 A, center tapped.
U1, U4 — 74LS00.
U2, U5 — 74LS93.
U3, U14-U17, incl. — 9374
U6 — MAN 52.
U7-U9, incl. — MAN 72.
U10-U13, incl. — 74LS190.
U18 — Full-wave bridge rectifier assembly.
U19 — LM309K regulator.

make up the universal digital frequency readout are mounted on the three circuit boards: the main counter board, the display board and the oscillator board. Double-sided boards with plated-through holes are used for the main counter and display boards. Plated-through holes are not a requirement if the builder remembers to solder the leads to corresponding pads on both sides of the board. The display board is joined to the main counter board at a right angle with the aid of four 4-pin "L" connectors.

Etching patterns for the three circuit boards are shown in the "Hints and Kinks" section of this issue. Parts placement guides are shown in Fig. 4. Arrangement of the boards and power supply components within an enclosure is not critical.

The authors are making available assembled units, complete parts kits or circuit boards for those builders who might be interested. Send an s.a.s.e. to the address given on the first page of this article.

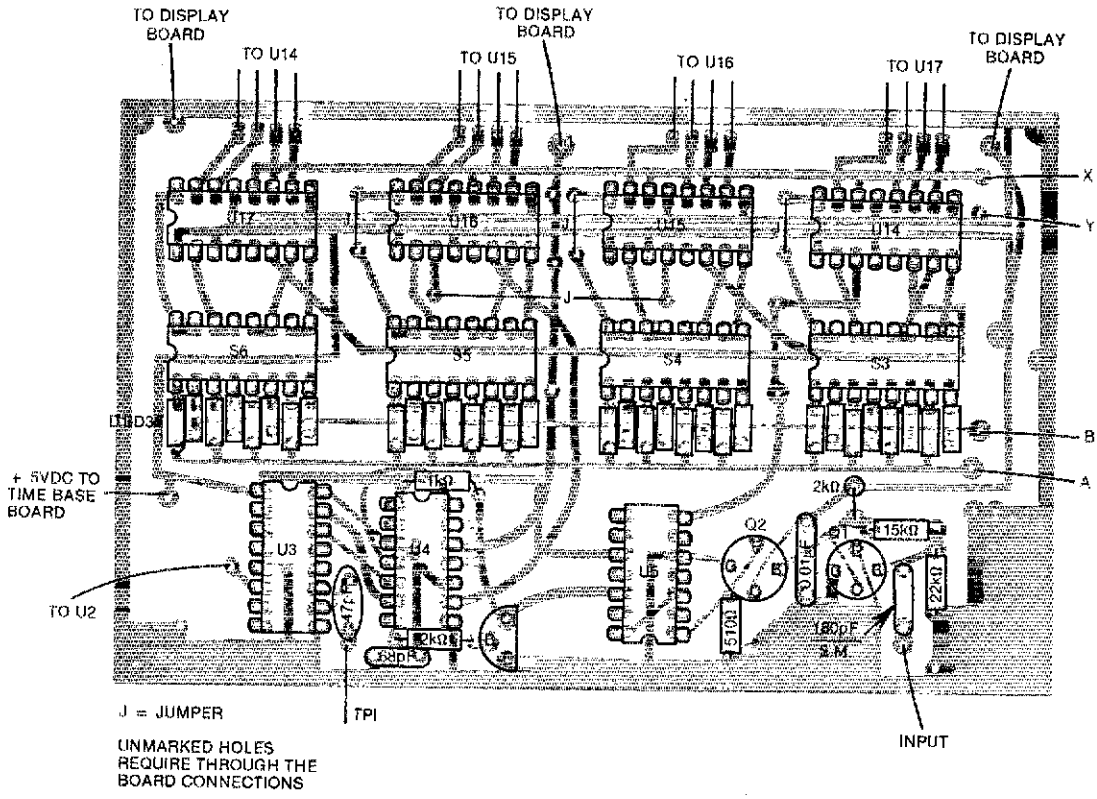
Programming

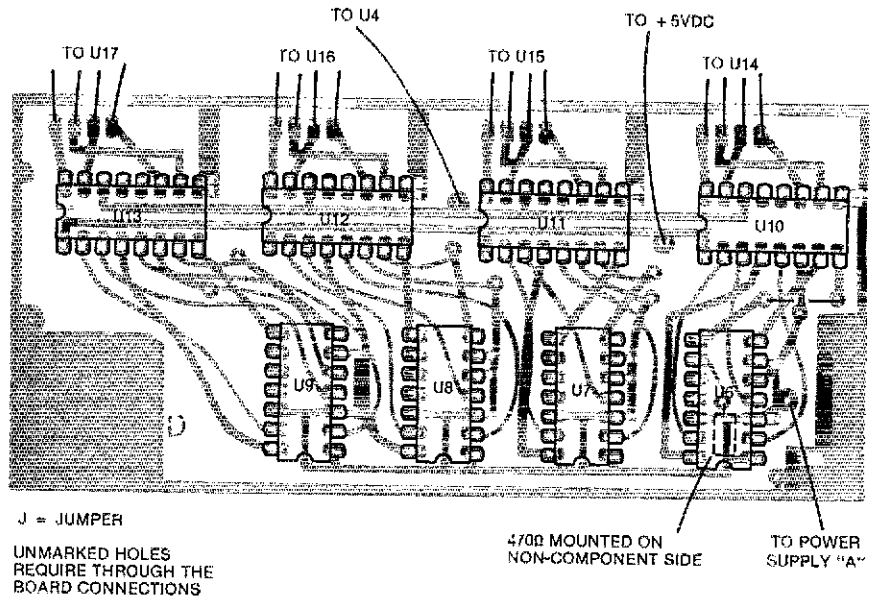
Programming the digital readout is as simple as addition or subtraction. The four DIP switches (one for each digit) control the starting point of the counters. DIP switches 1 and 2 will produce an "8" depending on whether the front panel switch is in the F_A or F_B position. Refer to the table and Fig. 4. If all of the DIP switches are in the off position the display will be blanked. All switches in the on position, for either F_A or F_B, will produce all zeroes on the display.

As an example, assume that you have a Drake R-4C receiver. Initially, set the DIP switches so that the display reads 000.0. Connect the input of the digital display to the INJ. OUT jack on the receiver and tune the receiver to 14.000 MHz. The display should read 645.0. To make the display read 000.0, disconnect the readout from the receiver and program in the numbers 355.0 (this is the difference of 000.0 and 645.0). Reconnect the readout and the display should indicate 000.0. Tune the receiver to 14.010 MHz. If the display does not indicate 010.0, the counter is counting in the wrong direction. By connecting or disconnecting a wire between points x and y on the main board, the direction of the count can be changed.

Calibration

The calibration procedure described





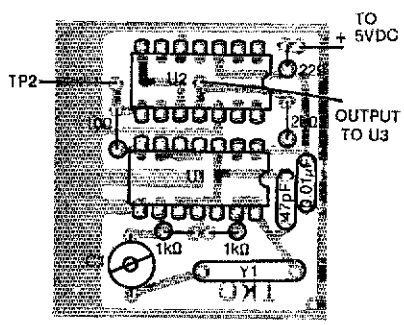


Fig. 3 — Circuit-board layouts for the main, display and oscillator boards. The main and display boards are double sided with a foil pattern on each side. Here the two sides are shown superimposed to aid in parts location. The oscillator is built on a single-sided board. Etching patterns for these boards are shown in the "Hints and Kinks" section of this issue.

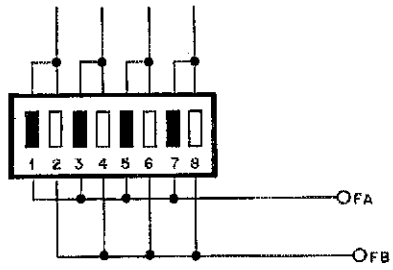


Fig. 4 — Numbering of the DIP switches and related information for programming of the counter.

Table 1

n	$f_{(kHz)}$	*Rate*
1	19,660.8	75
2	9830.4	50
3	6553.6	25
4	4915.2	18.75
5	3932.16	15
6	3276.8	12.5
7	2808.69	10.71
8	2457.6	9.4
9	2184.53	8.33
10	1966.08	7.5

where n is the prescale factor, $f_{(kHz)}$ is the crystal frequency and rate is the display update rate. A 3/4 time base duty cycle is assumed.

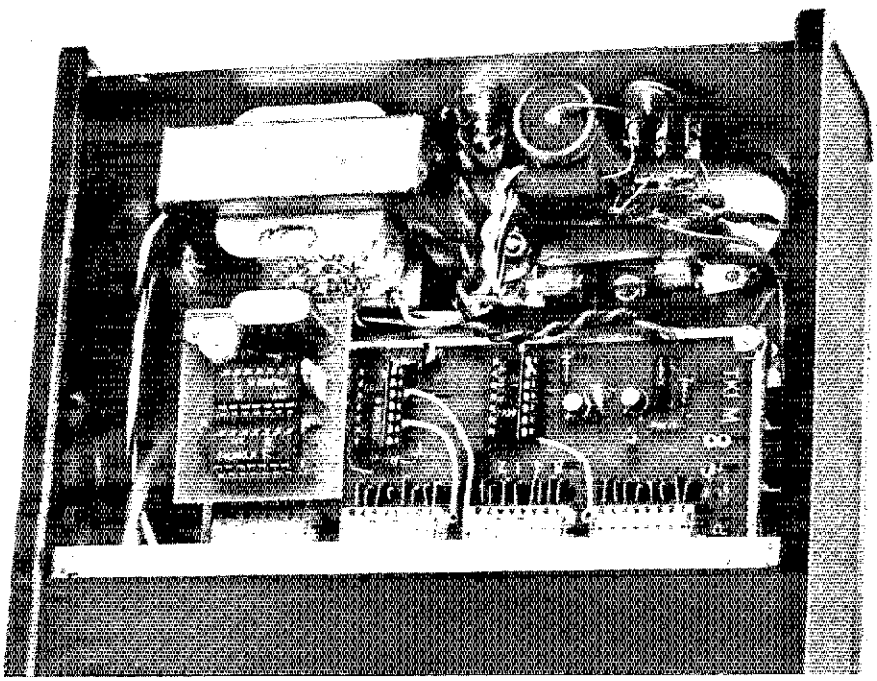


Fig. 5 — This is a photograph of the inside of the completed frequency readout. The oscillator is mounted above the main board by means of a spacer and associated hardware.

here requires no external calibration source or measuring equipment. It is assumed at this point that the digital readout is connected to the receiver and that the appropriate intermediate frequency has been programmed into the counter. To calibrate the counter some high-order harmonics of the crystal time base are injected into the input of the receiver. In this case, signals available from test point TP1 emanate from the Q_4 stage of U3. A 9.6-kHz square-wave signal which is rich in harmonics is present at this point. A wire is run from TP1 to the receiver antenna terminal. Tune the receiver, preferably on one of the higher bands (15 or 10 meters) to one of the many harmonics that appear every 9.6 kHz. Assume that a beat note is located at 21,390.5 kHz. Divide this frequency by 9.6 kHz. The number 2228.18 is obtained. Since this number (which is the order of the harmonic) contains a fractional part (0.18), the time base is not properly set.

Having computed the harmonic order, we can determine the frequency which should be read while observing the beat note: 2228 × 9.6 = 21,388.8. Since the display indicates a number rather close (1.7 kHz) to this frequency, the VFO can be set to the correct frequency and the crystal trimmer adjusted for the proper beat note — for most ssb equipment this would be 1500 Hz. To find this exact frequency take one-half of the difference between the upper- and lower-sideband BFO crystals in the receiver. Should the zero-beat method be used, this frequency must be subtracted from the new frequency for usb and added to the new frequency for lsb. There is some mutual dependence between the display and the beat note so that the readout has to be observed closely and corrected to the proper frequency as the crystal trimmer is adjusted. QST

Strays

SAFETY FIRST

☐ There are reasons for accidents involving radio gear, but never *good* reasons. A recent incident at a commercial radio station illustrates the dangers present in radio equipment. The station engineer bypassed safety knockout switches on the station transmitter and accidently came in contact with about 5000 volts while working on it. The resulting shock knocked the engineer into a wall and inflicted third-degree burns on his hand, face and arms. Take no chances with electricity. Even a low-voltage shock can be serious — sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot in a transmitter when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household how to turn the power off, and how to apply artificial respiration. Instruction sheets on the latest approved method of resuscitation can be obtained from your local Red Cross office.

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

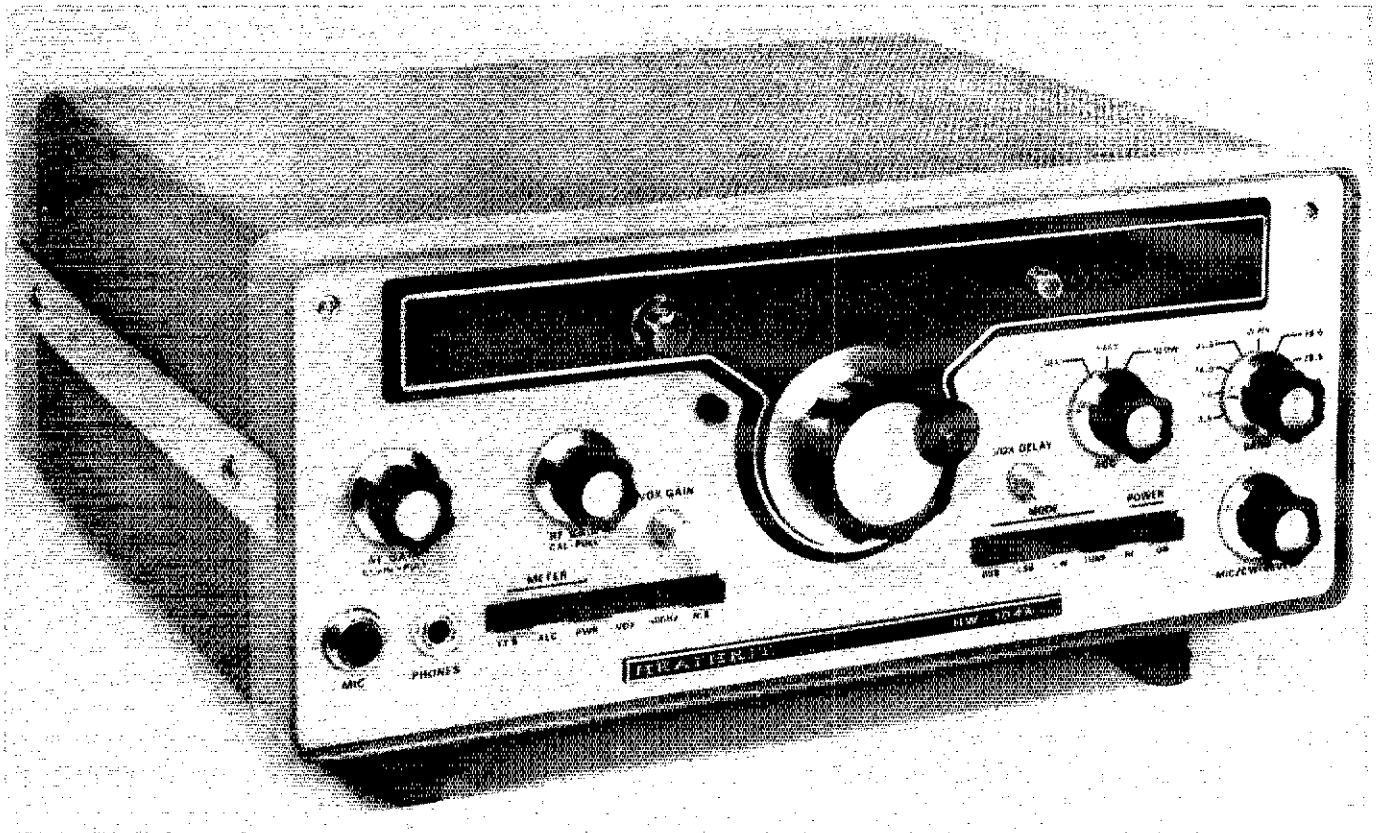
10) If you must climb into a tree, or work on a roof, remember that you're not standing on the ground. That first step down can be a very long and painful one. Never work alone.

11) Develop your own safety technique. *Take time to be careful. Death is permanent.*

Adding Receiver Incremental Tuning to the HW-104 or SB-104 Transceiver

Leapfrog may be a great game for the kids, but a real pain in the knob for transceivers without RIT! Add this simple circuit to your '104 and fret no more.

By Norman Bradshaw,* W8EEF



The front-panel view of the HW-104 shows the placement of the RIT function control switch and potentiometer. Each control is located 4-1/2 in. (114 mm) from the outer edges of the cabinet. Other possible locations are discussed in the text. *(photo courtesy of Harold Hansen)*

One desirable feature that's missing in the Heath HW-104 and SB-104 transceivers is receiver incremental tuning or RIT. This function may be added to these units by inclusion of the circuitry shown in Fig. 1. The tuning range is approximately plus/minus 1500 Hz from the normal (RIT off) receive or transmit frequency. The incremental tuning is activated only during receive periods. During transmission, the VFO frequency is unaffected.

One question comes to mind when attempting to install the circuit components in the '104 — where to mount the front-panel controls. This is answered by fitting the potentiometer and push-button switch into the red plastic bezel, with the pot on the left-hand side and the switch on the right. The front-panel layout photo depicts this installation. Two other alternatives exist. If your transceiver does not have the noise-blanker accessory, consider using the noise-blanker push-button switch to activate the RIT function. The original 100-kΩ VOX-gain control may be used for the RIT control. Since the VOX gain is seldom changed once adjusted, this function may be relegated to an added potentiometer mounted on a bracket and secured to the VFO enclosure. Then extra

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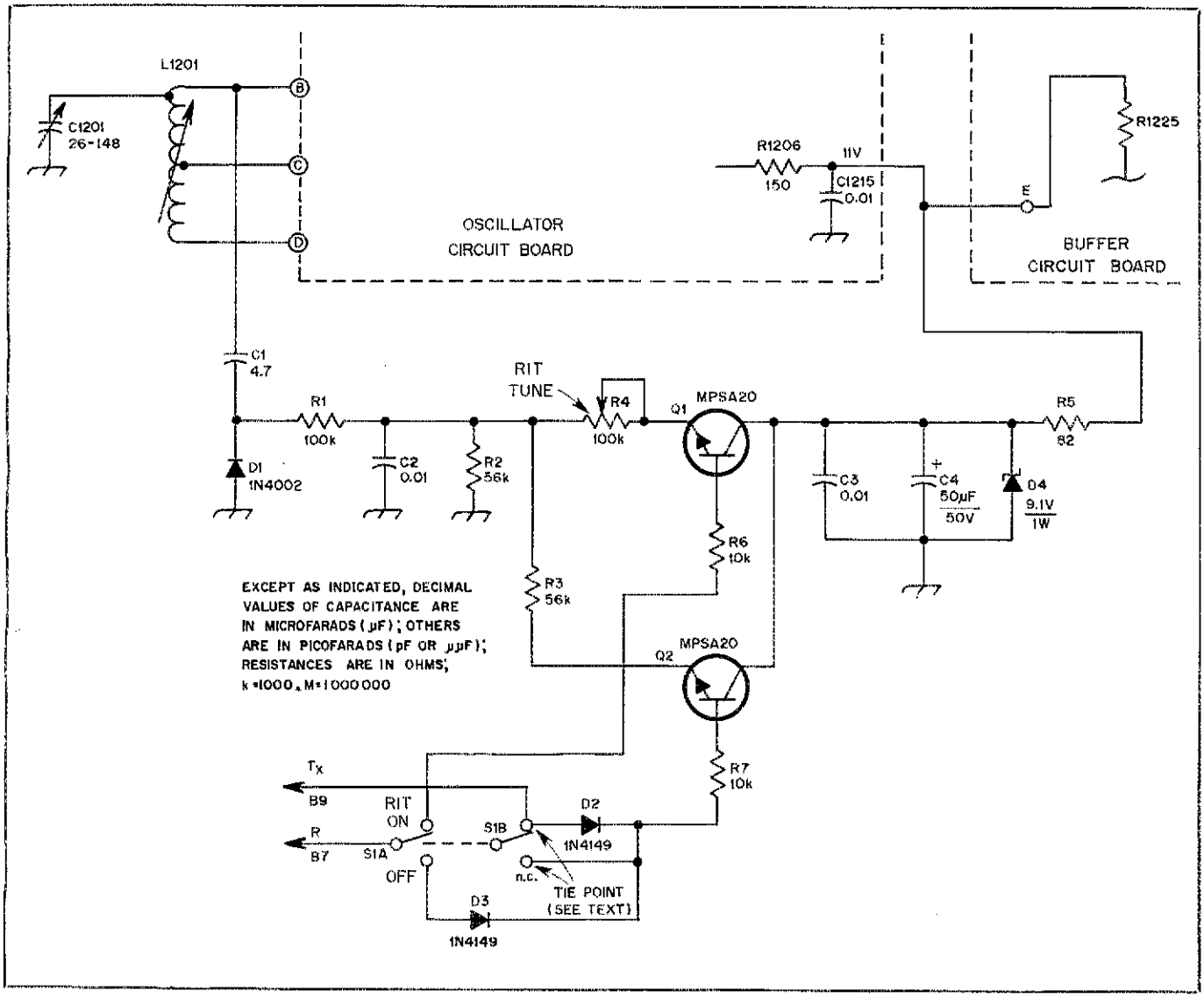


Fig. 1 — Circuit diagram of the RIT modification. All resistors are 1/4 W. Low-numbered components are additions. Only one-half of S1 is used for switching. The other section is used for component tie points, as explained in the text.

C1 — 4.7 pF.
C2, C3 — 0.01 µF.
C4 — 50 µF, 50 V, electrolytic.
D1 — 1N4002.
D2, D3 — 1N4149 or 1N914.
D4 — 9.1-V, 1/2-W Zener diode.
Q1, Q2 — MPSA20.
R1 — 100 kΩ.
R2, R3 — 56 kΩ.
R4 — 100 kΩ.
R5 — 82 Ω.
R6, R7 — 10 kΩ.
S1 — Dpdt push button.

holes in the front panel will not be required.

Circuit Description

With the RIT switch off, transceiver operation is unaltered from its original state. With the push button in (RIT on), the receiver control line (B7) turns Q1 on through S1A. This allows the 11-V supply at the collector of Q1 to be applied to R4, the RIT-frequency control. By varying the voltage applied through R4 to D1, the diode-junction capacitance is altered. This variable capacitance, in conjunction with C1, is felt at the VFO FET gate thereby changing the oscillator frequency. R2 is necessary for balancing purposes so that when R4 is centered, one half of the voltage available through Q1 will be impressed upon D1. This provides the zero or center frequency position of the RIT control.

The transmit-control line (B9) is coupled to Q2 via D2. R2 and R3 act as a voltage divider with the transceiver in the transmit mode to return the VFO to the center frequency, regardless of the setting of R4. This same action occurs via S1A and D3 during receive when the RIT is switched off. D2 and D3 act as an OR gate so that the receive and transmit control lines do not interfere with one another.

Installation

The RIT pc board is mounted between the oscillator circuit board and the tuning capacitor, C1201. First, drill a 1/4-inch (6-mm) hole in the bottom of the VFO enclosure. (SB-104 owners will have to plan a different exit-hole location as the VFO enclosure mounts directly on the chassis in that unit.) Locate this hole so that the four-wire cable used for interconnection will come straight down from the RIT pc board when it is installed. A one-inch square (25-mm) piece of sticky-back foam rubber is attached to the foil side of the board for purposes of insulation and to space the RIT board from the oscillator board. The ground-bus wire is soldered to the ground lug on the tuning capacitor. This should be a short, stiff lead which will aid in rigidly mounting the circuit board. The other side of the board is held in place by the four-wire cable and by the 4.7-pF capacitor (C1) which is connected to L1201. A short piece of hookup wire is run from the +11-V position on the RIT board to the exposed resistor lead of either R1225 or R1226 on the buffer cir-

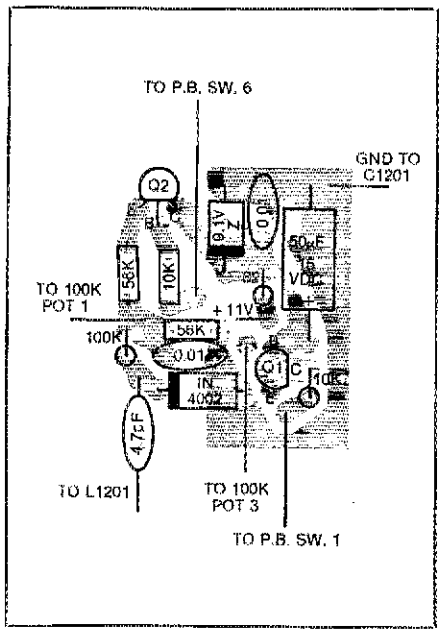


Fig. 2 — Parts placement diagram for the RIT circuit, shown from the component side. Shaded areas represent copper foil as viewed from the component side. The etching pattern is shown in the "Hints and Kinks" section of this issue.

cuit board. *Caution* — be sure to connect to the +11-V side of this resistor. The two 1N4149 diodes are mounted on the push-button switch, S1. Only one half of the dpdt switch is needed for actual switching; the other half is used for tie points. Color code or otherwise mark the leads for the new circuit to ensure proper connections. The four-conductor cable used in this installation has approximately 4 inches (102 mm) of plastic covering left on the end inside the VFO compartment. No grommet was used in the exit hole. The value of C4 is not critical — any value from 10 μF to 100 μF will suffice.

A short, shielded lead is connected from the VFO output jack on the inside of the back panel to one of the spare jacks located there. This enables the VFO output to be available for use with a frequency counter when realigning the VFO. Realignment is necessary because the additional capacity presented to the VFO tank due to the presence of C1 and D1 changes the VFO calibration slightly.

When using a frequency counter for realignment, adjust the VFO for a display of 5.5 MHz with the HW-104 dial at "0" and for a 5.0-MHz indication with the dial at "500." These steps will have to be repeated several times before the VFO will track properly. Alternatively, the VFO alignment procedure described in the instruction manual for use without a frequency counter is adequate. However, the counter method is much simpler. Once the realignment of the VFO is completed, you're ready to go! QST

Feedback

☐ Disregard the parts-layout guide for the "Single Channel VHF Monitor Receiver" (Bryant, Fig. 3, December 1979 *QST*, page 26), and use the information of Fig. 1 here instead. The reassignment of component numbers from the author's original to *QST* style was completed in the schematic diagram but was not carried through in the layout guide. The etching pattern as published in the December "Hints and Kinks" section is correct.

☐ Heavy borders (denoting Committees and Working Groups of particular interest to amateurs) were left off the boxes in the diagram in "WARC Countdown" (December *QST*, page 73). The following boxes should have had heavy borders: 5BA, Below 4 MHz; 5BB, 4-27.5 MHz; 5C, 27-960 MHz; 5D, 960 MHz-40 GHz; 5E, Above 40 GHz; 6A, Coordination Procedures; and 7, General Administrative.

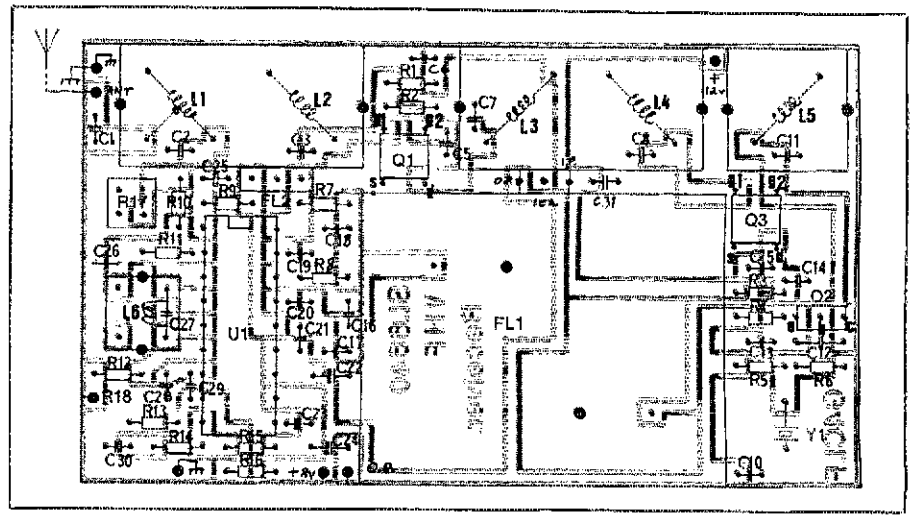


Fig. 1 — Corrected parts-placement guide for the single-channel vhf receiver, as viewed from the component side of the board. The shaded area represents an X-ray view of the etched pattern on the opposite side of the board. The board has copper on both sides, with clearance holes for component leads being the only copper removed on the component side.

☐ In "Tune Up Swiftly, Silently and Safely" (December *QST*, page 41), R1 in Fig. 1 should be 180 k. In Table 1, the first line should read:

Fwd	*Ref*	*SWR*
50	0	1.0

☐ Details for T1 of Fig. 2, page 12, of December 1979 *QST* ("Transmitter Fundamentals"), were not given in the caption. T1 consists of 36 turns of no. 28 enamel wire on an Amidon FT-50-61 (125 mu) toroid core (90 μH). The secondary winding has 4 turns of no. 28 wire over all of the primary winding.

☐ Two items were omitted from the obituary notice of Edmund B. Redington, W4ZM, which appeared in December 1979 *QST*, page 27. For 13 years, Ed served as assistant director of the Roanoke Division of the ARRL, which gave him its service award in 1975. He also served as president of the Foundation for Amateur Radio, which has formed a scholarship fund in his memory.

☐ Percy Crosthwaite, VE5RP, is the immediate past SCM of Saskatchewan, not Alberta as reported in "Canadian Newsfronts" (December 1979 *QST*, page 75).

☐ Members of ARRL advisory committees are appointed by the President, not by the Board of Directors, as stated in "Contest Mysteries Unraveled," November *QST*, page 64.

☐ On page 69 of December *QST*, the call sign of John Champa should be K8OCL.

☐ OSCAR 8 orbit numbers listed in November 1979 *QST*, page 113, starting with 2 Nov. are in error. Subtract 400 orbits. Orbit for 2 Nov. should be 8458AJ, 3 Nov. 8472J, etc. QST

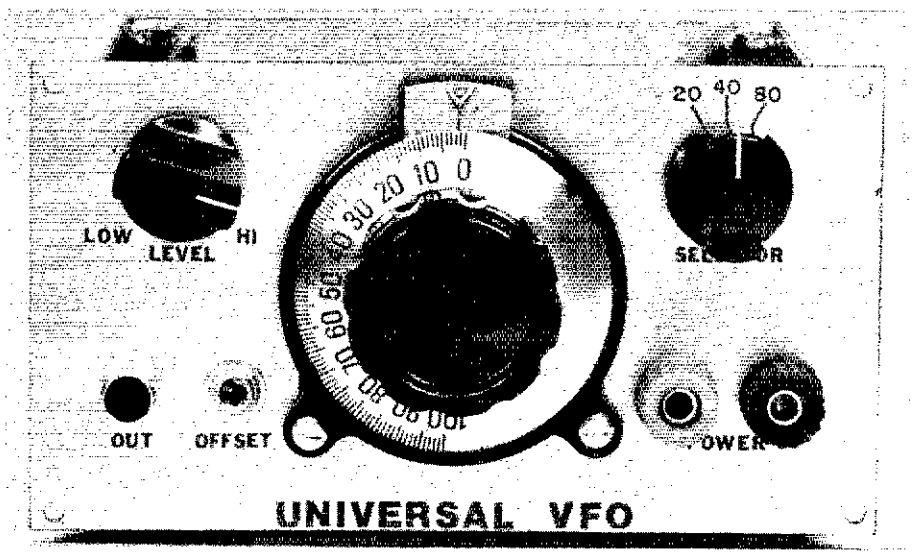
● *Basic Amateur Radio*

A Beginner's 3-Band VFO

Crystal control can be constrictive for the QRP operator or Novice. Build this stable but simple VFO if you're tired of being "rock bound." Learn some basics, too!

By Doug DeMaw,* W1FB and Bob Shriner,** WAØUZO

If you built the QRP solid-state transmitter from December 1979 *QST* you're apt to be singing the "quartz-crystal blues" by now. There's probably nothing more annoying to a cw operator than being a prisoner to a few crystal frequencies; invariably, or so it may seem, there's a QSO in progress on the crystal frequency which is available. The logical solution to the problem is to construct a VFO. This will give you freedom to roam throughout your segment of the chosen amateur band. Our project this month is an uncomplicated VFO which provides direct output on 80, 40 and 20 meters by virtue of band switching. The foundation unit is again the "Universal Breadboard" from Basic Radio in September 1979 *QST*.



Exterior view of the completed 3-band VFO. Double-sided pc board material is used for the panel and box walls in this version by Circuit Board Specialists.

What Is a VFO?

The term "VFO" stands for *variable-frequency oscillator*. Other names for similar circuits are "PTO" (permeability-tuned oscillator) and "LMO" (linear master oscillator). A PTO is similar to a VFO except that the frequency is changed by means of a movable powdered-iron or ferrite slug in a tuned-circuit coil. The VFO, on the other hand, is generally tuned by adjusting a variable capacitor. Some VFOs employ a varactor or VVC diode for tuning purposes. These diodes are subjected to different amounts of dc voltage which change their internal capacitances. VVC means *voltage-variable capacitance*. The primary difference between a VVC or varactor diode and a tuning capacitor is that one is tuned electrically and the other is tuned manually. The result is the same — an excursion in operating frequency.

From the December 1979 installment of this series we learned that in order for a crystal to oscillate we must supply feedback voltage in the oscillator stage; some of the oscillator output power is routed to the input of the oscillator (collector-to-base for a bipolar transistor, drain-to-source for an FET and plate-to-grid in a tube type of oscillator). This changes the stage from an amplifier to an oscillator.

The foregoing concept applies also to a VFO. The major difference between a crystal oscillator and a VFO is that the crystal comprises the resonant cricuit in the first example, while a coil and capacitor are used as the resonant circuit (resonator) in a VFO, PTO or LMO. It might be worth mentioning that linear master oscillators (LMOs) provide *linear* tuning, hence the name. More specifically, for each degree of mechanical or electrical tuning there will be an identical shift in frequency in terms of Hz, kHz or MHz. Some VFOs don't act quite that way. Instead, a large part of the tuning range is "crunched" at one end of the dial, while the remaining part of the frequency coverage is spread out over the other end of the dial. This is a *nonlinear* tuning characteristic. A linear response makes it easier to calibrate the VFO dial and provides smoother tuning when changing the operating frequency.

VFO Design Points

Let's examine the fine points of VFO operation. Categorically, here are the primary design objectives for good performance.

1) Good frequency stability versus time. Most designers prefer to have less than 100 Hz of frequency drift (change) from a cold start to a period an hour later.

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**Box 969, Pueblo, CO 81002

2) Purity of the output waveform. This means that we want *only* the desired output frequency. Harmonics, parasitics (random oscillations) and noise should be kept to the lowest level possible.

3) Acceptable mechanical stability. The circuit should contain components which will not cause changes in operating frequency when the VFO is subjected to vibration or shock.

4) Adequate VFO output voltage or power. The VFO should be capable of supplying sufficient output voltage or power to properly excite the stage in the transmitter or receiver to which it is connected.

5) Satisfactory electrical isolation between the oscillator and the VFO-chain load. This means that one or more buffer (isolating stages) or amplifier stages should be employed between the VFO-chain oscillator and the first stage of the transmitter. This helps prevent *frequency pulling* (chirp) when the transmitter is keyed. The chirp is caused by load changes at the VFO-chain output which are reflected to the oscillator. The more buffering (isolation) used, the lower the chances for unwanted "pulling."

6) Electrical shielding of the VFO circuit. Ideally, the VFO and its buffer stages are contained in an enclosure which provides isolation from stray rf and air currents.

These six performance goals have been taken into account for our workshop project of this installment.

Types of VFO Circuits

Rather than devote countless pages of text to the myriad types of VFOs which exist, let's turn our attention to the more common ones used by amateurs. We will avoid a discussion of vacuum-tube VFOs, as they are less efficient, overall, and more difficult to stabilize (heat) than their transistor equivalents are. Instead, let's examine the circuit at A in Fig. 1. Here we have what is known as a Hartley oscillator VFO. Years ago this type of circuit (but with a tetrode-tube oscillator) was referred to as an "ECO." The output is taken in our circuit from the source terminal of Q1. Part of the output energy is fed back to the gate of Q1 via L2. This technique supplies the necessary *positive feedback* to make Q1 oscillate. The percentage of power (typically, 25 percent or less) fed back is determined by the placement of the coil tap on L2. The closer the tap is to the transistor gate the greater the feedback. Generally, the tap is located between 10 and 25 percent of the total coil turns. The tap point is made nearest to the grounded end of L2. A good rule is to use no more feedback than is necessary to ensure reliable oscillator starting. Too much feedback can cause oscillator drift and spurious oscillations apart from the desired ones. C3 should be made small enough in value to minimize

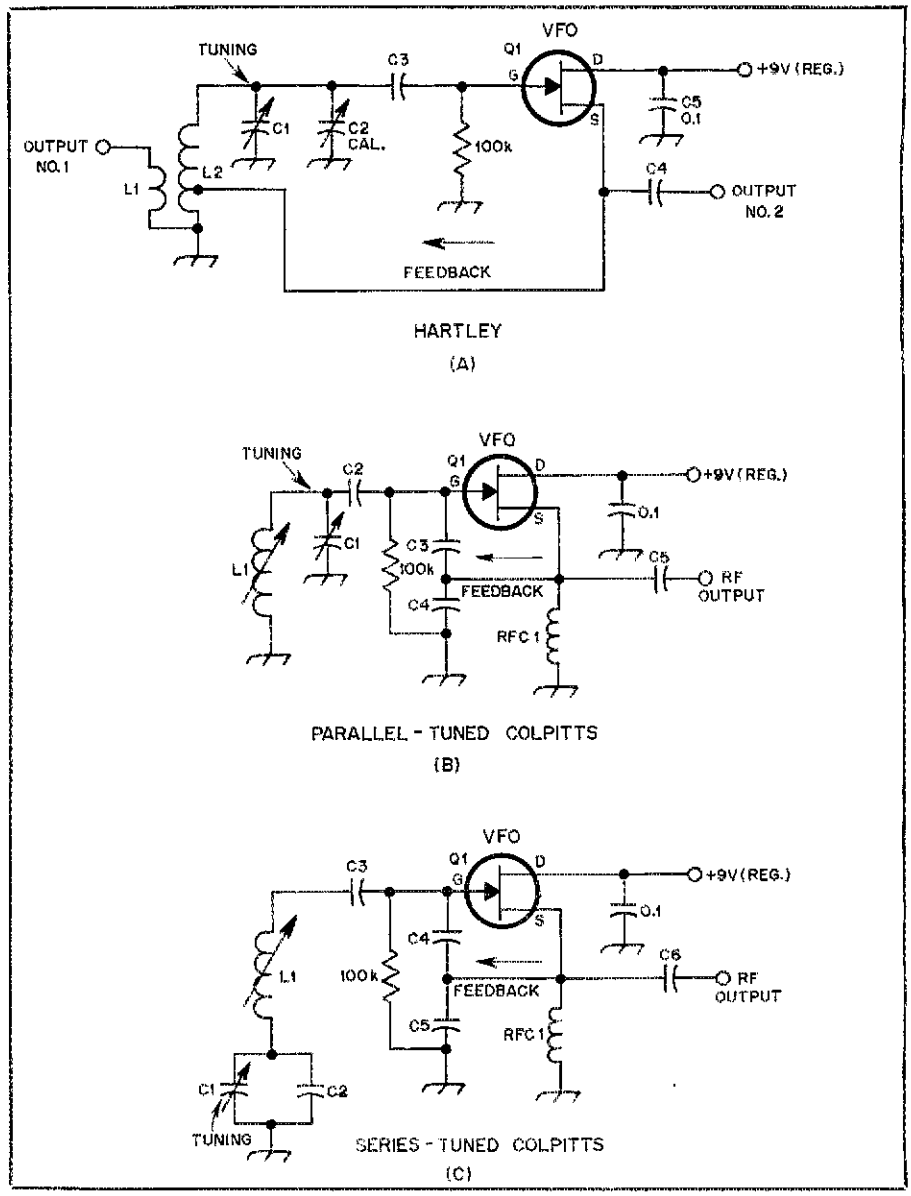


Fig. 1 — Examples of currently popular VFO circuits. A Hartley oscillator is shown at A. The circuit at B is that of a parallel-tuned Colpitts oscillator. A series-tuned Colpitts circuit is shown at C. Feedback here is from source to gate.

the coupling between the tuned circuit (L2-C1-C2) and the gate of Q1. However, it must be large enough to permit Q1 to oscillate reliably. Using a small-value capacitor at C3 will aid in keeping the Q (quality factor) of the tuned circuit high. This is desirable in the interest of frequency stability and purity of the output wave form from Q1. Output can be taken from a small winding near the ground end of L2 (output no. 1, L1) or by means of capacitive coupling from the Q1 source via C4. If the L1 method is used, the winding should be very small (minimum turns) to minimize loading of the tuned circuit. Similarly, if rf output is taken through C4, the capacitor should be the lowest value which will provide ample excitation to the following stage. In a practical VFO the value of C4 ranges from 20 to 100 pF for operation from 160 through, say, 20 meters. C5 is used as an rf-bypass capacitor. The drain should not have rf energy present in this circuit. C1 is for main tuning and C2 is used to calibrate the VFO dial. In this application C2 is called a "trimmer."

A more popular variety of oscillator is shown at B of Fig. 1. Here we have a parallel-tuned Colpitts VFO. It is called "parallel" because L1 and C1 *are* in parallel. Instead of a coil tap, as in Fig. 1A, the feedback is provided by means of a capacitive divider (C3 and C4). The effect is the same as when a coil tap is used. The ratio of the values at C3 and C4 will determine the amount of feedback energy. If C3 is small in value and C4 is large, the feedback amount will be small. If the situation is reversed the feedback will be high. Some VFOs of this type use a 1:1 capacitor ratio (see Fig. 2). RFC1 is

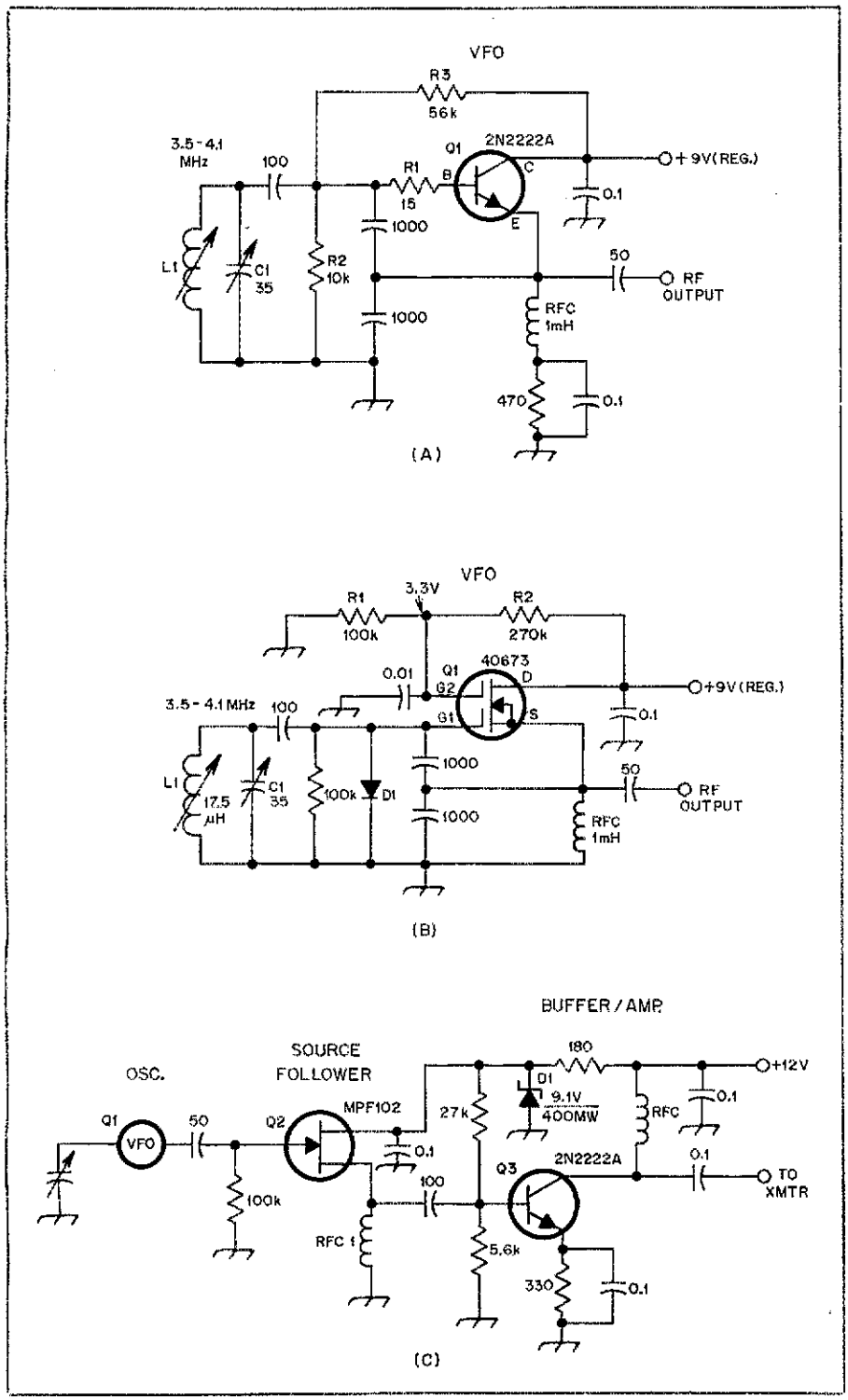


Fig. 2 — A practical 80-meter VFO which uses a bipolar transistor is shown at A. The diagram at B illustrates the same type of oscillator in which a dual-gate MOSFET is used. VFO buffering is depicted at C, where Q2 and Q3 help to isolate the oscillator from the load (see text).

employed to keep the source of Q1 *above rf ground*. The coil tap in Fig. 1A serves the same purpose. If RFC1 were not used, or if it were too low in inductance for the operating frequency, the transistor would not oscillate. C2 and C5 in this circuit should be as small in value as practical, consistent with reliable oscillation and ample output power. A trimmer capacitor is not shown in this circuit, since L1 in this example is slug tuned: The slug can be adjusted to provide VFO dial calibration.

At C of Fig. 1 is a variation of the parallel-tuned Colpitts VFO. It is called a *series-tuned* Colpitts oscillator. It is known in some circles as a series-tuned Clapp oscillator. It differs from the circuit of Fig. 1B only in the tuned-circuit arrangement. If offers the advantage of higher inductance at L1, which is sometimes desirable in terms of frequency stability at the higher operating ranges. Furthermore, C1 need not be as large in Fig. 1C to obtain the same tuning range as C1 provides in Fig. 1B.

JFETs are shown in the circuits of Fig. 1, but dual-gate MOSFETs or bipolar transistors can be used with good results (see Fig. 2). The basic advantage in using JFETs is that the parts count is lower than with the other transistor types. All the oscillators in Fig. 1 are capable of excellent stability. Care must be given to the type of capacitors used in the tuned circuit and feedback networks. Generally speaking, disc-ceramic capacitors are unsatisfactory unless they are the temperature-compensating variety. Polystyrene capacitors are highly recommended in the interest of frequency stability. A second choice would be silver-mica units. If slug-tuned coils are used in the oscillator tuned circuit, make certain that they are mechanically firm and that the slug core material is suitable for the operating frequency. The wrong core can spoil the coil Q. Ideally, for minimum long-term drift, the coil slug should *just* enter the coil when set for the required inductance. The farther it is inserted in the coil winding the greater the chances for drift caused by heat; the core properties change with temperature, and the greater the core penetration the larger the change in inductance.

Practical Circuits

Fig. 2A illustrates a practical VFO in which a 2N2222A bipolar transistor is used. With the values shown the approximate operating frequency is from 3.5 to 4.1 MHz. The nominal inductance at L1 should be 17.5 µH. R2 and R3 provide necessary forward bias at Q1 to ensure oscillation. If vhf parasitic (random) oscillations occur in a VFO, R1 can be added as a parasitic suppressor. Alternatively, a single miniature ferrite bead (950 mu) can be slipped over the Q1 base lead near the transistor body to prevent vhf oscillations.

Fig. 2B illustrates a practical VFO in which a dual-gate MOSFET is used. Gate no. 2 has forward bias applied by means of R1 and R2 (necessary). A 0.01-µF bypass capacitor is used at gate 2 to keep that terminal of Q1 at rf ground. The drain is bypassed in a like manner. D1 has been added to show how improved stability can be obtained when using an FET in an oscillator. The diode should be a high-speed (high frequency) type, such as a 1N914 silicon unit. It prevents the positive half of the sine wave at gate no. 1 from swinging beyond specific limits imposed by the diode. This in turn limits the FET transconductance, which keeps the transistor junction capacitance relatively constant. Without D1 acting as a clamp, the positive sine-wave excursion will cause the internal capacitance to vary considerably. This increases the junction heating, which also affects the internal capacitance.

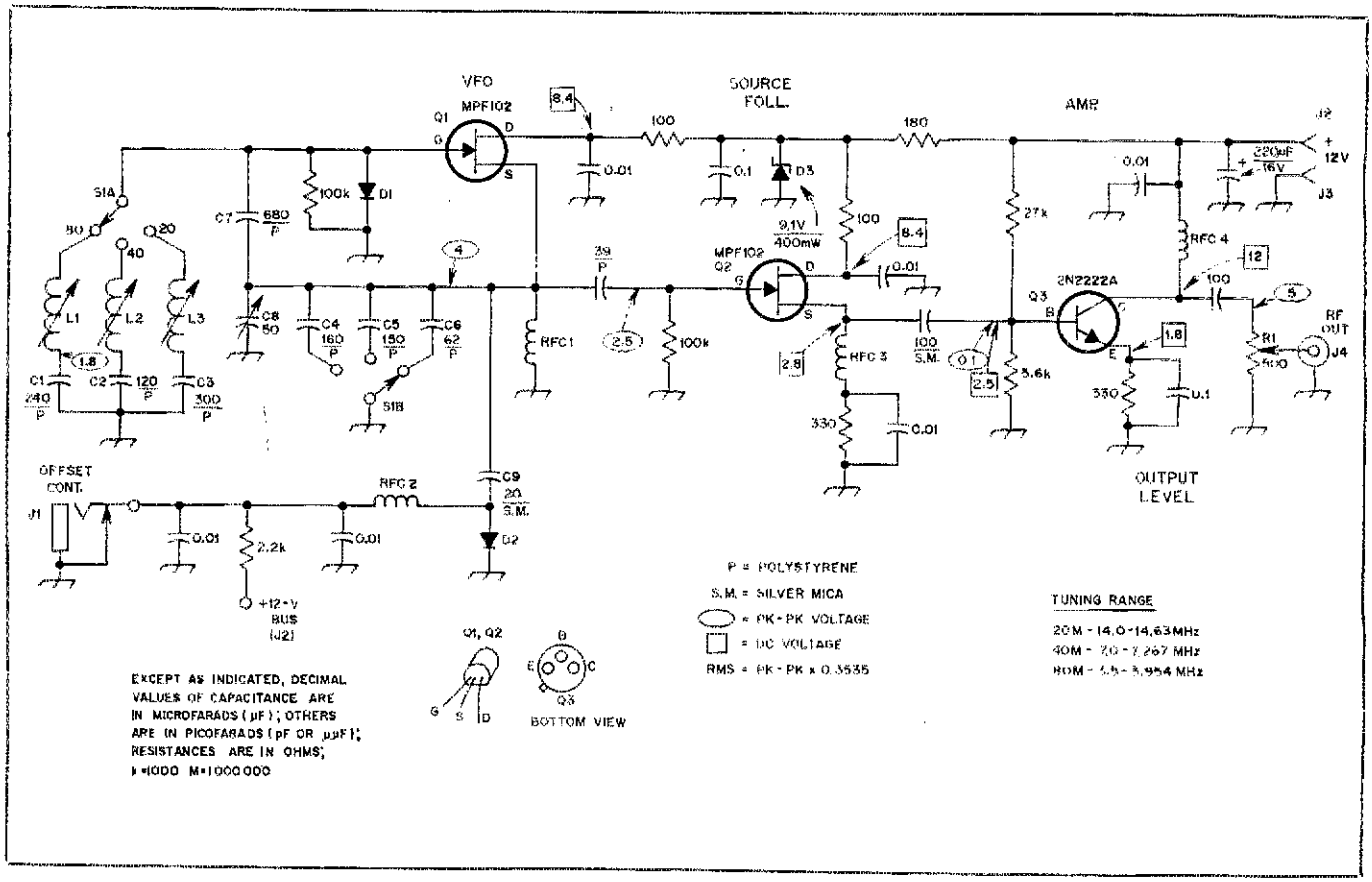


Fig. 3 — Schematic diagram of the Basic Radio VFO. Capacitors are disc ceramic unless otherwise indicated. Polarized capacitors are electrolytic or tantalum. Fixed-value resistors are 1/4- or 1/2-watt composition. Rf and dc voltage notations are included on the diagram as an aid to troubleshooting.

C1-C7, incl. — Numbered for text discussion and parts-placement purposes.
C8 — Miniature 50-pF variable (Hammarlund HF-50 or equiv.).
D1, D2 — High-frequency switching diode, 1N914 or equiv.
J1 — Miniature closed-circuit phone jack.
J2, J3 — Insulated binding post, one red (+) and one black (–).
J4 — Single-hole-mount phono jack.
L1 — 30-µH nom. inductor, slug tuned (J. W. Miller 42A335CBI or equiv. hi-Q type).
L2 — 7.5-µH nom. inductor, slug tuned (J. W. Miller 42A826CBI or equiv. hi-Q type).
L3 — 1.3-µH nom. inductor, slug tuned (J. W. Miller 42A156CBI or equiv. hi-Q type).
Q1, Q2 — Motorola MPF102 JFET (or 2N4416).
Q3 — 2N2222 or 2N2222A, any brand. Use 2N5179 as substitute if necessary.
R1 — 500-Ω linear-taper composition control.
RFC1-RFC4, incl. — 120-µH miniature rf choke (J. W. Miller 72F124AP or equiv.).
S1 — Double-pole, 2-position single-wafer phenolic wafer switch. The unit shown in Fig. 4 has several unused contacts.

Another advantage of D1 is that through a reduced junction-capacitance change there will be much lower harmonic output from the VFO: rapid changes in internal capacitance contribute substantially to the generation of harmonic currents. D1 can be added to any of the FET oscillators shown in this article. They do not aid performance when applied to the bipolar-transistor oscillators. This is because the base-emitter junction of a bipolar transistor serves a similar function to that of D1. A simple explanation of D1 is that it is a "bias stabilizing component."

VFO Isolation

Buffering of the oscillator is seen in our circuit of Fig. 2C. Q1 is followed by an FET *source-follower*. Input to that stage is applied to the gate and output is taken from the source. This type of circuit, whether it's a tube (cathode-follower) or transistor variety, does not have a voltage gain. Rather, some of the applied signal is lost. The theoretical output is 0.9 times the input voltage. This checks out when a resistor is used in place of RFC1. However, slightly greater output voltage is usually obtained when a choke or tuned circuit is used in the source circuit (see voltage notations in Fig. 3). The drain is at rf ground by virtue of the 0.1-µF bypass capacitor. The principal advantage of the FET source-follower is that it exhibits a high input impedance — 1 megohm or greater. This assures minimum loading of the oscillator, and hence excellent isolation from the VFO-chain (Q1, Q2 and Q3) load. Remember, the *load* is the transmitter to which we will attach the circuit of Fig. 3.

Output from Q2 of Fig. 2C is fed to the base of Q3, which functions as a broadband Class A amplifier. Q3 adds to the isolation we desire between the oscillator stage and the load. It also amplifies the VFO signal.

Voltage Regulation

A stable dc operating voltage is vitally important to VFO stability. For that reason we have shown a Zener-diode regulator in Fig. 2C and Fig. 3. The voltage is regulated at 6.8 to 9.1 volts in most VFOs. The appropriate Zener diode is chosen for the desired operating voltage. Not only is the oscillator supply voltage regulated, but regulation is applied to the drain of Q2 and the base of Q3. This helps to prevent load changes within the VFO chain when variations in the supply voltage occur. A stable operating voltage is the most important external consideration for the VFO stage, since even slight changes in drain voltage can cause a significant shift in operating frequency.

Drift Characteristics

There are two significant drift traits that we must concern ourselves with when designing or building VFOs. One is known as *short-term drift*. When a VFO is turned on after a period of non-use, the components and the transistors are considered "cold." Thus, we hear the expression "cold start." When the operating voltage is applied there is heating within the transistors until their junctions reach a stabilized operating temperature. Short-term drift generally completes its cycle

during the first three minutes of operation. In severe cases the drift can be many kHz. The usual cause of excessive short-term drift is too much feedback or unnecessarily high forward bias on the transistor. It is always best to use the least amount of feedback and forward bias possible, consistent with good performance. The VFO should be operated at minimum power dissipation to enhance stability. The power can always be built up *after* the oscillator stage, easily and inexpensively.

Long-term drift is caused by a host of operating events. One contributing factor is rf current which flows through the various components in the oscillator. Such components are the VFO coil, the coupling capacitors and the feedback capacitors. These rf currents cause internal heating of the components, however miniscule the amount may be. Heat will cause the inductance to change slightly. It will also lead to changes in critical capacitance. Since the heating is gradual until it stabilizes, the frequency drift is also gradual. Ordinarily, long-term drift slows down or stops after a period of one hour. From that time on a properly designed homemade VFO shouldn't drift more than 50 to 100 Hz per hour. After long-term stabilization is reached, most VFOs will drift upward and downward ("hunting") in frequency a few Hz in random fashion. Few VFOs will remain "rock solid" all of the time after warmup.

Ambient temperature changes also play a big role in long-term stability. This concerns the temperature within the VFO compartment. If the VFO assembly is part of a large piece of equipment, such as a solid-state transmitter or receiver, numerous components and transistors external to the VFO will heat up, causing a continual change in cabinet internal temperature. This temperature change is induced gradually into the VFO compartment until the entire system stabilizes.

We can learn from the foregoing statements that best long-term stability can be achieved if the VFO chain is kept isolated from sources of heat. Many amateurs use their VFOs outboard from the transmitter or receiver to enhance stability. It is well to note that radical changes in room temperature will also have a marked effect on long-term VFO stability. The extreme example is seen in a mobile installation, where the temperature can change in a startling manner on a hot day after the air conditioner is activated, or on a winter day after the car heater is turned on.

This Month's Project

We will construct a VFO which has output on any of three bands — 80, 40 or 20 meters. It can be used with most solid-state transmitters, but has been designed specifically for the QRP rig from December 1979 *QST* (Basic Radio).

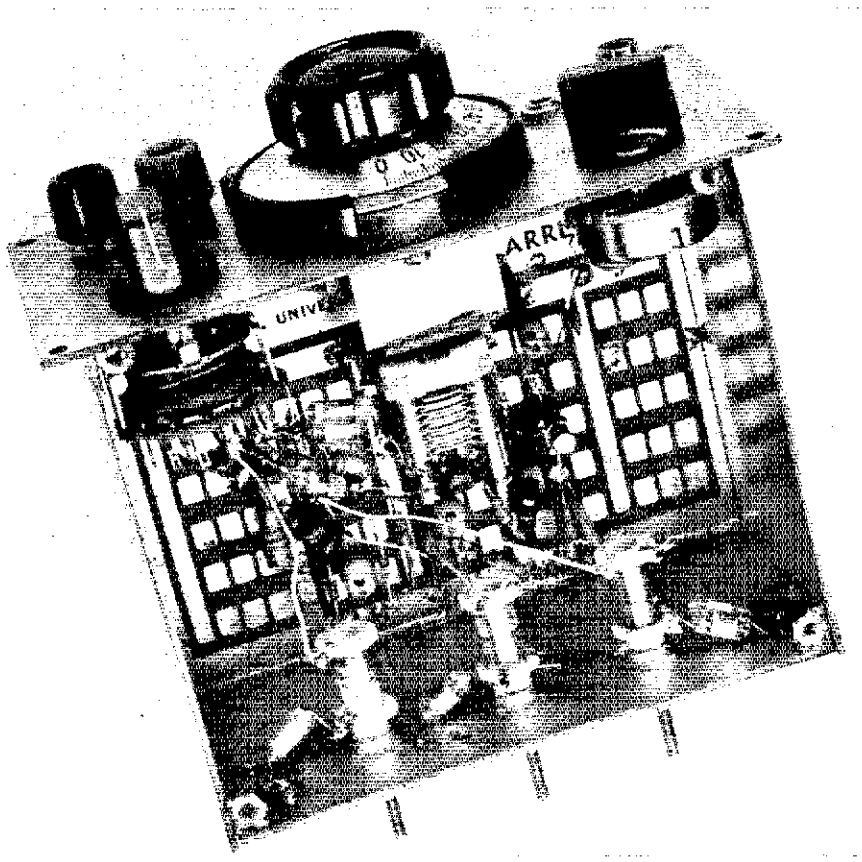


Fig. 4 — Interior view of the VFO. The polystyrene capacitors between C8 and S1 are paralleled groups which were needed to arrive at the standard values specified for C4, C5 and C6 of Fig. 3. Single units are recommended.

Simplicity of construction is provided by means of the Universal Breadboard and double-sided pc board, the latter of which is used for the cabinet, panel and top cover.[1]

The circuit for our 3-band VFO is given in Fig. 3. Q1 is the oscillator. The operating frequency is chosen by means of the band switch, S1A-S1B. Part of the feedback network (C4, C5 and C6) is changed by the switch, S1B. Similarly, the tuned circuits for the three bands are connected to Q1 via S1A. D1 has been included to reduce harmonics and stabilize the oscillator, as discussed earlier in this article.

D2 serves quite a different purpose. It operates as an electronic switch to offset the VFO operating frequency during receive periods. Were this not done, we would hear the VFO signal on top of the signal we were copying. Since the VFO is left operating at all times (this eliminates short-term drift), the offset circuit is necessary. The circuit is closed at J1 during transmit. This turns off the switch. When the circuit at J1 is open (receive), the 12-volt line reaches D2 and "saturates" it (turns it on). This places C9 in the circuit (Q1 source to ground), thereby shifting the oscillator frequency. J1 can be connected to the station transmit-receive control switch or relay to provide automatic offset actuation. The offset amount on 20 meters is 100 kHz, during 40-meter operation it is 44 kHz and on 80 meters the shift is 67 kHz.

C8 serves as the main tuning control. The shaft of C8 is coupled to a Radio Shack or Calrad vernier drive to provide smooth VFO tuning.

Output is taken from the oscillator at the source of Q1. It is routed by means of light capacitive coupling to the gate of source-follower Q2. The rf energy is next routed from the source of Q2 to the base of broadband amplifier Q3. R1 has been added as a convenience to those who wish to reduce the VFO output power. This is useful if the VFO is to be used as a signal generator, or to excite a circuit which requires less rf voltage than is available when R1 is set for maximum output. If this VFO is to be used only with the December 1979 *QST* transmitter, then R1 can be eliminated. If that is done, the 100-pF coupling capacitor should be connected directly to J4.

Output from this circuit is 5 volts peak-to-peak across R1, as measured with a 50-MHz scope. If an rf probe and VTVM are used for measuring the rf circuit voltages, the rms reading with the probe will be 0.3535 × the listed peak-to-peak voltages. Dc voltages are indicated on the diagram at significant points. The values rf and dc voltage given were obtained with

[1]Circuit boards, negatives and complete parts kits for this project are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

the VFO operating on 80 meters. Fig. 4 shows the inside of the assembled VFO chain.

Construction Notes

We need not follow the layout in Fig. 4. Almost any format and packaging technique will be suitable, provided the signal leads are kept as short and direct as possible. Those who are adept at laying out and etching their own pc boards can make this unit much more compact through that technique. Single-sided pc board should be used for the VFO circuit board if this is done — double-sided board creates unwanted capacitors between the foil elements and the ground-plane side of the board. This can cause poor performance and drift with the circuit of Fig. 3. Although the Universal board for this project *is* double-sided, no problems will result. This is because the critical components are not mounted on the pc-board pads. The VFO case is 4-1/2 × 3-3/4 × 2-1/2 inches (114 × 95 × 63 mm), wide, deep and high, respectively. The front panel measures 2-3/4 × 5 inches (70 × 127 mm). Installation of the Universal Breadboard chassis is accomplished by soldering it to the front panel and rear wall of the assembly. The panel and side walls of the box are joined in a like manner. Note: The bottom plate is the ground-plane side of The Universal Breadboard. Four adhesive-backed plastic feet are affixed to the bottom plate after it is soldered in position. The top cover is secured at each corner by means of 4-40 or 6-32 screws. Hex nuts of the appropriate size are soldered to each upper inside corner of the VFO case to accommodate the screws.

The main tuning capacitor is submounted on a U-shaped bracket which is made from pieces of double-sided pc board. It is 1-1/2 × 1 × 5/8 inches (38 × 25 × 16 mm) HWD. This bracket is soldered in place on the inner surface of the front panel.

A parts-placement guide is given in Fig. 5 for the main chassis. Parts which do not appear on the drawing are located on the front panel or rear wall of the VFO compartment, as shown in Fig. 4.

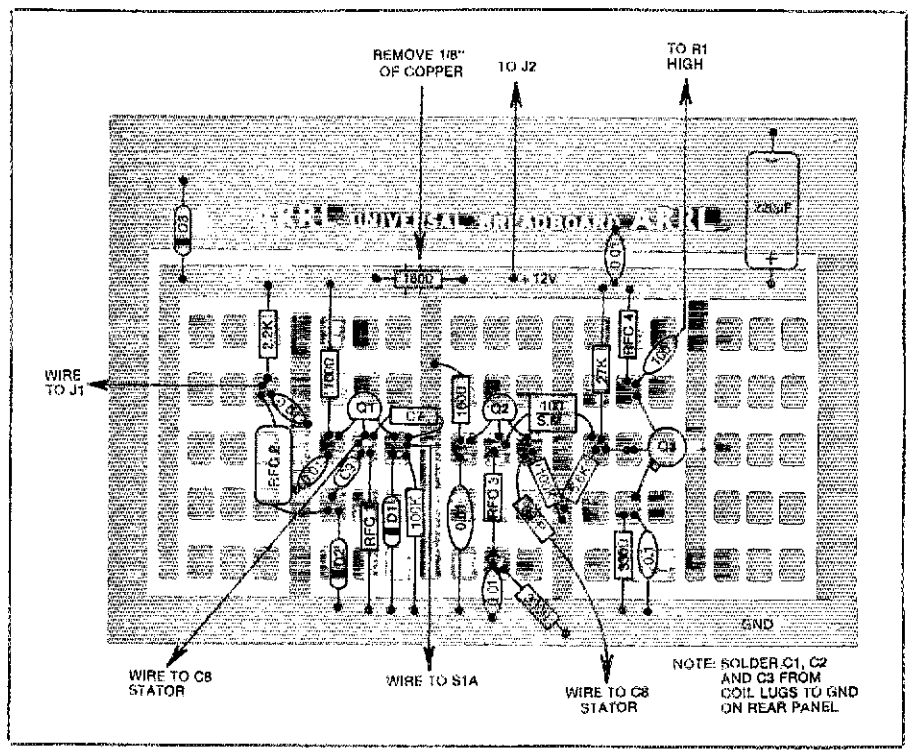


Fig. 5 — Scale layout and parts-placement guide. The scale black-and-white pattern for this board was presented in Basic Radio for September 1979 *QST*.

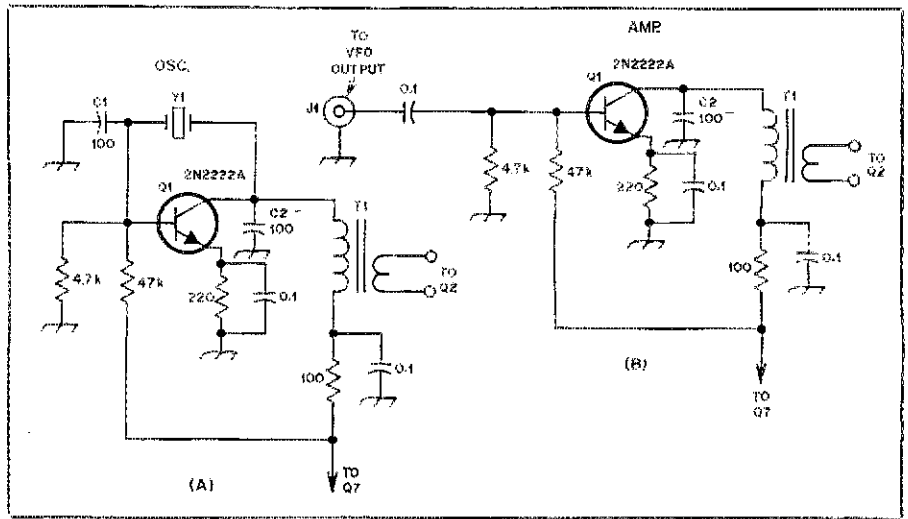


Fig. 6 — Original oscillator circuit (A) of the December 1979 *QST* Basic Radio transmitter. At B is the circuit modified for use with this VFO. Y1 and one 100-pF capacitor have been removed. A jack and 0.1-μF blocking capacitor have been added.

Concluding Comments

So that we will not have any unwanted "fireworks" or damaged components, we should examine the assembled VFO carefully before applying the operating voltage. Be sure the diodes are connected for the proper polarity in the circuit. Check also for unwanted solder blobs between adjacent circuit-board pads. Be certain that chips of metal or solder have not become lodged between the plates of the main-tuning capacitor. J2, since it carries +12 volts, must be insulated from the front panel. Check this and the +12-volt lines in the circuit to ensure that there is no short-circuit to ground. A VOM can be used for this part of the checkout. Finally, be very sure that the three transistors are connected to the circuit correctly. If the leads get mixed up, the transistors can be ruined quickly.

The major cause of malfunction in projects of this variety is inferior soldering. If the circuit fails to operate, but the wiring is correct, reheat the solder joints to be sure they are secure.

Calibration can be effected by connecting a length of wire (3 feet/0.9 m) to J4. Set R1 for maximum output. Place the far end of the wire near the antenna terminals of a calibrated receiver. Adjust C8 of Fig. 3 so that the plates are fully meshed. Set the receiver at 3.5 MHz and adjust the slug in L1 until the VFO signal is heard (zero beat). The same process is used for calibration on 40 and 20 meters.

If this VFO is to be used with the QRP transmitter from December 1979 *QST* it will be necessary to make some minor changes to the transmitter oscillator. These changes are shown in Fig. 6B. The original oscillator is depicted at A of Fig. 6.

We hope you have learned some of the fundamental considerations for VFO design and use from this article. The workshop project of this installment will permit you to move around in the amateur bands. Your QSO score should rise greatly after kicking the crystal-control habit! QST

All Solid-State QSK for the Heath SB-220

If you enjoy QSK cw and want the extra "sock" of an amplifier without pedaling a foot-switch, here's the answer. With prolonged tube life and reduced power consumption, you've got a deal that's hard to beat!

By Phil Clements,* K5PC

Spoiled by full break-in cw operation and being involved in long-haul traffic handling, I made a long search for a compatible "legal-limit" amplifier. It was immediately evident that the commercially available full-QSK type of units were out of reach of my pocketbook. An article by Dick Frey, K4XU, of Ten-Tec and a "crash" course on biasing in the ARRL *Handbook* helped the circuit evolve.[1,2]

To meet the "legal-limit" requirement an almost-new Heath SB-220 amplifier was purchased. The SB-220 is a real workhorse — very reliable and reasonably priced. It also lends itself nicely to modification, with ample room for additional parts. Along with the SB-220, an Ameco PLF-2 receiver preamplifier was purchased to serve as the T-R switch.

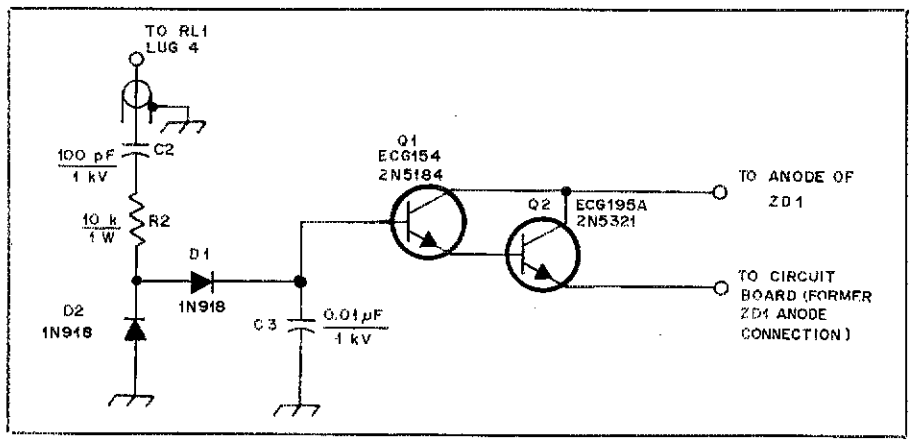
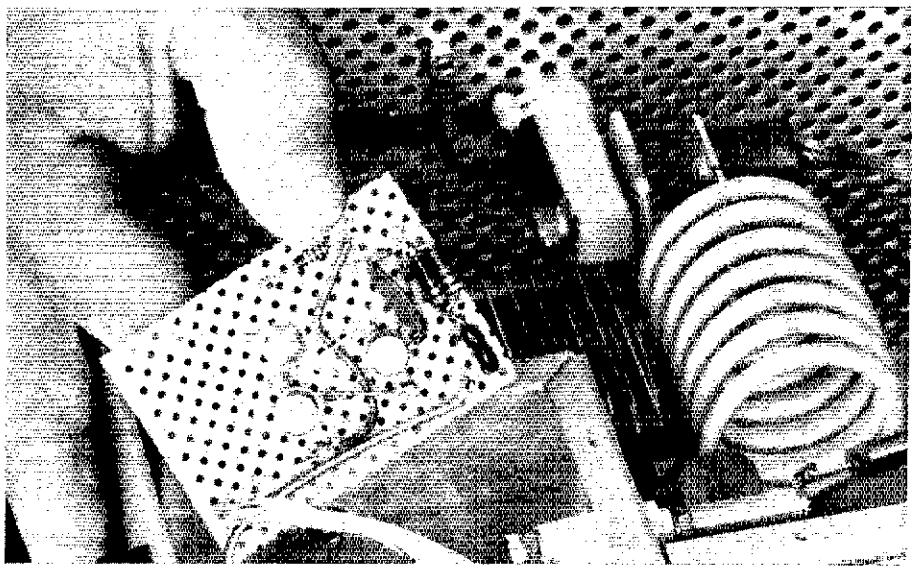


Fig. 1 — Diagram of the rf-actuated Darlington bias switch. All components are mounted on a small perf board secured to the chassis wall.

Circuit Theory

The next requirement was to devise a fully solid-state switching system for both the biasing and antenna changeover functions. An rf-sensing circuit in a Darlington configuration is used to remove the cutoff bias from the amplifier. See Fig. 1. Under standby conditions, Q2 is an open circuit allowing the full 120 V dc of the bias supply to cut off the 3-500Z tubes. When excitation is applied, Q2 conducts and the operating bias becomes the sum of the Zener diode voltage of ZD1, the collector-to-emitter saturation voltage of Q2 and the voltage drop across the grid-meter shunt, R3, for a total of approximately −6 V dc at an input of 1 kW. The switching speed and reliability of the Darlington circuit far surpass those of a mechanical relay. When the amplifier is in use one might think it is operating Class C because



This photo shows the relative size of the perf board and assembly of the Darlington rf-actuated switch. The T-R switch coupling capacitor may be seen in the background. (*photos by Ken Seals, KA5Q*).

*1313 Applegate Ln., Lewisville, TX 75067
[1]Notes appear on page 27.

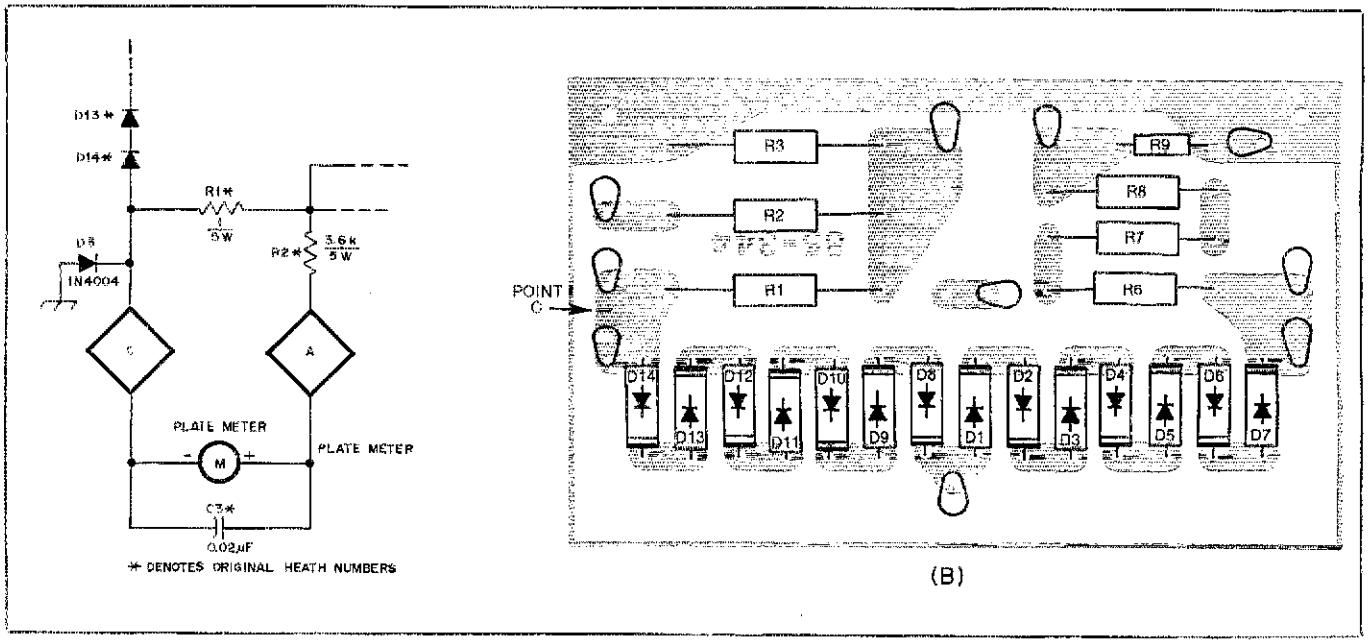


Fig. 2 — D3, the 1N4004 diode added at point C, acts as a protective clamp in case of bias-supply failure. The layout at B is viewed from the foil side.

the final amplifier plate current is zero with no rf excitation present. In reality, the mode of operation is still Class B. The added bonus (for both cw and ssb operation) is reduced quiescent plate dissipation — from an approximate 400 watts to almost nothing! This increases tube life and reliability while also lowering the operating temperature and consequent heat generation.

The switching circuit is operated by the rectification of a small amount (about 400 mW) of rf excitation which is fed to the base of Q1. This turns on Q2 which restores the original circuit configuration for proper Class B operation. This switching is done at very high speed in response to the applied excitation voltage.

Construction

All components (with the exception of the bias-current limiting resistor, R1,) are mounted on a small perf board which is secured to the vertical wall between the plate current meter and the input coil assembly.[3] A single hole is drilled from the plate tank side of the final-amplifier compartment. This is positioned just above the plate-loading capacitor, C57, to accommodate the metal standoff used to mount the perf board. The rf pickup cable is routed through the grommet below.[4]

The lead to the anode of Zener diode ZD1 from the circuit board is removed and discarded. The Darlington switch is inserted at this point by installing a lead from the Q1/Q2 collector junction to the anode of ZD1. Then a lead from the emitter of Q2 is attached to the point on the circuit from which the ZD1 anode lead was previously removed. This places the newly constructed switch assembly in series with ZD1 and the grid metering circuit.

A 1N4004 diode (D3) is connected between point C on the circuit-board assembly and a convenient ground point. See Fig. 2. The diode serves as a clamp to prevent that point from going negative with respect to ground should the bias supply fail. Should any of the added devices open, the amplifier will remain in a cutoff condition.

As shown in Fig. 3, R1 (5.6 kΩ, 5 W) is installed from lug 11 to lug 9 of relay RL1. This resistor limits the current drawn from the bias supply. R27 (100 kΩ, 1/2 W) is removed from lug 9 of the relay and discarded. Remove the black lead from lug 6 of RL1 and connect it to

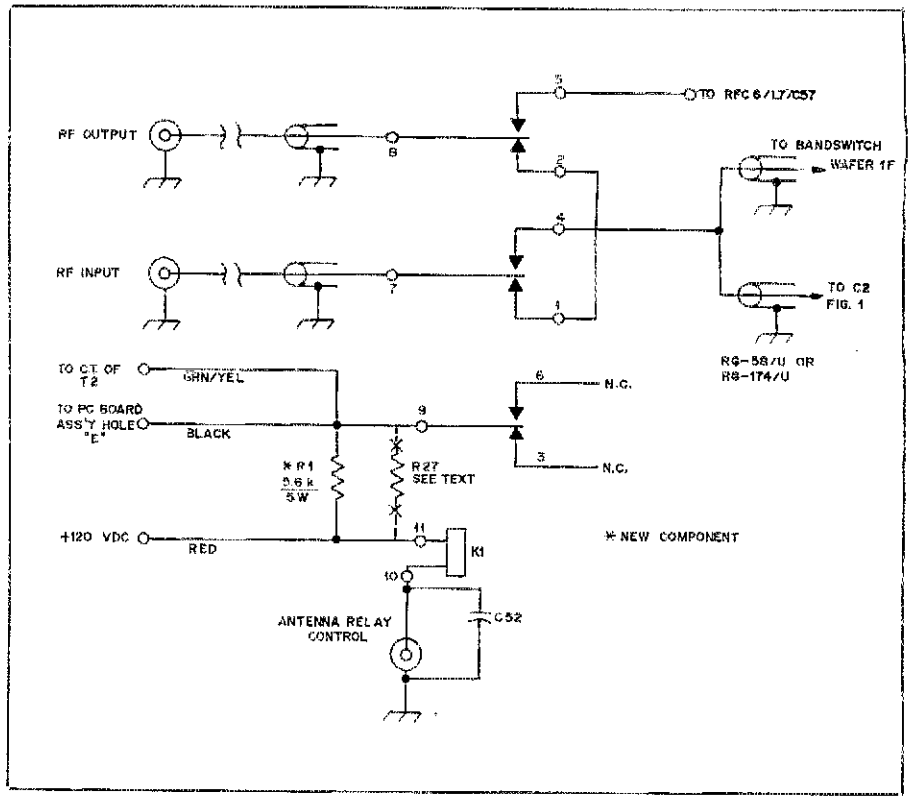


Fig. 3 — R1 is installed at the relay and acts as a bias-supply, current-limiting resistor. R27 is removed from the circuit.

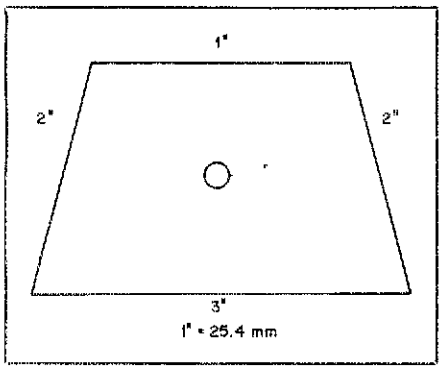
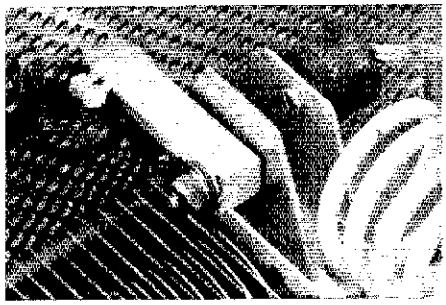


Fig. 4 — A single plate for the T-R switch coupling capacitor is fashioned from either scrap aluminum or a modified Heath bracket. See text.



The T-R switch coupling capacitor is shown here. It is mounted by means of a standoff insulator secured through one of the perforated holes on the side of the amplifier cage. This permits adjustment of the distance between the plates of the capacitor. The coaxial cable runs across the inside of the front panel, down the far side and through the cooling-fan cutout.

lug 9 of the same relay.

The center conductor of the rf pickup lead previously routed beneath the chassis is now soldered to lug 4 of RL1. The relay now functions simply as an amplifier in/out switch affecting only rf connections between the exciter, amplifier and antenna. RL1 may be operated remotely through the relay jack or from a front-panel switch. If desired, the relay can also be removed completely and all connections wired to a terminal strip mounted in its place. I chose to ground the blue lead from RL1 at the antenna relay control jack on the rear panel and use the jack for the receiver coaxial cable connection. Thus, when the amplifier is turned off, the transceiver is connected directly to the antenna.

T-R Switching

Now that the transmit functions have been taken care of, the remaining step is to couple the receiver to the station antenna electronically. Electronic T-R switches developed a bad reputation because they were usually placed at a low-impedance point — the output of the final amplifier tank circuit. This allowed the transmitter final tank circuit to act as a "suck out" trap, greatly reducing received signal strength. To eliminate this problem and obtain optimum operating conditions, one plate of a low-value capacitor (1 to 3 pF) is fabricated from some scrap aluminum having a thickness of 0.060-in. (1.5-mm). (The other plate of the capacitor is formed by the existing plate coil bracket.) The dimensions are shown in Fig. 4. As an alternative, another Heath plate coil bracket (P/N 204-2102) may be used. The lower one inch (25 mm) of the bracket is removed to provide the proper dimensions. The capacitor plate is installed at a high-impedance point which is available at the stator of C55, the plate-tuning capacitor. This placement may be seen in the accompanying photograph. The presence of high voltage on the tube side of the plate blocking capacitor, C29, and the high rf voltage present at this point mandate proper installation of the capacitor. A capacitor much larger than approximately 3 pF will affect amplifier tuning and could overload the FET in the receiver preamplifier. The Ameco PLF-2 preamplifier is connected via coaxial cable from the fabricated capacitor to the receiver and operated as directed in the PLF-2 instruction manual. For added protection, a pair of parallel, reverse-connected 1N914 diodes was installed across the rf input jack of the PLF-2 as shown in Fig. 5. The 20-dB gain of the preamplifier more than makes up for the losses in the coupling method used.

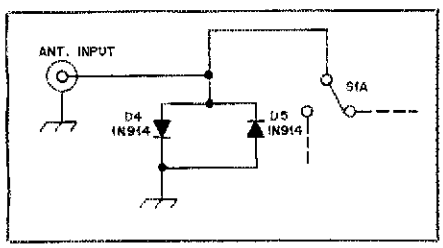


Fig. 5 — Protective diodes are added to the Ameco PLF-2 preamplifier to prevent damage to the input FET.

Summary

For a very modest investment, I have achieved the goal of a legal-limit, full-QSK station with no relays or mechanical parts. There are also added bonuses of longer tube life, better reliability and a cooler ham shack! QST

Notes

[1]Frey, "How to Modify Linear Amplifiers for Full Break-In Operation," *Ham Radio*, April 1978.

[2]Bryant, "Electronic Bias Switching for RF Power Amplifiers," *QST*, May 1974. [This presentation included oscilloscope waveforms of the bias switching action and may be of interest to some readers. — Ed.]

[3]SB-220 instruction manual, pictorial 4-4, above point CZ.

[4]See note 3, pictorial 4-4, position T.

Strays

ON PROGRESS AND PROGNOSTICATION

☐ Nostalgia-oriented old-timers may get a chuckle or two from the following excerpts from *The Marconigraph* for February 1913. Not only do we find an air of exuberance concerning what was then considered (and rightfully so) a scientific breakthrough in communications (via mobile radio), but we learn what fools mortals can really be when it comes to forecasting the future of progress. Perhaps there is still a lesson to be learned from all of this.

"Demonstrations which have been given in practically all of the countries of Europe caused a general revision of ideas in transmitters and receivers, until today the apparatus proves an unqualified success when subjected to the most rigorous tests. The automobile stations, the largest for which any great demand for military use has been found, are of the 1-1/2 kilowatt power, with a range of 150 to 200 miles." This excerpt was taken from page 212.

On page 215 we find the following proclamation, "Trips to the Planets?" It says, "A Paris literary man predicts that trips to neighboring planets will be possible some day. It is *just* a prediction, however. There are no grounds for it. He thinks it is not more impossible than wireless telegraphy would have seemed 300 years ago. But, perhaps we are nearing the end of the scientific age, instead of being at the beginning. It has accomplished quite enough in the field of transportation, and mankind should be content if it turns its time to improving the quality of things that the world has now gained."

Interestingly, there are people today who subscribe to the foregoing doctrine. We are fortunate, indeed, that scientific endeavor did not come to a screeching halt in 1913! Anyone for spark transmission in and below the standard broadcast band? — *Doug DeMaw, W1FB*

DO YOU HAVE "MOVING UP?"

☐ If any members or clubs have permanent copies of *Moving Up to Amateur Radio* and would be willing to loan the film to people in their area, then we need your help. Hq. does not have enough copies to keep up with an ever-increasing demand. Members must now reserve the film two to three months in advance. If you're willing to help, contact Donna McManus, film librarian, at ARRL hq.

Multielement Twin-Loop Array Antennas for VHF/UHF

Want to stack two antennas on a single boom? Here's an effective array for experienced experimenters.

By Hiromu Okagaki,* JA4VWK

This article describes paired loop antennas for the 144- and 432-MHz bands. Each element is a figure-eight configuration of two one-wavelength loops. A figure eight has a gain of about 2 dB over a single loop. This antenna is inherently broadbanded.

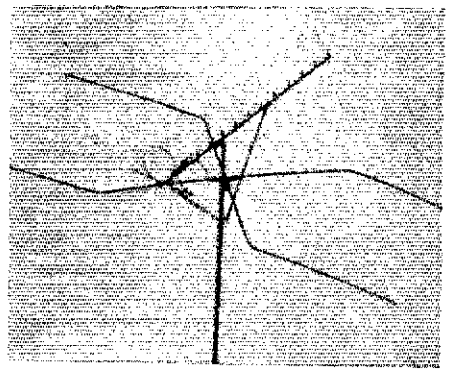
A 15-element array for 432 MHz mounted atop a mast is pictured in the title photo. Table 1 lists the construction information. The dimensions are given first in millimeters because the original work was done in those units. The editor has inserted near-equivalent English dimensions.

The radiation resistance of a one-wavelength circular loop is on the order of 150 ohms. As illustrated in Fig. 1, we have a choice of terminal impedances when we connect two loops in a figure eight. The proximity of the parasitic elements reduces the radiation resistance. Direct 50-ohm coaxial feed is used in the 432-MHz antenna pictured.

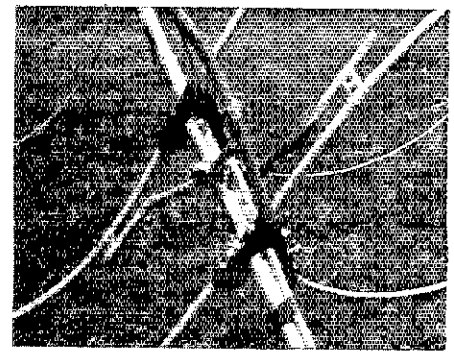
As mounted in the photo, the antenna radiates a vertically polarized wave. For horizontal polarization, the loops should be stacked vertically rather than horizontally. Avoid placing conductors (such as metallic masts) between the elements, because to do so will distort the radiation pattern.

Two reflectors are used in the 432-MHz array to improve the front-to-back ratio.

*504 Sakae-machi, Tottori-shi, Japan



A 432-MHz twin-loop array, supported by vinyl tubing. Direct 50-ohm coaxial feed is used.



50-ohm matching section of the 144-MHz antenna. Note that the loops are cross-connected for end-fire phasing.

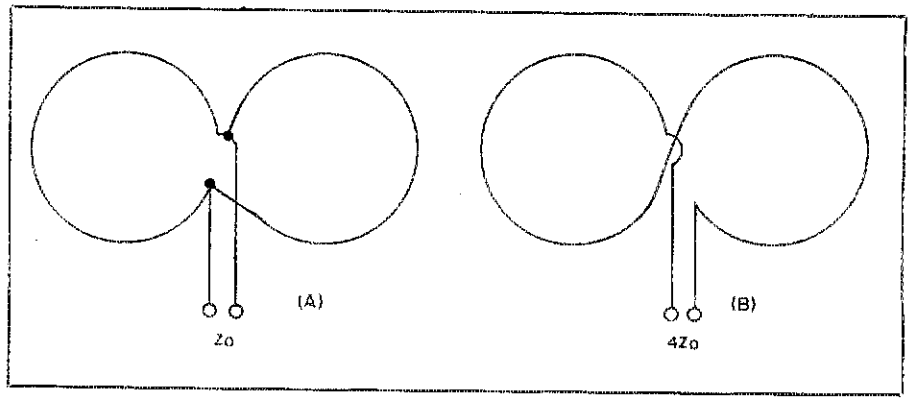


Fig. 1 — (A) Parallel-connected loops present an impedance of approximately 75 ohms (50 ohms in a parasitic array). (B) Series-connected loops present an impedance of approximately 300 ohms (200 ohms in a parasitic array).

Table 1

15-element Twin-Loop Array for 432 MHz (Direct Feed)

Element	*Material*	*Element length, each side (mm)*	*(inches)*	*Spacing from the preceding element (mm)*	*(inches)*	*Notes*
Reflector II	3.9-mm (3/16-inch) dia aluminum rod	750	29-1/2			Lattice
Reflector I	10-mm (3/8-inch) dia aluminum tube, flattened	750	29-1/2	215	8-1/2	
Radiator	2.5-mm dia (no. 10 AWG) enam. coated copper wire	690	27-1/8	85	3-3/8	
Director I	3.9-mm (3/16-inch) dia aluminum rod	640	25-1/4	85	3-3/8	
Director II	"	630	24-3/4	63	2-1/2	
Directors III-XI	"	630	24-3/4	135	5-5/16	
Director XII	"	630	24-3/4	120	4-3/4	
Boom	22-mm (7/8-inch) dia polystyrene tube and 18-20-mm (3/4-inch) dia fiberglass tube					Length 1810 mm (71-1/4 inches)

Table 2

9-element Twin-Loop Array for 144 MHz, End-Fire Driven, Lambda-Matched

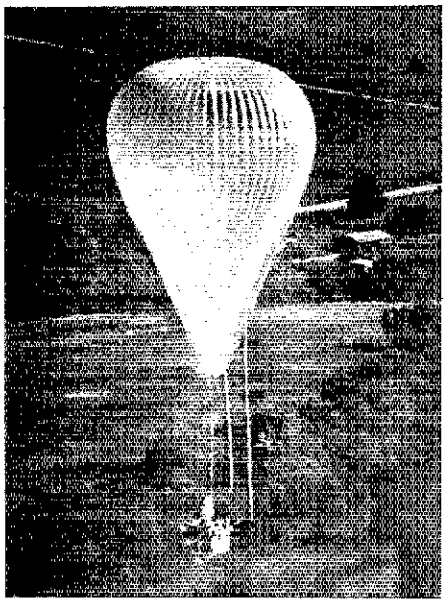
Element	*Material*	*Element length, each loop (mm)*	*(inches)*	*Spacing from the preceding element (mm)*	*(inches)*	*Notes*
Reflector	4.1-mm (3/16-inch) dia aluminum rod	2180	85-13/16			Twin-loop supported by a fiberglass arm
Rear radiator	10-mm (3/8-inch) dia aluminum tube	2120	83-1/2	360	14-3/16	
Front radiator	"	2030	79-15/16	220	8-5/8	
(Matching rod)	"	440	17-5/16			"Lambda-match"
Director I	4.1-mm (3/16-inch) dia aluminum rod	1940	76-3/8	280	11	Supported by spacers to front radiator and director II
Director II	"	1910	75-3/16	180	7-1/8	Supported by a fiberglass arm
Directors III-V	"	1880	74	410	16-1/8	"
Director VI	"	1880	74	390	15-1/4	"
Boom	26-mm (1-inch) dia aluminum tube and 22-mm (7/8-inch) dia aluminum tube					length 2700 mm (106-5/16 inches)

The rear reflector consists of a rod folded so that the long members are parallel to the polarization plane.

A different scheme is used in the 144-MHz design. Two driven elements in a log-periodic cell illuminate the array. The most convenient way to feed the antenna is by means of a quadruple lambda match. The feed system is shown in detail in the close-up photograph. The matching method can best be described as four half-delta/gamma sections fed from a common coaxial center conductor. The driven element loops are grounded to the boom, as is the coax braid. Construction information is given in Table 2. The dimensions for both antennas were determined empirically.

The parasitic elements of both antennas must be closed loops. They may be grounded to the boom at a common point, or left floating. The transmission line is secured to the boom and exits at the rear of each antenna.

Strays



Fred Hyde, KØLIS, Prairie Village, KS, was one of four crew members on the *DaVinci Trans America Balloon*, which set a long-distance flight record for balloonists in the continental U.S. before crash-landing in Ohio because of a severe storm. Amateur Radio kept the crew in touch with hams on the ground. This photo was taken near Topeka, KS, from a light plane piloted by John Shilder, WBØNEV. *(photo by Dale Monaghen, WØHSK)*

NEW ADDRESS FOR MICHIGAN AREA REPEATER COUNCIL

☐ Raleigh L. Wert, W8QOI, secretary of the Michigan Area Repeater Council, requests that all mail be directed to: Michigan Area Repeater Council, 309 E. Gordonville Rd., R 12, Midland, MI 48640.

I would like to get in touch with . . .

☐ anyone who has information on special radio aids for blind operators, to be included in a new manual. Please contact Byron Eguiguren, WD9IAN, WA9WHS A.R.S. Trustee, Hadley School for the Blind, 700 Elm St., Winnetka, IL 60093.

Hunt Turner, KØHT (left), and artist John Adams recently presented an art exhibit to hams in six call areas via SSTV. A comic strip series especially written for slow scanners is coming next. *(photo by Lynne Glaeske)*

Simple, Accurate Resistance Measurement

If you're looking for close-tolerance resistors, this little gem could save you time and money. You may have the creatures right in your junk box!

By William D. Koch,* WD9BFI

One of the frustrations that face most builders of equipment these days is the dwindling number of sources and quality of electronic components. It seems that building even relatively simple equipment requires shopping and scrounging from several sources before all the parts are located. But woe be unto the ham who tries to purchase precision components — he'd better have a rich aunt!

Not too long ago, I became interested in building a phasing type ssb transmitter and receiver.[1,2] As you might guess, the design called for some 1-percent resistors and 3-percent capacitors for the audio phase-shift network. After searching through several catalogs, I managed to locate only about half of the close-tolerance components required. I was ready to scrap the project when I wondered if there was an easy way to accurately measure resistors and capacitors obtained from my junk box. Assuming that reasonable accuracy could be expected, it seemed possible to use series and parallel combinations to fabricate the needed values. A dependable, yet inexpensive, measuring device resulted from this thoughtful moment. Other amateurs may find the approach and techniques I employed a practical solution for conducting similar measurements.

Circuit Theory and Description

A simplified circuit diagram is illustrated in Fig. 1. Most readers should immediately recognize this circuit as the classical Wheatstone resistance-bridge

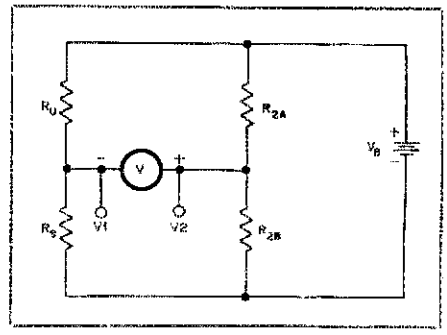


Fig. 1 — A basic Wheatstone resistance-bridge circuit

configuration. Current through M1 will be zero when the voltages V_1 and V_2 are equal. When $V_1 = V_2$, the following relationship holds:

$$\frac{R_U}{R_S} = \frac{R2_A}{R2_B}$$

$$\text{where } R_U = R_S \times \frac{R2_A}{R2_B}$$

It can be seen that, as $R2_A/R2_B$ is a dimensionless quantity, there is no need to actually *know* the values of $R2_A$ and $R2_B$. We only need to know accurately the ratio of $R2_A$ and $R2_B$.

One way to take advantage of this ratio property is to use a potentiometer for $R2_A$ and $R2_B$. The slider is connected to the point where $R2_A$ and $R2_B$ are wired to the meter. The ratio of the two end-to-slider resistances will vary according to the slider position. The problem is to accurately determine the actual slider position. Use of a very linear 0.25-percent 10-turn potentiometer neatly solves this matter. Such potentiometers are occasionally available for a nominal price as surplus items.

By coupling a 10-turn counter to the potentiometer, you can easily determine the position of the slider to better than 1/100th of a turn. As an example, let's presume we have a maximum counter-dial scale of 1000. The ratio of $R2_A/R2_B$ then is $1000 - X/1000$, where X is the dial reading and can be read to a 3.5-place accuracy (e.g., 437.0, 437.5, 438.0). With a dial reading of 437.5, the ratio R_U/R_S is 1.286 or $R_U = 1.286 \times R_S$. If R_S equals 10,000 ohms, then R_U equals 12,860 ohms.

For best accuracy, strive to have readings close to 500 or mid scale to minimize effects of any dial backlash. Presume that we have a half-digit backlash (437.0 vs. 437.5). The error caused by this backlash at 100 and 900 is 0.6 percent while at 500 it is 0.2 percent.

The particular end-to-end resistance of the potentiometer is not too critical. However, with lower values, current draw could become high enough to dissipate excessive power in the potentiometer. On the other hand, with values higher than 20 to 50 kΩ, detection of the exact null becomes more difficult unless a more sensitive meter is used.

In Fig. 2, R1 is the sensitivity control. When a measurement is first started, the bridge can be unbalanced enough to cause excessive current to flow through the meter. R1 adds series resistance to prevent meter damage. As the null is approached, R1 can be rotated to reduce the resistance

*1138 Stockton St., Indianapolis, IN 46260
[1]References appear on page 31.

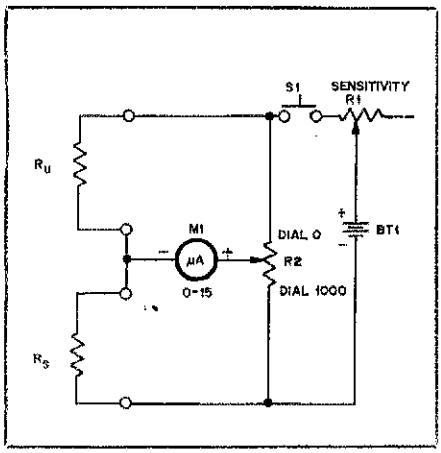


Fig. 2 — WD9BFI uses this circuit configuration for determining the values of unknown resistors where accuracy is desired.
BT1 — 6- to 18-V battery.
R_U — Unknown resistor.
R_S — Standard resistor.
R1 — 1-megohm potentiometer, audio taper.
R2 — 10-kilohm, 10-turn, wirewound linear potentiometer.
M1 — Surplus 0- to 15-μA zero-center meter.

thereby increasing circuit sensitivity.

Construction

The resistance bridge can be built on almost any junk chassis you happen to have. When I was testing the idea, I haywired the circuit in an old chassis scrounged from a 6V6 crystal-oscillator transmitter built when I was a Novice, some 17 years ago. Construction is not critical, although the 10-turn counter *should* be solidly mounted for minimum backlash and best accuracy. In my unit, R_S was mounted outboard between two five-way binding posts, although a rotary switch and multiple precision resistors could be used just as well. The battery supply in the original unit contained four penlight cells wired in series, although a 9-V radio battery is a satisfactory substitute. R_U is suspended between two five-way binding posts on the top of the chassis.

Only one adjustment needs to be made before the unit is operational. The counter must be set at 500.0 when the potentiometer is in the exact center of travel. This is easy to do. Find two 10-kΩ resistors, one to serve as the unknown and the other for the standard. Balance the bridge. Note the reading. Now, switch the two resistors. Balance the bridge again, and note the reading. The difference of 500 minus reading no. 1 should be the same as reading no. 2 minus 500. If not, adjust the counter-to-potentiometer coupling and redo the entire procedure. Keep adjusting the coupling until the two differences are the same.

Resistance Standards

There are at least two ways to acquire an accurate set of standard resistors. You may elect either to buy surplus 0.05- to 0.25-percent accuracy resistors or use certain characteristics of commercially available 5-percent resistors and mathematically calculate a given standard value. In effect, the second method relies on the manufacturing tolerances and statistical analysis of resistors in your junk box to measure the value of a standard candidate resistor.

The first technique is by far the preferable one, although the second can give acceptable results if enough patience is exercised. I picked up my "standards" at hamfests for next to nothing. Keep your eyes open. Many times you can bargain for a handful of precision resistors for a few dollars. Beware, however, of castoffs and damaged resistors! Before accepting the marked value as gospel, test it against several of the other values you acquired.

Testing the value of a prospective standard is not all that difficult, but it does take a little thought. Suppose the proposed standard R_U is marked 9380 ohms ±1 percent. The value of the resistor could range between 9286.2 and 9473.8 ohms, assuming the resistor is within specifications. Suppose you are testing it against a 10,000-ohm 1-percent resistor, R_S, which can have an actual value from 9900 to 10,100 ohms. The maximum ratio these two resistors can have while remaining within the specified bounds is 10,100/9286.2 ohms or 1.0876 with a dial reading of 479.0. The minimum ratio is 1.0450 with a dial reading of 489.0. If a dial indication between these two limits is obtained, then your proposed standard resistor is likely within tolerance. This test should be performed several more times against other resistors to make certain that both the standard and original test resistors are not off by the same amount (2 percent) in the same direction. Using several other resistors to test the proposed standard reduces the probability of such an occurrence. After passing a number of such tests, it is probably safe to presume that your standard is within the marked tolerance. The procedure can be repeated for other standards, but keep in mind the backlash issue mentioned earlier.

The second procedure for testing a standard candidate involves an approach similar to the first, although it is more tedious. Basically, a number of like-tolerance, like-resistance values are compared against the proposed standard resistance with the potentiometer ratio being recorded for each comparison resistor. The results of the comparison resistor list is scanned for obvious "ringers" which are discarded from further analysis. A simple average of ratios is then taken. This ratio is then multiplied by the nominal value of the comparison resistors to determine the value of the standard.

Table 1 is an example showing a ratio comparison between a comparison resistor and a standard resistor. In this case both the standard and comparison resistors are rated at 10 kΩ and 5-percent tolerance. Reading number 2 is discarded because the ratio of two 5-percent resistors of the same nominal value must lie between 0.90476 and 1.1052 (0.95/1.05 and 1.05/0.95). Since only comparison no. 2 does not lie within this range, very likely it is the only one out of specification. Discarding this reading leaves us with five. The arithmetic total of readings is 5.1278, or an average of 1.0256 per reading. This means that $R_T/R_S = 1.0256$ or $R_S = 9750$ ohms.

Table 1

A comparison between a standard resistor and a comparison resistor where both are rated at 10 kΩ with 5-percent tolerance.

Test	*Ratio of Comparison Resistor to Standard Resistor*
1	1.056
2	1.128 discard
3	0.9948
4	1.046
5	1.026
6	1.005
.	.
.	.
.	.
.	.

I emphasize that the second approach to validating standards is more subject to error than the first. For best accuracy and minimum chance of error, a large number of comparisons should be made. Even more important, one should make certain that the comparison resistors are from different sources and not all from the same manufacturing lot. If this precaution is not taken, the standard resistor may be biased inasmuch as there could have been a production run in which the resistor values tended to be higher or lower, on average, than the nominal value. Amateurs who are ambitious enough to try this second technique should have a number of resistors acquired over the years. I do not mean to seem too negative on this approach. If you try it, use a little discretion. I have employed both procedures with equally acceptable results.

Conclusion

The technique described to measure resistors has proved quite satisfactory. First of all, when measuring 1-percent junk-box resistors, I consistently find that I can measure them accurately. Furthermore, the ssb phasing receiver has been completed and it works well. Sideband suppression, which is significantly affected by phase-shift network inaccuracies, appears adequate. 73

References

[1]Shubert, "Solid-State Phasing-type SSB Communications Receiver," *Ham Radio*, August 1973, p. 6.
[2]Shubert, "Phasing-type Single-Sideband Transmitter," *Ham Radio*, June 1975, p. 8.

A Remotely Controlled Antenna-Matching Network

Want to get rid of feed-line losses caused by antenna mismatches? Put the matching network right at the antenna feed point. Here's how!

By Herbert Drake, Jr.,* N6QE

You can't dispute the benefits of full-size, resonant antenna systems as part of a complete amateur station. But there are many amateurs who can only consider small, highly reactive random arrays or verticals because of real-estate limitations. Presented here is an approach that makes such types of antennas more acceptable in terms of overall station efficiency. This is accomplished by placing an antenna-matching network *right at the feed point* and controlling it remotely to provide convenient band-changing capabilities without compromise.

The basic theory applied is that any antenna, be it vertical, horizontal or a combination of both, can be a satisfactory radiator provided it is properly matched in a low-loss manner. In other words, all of the transmitted power must be radiated if there are no mismatched feed lines and other lossy elements to convert this power into heat. The energy may not go in the chosen direction, but at least it will be radiated!

The antenna-matching network may be placed anywhere between the transmitter and the antenna if the intention is simply to match the transmitter to the load. It is assumed that the transmitter output tank is capable of handling the impedance of the line connected between the matching network and the transmitter. In this vein, many older transmitter pi-network output tanks were sufficiently flexible in matching range to dispense with the need for an external matching network. The reason for locating the network at the antenna feed point is to eliminate transmission-line losses while matching the wide range of impedances that result from the use of random-length antennas operated as multiband radiators. In such cases, the VSWR on a coaxial feed line becomes so severe that high losses are the result. Of course, it is possible to use open-wire feeders with a matching network at the operating position, but often the aesthetic appearance and inconveniences resulting from this approach are unsatisfactory. In industrial and military hf radio installations, remotely controlled matching networks are commonplace. Some of them contain servos and phase detectors that can automatically adjust the matching network within seconds.

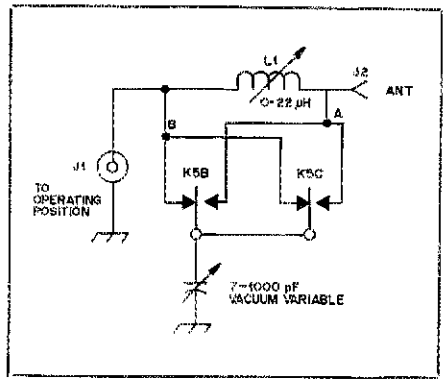


Fig. 1 — The basic circuit of the antenna-matching network. Both the rotary inductor and the vacuum-variable capacitor are motor controlled. K5 is used to select either mode of operation. (See text.)

The system presented here contains many features that are offered for consideration and not necessarily for exact duplication. This antenna-matching network has performed reliably since installation. A 60-foot (18.3-m) horizontal random-length antenna about five feet (1.5 m) above the surface of the roof was used at the time. The matching network components employed are capable of operation at a sustained 1-kW input level during RTTY operation. Only two motorized adjustments (L and C) are required and both of these are metered at the control point to permit coarse tuning from tabulated settings. The control switches are duplicated inside the remote unit so that maintenance may be accomplished without the need for assistance.

The Circuit

The circuit of the antenna-matching network is shown in Fig. 1. Successful operation depends upon the use of components displaying a wide tuning range, such as the 7- to 1000-pF vacuum-variable capacitor. Fig. 2 shows the range of complex impedances that may be matched at a frequency of 3.5 MHz to a source requiring a 50-ohm resistive load. The two modes are relay-selected. Fig. 2B shows the detail near the origin. Fig. 3A presents the same data for 29 MHz. It is assumed that almost all random-length antenna impedances will fall within the areas

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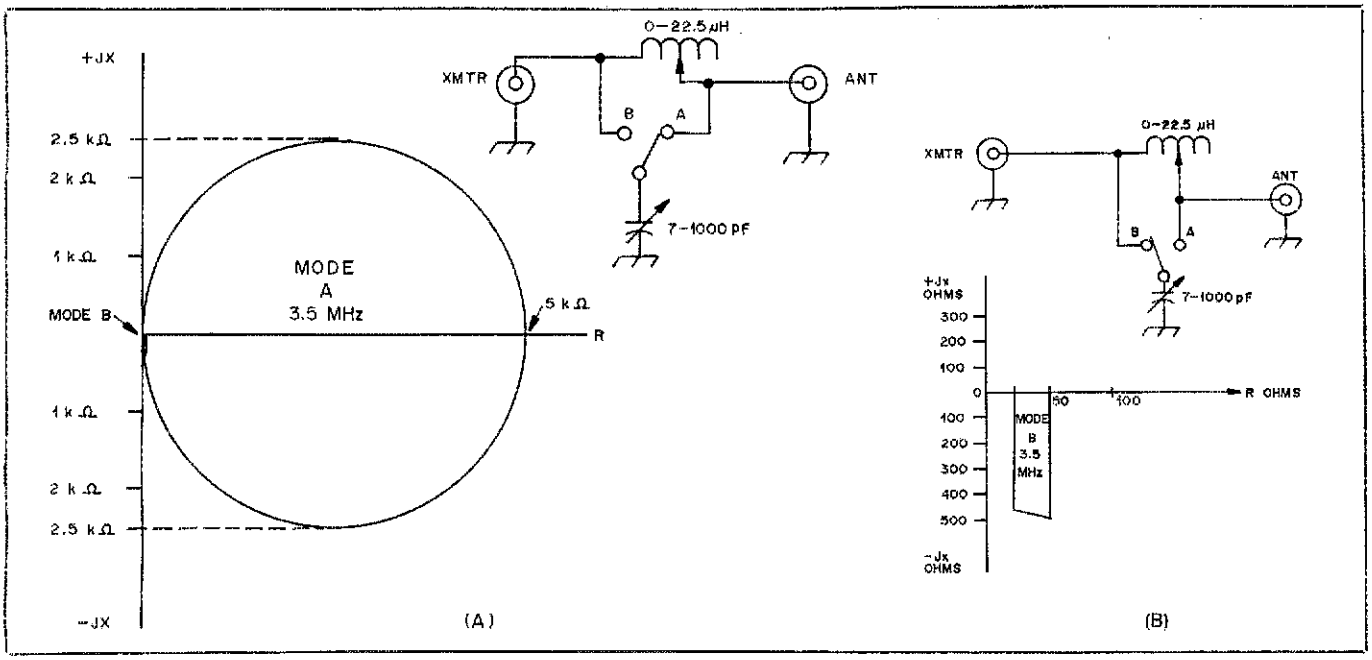

Fig. 2 — Diagram showing the 3.5-MHz complex impedance matching range. At A, the whole plot is shown, while at B, the area near the origin is shown in greater detail.

representative of one of the two modes of operation at any given frequency. However, should an "unmatchable" impedance be presented, a small amount of pruning of the antenna would no doubt bring the feed-point impedance into range of the matching network.

Fig. 4 shows the schematic for the remote box. A dual-field, series-wound 24-V dc motor with a built-in gear train was chosen to drive the rotary inductor at approximately 120 rpm. Its operation is controlled by K1, K2 and two limit switches (S1 and S2). A 27-V dc permanent-magnet field motor and associated limit switches were already mounted on the variable capacitor assembly and it was only necessary to add a potentiometer and suitable gearing for the logging-meter feature. Note that this motor is driven by a potential of only 10 V in order to slow it down. Both control relays are wired so that the accidental simultaneous operation of a clockwise and counter-clockwise relay will not result in a short circuit.

The logging potentiometer associated with the inductor is operated with a dial cord and pulley arrangement. A stand-off insulator is mounted on the sliding tap of

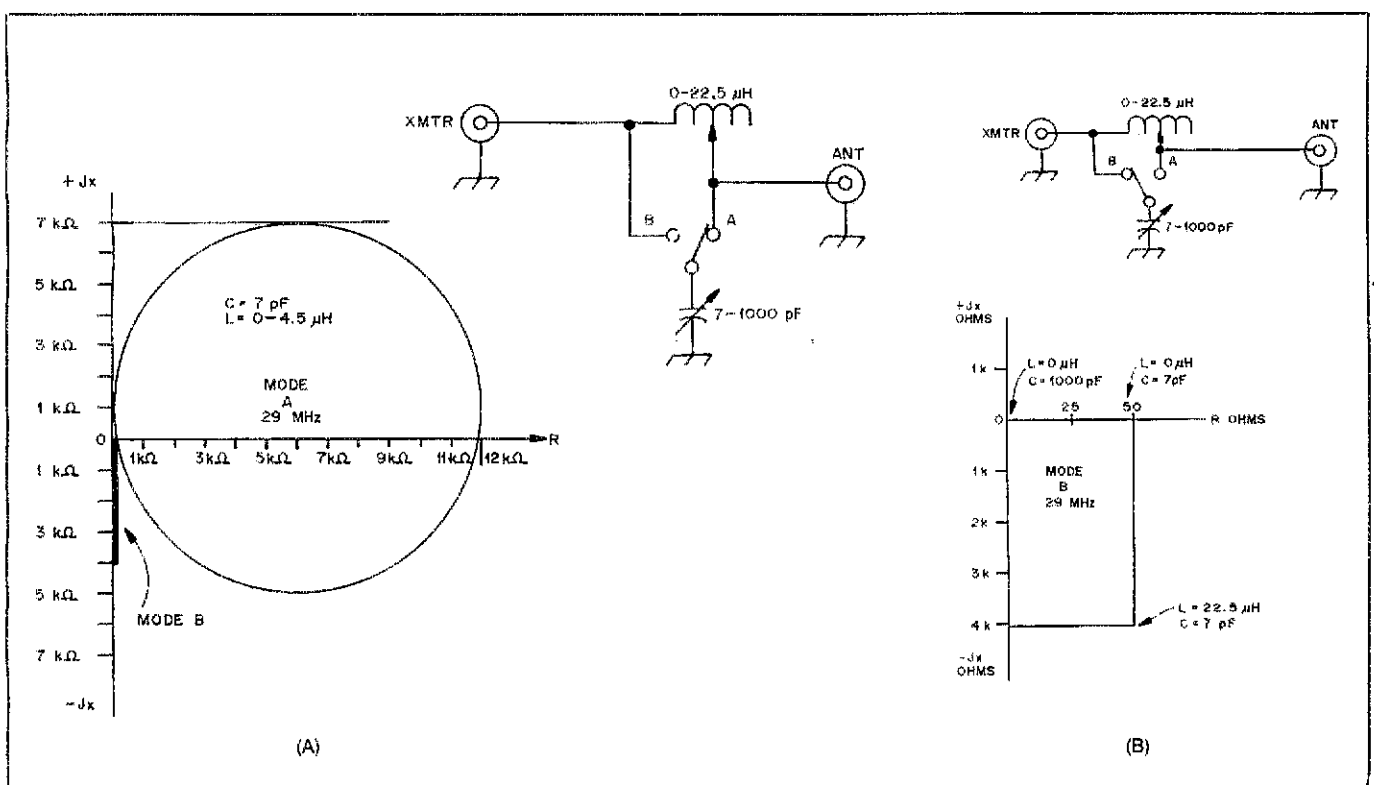

Fig. 3 — The 29-MHz complex impedance matching range diagram. The entire plot is at A, with detail near the origin shown at B.

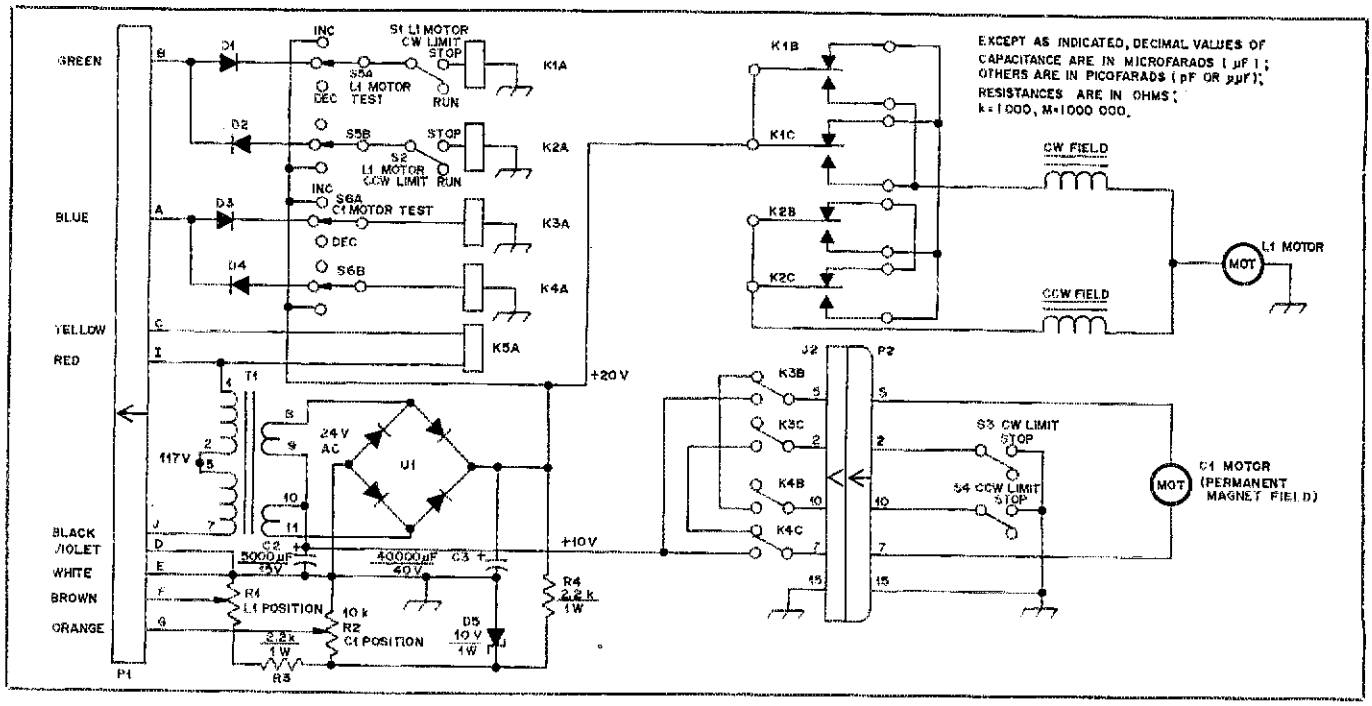

Fig. 4 — The circuitry for the remotely controlled antenna-matching network. The power supply is also located remotely to avoid losses in the control cable because of the heavy current requirements of the low-voltage motors. See separate parts list for component specifications.

Parts List

C1 — Jennings UCSL-1000 vacuum variable capacitor.
C2 — 5000-µF, 15-V electrolytic.
C3 — 40,000-µF, 40-V electrolytic.
C4, C5 — 1000-µF, 50-V electrolytic.
D1-D4 — 1N4001.
D5 — Zener diode, 10 V, 1 W.
D6-D9 — Motorola MR501, 100 PIV, 3 A.
J1 — TRW/Cinch S310AB.
J2 — Part of P2 assembly.
K1-K4 — Knight KN105-2C-24D, dpdt, 24 V dc.
K5 — Hart-Advance AT/2C/115VA, dpdt, 115 V ac.
L1 — E. F. Johnson 226-1-4 rotary inductor.
M1, M2 — 0-1 mA.
P1 — Amphenol 3102A-18-1P, 3106A-18-S, and 3057-10A.
P2 — Cinch DB-15-S.
P3 — 3-wire ac plug.
R1 — 5-kΩ potentiometer.
R2 — 10-kΩ potentiometer.
R3, R4 — 2.2 kΩ, 1 W.
S1-S4 — Spst Microswitches.
S5, S6 — 2-pole, 3-position rotary.
S7, S8 — Spdt, Centralab 1455.
S9, S10 — Single pole, 3-position rotary.
T1 — Stancor RT-202.
T2 — Stancor TP-2.
U1 — Diode bridge, Motorola MDA 970-2, 100 PIV, 4 A.

the inductor and serves two purposes; it activates the limit switches and drives the dial cord and L potentiometer. The limit switches for the L motor were placed in the coil circuits of relays K1 and K2 rather than in the motor-field leads. This was done to protect the switch contacts from the high current present in the motor fields. Both the capacitor and inductor logging potentiometers are adjusted mechanically so that the wipers are at ground potential with either C or L at minimum. The wipers travel close to the end of their rotation with either of the units at their maximum positions.

The power supply for the motors, test switches and meter circuits are located in the remote box in order to minimize power losses in the control cable. Although the inductor motor draws several amperes, the primary current of the power transformer is considerably less, resulting in a lower control-cable voltage drop. The Zener diode in the meter supply and the separate ground return ensure that the meter readings do not fluctuate with line-voltage variations during the operation of either or both tuning motors.

Fig. 5 is a sketch of the component

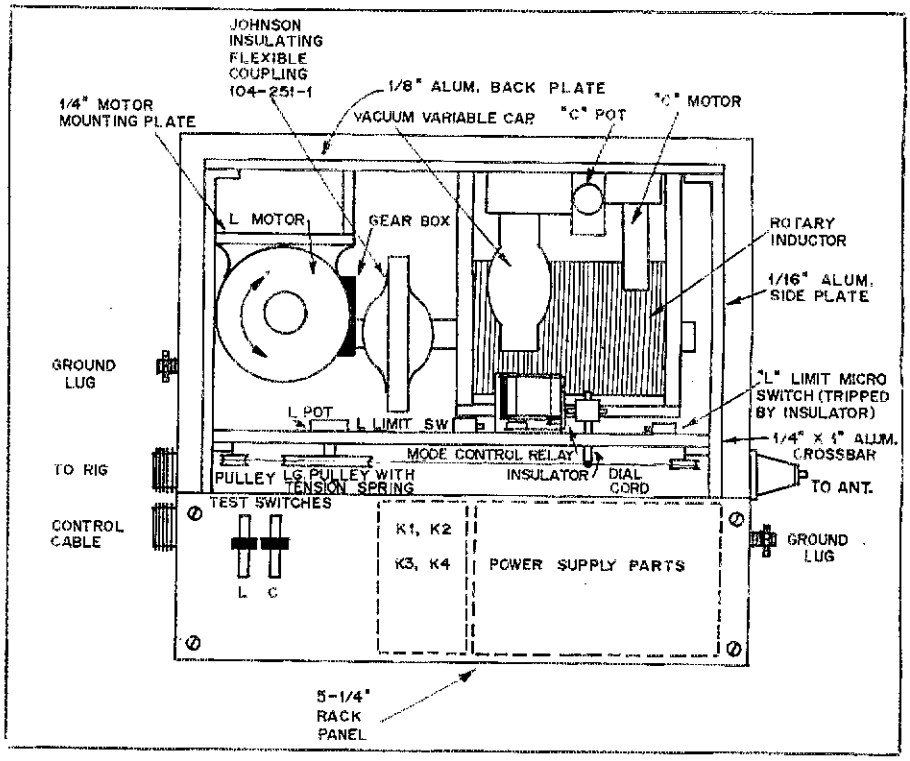

Fig. 5 — A sketch of the antenna-matching network box layout. The sketch is meant to be used as a guideline and not necessarily drawn for exact duplication.

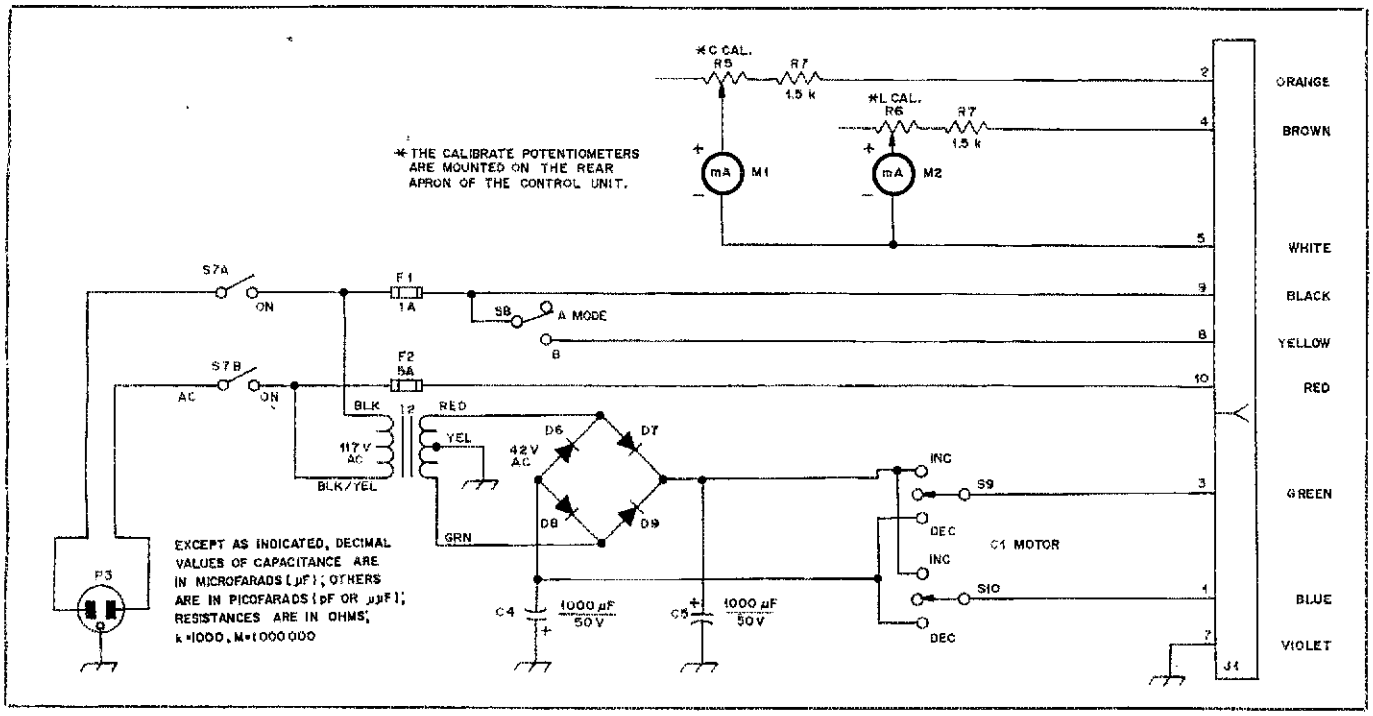

Fig. 6 — Schematic of the operating position control unit. The calibration controls are adjusted according to the text. The switches, S4 and S5, are mounted beneath their associated meters. See separate parts list for component specifications.

location within the remote box. More exact data are omitted since a builder would probably use different motors and alternative components, depending upon sources of supply.[1] Sheet aluminum and 1/4 × 1-inch (6 × 25-mm) aluminum bar stock were employed in construction. A surplus aluminum box with a well-sealed "suitcase" type of removable top was selected. Components were mounted to an independent frame rather than to the box itself in order to obtain good mechanical stability and to avoid drilling too many holes in the outer box. All holes that were drilled for screws or connectors were carefully waterproofed by means of rubber gasketing material, including the SO-239 chassis connector. The Cinch DB-15-S connector specified for P1 and J1 was the fitting required to mate with the surplus vacuum capacitor/motor assembly; it was not my choice. The Amphenol numbers listed for P1 represent one of those "military" connectors ordered by specifying the shell, clamp, insert, boot, etc. My concern was that the connector be waterproof. Finally, an ample supply of blue/pink indicating silica-gel desiccant was placed in the box. This gel must be renewed periodically in the oven because of the accumulation of moisture.

Table 1

Frequency (MHz)	*L*	*C*	*Mode*
3.525	46	91	A
3.600	42	86	A
3.700	37	83	A
3.800	30	76	A
3.900	11	73	A
4.000	22	100	A
7.025	68	39	B
7.300	61	40	B
14.025	54	50	A
14.350	57	49	A
21.025	16	40	B
21.450	17	39	B
28.000	17	42	A
29.700	5	42	A

Operation

The control circuitry mounted near the station equipment is shown in Fig. 6. The two control switches are mounted horizontally beneath their associated meters. Operating either switch left or right results in the meter indicating the same direction. The meter calibration potentiometers are set so that the meters read full scale when their motors operate the appropriate limit switch.

The operation of the matching network is simple once the tasks of "homing in" the L and C values, logging the meter readings and noting the mode settings are accomplished. I have found that a table (such as that shown in Table 1) posted near the rig is helpful. Additional columns can be provided to show the tune and load control settings of the transmitter. After setting the inductance and capacitance in accordance with the logging meters, a VSWR indicator can be used to aid in nulling the residual reflected reading by alternately operating the L and C switches. Happy matching! QST

[1]Possible sources of supply for components similar to those used by the author are Radiokit, Box 429, Hollis, NH 03049; Multronics, Inc., 9005 Red Branch Rd., Columbia, MD 21045; Fair Radio Sales, Box 1105, Lima, OH 45802, Herbach and Rademan, Inc., 401 East Erie Ave., Philadelphia, PA 19134; Newark Electronics, 112 Cottage Grove Rd., Bloomfield, CT 06002. (Newark has coast-to-coast dealerships.) For relays: Allied Electronics, 845 Woburn St., Wilmington, MA 01887 (Allied has coast-to-coast dealerships; the relays are listed in the *Engineering Manual and Purchasing Guide, No. 790*).

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The Microprocessor and Slow-Scan Television

Put your 6800, 8080, or whatever microprocessor you may own, to work. It can become the heart of a video processing system for reception and transmission of SSTV pictures.

By Paul M. Jessop,* G8KGV

Slow-scan television (SSTV) is one of the more interesting modes available to the radio amateur. But at present, much equipment is either a bit primitive, homemade using long-persistence phosphor tubes, or else very expensive commercial, using slow-to-fast conversion. These latter use dynamic shift registers which are now more expensive than the more modern equivalent, the random access memory (RAM). They are also more temperamental and require awkward high-level clock drives.

This article describes how the owner of a microprocessor with a reasonable amount of memory can decode, display and process SSTV signals received off the air or from tape and also send user-generated pictures. The term "reasonable" here means that 8-K bytes of memory are required for picture storage and there is an additional software overhead of perhaps 1 K on top of this. Another requirement is a display device capable of displaying a matrix of 128 × 128 dots in 16 tones. This must use direct memory access (DMA) and can derive many of the signals it requires from an existing video display. Such a device is not, to the author's knowledge, commercially available.

To survey quickly the SSTV technique, a picture is sent by frequency modulating an audio subcarrier according to the intensity at that point in the picture. This subcarrier is fed to the transmitter which is normally operated in the ssb mode, but fm is not unknown and has advantages for short-range work. Sync pulses are added at the end of each line (5 ms) and frame (30 ms). The lines are scanned at about 16 lines per second and there are about 128 lines in a frame. A complete frame thus takes about eight seconds. The frequencies used are shown in Table 1.

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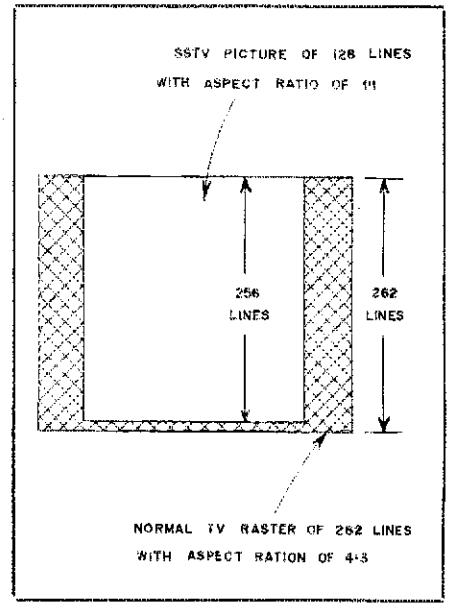


Fig. 1 — The way in which the SSTV picture is displayed on a normal television screen. Each line of the 128-line SSTV picture is displayed twice. The cross-hatched area represents a blanked border created by displaying a 1:1-aspect-ratio picture on a screen surface having a 4:3 aspect ratio.

Table 1

Information	*Frequency*
Sync	1200 Hz
Black	1500 Hz
White	2300 Hz

In the system described here, each line is divided into 128 dots (pixels), each of which can take one of 16 values of intensity, white through black. Each pixel thus occupies 4 bits of information (4 bits represent 16 discrete values) and there are 128 × 128 = 16,384 pixels. Thus 65,536 or 64 K (1 K = 1024) bits are required to represent the whole picture. Since most microprocessors work in terms of 8 bits (1 byte), the memory requirement is for 64 K ÷ 8 = 8-K bytes, a standard size of memory board.

To turn now to the hardware required, each of the dots must be displayed on a domestic television. A proposed scheme is shown in Fig. 1. A noninterlaced scan of 262 lines is produced, with each line of the SSTV picture duplicated. This leaves a small gap at the bottom and a rather larger gap at either side. The latter occurs because the SSTV picture is square whereas the television screen is rectangular. The scan rate of the domestic television is 15.75 kHz and therefore the time for one scan is 64 μs. Some of this time is used by the line sync and blanking periods and only 75 percent of the image width is used by the SSTV picture. Therefore, the time in which the 128 pixels making up the SSTV line are shown is about 42 μs. Hence the time between consecutive pixels is 330 ns, but this does *not* mean that the memory must have an access time of less than 330 ns. This is because of a trick in the way the information is stored; more on this later. The actual required memory access time is 600 ns or less. This is a normal speed since a microprocesor running at 1 MHz (e.g., 6800, 8080) needs an access time of 575 ns.

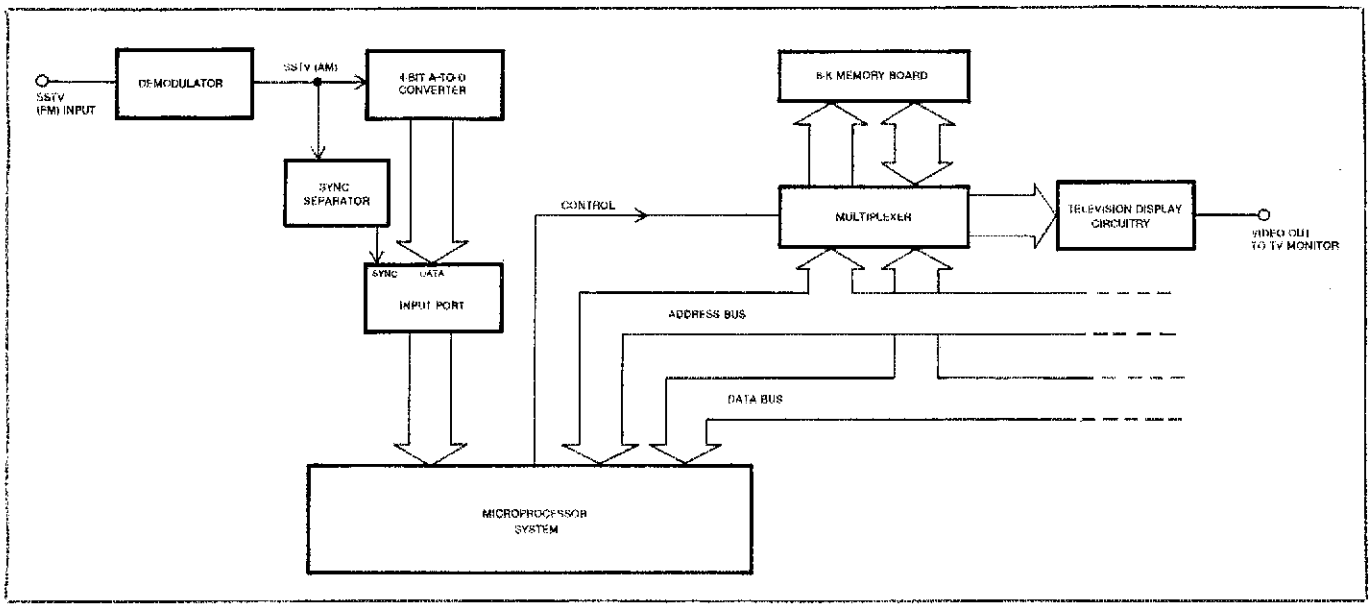
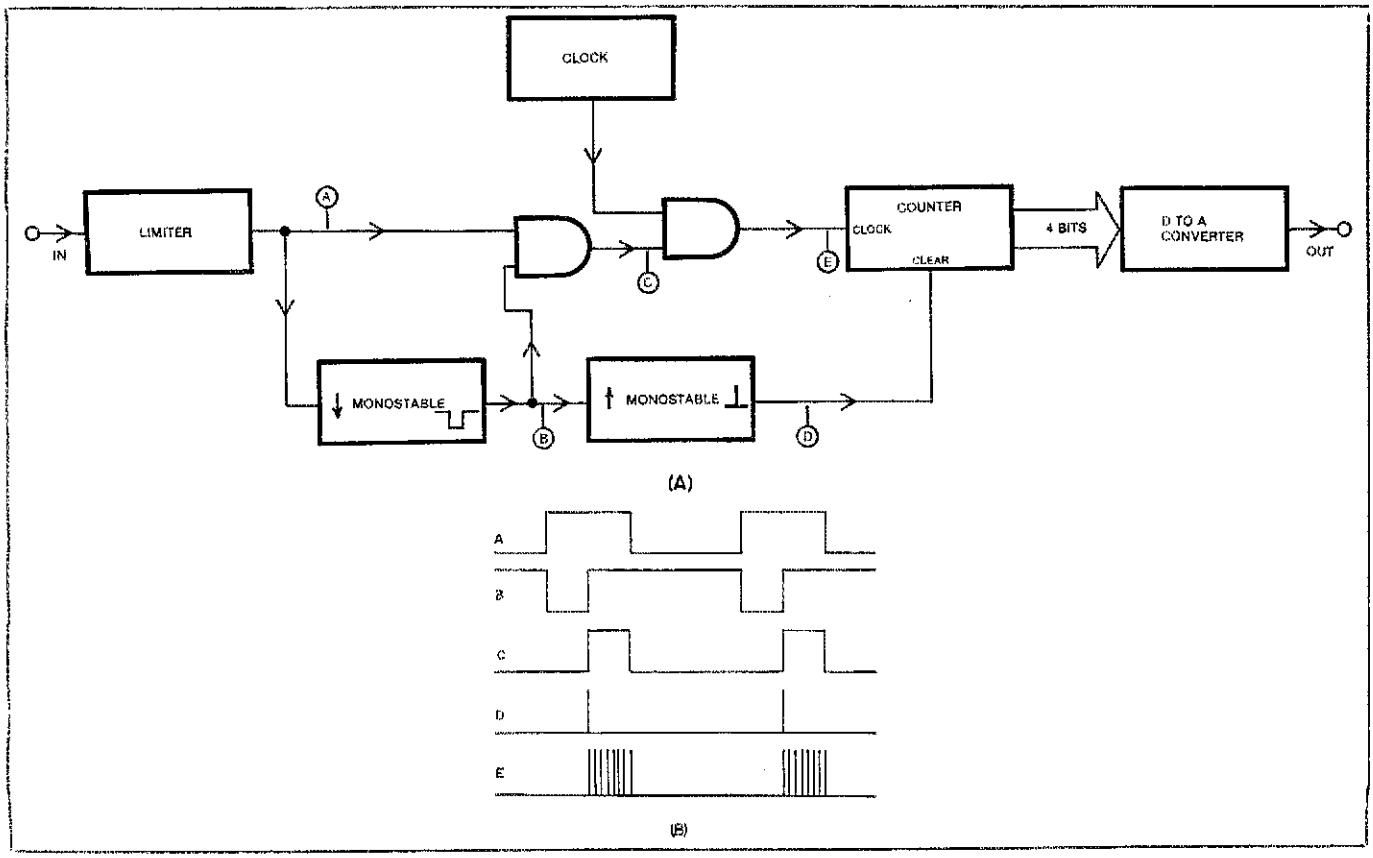


Fig. 2 — Block diagram of the complete microprocessor-based SSTV slow- to fast-scan converter.

Thus standard memory parts can be used, a major factor since the assembly of the memory could be a headache unless a ready-made unit or at least an etched circuit board is available.

The overall system block diagram is shown in Fig. 2. The large block labeled "microprocessor system" covers a multitude of sins. Any microprocessor will do and the choice is governed largely by availability, since it is unlikely that anyone should consider buying a microprocessor solely for use on SSTV and its suitability for other tasks would be a primary consideration. There are many circuits for the SSTV demodulator and this choice is clearly with the builder, who may well already have a unit available. It is possible to perform the demodulating function in software but this is not as simple as it might at first seem. A hardware system which in essence is very similar is shown in Fig. 3. The principle is to count how much longer the pulse length is than a pulse representing white picture information (1/2300 Hz or approximately 435 ms). While the output of the counter could be fed to the microprocessor or the hardware could be emulated in software, there is a major difficulty. The system

Fig. 3 — Block diagram of a circuit to demodulate incoming SSTV audio signals for the microprocessor. At B waveforms for corresponding points *indicated* at A are shown. The duration of the incoming-waveform pulse (A) is greater than that for white picture information (B). The principle is to count how much longer, represented by the number of spikes in waveform E.



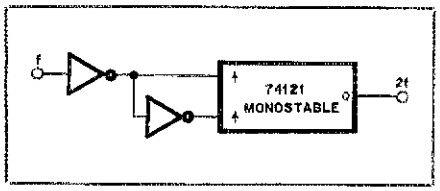


Fig. 4 — A technique for frequency doubling with a 74121 monostable multivibrator. (See text.)

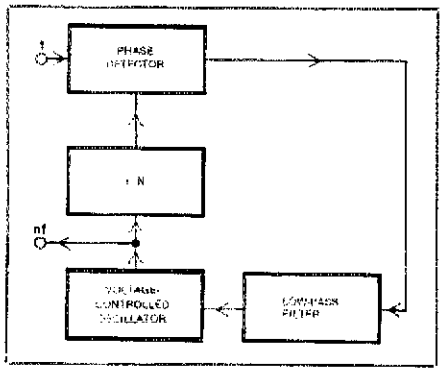


Fig. 5 — Frequency multiplication "by division," using a phase-locked loop. (See text.)

requires 128 samples per line but in a line of black, there are less than 100 cycles (1500-Hz tone for approximately 1/16 second). Thus to utilize this scheme, either some complicated software or modification to the hardware is required. One way around this is to multiply the frequency of the signal either directly (Fig. 4) or "by division" (Fig. 5). Frequency doubling still gives less than 200 cycles per line so some fairly sophisticated software is yet called for. If this method of demodulation really must be used, the easiest way is to time the pulse in hardware, convert to an analog signal and smooth this. The signal can then be converted into a digital form and sampled by the microprocessor as required.

The multiplexer of Fig. 2 serves to share the 8-K RAM between the microprocessor and the TV display generator (TVDG). The memory is normally connected to the TVDG but when the microprocessor attempts a read or write on the memory block, the multiplexers switch the control to the main buses. Thus the microprocessor has priority in accessing the memory; this could cause glitches on the screen unless the software were so written that all transfers take place during the frame blanking period. It is generally found, though, that with this type of circuitry, the glitches are not objectionable, and of course only occur when a signal is actually being received.

By far the most complicated part of the circuitry is the TVDG. However, no new boundaries are being broken as it bears much resemblance to a normal video display teminal. If one of these is already in use, many of the signals required by the TVDG can be derived from it (sync and blanking pulses). A more detailed block diagram of this part of the circuit appears in Fig. 6. Its operation is perhaps best understood if the actions taken immediately after a frame-sync pulse are examined. This pulse clears the row and column counters which keep track of which cell is being accessed. The next line-sync (LS) pulse triggers a delay circuit which defines where the left edge of the picture falls on the screen (see Fig. 1). The delayed pulse gates the master clock which controls the rate at which the pixels occur across the screen, i.e., the width of the picture. This is about 3 MHz. This pulse train feeds the column counter which is a 7-bit binary divider. The most significant 6 bits act to address the 6 least significant bits of the RAM. And the least significant bit of the counter is fed to a data selector which effectively multiplexes the 8-bit memory word onto 4 lines. As mentioned earlier, a trick in addressing the memory allows the use of slower (and therefore cheaper) RAM. This is that trick, but it has another advantage up its sleeve. Since the data are stored in 8-bit-wide bytes, standard memory boards can be used. Two consecutive pixels are stored in the same byte so when they are accessed sequentially, the memory need only be referenced once. The access time requirement of the memory is therefore halved. The data selector has the function of separating the two pixels.

A carry or overflow from the column counter has three effects. First, it disables the clock gate so that no further counting takes place until it is cleared by the next LS pulse. Second, it blanks the video

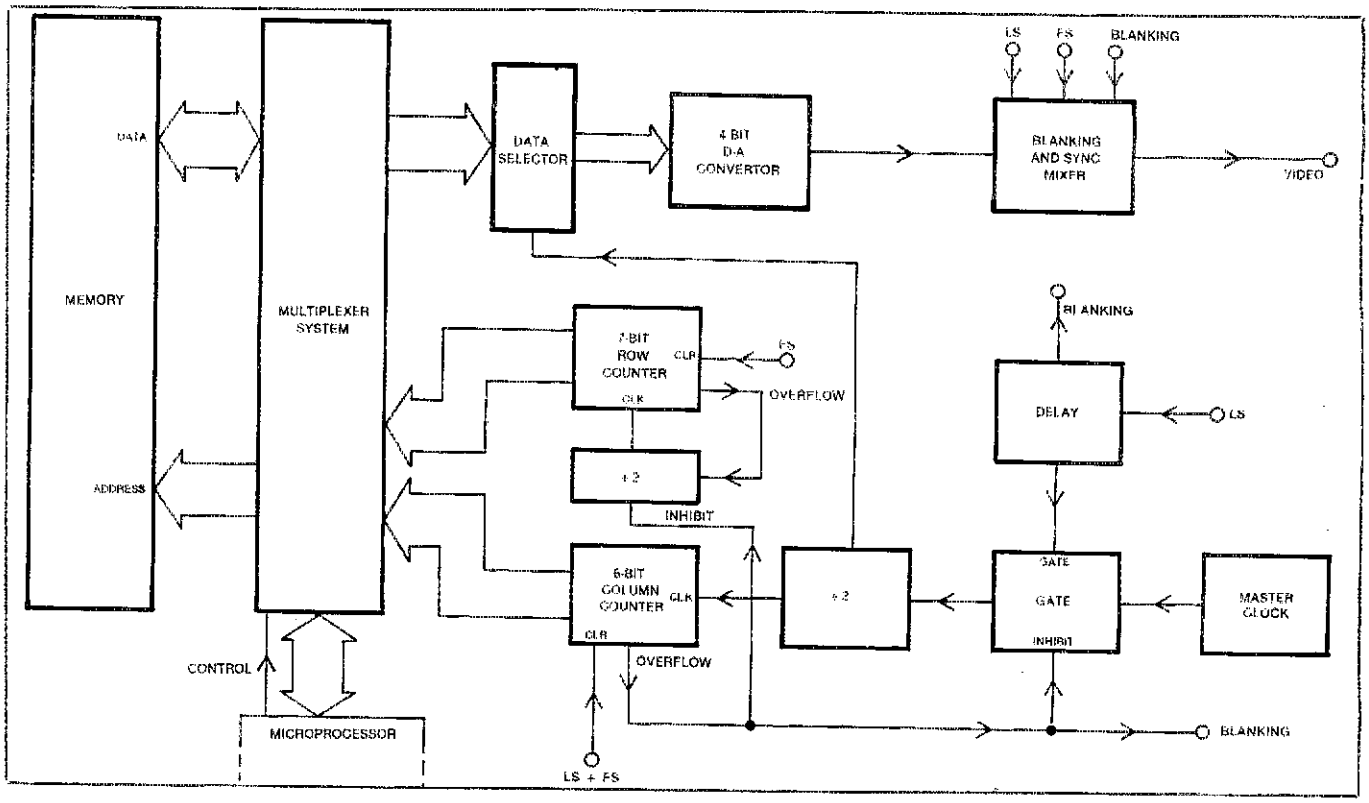


Fig. 6 — Detailed block diagram of the television display generator (TVDG). Operation of the circuit is discussed in the text. The 6-bit column counter and its preceding binary divider form a 7-bit counter.

output so that spurious picture information is suppressed. And third, it clocks the row counter. Since each row of the SSTV picture is to be displayed on two consecutive lines of the video output, a divide-by-2 flip-flop is inserted between the column and row counters, together with a gate which prevents further counting.

The output of the data selector feeds a D-A converter which generates 16 discrete analog levels. This, in turn, feeds a blanking/sync mixer, for which many designs exist. This concludes the details of the main features, at least of the hardware side. We now turn to the software required to use the hardware to the best advantage.

Software Techniques

The objective of the software controlling the system is to receive the signal, store it in the memory of the display generator and also to process the data to make the picture more intelligible. A basic routine for reading the SSTV information from the input port and writing it to the picture memory is shown in Fig. 7. If followed through, the process is self-explanatory but one thing should be noted, namely the difference between the two types of rectangular (process) boxes. The boxes with single sides represent basic operations such as can be performed by the microprocessor in one or two instructions but the double-sided boxes represent more complicated processes typically represented in the program by a subroutine. It should be noted that this is by no means an optimum algorithm but was designed merely to illustrate the basic principles involved in transferring the data from input port to memory. Other "bells and whistles" are within the grasp of the user merely by modifying the program. Some additions will be examined here, namely buffered read, 9-cell averaging and frame averaging.

Buffered Read

It was mentioned earlier that if the TVDG and the microprocessor attempt to access the 8-K memory block at the same time, the microprocessor will win, possibly causing a spurious response on the screen. This can be avoided if, instead of writing received data direct to the TVDG memory, it is stored in a buffer and transferred to the TVDG memory when the TV display is blanked. There are four FSTV half-frames during each SSTV line and thus there are four vertical blanking periods during which the transfer may be made. These last rather more than 1 millisecond so at least 4 ms is available to transfer 128 four-bit data items which can in fact be treated as 64 eight-bit bytes.

In order to carry out this task, the microprocessor must clearly know when the display is blanked and another input line would be required, carrying the FSTV frame blanking signal. However, the pro-

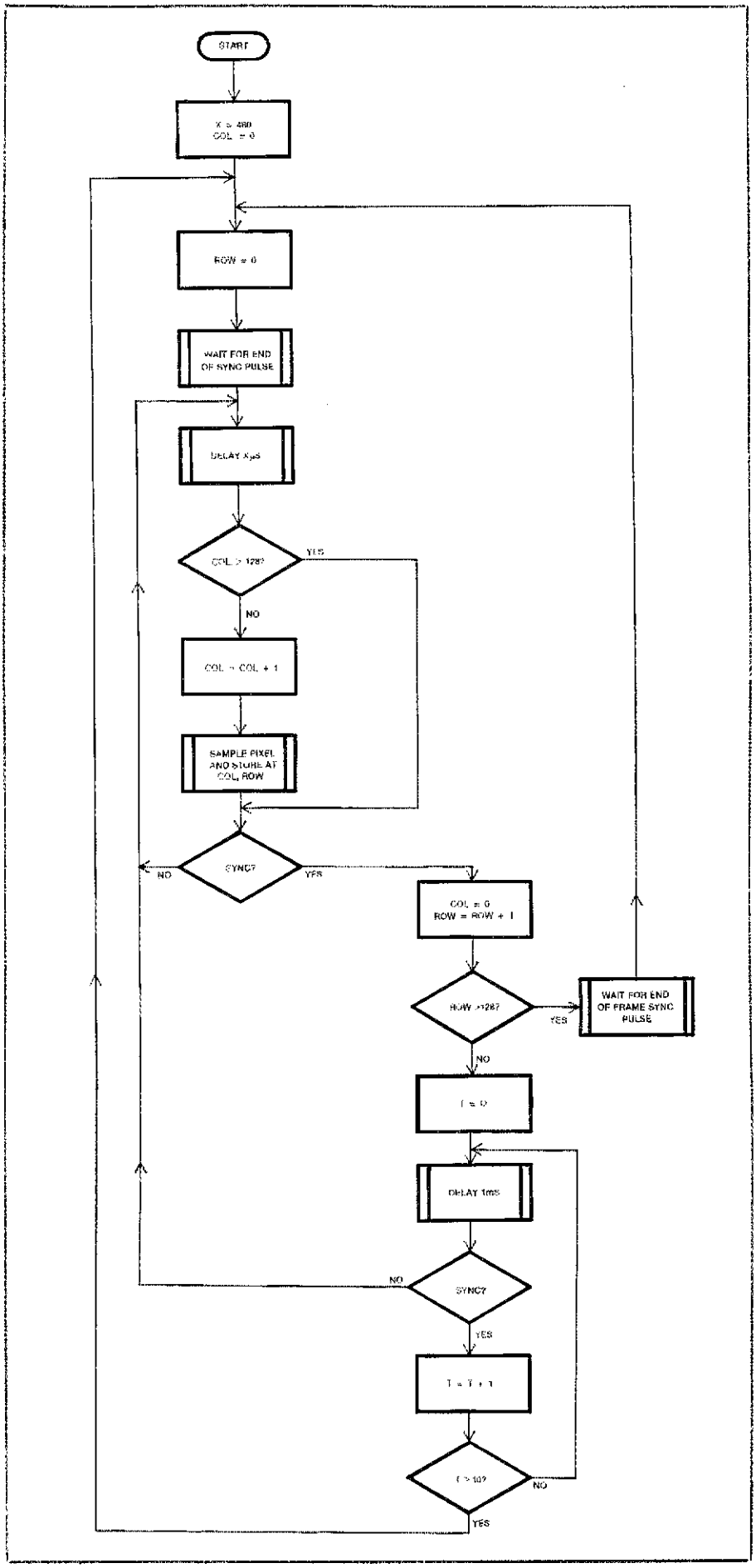


Fig. 7 — A routine for copying SSTV video input into the TVDG memory.

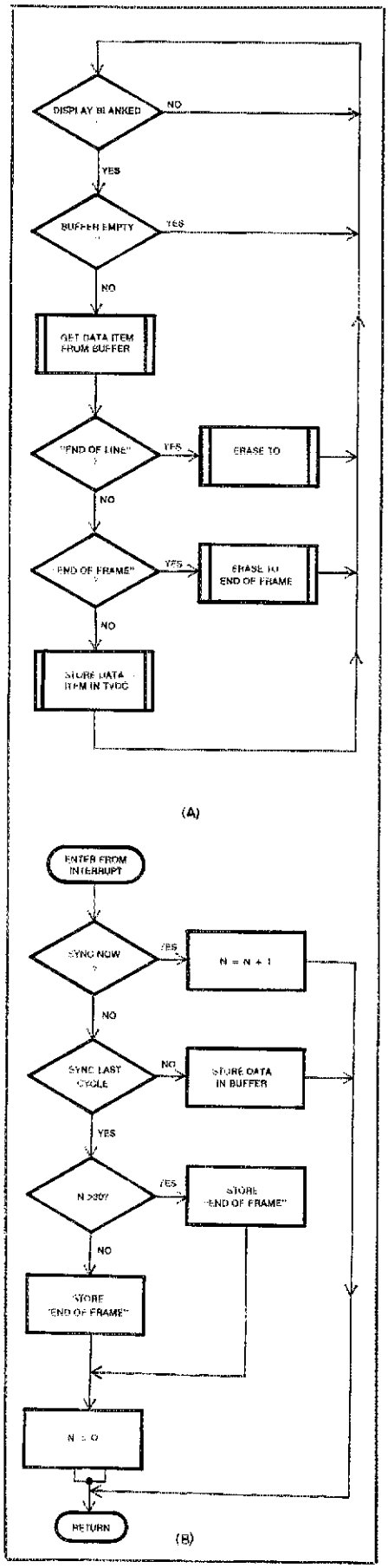


Fig. 8 — Flow charts for a buffered read technique. At A, the main routine for an interrupt-driven system. At B, the interrupt-handling routine.

cess of unloading the buffer must not be allowed to interfere with the timing of the input sampling or the timing of the SSTV sync pulses. These difficulties mean that there is a strong argument for an interrupt-driven system. This is a system where the microprocessor has a "foreground" task of unloading a buffer into the TVDG memory and a "background" task of sampling the incoming data and writing it to the buffer when an interrupt occurs, i.e., every 480 μs (the duration of each pixel). This interrupting signal can be derived from a crystal-controlled clock. Flow charts for performing these functions are shown in Fig. 8. The effect of this process is to have two tasks for the microprocessor which appear to be happening at the same time, but in truth, they happen sequentially but very quickly. The buffer requires some comment since the normal type of last-in-first-out device is inadequate. This is because the buffer is required to access both ends of data. The type of buffer needed is a circular buffer, such as is shown in Fig. 9. This sort of buffer occupies a finite area of memory, and both ends are in fact accessible. These are addressed by pointers which are incremented after each read or write operation and reset to the beginning of the buffer when they exceed the highest address of buffer area. Thus, although the buffer is implemented in linear memory, it appears to the program to be circular. The length of the buffer is clearly a matter for some thought and is dependent on several factors, for instance the processor speed and the time taken in responding to an interrupt request in reading the data on the input port and writing it to the buffer. Under any circumstances, 64 bytes should suffice and this can probably be significantly reduced.

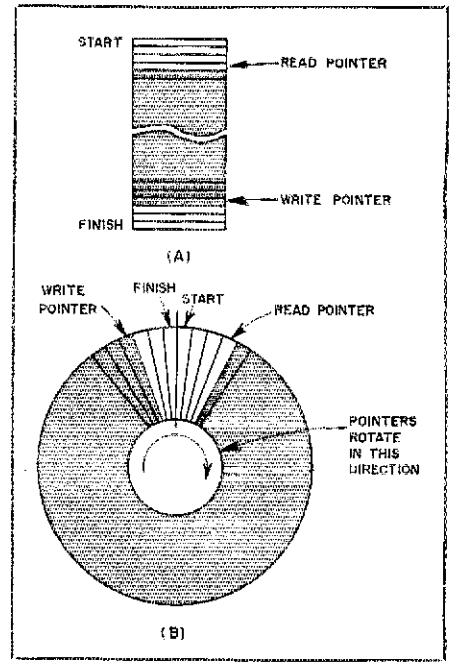


Fig. 9 — The circular buffer as it physically exists in memory (A) and as it appears to the program (B). The shaded areas represent the amount of buffer actually in use. This can contract until the two pointers are adjacent or expand until the same situation occurs, but they must not pass.

Nine-Cell Averaging

When noise is present on an audio signal, it is possible to reduce this by passing the signal through a low-pass filter. The same is true of the SSTV video signal; unwanted high-frequency components appear as snow on the picture and reduce its readability. These unwanted components can be removed by a normal RC or active filter but they can also be reduced by the use of a technique best known to statisticians, the moving average. In statistics, the fluctuations in a set of results can be reduced by replacing each data item by the average of those on either side of it and the item itself. The result is that the new data show the trend of the results without being obscured by individual variations. The same technique can be applied to SSTV processing and is very easy to operate under the control of a microprocessor.

Because an SSTV picture is a two-dimensional medium, the averaging is extended from three data items to nine cells, that under consideration and the eight surrounding it. However, despite the apparent simplicity of the scheme, there are two problems which arise. The first is that when the cell in question is received, that following it and those on the next line have not yet been received and are forward references. The other is that unless two separate blocks of memory are available, it is imperative to carry out the averaging process within one block, with the result that it is inevitable that already-processed data will be used to influence the new value of another cell. This means that the averaging process is being extended beyond the 9-cell block and while this may not be detrimental, it is not what was wanted. The only real answer to the second problem is to install another memory block but the first may be readily overcome by a software technique. This is as follows: When the bottom right cell of the 9-cell square is received, the square is complete and the averaging process may take place. The values of the intensity in all nine cells are added together and the sum is divided by nine (this is not easy, but there are alternatives; these will be discussed in due course) and the result is written back into the center cell. This is quite easy to achieve since it is the value in the list, 129 cells back from the current cell. The division by nine still remains as a major stumbling block, however, since it cannot be performed quickly by the microprocessor. The only numbers which are easy to divide by are powers of two so here 16 is suitable. The division can now take place by shifting the result in binary

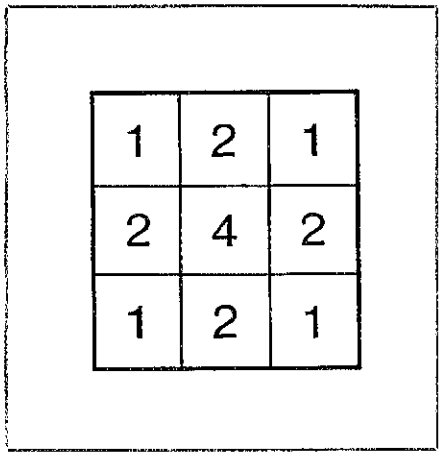


Fig. 10 — Weightings for 9-cell averaging for convenient division by 16.

by four places to the right. As it happens, the necessity to divide by 16 provides another advantage, that is that the average value can be weighted toward the center cell. This means that instead of merely adding all the cells together, some are added in more than once and the result is divided by the total number of additions. Now the weightings must add to 16 and be larger toward the center of the square so the result is biased toward the center cell. A suggested plan is shown in Fig. 10. In practice the numbers would not be individually added a number of times but a process akin to Fig. 11 would be carried out. This achieves the same result but uses far less memory space to do it. Clearly, there are many possible weightings; each experimenter can easily determine the best arrangement.

Frame Averaging

This technique is very similar in essence to the averaging method described above. The averaging is not carried out within the same frame, however, but between successive frames. When a pixel is received, instead of storing it at its memory location, it is added to the previous value and the sum is divided by two. This is then returned to the previous location. The result is that the display shows the average of the frame just received and the previous frame. The previous frame was made up of that frame and the one previous to that, however, which was in turn made up of two frames. Thus each new frame is dependent upon all the previous frames, with the contribution made by each successive frame halving. Thus the contribution soon becomes so small that it cannot be resolved by the grey-scale of the TVDG. This means that when the received picture changes, the old picture is soon swamped by the new picture. The effect of individual noise pulses is much reduced, however.

Transmission

To turn now to the generation for transmission of SSTV signals, it turns out that the microprocessor is very versatile in the functions it is able to perform. Keyboards which allow the user to type to an internal memory have been available for a considerable time. The stored information is then sent in an SSTV picture by use of a dot-matrix character generator. This generator was originally made from a diode matrix but dedicated ICs are now available to perform the same function more efficiently and with much less inconvenience to the constructor. Although a microprocessor can easily perform the function of an SSTV typewriter, the designer has a few decisions to make about the way this works.

The first decision is in the way in which the character generator is implemented. The obvious way is to include the data for the generator in the software which runs the SSTV system, but this is wasteful of memory space and there is an easier solution. This is to "hang" a character-generator IC on the microprocessor bus. This IC is much cheaper than the equivalent amount of RAM because it is mass produced and it need not be loaded from paper tape each time the system is initialized. The older type of character-generator ICs is easiest to interface since it does not contain the shift registers which make the new ones so easy to use in a television typewriter. The second design decision is whether the transmitted picture is generated directly from alphanumeric data stored in the computer memory or is first translated into the actual intensities for each point in the frame, stored in the TVDG memory and then transmitted straight from the memory. The second method has the advantage that any transmitted data are automatically displayed but if it is desired only to transmit alphanumeric information,

```
(1)  V = 0                Clear V
(2)  V = V + Center       ——
(3)  V = V × 2            Shift left
(4)  V = V + Edges        ——
(5)  V = V × 2            Shift left
(6)  V = V + Corners      ——
(7)  V = V − 16           Shift right four times
```

Fig. 11 — A procedure to generate the weightings shown in Fig. 10. At the end of this procedure, the variable V contains the averaged value.

either method is quite suitable. If, however, it is also desired to transmit pictorial or diagramatic information, the second method is mandatory, and, of course, some method of creating the picture in the first place is required. This can be based on a cursor, moved about the screen depositing bright cells as it goes. This is slow but very accurate results are obtained. A much quicker alternative is a light pen, but this can produce rather ragged results and use very complicated hardware.

Other Applications

One clear candidate for microprocessor use in SSTV is in the generation of animated sequences. Here, memory space can be saved by storing only changes to the frame. Or the microprocessor can be used to produce tapes which can be transmitted later. This latter is possibly more practical and shows that high technology is not necessarily the best way to solve a problem. An area where some research is required in the amateur field is in the use of random sampling to reduce the bandwidth of a signal. The principle is that instead of sending a row of a picture at a time, one dot from each row, chosen by a pseudo-random algorithm, is sent and the receiving equipment, by the use of the same algorithm, can reconstruct the picture and display. Clearly, the use of microprocessors makes this much easier; it may even be possible to transmit actual animated sequences within the confines of a voice band by the use of this technique.

The experimenter with a microprocessor at his command can contribute much in development work. Complexity is not an economic factor because all the work is done in software. If the individual has almost unlimited time at his disposal, he can perform feats which would not be considered economical in industry. DST

Strays

BORROWED A LEAGUE FILM LATELY?

☐ The evaluation forms that we have been sending out with film, slides and tapes are considered first class mail when filled in. As a result of this, we will not be using this form any longer. The return label has been changed to include an area to comment on needed repairs. The Post Office may require extra postage on the return labels. — *Donna McManus, Film Librarian, Club and Training Dept.*

WELDING? WATCH IT

☐ There is the same amount of force in an exploding butane lighter as in three sticks of dynamite. Two Union Pacific Railroad employees experienced tragic accidents when butane lighters exploded as the result of welding accidents. A welding spark can come in contact with the lighter and burn through, exposing the fluid, resulting in an explosion. Remember, safety is everybody's business. — *Dial Radio Club, Middletown, OH, Newsletter*

Hints and Kinks from Abroad

Edited by Doug DeMaw,* W1FB

Pat Hawker's monthly column in Radio Communications, *"Technical Topics," contains some really great data. Here are a few of the gems from past issues of the Radio Society of Great Britain (RSGB) journal.*

MOSFET SSB Adaptor

The March 1978 "Technical Topics" column included an item from Lionel Sear, G3PPT, about a combined product detector/oscillator arrangement that he had found suitable for use in a direct-conversion receiver. He explained that this had stemmed from an item in *Elektor* (combined July/August 1977 issue, page 72) where a 455-kHz version formed the basis of a MOSFET ssb adaptor intended for use with any hf receivers not already fitted with a product detector or BFO. The original circuit is shown in Fig. 1 although, of course, it could be adapted for use at other intermediate frequencies.

It is noted in *Elektor* that self-oscillating product detectors tend to force the oscillator into resonance with the incoming signal, but that the dual-gate MOSFET appears to be reasonably free of this vice. However, by increasing the signal applied to the adaptor, this forced resonance effect can be used deliberately to achieve synchronous demodulation of a-m signals over about a ± 1-kHz range. The oscillator arrangement is based on the Clapp configuration.

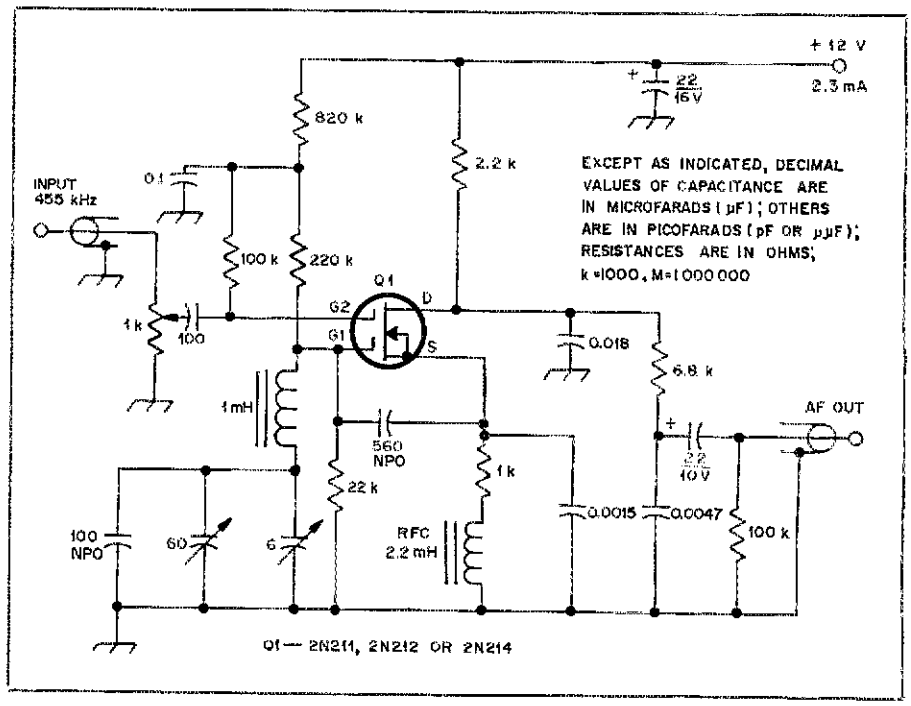


Fig. 1 — MOSFET ssb adaptor featuring combined product detector/oscillator circuit described in *Elektor*.

Matching Coaxial Cables

Wyn Mainwaring, G8AWT, has made effective use of a novel technique for matching different coaxial cables or curing socket-to-cable problems. Although as indicated later, I am not sure whether this is as easy to implement as an alternative idea that was drawn to the attention of readers by G3KYH in "Technical Topics," October 1971, and subsequently has been included in several editions of *ART*. But first let G8AWT explain his technique. He writes:

"Much radio equipment is built to professional standards, including 50-Ω impedance coaxial feeds, of which there are many (and an expensive range of inter-series connectors). The well-established BNC devices are ample for the power levels found in amateur radio and they are usable to 10 GHz; it is small and positive in a quick connection with no threads to cross or bind.

"However, older gear is more likely to have 75-Ω outlets or feed impedance, via a B-L connector. The nickel-plated versions of B-L are a better long-term proposition than the more common aluminum-bodied plug, mating with a nickel or cadmium-plated socket. It depends on a firm push "home" to minimize dielectric air-gap and to ensure reflection-free connection at very high frequencies.

"How can we join the two systems? A λ/4 coaxial matching transformer (taking into account the velocity factor of the cable) can provide the answer if this can be made by using a solid polyethylene cable of an impedance that is the geometric mean of 75/50-Ω systems, i.e., 61 Ω, or in terms of solid polyethylene cables, 67 pF, 100 pF and 82 pF per meter-length of cable. But how can we make a 61-Ω length of cable?

"This can be done without disturbing the inner part or cutting the outer conductor of a piece of single-cored UR43 (or the flex-cored UR76) as follows: Start with the cable correctly terminated at one end with a 50-Ω BNC connector. Then, carefully strip the black PVC sheath from a good λ/4 length at the other end (68 in. [1.7 m] for 28 MHz, 28 in. [0.7 m] for 70 MHz, 13-1/2-in. [343 mm] for 144 MHz, etc.); the outer shield can then be pushed back like a sausage skin to reveal the solid polyethylene dielectric. Next, some readily available plumbers' PTFE pipe-thread tape (0.06 mm thick seems a common type) is lap-wound over the length of polyethylene, forming two layers from the braid toward the free end, then returning toward the braid, forming a three-layer lap, totalling five layers over the polyethylene. It is this taped length that forms the new-impedance cable, an overall diameter of 3.5 mm being needed for this mixed dielectric length of cable.

"The braid now needs to be eased back over the taped section resulting in a shrinkage of about four percent. As much care as possible should be exercised in replacing the braid smoothly and keeping it in place with adhesive PVC tape, which can be multilayered to bring the diameter up to a convenient size for the B-L plug at the 75-Ω matching end, or for accepting a larger PVC tube (from some domestic fringe-type cable) which may be sealed from the weather with Bostick no. 1 or PVX adhesive."

*Senior Technical Editor, ARRL

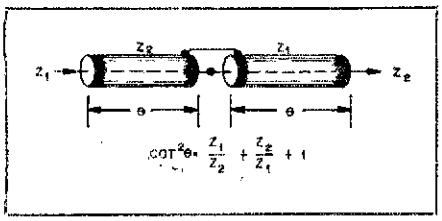


Fig. 2 — Transmission-line transformer used to provide a simple means of matching 50-Ω and 75-Ω coaxial cables.

G8AWT sent along a short length of modified cable showing that it makes up into a very neat arrangement with the $\lambda/4$ matching section built into the cable.

However, the alternative technique suggested in 1971 by G3KYH and based on an article in *Electronic Engineering* (April 1962) is shown in Fig. 2. This permits any two cables of different impedance to be matched together by using appropriate lengths of the cables as shown, thereby avoiding the need for a cable at the geometric mean impedance. G3KYH simplified the original formula to that shown and noted that "for a 50/75-Ω transformer this works out to an electrical length of 29.3° for each section of cable. The physical length must of course take into account the velocity factor of the cables (typically about 0.66-0.80)."

Versatile Calibrator

"Technical Topics," November 1976, showed how the 7490 IC decade divider can, by variation of connections, function as a divide-by-n device, where n is any integer from 2 to 10. An interesting example of how this facility can be put to very practical use is to be found in a handy crystal calibrator designed by G8JKL and G8ISY. This provides marker points for use up to vhf at intervals of 1 MHz, 100 kHz and then the option of either 10- or 12.5-kHz markers.

G8JKL writes: "Since operation on fixed channels has become the vogue on vhf and I use a tunable receiver, the need for something better, in the way of crystal calibrators, than the original band-edge marker soon became apparent. To this end the TTL calibrator shown in Fig. 3 was designed by G8ISY and me. The switching allows netting on to the fm channels which are 25 kHz apart by arranging the second 7490 to divide by either 8 or 10. The unit can be built on Veroboard and conveniently fits into a tobacco box together with three no. 8 cells making a 'jam' fit."

Frame Receiving Antenna

On several occasions we have mentioned briefly the use of simple frame antennas, with single-turn coupling coils, for DX reception of medium-wave broadcast or 1.8-MHz stations. Each time inquiries have been received seeking further constructional details, although these are not particularly critical. As such a design has recently appeared in *Electronics Australia* (October 1976), the opportunity is taken of reproducing it (Fig. 4).

About 100 feet (30.4 m) of plastic-covered wire (about no. 22) should be used for the main winding. This should be wound to a whole number of turns; if it will not tune to 1.8 MHz with seven turns, take one off and try again. Coaxial cable (75 Ω) can be used instead of 300-Ω balanced line to the receiver, but aim at making the windings and general construction as symmetrical as possible, since the depth of the rejection null depends on the electrical balance. Tune in signals on the receiver, peaking the antenna tuning control and adjusting direction of loop for maximum pickup or for maximum rejection of interference. QST

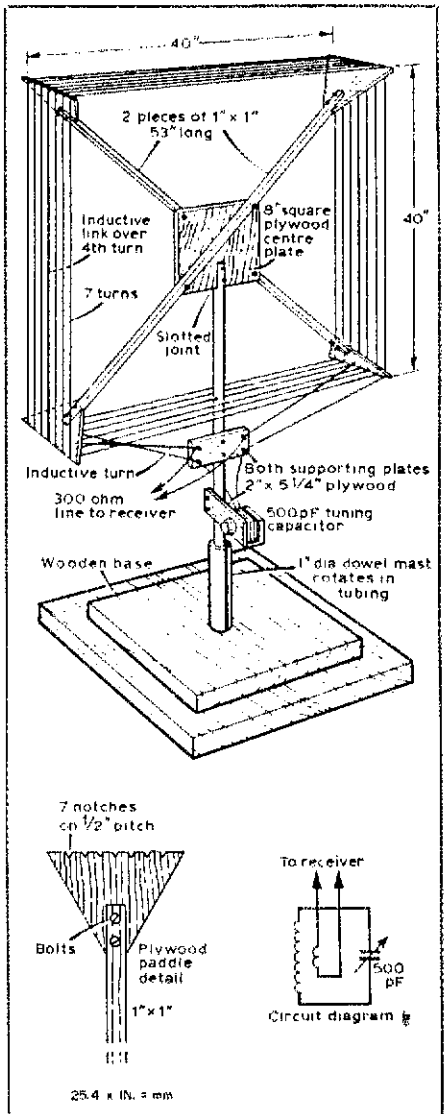


Fig. 4 — Constructional details of loop antenna for operation on medium waves and/or 1.8 MHz and capable of providing deep null on interfering signals *(Electronics Australia)*.

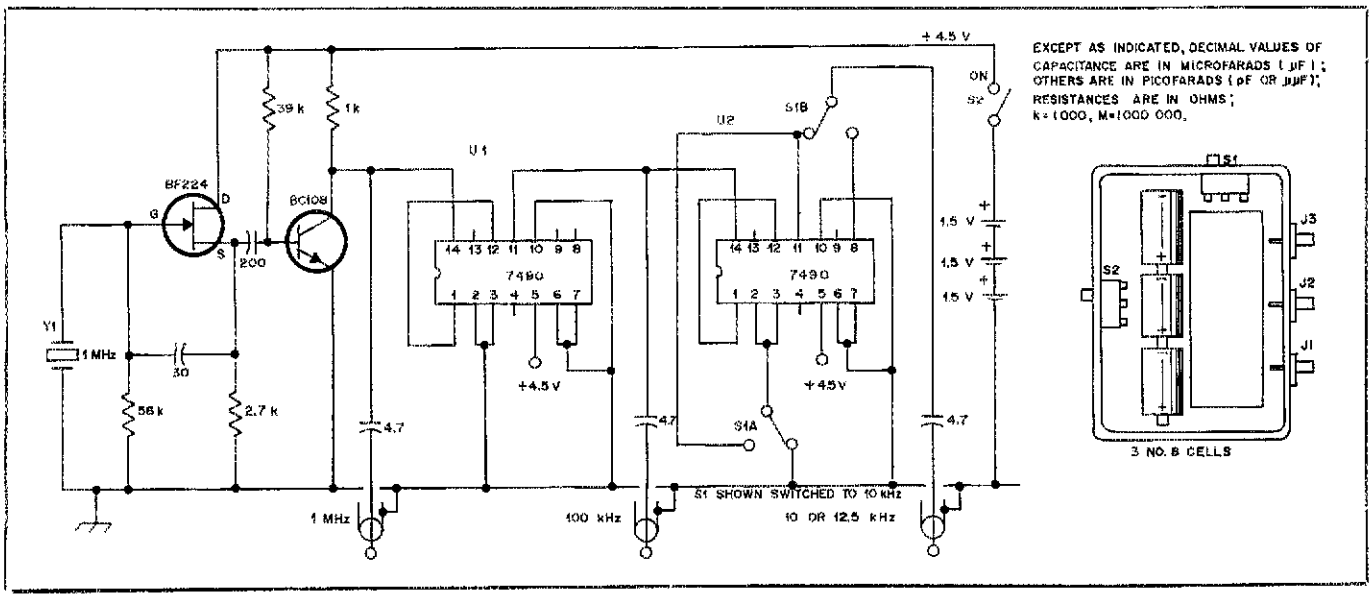


Fig. 3 — The versatile calibrator providing switchable 10- or 12.5-kHz markers.

A Static Morse Keyboard

Build this Morse keyboard for your cw station and send "perfect" code. Its static design will permit separation of the keyboard and code-generating circuitry — and no EMI problems!

By C. T. Isley,* W7KIM

A recent *QST* article by Al Helfrick, K2BLA, described an inexpensive Morse keyboard that utilized a *scanned* keyboard.[1] The design described in this article, on the other hand, utilizes a *static* keyboard. A static keyboard generates the appropriate digital code for the Morse-code character selected, as soon as the corresponding key is closed. The digital code is the same seven-bit binary "word" used by K2BLA in his design.

Why a static keyboard? In my case, a separate keyboard was preferred with the code-generating circuitry in another enclosure. Since I planned to add other functions in the near future, this approach appeared to offer greater flexibility over a unit where all functions are packaged inside the keyboard. Several feet of connecting cable would be required for this type of design and it was felt that a potential for EMI (*electro*magnetic *i*nterference) problems might arise with a scanned keyboard. A static keyboard will not cause EMI. From the standpoint of externally induced EMI, it might be argued that a relatively long length of unshielded interconnecting cable would pick up enough rf in a strong field to cause spurious operation of the keyer. While this has not happened in my case, it would appear that such an occurrence could easily be suppressed by the installation of simple single-section LC or RC filters at the input of the keyboard circuitry. The "brute-force" approach using fully shielded cable could also be used (which might solve all EMI problems), however, using multi-conductor cable this approach becomes physically unattractive.

Table 1

Keyswitch Connections for the Morse Keyboard

Connect keyboard switches as indicated. "A" coordinates represent vertical matrix lines; "B" coordinates represent horizontal matrix lines.

Character	Connect From	To	Character	Connect From	To
A	A7	B7	W	A7	B15
B	A6	B2	X	A6	B10
C	A6	B6	Y	A6	B14
D	A7	B10	Z	A6	B4
E	A7	B3	1	A4	B15
F	A6	B5	2	A4	B13
G	A7	B12	3	A4	B9
H	A6	B1	4	A4	B1
I	A7	B5	5	A5	B1
J	A6	B15	6	A5	B2
K	A7	B14	7	A5	B4
L	A6	B3	8	A5	B8
M	A7	B8	9	A5	B16
N	A7	B6	0	A4	B16
O	A7	B16	$\overline{AS}$	A5	B3
P	A6	B7	$\overline{AR}$	A5	B11
Q	A6	B12	BT	A4	B2
R	A7	B11	$\overline{SN}$	A5	B10
S	A7	B9	$\overline{SK}$	A2	B9
T	A7	B4	Comma	A1	B4
U	A7	B13	Period	A2	B11
V	A6	B9	?	A3	B13

Design of the Matrix

The design of a static keyboard generally implies the use of a diode matrix. Using the direct approach to designing a diode matrix for this application would call for a large number of diodes — obviously onerous and undesirable in this instance. If the seven-bit binary "word" is partitioned so that the first four bits (in the sense of right to left) are used to specify the matrix column, then a relatively simple, tractable design approach results. Fig. 1 shows the matrix circuitry. Only 41 diodes, three transistors, and four IC's are needed for this matrix — hardly formidable or costly to fabricate. As can be seen in Fig. 1, depressing a particular key completes the circuit between the base(s) of the selected transistor(s) (Q1-Q3) and the terminating resistors corresponding to selected rows for the desired binary code. Table 1 shows the connections from the matrix to the keyboard switches. The steering diodes associated with each row and column (respectively) effect this selection process. The strobe signal needed to indicate the presence of a character code is developed by U4. Actually, the circuitry used to convert the seven-bit "word" into Morse code requires the complement of the strobe ($\overline{STR}$), so one of the inverters in U3 is used to implement this operation.

Circuit Operation

The method for generating the actual Morse-code character is the same as that described by K2BLA with only minor circuit modifications. The schematic diagram for the Morse-character generator and keying circuit is shown in Fig. 2. The operation of the shift register and character generator has been described in K2BLA's article, and will not be covered in detail here. Each of the parallel inputs to the shift registers (U6 and U10) has been labeled with the binary weight corresponding to the output line from the keyboard encoder. When $\overline{STR}$ is low, the output of U13C goes high. This positive step triggers dual multivibrator (U5B) causing the Q output to go high. After

*804 Cortez La., Foster City, CA 94404

[1]Helfrick, "An Inexpensive Morse Keyboard," *QST*, January 1978, p. 24.

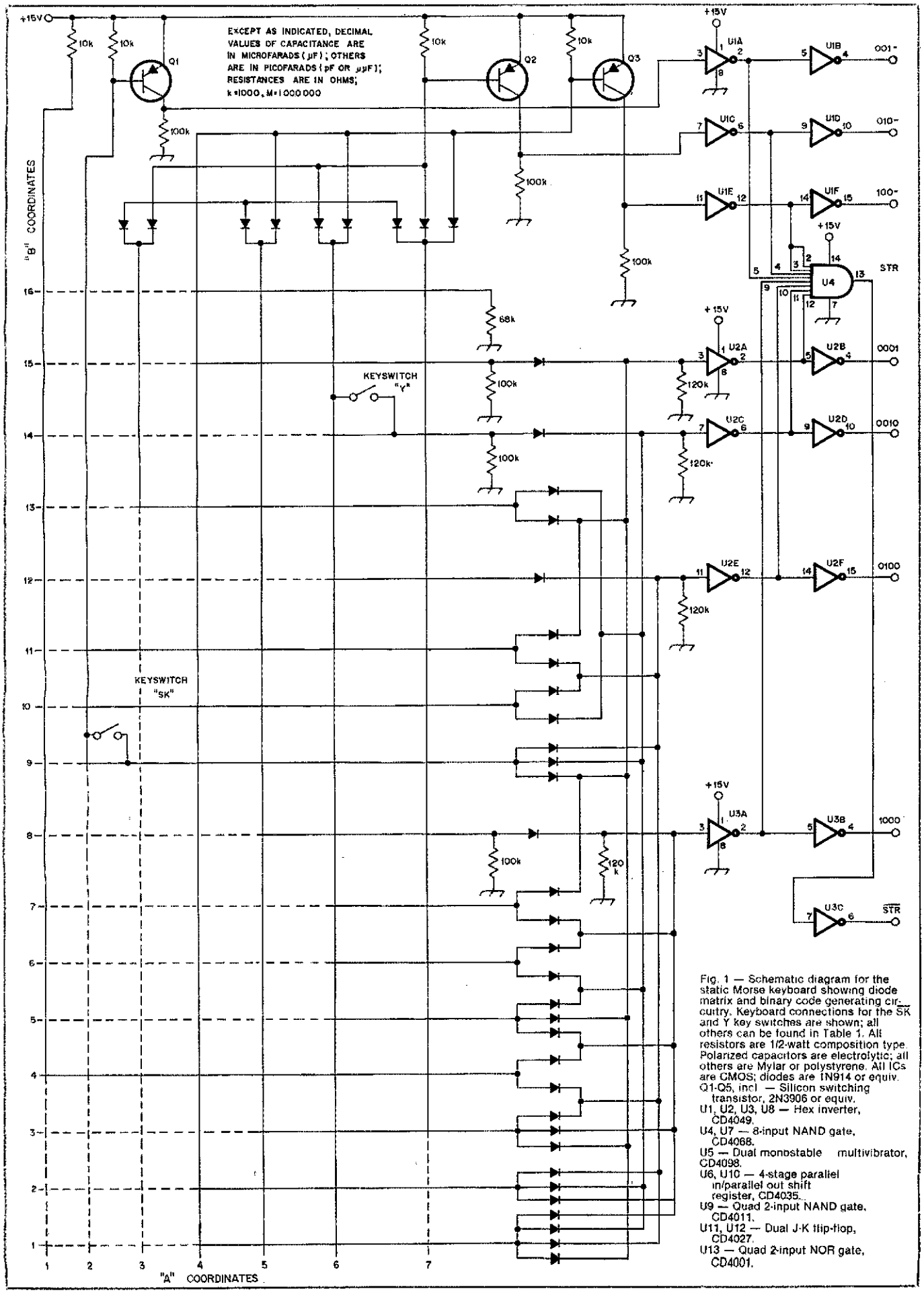


Fig. 1 — Schematic diagram for the static Morse keyboard showing diode matrix and binary code generating circuitry. Keyboard connections for the SK and Y key switches are shown; all others can be found in Table 1. All resistors are 1/2-watt composition type. Polarized capacitors are electrolytic; all others are Mylar or polystyrene. All ICs are CMOS; diodes are 1N914 or equiv.

Q1-Q5, incl — Silicon switching transistor, 2N3906 or equiv.
U1, U2, U3, U8 — Hex inverter, CD4049.
U4, U7 — 8-input NAND gate, CD4068.
U5 — Dual monostable multivibrator, CD4098.
U6, U10 — 4-stage parallel in/parallel out shift register, CD4035.
U9 — Quad 2-input NAND gate, CD4011.
U11, U12 — Dual J-K flip-flop, CD4027.
U13 — Quad 2-input NOR gate, CD4001.

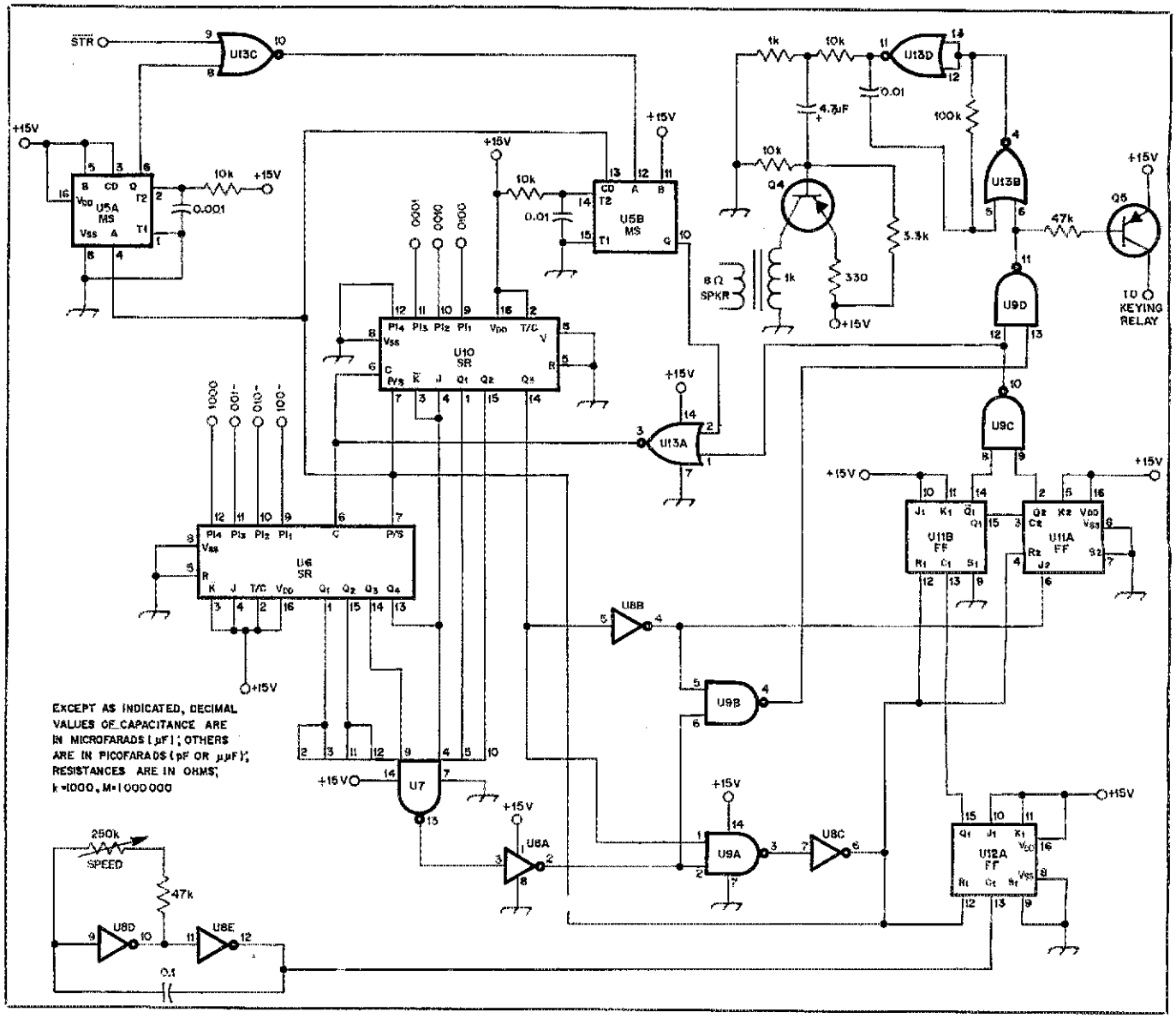


Fig. 2 — Schematic diagram showing Morse-character generator and keying circuitry of the static Morse keyboard. Parts list is given in Fig. 1 caption.

about 40 µs, U5B resets itself. A negative-going step will cause the output of U13A to go high. This positive transition, applied to the clock inputs of U6 and U10, effects transfer of the binary word present at the parallel inputs. When the shift registers are loaded, gate U7 senses that the binary word in the registers is no longer all ones. As a result, the reset lines to flip-flops U1B, U2A and U2B are caused to go low, allowing the dit-dah timing to start. This same level change is applied to the CD input of U5B. So long as CD is low, U5B cannot be triggered. Thus, during the generation of the Morse-code character, further entry of data from the keyboard is locked out. After readout of the encoded "word" plus one character space, the output of U8C goes high. This positive step resets flip-flops U1B, U2A and U2B and inhibits any further dit-dah keying action. The positive step also triggers U5B, resulting in the appearance of a positive pulse of about 2-µs duration. If the STR signal is present (low), the output of gate U13C will first go low, and then go high on the trailing edge of the pulse. This positive transition will trigger U5B and cause a repeat of the sequence just described. If STR is not present (high), further operation ceases until STR is again present.

Since the strobe and the data bits are developed by a single key closure (when the STR signal is at a level adequate to trigger U5B), the "high" data lines will also be at a level suitable for reading into the shift registers. This is true even if the key closure has not completely stabilized. As long as the delay in the dual multivibrator (U5B) is small enough, the keying action is effectively "debounced." No difficulty was encountered with the time constant used in the timing network for U5B. If difficulties are encountered the time constant should be decreased.

While *n*-key lockout is provided during the character generation, only the intended key should be closed at the time U5B is reset; otherwise, "garbage" may be transferred into the shift registers.

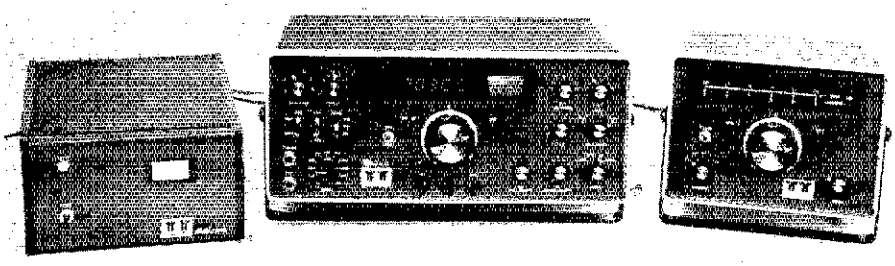
No evaluation has been made of operation at low supply voltages, since the 15-volt supply was already constructed. I suspect that unreliable keyboard operation might occur with supply voltages well below 15 volts, since there is approximately 1.5 volts total drop across the matrix diodes themselves. With respect to the transistors (Q1-Q3) there must be sufficient voltage developed across the respective 10-kΩ bias resistor to drive the transistor into saturation.

The keyboard is working fine in its breadboard form and I'm currently working on a more suitable layout. I hope all who build the keyboard will enjoy sending perfect code as much as I have. See you on the air! QST

Product Review

Conducted By Paul K. Pagel,* N1FB

The Ten-Tec OMNI D Transceiver



The OMNI D complete with the optional matching power supply and remote VFO. The bails on the transceiver and VFO may be used as support brackets as shown and double as carrying handles, or they may be removed entirely.

The Ten-Tec OMNI D Transceiver

Claimed Specifications

Frequency coverage: 160 to 10 meters, plus WWV receive at 10 MHz.
Modes: Ssb and cw.
Power output: 85 to 100 watts, typical.
Power requirements: 12 to 14 V dc, 850 mA receive, 18.5 A transmit.
Receiver sensitivity: Tailored from 2.0 μV on 1.8 MHz to 0.3 μV on 28 MHz for 10-dB S + N/N ratio.
Weight: 14-1/2 pounds (32 kg).
Dimensions: (HWD) 5-1/2 × 14-1/4 × 14 inches, less bail (140 × 362 × 356 mm).
Price class: OMNI D, $1120. 252 MO power supply, $140. 243 remote VFO, $140.

Once there was a valid argument that cw ops had to take a back seat when it came to equipment choice. That is to say, most transceivers appeared to be designed primarily for ssb use with cw "thrown in" as an afterthought. Then along came Ten-Tec. Anyone tuning the cw bands and listening to the descriptions of the equipment being used will attest to the fact that a great many cw ops have made a home for their favorite piece of Ten-Tec gear. Not only are they used in the house, but in the car, in campers, and while mountaintopping as well.

The latest offering from Sevierville is the B version of the OMNI. This updated model, complete with optional 1.8- and 0.5-kHz filters, noise blanker and model 243 VFO arrived at the Product Review desk one afternoon. That evening it was on the air.

General Description

The OMNI series transceivers are light in weight and ideally suited for mobile or portable use as well as fixed-station applications. A clam-shell aluminum cabinet houses the components and is finished with a black vinyl-covered top and bottom. A complementary-colored dark gray panel and satin-etched trim provide the finishing touches. The power supply may consist of any source capable of supplying 13.8 V dc at 18.5 A. The 252 MO supply was received with the review unit. This supply has over-current protection and is equipped with a front-panel-mounted meter. An optional over-voltage protection feature is available, too. This provides for instantaneous removal of the power supply output voltage should it rise above 15 volts for any reason.

The transceiver covers 160 through 10 meters with WWV reception at 10 MHz. There is also an AUX position for future band additions and the 10-MHz position may be converted for transmission should the need arise. The OMNI is fully transistorized. A total of 20 ICs, 44 transistors and 63 diodes is used along with 23 circuit boards. The only transmitter "tuning" necessary is the setting of the DRIVE and ALC controls for the desired power output. The receiver RESONATE control is peaked to optimize the preselector tuning when changing bands. There are no tuning or loading controls *per se*. The final amplifier transistors are warranted fully for the first year and prorated for 5 years. To check the "100-percent duty cycle" rating given the transceiver, we locked the key down at full power output (into a dummy load) for over an hour. During that interval, the output power decreased from 100 watts to 82 watts. No tuning touch-ups were made. The final-amplifier heat sink was warm to the touch after that episode, but not unduly so. A fan was used to cool the heat sink of the power supply, not that of the OMNI. (This procedural step is outlined in the power supply manual). Operation of the transceiver under conditions producing a VSWR of 3:1 (during antenna-matching-network adjustment) produced no failures.

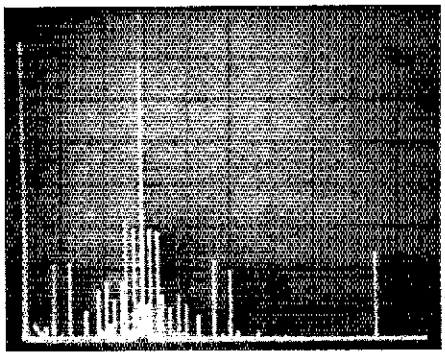


Fig. 1 — This photo shows a worst-case condition with the OMNI operating at rated input power on cw at 28 MHz. The vertical divisions are 10 dB each. Horizontal divisions are 10 MHz each. The spurious emissions close to the carrier frequency are 48 dB down with respect to the fundamental. Other spurs are at least 51 dB down. The OMNI D meets present FCC requirements for spectral purity.

The "B"(asic) Differences

There are a few differences between the earlier OMNI and the later OMNI B. The first units had a squelch control. This has been replaced by a notch filter which is quite effective in eliminating bothersome heterodynes . . . and there can be lots of those on 40 meters! A close look at the selectivity switch will disclose another change. The earlier OMNI had an audio active filter for use on cw which had three selectable skirt contours. The B model has both an optional 0.5-kHz cw crystal filter and a 1.8-kHz crystal filter for ssb. The audio filter is retained and used in conjunction with the crystal filters for providing additional selectivity. Both of these filters may be switched in cascade with the standard filter. The switching is arranged so the operator may simultaneously employ the audio filtering as well. Ten-Tec is offering factory conversion of the earlier OMNI series to the series B at a nominal cost.

The Receiver

The receiver employs an 8-pole ladder filter with a 2.4-kHz bandwidth and 1.7:1 shape fac-

*Assistant Technical Editor, ARRL

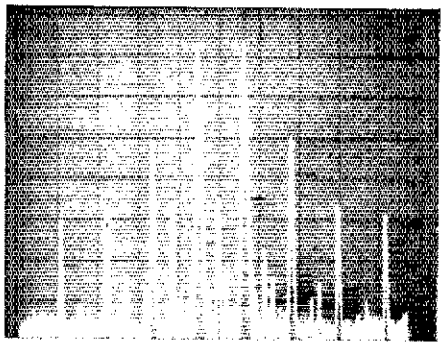


Fig. 2 — The output of the OMNI D during a full-power, 14-MHz, two-tone test. Each vertical division is 10 dB and each horizontal division is 1 kHz. The third-order products are approximately 30 dB down from the PEP level.

tor. The two optional filters available display a 1.8-kHz bandwidth, 1.8:1 shape factor for the narrow ssb filter and 500-Hz bandwidth, 1.9:1 shape factor for cw. A single-conversion system is used with a 9-MHz i-f. The rf amplifier stage is fixed-biased and has no agc applied to it. The rf-gain control is actually used to control the i-f gain. A quad diode, high-level, doubly balanced mixer circuit is used. This type of mixer circuit is characterized by its ability to handle high signal levels without being adversely affected. Receiver dynamic-range measurements were made in the ARRL lab. These are worst case figures developed at 80 meters: MDS (minimum discernible signal or noise floor) −128 dBm; blocking dynamic range 115 dB; IMD dynamic range 94 dB. This provides an input intercept figure of +13 dBm. At 20 meters, the following figures were obtained: MDS −139 dBm; blocking dynamic range 125 dB; IMD dynamic range 90 dB. The resulting input intercept figure is −4 dBm. The sensitivity of the receiver is tailored to produce a 10-dB S + N/N ratio with input signals of 2.0 μV on 160 meters and 0.3 μV on 10 meters.

There are a number of receiver "birdies" and the instruction manual points out a couple of strong responses that will be encountered. The strongest was that on 10 meters at 28.980 MHz (S9 + 20 dB). This response may be bypassed by switching to the next higher band segment and tuning appropriately below that segment edge. Other in-band responses were found at: 3.600 (S3), 7.181 (S3), 21.320 (S4), 29.234 (S4), and 29.984 (S4).

The tuning rate is a comfortable 18 kHz per revolution of the knob. A small amount of backlash was noted when tuning in one direction only. This is because of the action of the tension spring in the PTO. If present, backlash may be eliminated by simply loosening the setscrew on the knob and pushing the knob a bit further in toward the panel. Operators are cautioned that touching the metal insert or the knob skirt will shift the frequency of the PTO slightly. This is because the PTO shaft is above chassis potential. The actual frequency change is slight and during operation this never occurred unless a deliberate attempt was made to touch these areas. Frequency readout on the OMNI D is by means of six 0.43-inch LEDs. All are red in color with the exception of the 100-Hz unit which is green. The PTO stability is excellent. It took an awful lot of physical abuse to persuade the PTO to move a few hertz. The OFFSET control has two ranges: plus/minus 0.5 kHz and 5 kHz. This function is used for receiver offset tuning only and is disabled during transmit.

The RESONATE knob controls the preselector for the receiver. Care should be taken to ensure that the control is peaked correctly as it is possible to peak at an image frequency of the internal 9-MHz oscillator frequency on all but the two lower bands. One spurious response was noted while listening on 20 meters. An 80/40-meter inverted V was being used as a receiving antenna and the antenna-matching network hadn't been tuned for 20 meters. The response heard was that of a strong 16-MHz RTTY signal and resulted from mixing with the fifth harmonic of the VFO signal. The frequency of the signal was verified by means of a separate receiver. Even with the RESONATE control properly peaked, the signal was still audible. It wasn't until the matching network was tuned correctly for the band in use that the response was eliminated. This example underscored the usefulness of an antenna-matching network in rejecting unwanted signals. Use of a properly designed and matched-antenna system is also emphasized.

There is plenty of audio output both with the internal speakers (two bottom-mounted 2-1/2 inch [64 mm] types) and with headphones. In fact, Ten-Tec recommends a pad be used when employing low-impedance headphones. This consists simply of a couple of resistors which may be hidden within the body of the phone plug.

The Transmitter

The power output on all bands was in excess of 90 watts except on 160 meters. There, the power was measured at between 80 to 82 watts from one end of the band to the other using a Bird wattmeter and dummy load. On 10 meters, the output was a healthy 98 watts. QRP operation is readily accomplished by using the ALC and DRIVE controls to vary the level of output power.

The transmitter was subjected to spectrum analysis in the ARRL lab and the results are shown in the accompanying photos of Figs. 1 and 2. Audio quality reports received while operating ssb were complimentary. A high-impedance microphone is required and a standard 3-conductor plug is used for the microphone connector. A speech processor is not supplied with the OMNI, but since the reviewer is not an avid ssb DXer, it wasn't missed. VOX system sensitivity is excellent and it operates noiselessly. The VOX controls are readily accessible at the front panel and have no effect on the cw QSK operation of the transceiver.

QSK . . . now, there's where the cw enthusiast can really "do his thing"! Operating QSK allows you to hear what's happening on the frequency between dits and dahs. It can mean preventing the loss of a contact due to fading, QRM, etc., and gives the other operator(s) a chance to interject a comment now and then. This has the effect of lending a truly conversational air to a cw QSO. Two speeds are provided for QSK operation which should suit most any type of operating condition. The SLOW position has a smooth receive/transmit transition which "holds" between code elements. The FAST position allows the operator to hear between the code elements but is somewhat "noisier" to the uninitiated.

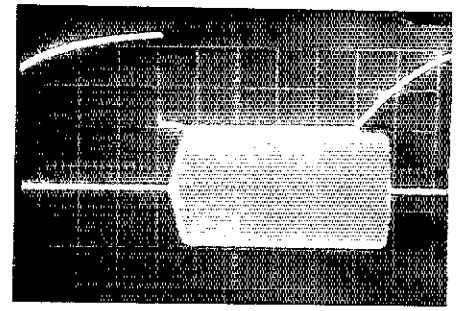


Fig. 3 — Two waveforms are shown: The upper waveform depicts the actual key-down time, while the lower is the cw output signal of the Ten-Tec OMNI D, series B, on 10 meters. Each horizontal division is 5 ms. The "make" of the wave differs slightly between bands (only 1-1/4 ms). Here, the wave is shown starting approximately 1-1/4 ms after key down. On 40 meters, this point shifts to approximately 2-1/2 ms after key down. "Make" and "break" time constants of approximately 5 ms will produce absolutely clickless keying. (An excellent treatise, "Some Thoughts on Keying," was presented by Goodman in April 1941 *QST*).

Unlike some VOX keying systems (commonly called "semi-break-in" keying), no part of the initial code element is lost in going from receive to transmit . . . it's instantaneous. A presentation of the keyed cw waveform is shown in Fig. 3. The cw monitor note is internally generated and both volume and pitch are controlled by two thumbwheel potentiometers located beneath the OMNI. These are accessible through a hole in the bottom plate and may be adjusted during operation.

A ZERO BEAT switch on the front panel allows the operator of the OMNI to adjust his transmit frequency exactly to that of the received signal frequency. When this button is depressed, the receiver carrier oscillator frequency is shifted a nominal 750 Hz to match the transmit frequency offset. The OFFSET control is automatically disabled. The operator then tunes the OMNI for an exact zero beat (or null) of the received signal. When the button is released, the receive and transmit frequencies will be the same and the beat note will again be heard.

The Remote VFO

The 243 remote VFO (optional) supplies more flexibility to the OMNI. In addition to the normal splitting of receive/transmit functions with the transceiver, there are two other positions available which allow *simultaneous* dual-frequency reception. The digital readout of the transceiver is not to be trusted during this mode as it will lock onto whichever VFO signal is the strongest or display random digits. To check the frequencies properly, the operator must switch to a single receive frequency position. The remote VFO readout is an analog readout and proved to be quite accurate.

The Ten-Tec OMNI appears to be ideally suited for the cw and ssb DXer. The rapid QSK and band-change features should appeal to many. RTTY enthusiasts will welcome the long-term power-handling capabilities of the final amplifiers, too. — *Paul K. Pagel, N1FB*

Presenting the Drake R-7 receiver. A synthesized, general coverage receiver, it offers a wide range of features. Covering the frequency range of 0 to 30 MHz, this receiver is at home in both the ham shack and the laboratory.

R. L. DRAKE R-7 RECEIVER

The beholder of this fine new product may regard it initially as just another "super-duper signal scooper," but it is, in fact, anything *but* just another fancy receiver. The Drake R-7 (*model 1240*) is a synthesized general-coverage (0- to 30-MHz) unit with no gaps in the frequency coverage.

The utility of this new product can be used to advantage in the ham shack or laboratory, with or without the many available options. Among them are the MS-7 speaker, i-f filters for 300, 500 and 1800 Hz. One can also purchase filters for 4.0- or 6.0-kHz bandwidths. Other accessories are the NB-7A noise blanker and Aux-7 range program/fixed-frequency board. The latter permits programming eight additional 500-kHz range segments in the 0- to 30-MHz range, irrespective of the existing eleven 500-kHz range increments.

Specific Circuit Features

The receiver front end employs a high-level doubly balanced mixer. As an enhancement to image rejection, the first i-f is derived at 48 MHz by means of "up-converting." Front-end bandpass filters are used from vlf through hf. A broadband preamplifier can be switched in from the front panel at all frequencies above 1.5 MHz. This adds 10 dB of front-end gain when it is needed.

A multiposition antenna selector switch is located on the front panel. It enables the operator to receive simultaneously with the R-7 and a TR-7 for split-frequency reception. Other positions can be used to select alternate antennas and outboard vhf and uhf converters. This receiver can be used for transceiving when utilized with the TR-7.

A tunable i-f notch filter is included in the circuit. It is used for reducing unwanted heterodynes from interfering strong signals. Electronic passband tuning is still another feature of the R-7. It can be adjusted for use with any of the filter bandwidths listed earlier.

There are three selectable age time constants in addition to an "off" position. Also, the receiver is equipped for digital and analog frequency readout. A front-panel switch enables the operator to use the internal counter as a 150-MHz external frequency counter, if desired. A 25-kHz calibrator is included for alignment of the analog dial.

A low-distortion "synchro-phase" a-m detector is included in the receiver. This circuit permits a 3-kHz a-m sideband response when using a 4-kHz filter. The technique provides better interference rejection than is possible with conventional systems. The principal application for amateurs would be in the monitoring of international shortwave broadcasts, but amateur a-m diehards might appreciate the feature also!

Performance

As one might conclude from reading the specifications for the R-7, the receiver dynamic range is excellent. The worst-case numbers were obtained on 80 meters with and without the preamp switched in. They are, with the preamp actuated:

Noise Floor	Blocking	IMD
−139 dBm	112 dB	91 dB

Without the preamp turned on:

Noise Floor	Blocking	IMD
−133 dBm	>120 dB	100 dB

The tests were based on the W7ZOI measurement techniques described in July 1975 *QST*. These numbers equate to a third-order input intercept of −2.5 dBm on 80 meters with the preamp turned off and +17 dBm with the preamp turned on. The League's product-analysis engineer reported difficulty in identifying the IMD responses, as they were among other responses within the receiver, presumably caused by the frequency synthesizer. Our present measurement capability prevents us from making definitive I.O noise-floor measurements.

In actual amateur service at W1FB (two short blocks from W1AW), the receiver performed extremely well in the presence of very strong signals. There was no evidence of overloading when W1AW was operating. Image rejection appears to be excellent: Drake rates it at greater than 80 dB (48.05 MHz first i-f, 5.645 MHz second i-f and 50 kHz third i-f).

The antenna input impedance is 50 Ω. The audio output is rated at 2.5 watts with less than 10 percent total harmonic distortion (THD) into a 4-Ω load. The frequency drift checked out at 85 Hz after a 30-minute warm-up period. This is quite good, considering the power supply is built in and the heat from the many active devices contained in the circuit. — *Doug DeMaw, W1FB*

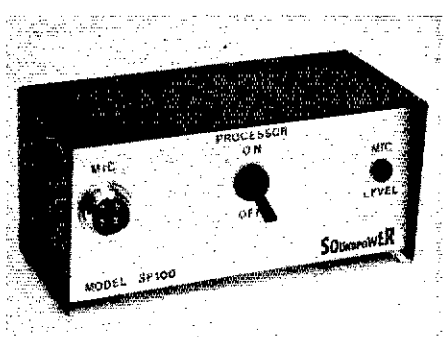
Drake R-7 VLF/HF Receiver

Claimed specifications

Sensitivity: 1.8-30 MHz less than 0.2 μV for 10 dB S + N/N with preamp on; less than 0.5 μV with preamp off. From 0.01 to 1.5 MHz, less than 1.0 μV.
Dimensions (HWD): 4.6 × 13.6 × 13 inches (116 × 346 × 330 mm).
Weight: 18.4 lbs (8.34 kg).
Power requirements: 100 to 240 V ac, 50/60 Hz, 60 watts, or 11 to 16 V dc at 3 A (13.8 V dc nom.).
Price class: $1300.
Manufacturer: R. L. Drake Company, Miamisburg, OH 45342. Tel. 513-866-2421.

THE SOUNDPOWER SP100 AUDIO SPEECH PROCESSOR

Many of the new transceivers and transmitters being sold today include either an rf or audio type of speech processor. Processors are designed to provide that extra "punch" on occasions when received signals at the other end are weak or the QRM makes the going tough. Rf speech processors employ clipping circuits and utilize expensive filters to "clean up" the signal. Most of these types of processors are



If you're looking to add a little more "punch" to your ssb signal, here's an accessory that may prove to be the answer. The Soundpower SP100 is simply installed in the mic line and provides a unique method of audio processing.

designed to be installed in the transmitter i-f circuit.[1] Audio processors, on the other hand, are plugged directly into the microphone jack and perform their function at audio frequencies.

The Soundpower SP100 audio processor is housed in a compact 5-3/16 × 2-1/2 × 2-7/16 inch (132 × 64 × 62 mm) cabinet. It is supplied with a female 4-conductor jack similar to Radio Shack 274-001. The review unit came with a mating power supply, the PS9, although any power source capable of providing 6 to 15 V dc at 30 mA may be used. A manufacturer's one-year guarantee accompanies the SP100.

During the review period, the SP100 was used with a Kenwood T-599D transmitter which does not have a built-in speech processor. Previous on-the-air reports indicated that the audio quality and "punch" of the transmitter alone were very good. In fact, many stations contacted had indicated that the "processor was working well" when none was in use! Under such circumstances, it appeared this would be a good proving ground.

Hooking up the SP100 proved to be no problem, though the instructions could have been made a little clearer. Two adjustments had to be made from the back of the unit — the gain and output level settings. My initial attempt at using the processor was not successful. Reports indicated too much gain or output and a correspondingly distorted signal. The instructions suggested the gain should be adjusted until the LED on the front panel was on almost continuously. With my Astatic 10-D microphone (a high-impedance microphone is to be used with the SP100), I found output quality to be better when the light was on only intermittently. In any case, the adjustment requires a fine touch, but once set, can be left alone.

As with any such piece of equipment, the proof of its worth is in the on-the-air reports. The station wattmeter indicated a significant increase in average output power with the SP100 in use. My on-the-air voice was definitely "different" as the processor is intended to utilize only those speech components that contribute to high articulation and intelligibility. In other words, concentrate the audio power at those frequencies most needed for communication. Operators who could already hear me well said the processor didn't help and most preferred that it not be used. But, when my signal was weak, the processor made a definite improvement in getting through. During a contest, a DX pile-up or even attempting a ragchew when QRM is rough, the SP100 will give you that added "edge" in intelligibility. — *Tom Frenaye, K1KI*

[1]Some rf speech processors, such as the Daiwa RF 440, are connected in the mic line. (See "Product Review," *QST*, April 1979.)

Soundpower SP100 Audio Speech Processor

Specifications

Input level: 0.5 to 500 mV.
Output level: Constant amplitude, adjustable 0 to 0.3 V.
Power requirements: 6 to 15 V dc, 0.01 to 0.03 A.
Weight: 1 pound (0.5 kg).
Case: Aluminum.
Color: Two-tone, gray and black.
Price class: Processor, $80; power supply, $6.
Manufacturer: Soundpower, P. O. Box 426, Bergenfield, NJ 07621.

APOLLO PRODUCTS CABINETS

Whether we like to believe it or not, eye appeal has a lot to do with our choice and appraisal of anything we buy, be it a car, house or a piece of electronic equipment. And no matter how good the design, how painstaking the circuit assembly, the finished product of any homemade piece of amateur equipment can be made or broken by the enclosure chosen to house the assembly. If your eyes haven't been captured already, a glance at Figs. 4 and 5 should get your mental "gears" in motion if you're contemplating another construction project.

Apollo Products has a cabinet, enclosure, box, housing or reliquary for virtually *any* item you may have that's looking for a home. The panels are made of 20-gauge brushed-chrome steel and may be finished with a touch of wood-grained adhesive-backed vinyl or baked enamel. Covers have a baked-on wrinkle finish of different colors. Certain chassis are nickel-plated copper to exhibit good rf conductivity. All cabinets are fully assembled and supplied with rubber feet.

Some of the units shown in Fig. 5 are supplied with red dpdt rocker switches. There's even a ready-made housing for an antenna-matching network. That's not all — there are more items available than meet the eye in the two photos. For instance, Apollo also manufactures small aluminum chassis which may be used to fabricate a coaxial switch — complete with prepunched holes for the SO-239 connectors and the switch. A catalog and price list are available from: Apollo Products, Box 245, Vaughnsville, OH 45893. — *Paul K. Pagel, N1FB*

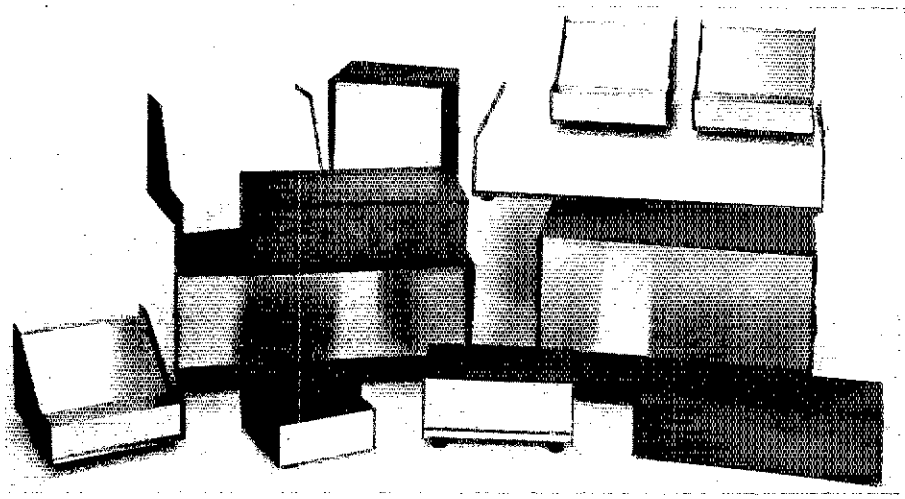


Fig. 4 — Here's a sampling of the offering from Apollo Products. The smaller, sloping-front cabinets are ideal for mounting meters and make perfect housings for smaller pieces of test equipment.

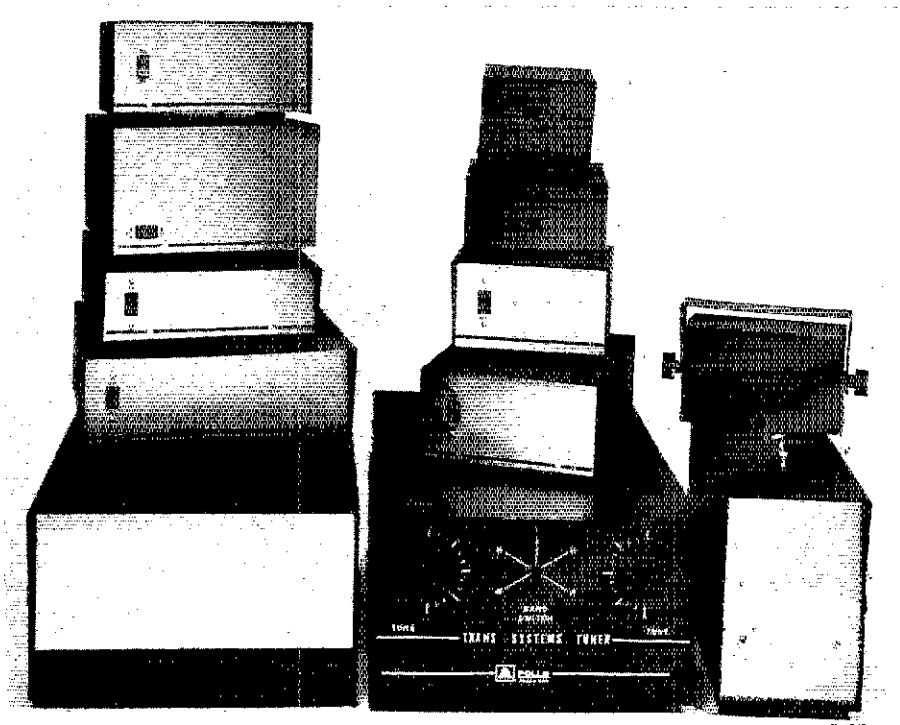


Fig. 5 — Power supplies, antenna-matching network, amplifier or oscilloscope — one of these cabinets should fit the bill for your next project.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

A TUNING AID AND PROTECTIVE CIRCUIT FOR THE HEATH SB-230

The following information, which is intended particularly for the SB-230, is applicable to other amplifiers, provided appropriate changes are made. Excessive plate and grid current in an rf amplifier can easily result from improper tuning, loading, drive or switch positioning. With a single meter which is switched from circuit to circuit for metering, excessive current in an unattended circuit could go unnoticed for an extended period of time. In order to protect my amplifier from such a situation, I've installed the circuit illustrated in the accompanying diagram. It is designed to limit plate and grid current to a desired level and provide a measure of protection in the event of an arc within the tube.

Components illustrated in solid lines have been added to my Heath SB-230. Q1, Q2 and D3 provide an alc voltage. If the plate current exceeds a value which causes the voltage across RP and the 0.5-ohm resistor in series to be slightly in excess of that specified for D3, these components provide a clamping action. Q3 and Q4 also furnish an alc voltage if the grid current through RG causes Q3 to turn on.

*Assistant Technical Editor, *QST*

All added components fit easily in space that is available in the amplifier. They can be supported by their leads. Additional wafer-style terminal strips may be mounted, using hardware that is already in the SB-230.

This modification requires that the original alc circuit in the SB-230 be removed. Addition of alc feedback from the SB-230 to the exciter may slightly disturb the exciter alc circuit.

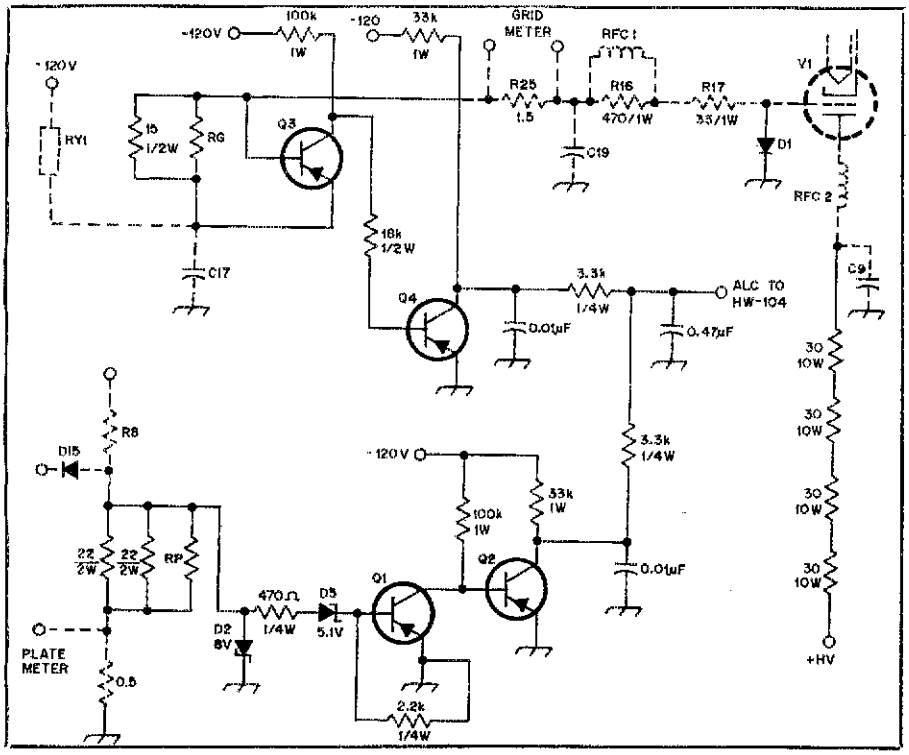
A 120-ohm, 40-watt resistance composed of four 30-ohm, 10-watt resistors was added in series with the plate voltage. In the event of an arc, this resistance will limit the plate currents. D1 will help protect the grid during an arc and also the metering in the grid circuit. D2 protects the plate metering and current limiting circuits.

The circuit, as shown, has been in use for some time and has proven satisfactory. While it prevents excessive currents, it will not prevent excessive dissipation if the tube is operated unloaded or mistuned for too long a time. The grid-current level of the SB-230 tends to become excessive if the load control is not adjusted properly (this is true of many grounded-grid linear amplifiers). As a result, the amplifier with the above grid-current limit cannot be driven to rated plate current if the load adjustment is not correct. Inability to drive the SB-230 to rated plate current with improper load adjustment is an indication that the grid-current limiting is working. The plate current will be driven to the limit if the load control is adjusted improperly. This happens when the drive is set too far beyond the point where the grid-current limiting is in effect because of improper loading. The circuit is fast-acting and will function as an rf compressor if the microphone gain is set too high.

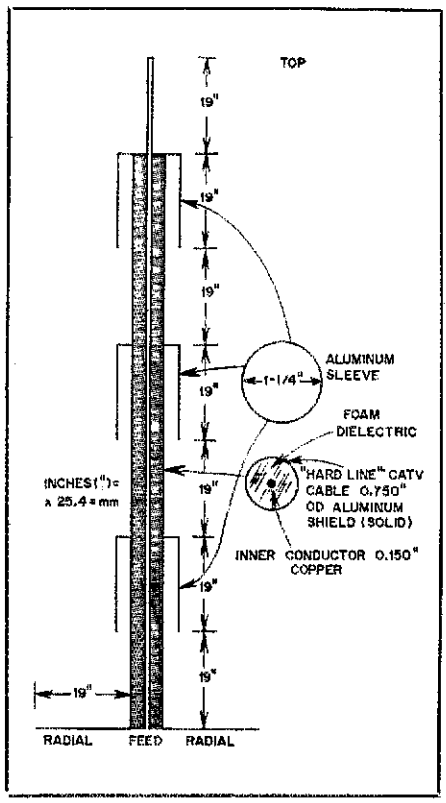
Installing the foregoing modifications in the SB-230 should be attempted only by persons who are knowledgeable about high-voltage operation and semiconductor circuits. The plate-current limiting resistors can be mounted, preferably with the aid of at least one high-voltage standoff insulator, in the shielded cage containing the tube and tuning components. — *Wray U. Shipley, N4YC, Owensboro, KY*

A HARDLINE COAXIAL ANTENNA FOR 2 METERS

I ran across Phil Rand's antenna article in November 1951 *QST* while searching for data on coaxial antennas that could be made from obtainable materials and fabricated without the benefit of a machine shop. A similar antenna could be made from CATV Hardline cable. Often, odd length pieces of such cable are available from CATV companies.



This transistorized modification of the Heath SB-230 offers protection against excessive plate or grid current. Resistances are in ohms.
D1 — Silicon rectifier, 1000 PRV, 3 A, GE512 or ECG156, or equiv.
D2 — Zener diode, 8 V, 5 W, GE5ZD8 or ECG5122A or equiv.
D3 — Zener diode, 5.1 V, 5 W, GE5ZD-5.1, or ECG135A or equiv.
Q1-Q4, incl. — GE228 or 2N5415.
RG — Chosen to set grid current limit ≈ 56 Ω, 1/4 W.
RP — Chosen to set plate current limit ≈ 82 Ω, 1/2 W.



W9KPG suggests this antenna design for 2-meter operation. It is constructed from Hardline CATV coaxial cable. Measurements shown are for the 144-MHz end of the band. The measurements should be shortened to 18 inches for the fm segment.

I have corresponded with Phil about my idea (as shown in the accompanying diagram). He advises that there is no need to consider the velocity factor, inasmuch as the coaxial cable feeds only the top element. He also suggests that I keep the same ratio of mast-to-skirt diameters, stating that the skirt diameter should be 1-1/4 inches. Additionally he advises that the 19-inch dimensions are for the 144-MHz end of the 2-meter band. These measurements should be changed to 18 inches for the fm segment. — *Harry H. Heinrich, W9KPG, Green Bay, WI*

WRINKLE FINISH

I read with interest Doug DeMaw's explanation in September 1979 *QST* about using a drying oven in paint finishing of radio projects. I thought some readers might be interested in my method of getting a rather nice wrinkle finish on a panel.

A bare panel can be primed with standard zinc-chromate spray primer. Allow it to dry naturally. What I do next is to wait until my wife has gone for the day so that I can heat the panel for about 20 minutes in the oven at a 300°F temperature. After I'm sure the panel is completely heat-soaked, I remove it from the oven, place it on a piece of wood and spray it with the finish paint. The finish coat dries instantly. But rather than settling flatly, it provides an attractive wrinkle. Anyone trying this method should not let the paint can get too close to the project, lest runs appear.

Two other tips — aluminum should always be primed *before* painting. Zinc-chromate is the better choice for this purpose. For finish paint I prefer the type used on machinery. It is known as "machine gray." Most industrial supply houses carry it in spray cans. The price is about the same as one would pay at ordinary outlets, but the paint seems to be tougher. It is available in several tones and brands. I find that I can match S-Line colors fairly well and the finished work takes transfer letters nicely. — *R. C. Locher, Jr., W9KNI, Deerfield, IL*

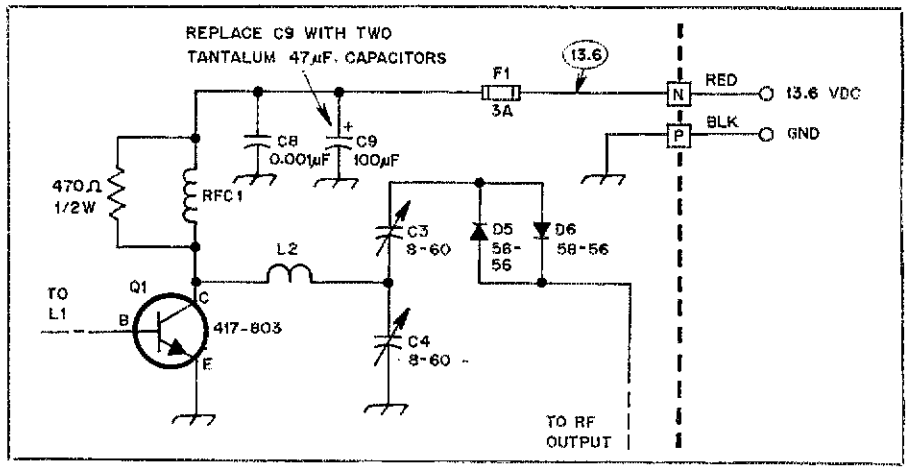
[Editor's Note: Readers who plan to have a wrinkle finish on panels and cabinets may also like to know that the Illinois Bronze Paint Co., of Lake Zurich, IL, produces wrinkle finish paint in several colors. Their Celestial Blue no. 338 closely matches Heath coloring.]

ELIMINATING 2-METER AMPLIFIER SPURIOUS EMISSIONS

After carefully constructing and adjusting my HA-201 2-meter amplifier according to the instructions, I was dismayed to discover that it was emitting spurious signals. Repeated adjustments failed to solve the difficulty. My Drake TR-22C was used to drive the amplifier. The antenna system operated with a low VSWR. Neither of these appeared to be at fault.

Consultations with other engineers regarding the amplifier design and circuit-board layout indicated two likely trouble spots. The first, C9, an aluminum electrolytic capacitor, could have been sufficiently inductive to form a low-frequency oscillatory circuit in conjunction with other components. I replaced C9, therefore, with two low-inductance 47-μF tantalum capacitors in parallel.

A second component that seemed questionable was RFC1. A high-Q choke in this position could also contribute to unwanted oscillations. The remedy I chose was to place a 470-ohm, 1/2-watt resistor in parallel with this rf choke. These modifications, which are indicated in the accompanying diagram, eliminated the spurious emissions. Another amateur, two blocks away, who checked my transmissions carefully, confirmed my observations. — *Ron Baxley, N4GB, Huntsville, AL*



N4GB suggests this modification of the Heath-201 2-meter amplifier to eliminate unwanted emissions. Two 47-μF tantalum capacitors replace C9 (100 μF) and a 470-ohm resistor is bridged across RFC1.

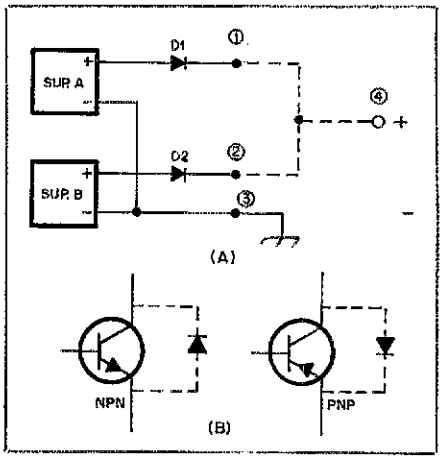
COUPLING TWO LOW-VOLTAGE POWER SUPPLIES

In order to provide an adequate power system for my UV-3 or Midland 510 transceiver, I paralleled two 4-ampere regulated power supplies. They were purchased previously for about $15 each. The arrangement for combining the two supplies provides equalized current drain and voltage. The design credits go to Richard Frankenfield, WA2QAF, of Trenton, NJ, who provided the schematic diagram and adjustment information.

Diodes for the parallel configuration must be able to handle the maximum supply current. Both power supplies (A and B) must be initially independent of each other. There should be separate supplies (as shown) or at least separate secondary windings. In either case, both sources must have equal current capabilities.

With the aid of a voltmeter connected between terminals 1 and 3, adjust supply A for the desired output voltage. Next adjust supply B for the same voltage. This measurement is taken between terminals 2 and 3. The balancing adjustment is made with the voltmeter connected to terminals 1 and 2. *Adjust only one supply to obtain zero voltage between the supplies.* Use the more sensitive meter scales as zero is approached. After reaching a balance, terminals 1 and 2 are jumpered to form a common + supply line to terminal 4.

For inductive-kick protection for the pass transistors, add the diodes shown in drawing B. These are rectifier types of silicon diodes, such as 1N5054 or 1N4005s. Protection is provided by keeping the reverse emitter-collector voltage from exceeding the breakdown specifications. Caution: Observe polarity — check with a VM first! — *Louis H. Roth, W2DKH, Jamesburg, NJ*



Two low-voltage power supplies may be paralleled in the manner shown at A above. D1 and D2 must be capable of handling the maximum supply current. Part B indicates the methods of providing inductive-kick protection for an npn or pnp pass stage. W2DKH, who submitted this idea, indicates that design credits properly go to WA2QAF.

TOO MUCH GAIN FOR THE "ACT" CAUSES PROBLEM

Jim Bartlett's May 1978 *QST* article concerning an audio continuity tester (ACT) impressed me as a mighty handy device to have around the workbench or for use as a code monitor. I constructed a copy of his instrument but failed to get it to perform properly. Completely rebuilding it from scratch did not correct the difficulty.

I suspected the choice of transistors I had used might be at the cause of my problem. This turned out to be the case. The parts list had not specifically indicated the transistors Jim had used.

At the Morgantown, WV, hamfest, where Jim gave a technical talk, he told me that the transistors he used were a Radio Shack RS-2010 for Q1 and a 2N3904 for Q2. I was able to purchase the RS-2010 but unable to acquire a 2N3904 for which I substituted an RS-2023. With these transistors installed, the ACT performed like a charm. Apparently I had provided too much gain by using a Darlington pair for Q1. — *Alvin L. Leedham, WD8NVG, Zanesville, OH*

FOR A SLOW-TURNING CDE HAM-III ROTATOR

If your CDE Ham-III rotator is slow-turning, try replacing the filter capacitor in the control box. Doing so should restore it to normal operation. — *Murray Lampert, VE3MDL, Downsview, ON*

CURING HIGH-POWER TVI

I completely eliminated a very serious TVI overload problem that affected my XL-100 TV set whenever I operated my 2-kW PEP rig in the 20-meter band. There has been no problem, however, with low power. My method may help other amateurs faced with a similar situation.

With a dip oscillator meter set in the absorption mode and tuned to the band causing the greatest TVI, turn the transmitter on and "sniff" along the TV antenna with the dipper. Start near the TV set. No doubt you will find a very noticeable indication on your meter as a result of the standing wave developed on the TV lead.

Add approximately 1/4 wavelength (based on the band you have chosen) of Twin Lead to your TV line and reconnect it to the TV set. Now sniff along the line until you find a minimum reading on the meter. This will indicate a low-voltage point of the standing wave. Cut the line at this point and reconnect the TV set. You should find the overloading minimized or eliminated. Be sure the antenna is connected to the TV set whenever you sniff with the dip meter. — *Sam Peck, W6CQR, Oxnard, CA*

A CURE FOR UNWANTED OSCILLATION IN THE FT-101E

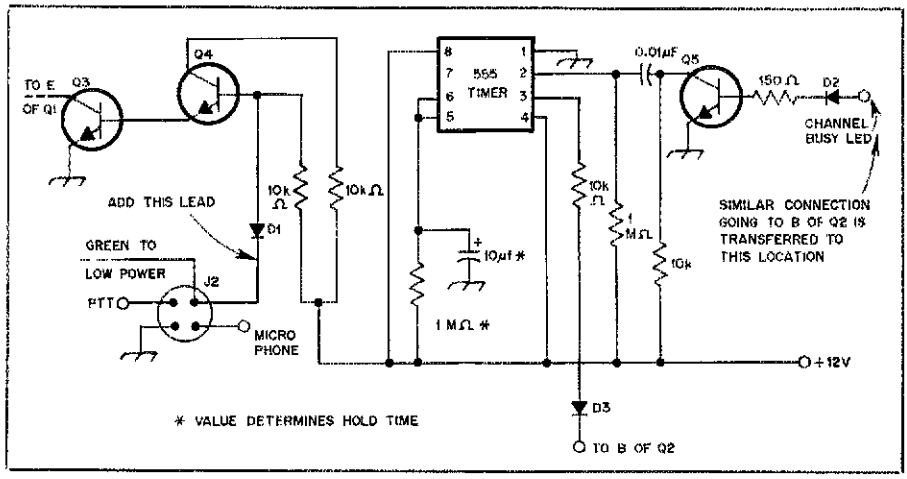
A tip found in the "Fox-Tango Newsletter" provided the cure for unwanted oscillation in my FT-101E. The oscillation would occur after the set had warmed up and when the rig was in the receiving mode. The interfering signal was evident across whatever band was in use, at times nearly blocking the receiver.

It turned out, as the tip suggested, that the problem was an open resistor in the bias section of the circuit board. The open resistor affected the bias of the driver tube, causing it to go into oscillation and making the final amplifier overheat. After a quick fix, the trouble ceased. It's great to be back on the air free of the difficulty. — *Jim Hoffer, WA8OVC, Marshall, MI*

TAPE-RECORDER-DRIVEN SOLID-STATE KEYER MODIFICATION

After constructing the circuit described by K7NVH/8 as presented in the October 1971 *QST* and on page 93 of *Hints and Kinks*, Vol. IX, I found the transmitter keying to be quite heavy in weighting. The tape-recorder volume adjustment was also critical. By removing the 5-µF electrolytic capacitor connected between the base of Q1 and ground, the desired weighting of the transmitted signal was achieved and adjustment of the recorder output level became less critical.

The only change to the circuitry, other than removal of the capacitor, was the use of a 2N2907 general-purpose transistor. This replacement for the 2N4126 in the original diagram is available at Radio Shack stores. The transmitter in use at my station (a much-modified 32S-1) uses only −27 volts at the key jack terminal. For simplicity, the circuit cannot be beaten: A straight key has *more* parts! — *Paul Pagel, N1FB*



This diagram is a circuit change suggested for use with the scanner designed for the KDK 2-meter transceiver and described in the October 1978 "Hints and Kinks." See text for details. D1-D3, incl. — Small signal diodes, Radio Shack no. 1123 or equiv. Q3-Q5, incl. — Npn transistor, type 2N3692 or equiv. Resistances are shown in ohms.

ADDITIONAL SCANNER MODIFICATION FOR THE KDK-144

KDK-144 owners who made the scanner modification described in the October 1978 "Hints and Kinks," should be interested in this refinement which provides further operating benefits. With this new modification the scanner will lock on a signal for about five seconds and then resume scanning. The scanner will run only when the power switch on the microphone is in the LO position. Switching to high power locks the KDK on frequency for both receive and transmit. The accompanying diagram, illustrating the new modification, was prepared with the assistance of W9EEL.

Q3 and Q4 can be mounted in the PLL compartment of the KDK. Q5 and the 555 timer must be mounted elsewhere. I suggest a position behind the front panel and above the main tuning switch. As with the 1978 KDK modification, no additional external switches are needed. — *Robert Shoemaker, W9MTU, Anderson, IN*

OIL WHERE YOU WANT IT

When the blower motor on my TS-820 seemed sluggish, I pulled the fan, cleaned the blades and attempted to lubricate the motor. Because the pin holes for oiling are so small I was not able to insert the tip of a sewing machine oil can. The dilemma was solved by my XYL who works at a local pharmacy. She suggested the use of a no. 3CC25G5/8 hypodermic needle. With this 18-cent plasticized syringe filled with oil, I can now inoculate my motor when necessary, with no spills, no drips and every drop of oil going where it belongs. With all the blowers in rigs today, I'm sure many amateurs will find this kink of immense help. — *Harry J. Drummond, W8WX, Fairmont, WV*

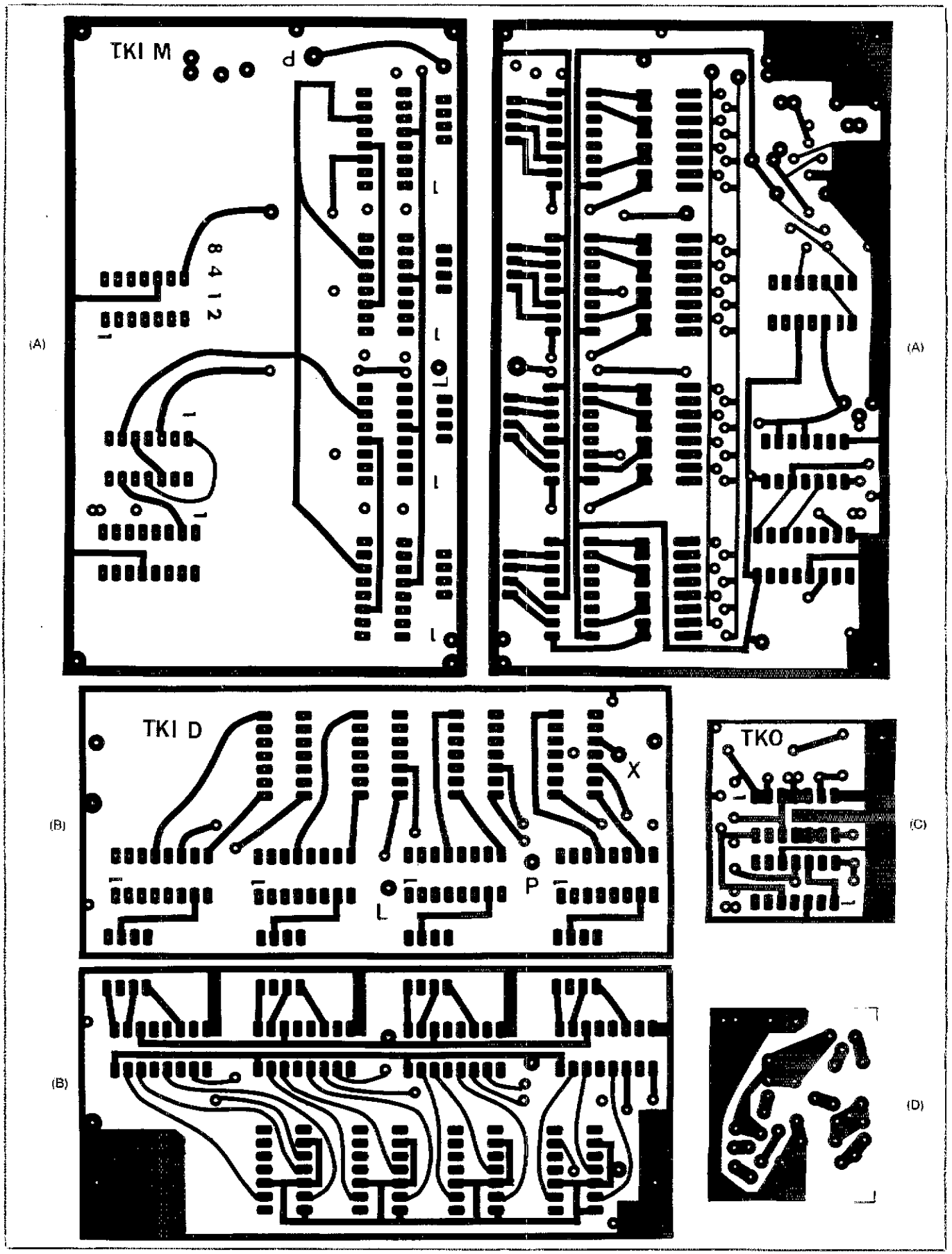
SOLDERING TARNISHED COPPER WIRE

To solve the problem of cleaning aged copper or copper-clad wire prior to soldering, heat the wire to a dull pink and then dip it in alcohol keeping it there until the bubbling stops. Then remove it from the fluid and the wire should be very clean. In order not to use an excess amount of alcohol, I use a 1-inch (25-mm) diameter piece of pipe with a plug in one end for the container. — *Glenn Markley, W8VLB, Mansfield, OH*

ACCU HINTS

☐ I have found that the Accu-Keyer and Accu-Memory work very well with type 74LS00 logic devices. This low-power Schottky series is pin compatible with the standard 7400 series, has the same general speed characteristics, but consumes only 1/3 to 1/4 the power of the standard series. However, it *is* important that if you use the low-power Schottky series, all chips should be of this same series. Otherwise, you could run into problems with regard to output loading. Thus, just substitute a 74LS00 for the 7400, 74LS02 for the 7402, 74LS74 for the 7474 and so on. This reduction in power has enabled me to get by with a very simple power supply, using a 7805 three-terminal regulator.

In the original Accu-Memory article (August 1975 *QST*) and supplemental notes (July 1976 *QST*), the decimal point in the display is shown as connected to the run-switch return. This has the decimal point on *any* time the unit is used as a keyer, when loading the memory or when sending memory. If you move the decimal-point return wire to pin 13 of U4 in the memory, it will function as a memory operating signal going on only when loading or sending memory and will not light when just keying. — *Harlan Bercovici, WØMYN (Life Member), Littleton, CO*



Circuit-board etching patterns for projects in this issue of *QST*. Patterns are shown at actual size from the etched side of the board, with black representing copper. The boards represented at A-A and B-B are double sided with plated-through holes (or appropriate through-board connections). Those at C and D have foil on one side only. The patterns at A through C are for the digital frequency readout (see Fig. 3, p. 14). At A is the pattern for the main board, at B for the display board, and at C for the oscillator board. As shown here the left edge of the left-hand pattern at A aligns with the right edge of the right-hand pattern, and the top edge of the upper pattern at B aligns with the bottom edge of the lower pattern. The pattern at D is for the Heath HW-104 RIT modification (see Fig. 2, p. 18).

Technical Correspondence

Conducted By
Doug DeMaw,* W1FB

ONLY AN EMBER REMAINS!

☐ I thought you would be interested in the picture of my QRO mobile loading-coil form (Fig. 1). The rig is an FT-301-D and a Metron MA-1000 linear amplifier. The coil was wound with no. 10 wire. The coil form shown in the photograph is the outer cover for the loading inductor. It is made of PVC pipe. The end plates are made of aluminum. The inner coil form was also made of PVC tubing (grooved). When the damage occurred there was a high VSWR which was caused by a camping trailer being close to the van on which the antenna was mounted.

QST seems to be neglecting the subject of mobiles and related projects. I'm speaking about hf-band mobile, that is. We need to see such things as solid-state or tube-type amplifiers, multiband antennas — the works. — *Dwight McSmith, 500 Chapel St., Hampton, VA 23669*

[Editor's Note: The charred outer sleeve shown in Fig. 1 is fair warning that PVC materials are not well suited to high levels of rf voltage. Nylon insulating material is very poor under similar conditions. This was observed some years ago when the column editor attempted top loading on a 50-foot Rohn tower for operation on 160 meters. A PVC coil form was used. It fasted only a few moments after power was applied to the antenna. The result was a coil form which closely resembled the one in Fig. 1!

Concerning the *QST* articles on hf-band mobiling . . . well, the popularity of vhf and uhf fm-repeater operation has depleted the number of hf-mobile operators in recent years. As a consequence the editors of *QST* are not receiving articles on the general subject. We would welcome contributions concerning hf-band mobile hardware and techniques. If some of you are developing equipment for that style of operating, please send the details to us for possible publication in the journal.]

*Senior Technical Editor, ARRL

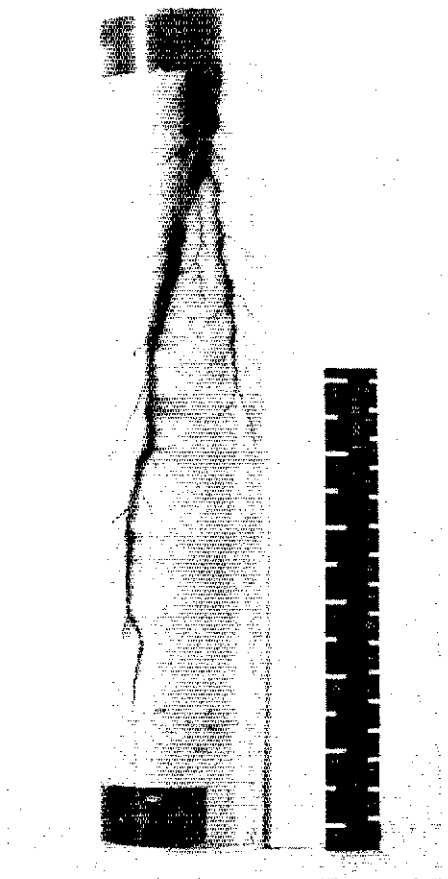


Fig. 1 — This charred PVC tube was the outer covering for the loading coil of a QRO-mobile setup. The dielectric broke down under conditions of high rf voltage.

MORE ON SOLID-STATE PA MATCHING NETWORKS

☐ When I experimented with Class C tuned transistor PAs about a decade ago I noticed the same phenomenon that W7EL reported in October 1978 *QST*. I also had the impression that the matching sections derived from vhf/uhf circuits are insufficient for hf power amplifiers.

The solution I adopted to cure this is somewhat different, however. I also place a capacitor (Cp) from collector to ground, but, as a starting value, the reactance (X_{Cp}) of this capacitor is about the same as the collector load resistance ($X_{Cp} = Vcc^2/2P_o$), giving a loaded Q of 1.

In multiband transmitters, therefore, the collector choke remains the same and is chosen for the requirements of the lowest band in use (typically 80 μH for an 18-volt, 2-watt output PA). The capacitor, Cp, is being switched from band to band together with the other tank-circuit components.

The loaded Q = 1 will stop the "ringing" phenomenon, but will also decrease the efficiency to 50 to 60 percent. On the other hand, the PA becomes very insensitive to mismatch, even at full drive. For better efficiency and slightly reduced mismatch safety the loaded Q may be reduced to about 0.7. In higher power PAs where transistors with high internal capacitances are used, the Q may be reduced even further, depending on the efficiency obtainable.

I purposely place this capacitor (Cp) from collector to ground, not to the emitter. As an additional measure for mismatch protection I recommend a small, unbypassed emitter resistor, which causes a dc drop of about 0.5 volt when the stage is tuned correctly. Placing Cp to the emitter in this case would form a *regenerative* circuit.

When using vhf/uhf transistors for hf PAs I further recommend reducing Vcc to 0.5 $V_{CEO(sus.)}$ or less for fail-safe operation, because the breakdown voltages are lower at dc and lower frequencies than at vhf/uhf.

Another trouble which may show up in tuned Class C transistor PAs is *frequency dividing*. The tank circuit, therefore, must have a configuration without any resonance at one half, one third, etc., of the operating frequency. This is especially important if multisection pi networks are to be used for high harmonic suppression, or if a low-pass L section is to be added for antenna tuning.

Subharmonic resonances may be avoided by incorporating a parallel-resonant circuit (Fig. 2) or a series-resonant circuit (Fig. 3). The components marked * are selected by means of the band switch. I have been using the circuit of Fig. 2 in my portable 5-band QRP transmitter (2N3553 PA) since 1969. It will match all random-length wires as well as coax-fed antennas.

The circuit of Fig. 3 will have somewhat better harmonic suppression, but the antenna must be safety-grounded by means of a separate choke. Therefore, this scheme will be

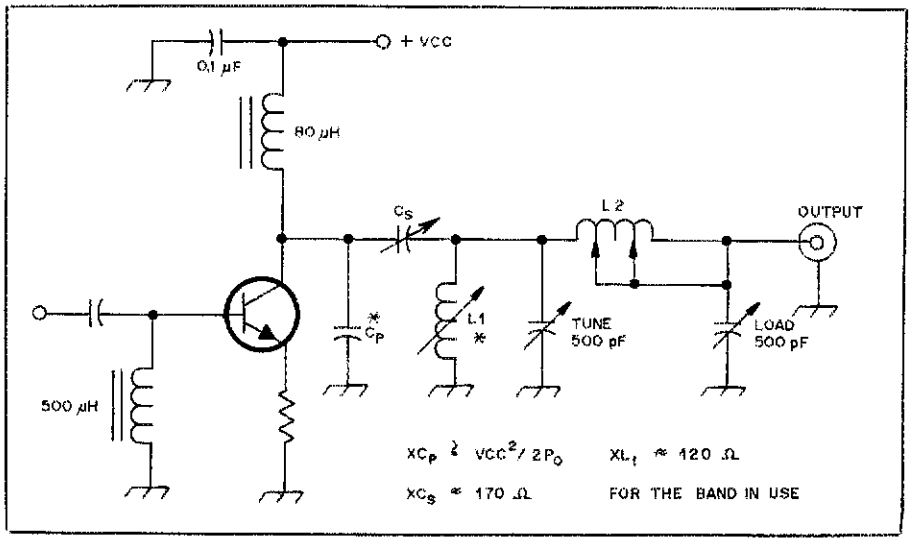


Fig. 2 — Details of the parallel-resonant circuit.

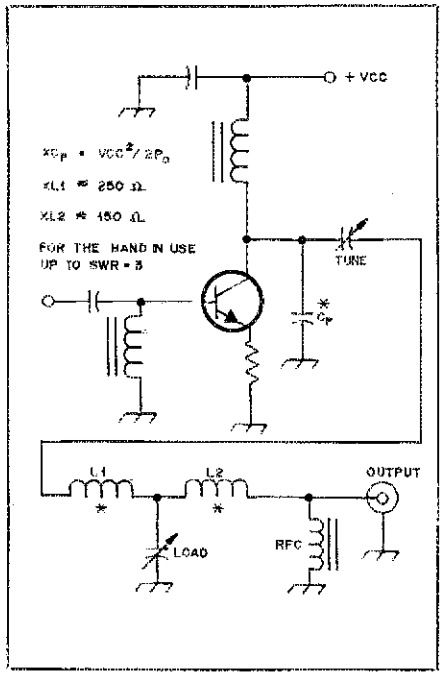


Fig. 3 — Circuit for the series-resonant condition.

good for coax-fed antennas and may take a rather high SWR, up to 3:1. — *Hans-Joachim Brandt, DJ1ZB, Lohensteinstrasse 7/b, 8000 Munich 60, Federal Republic of Germany*

TOWARD SAFER ANTENNA INSTALLATIONS

☐ The article describing installation techniques for medium and large Yagis (June 1979 *QST*) was read with considerable interest. Much of the material will be quite helpful to our colleagues who have no previous experience installing such antennas. There are, however, potentially fatal hazards in one or more of the suggestions. The following comments are offered:

1) Two pulleys, or blocks, should be used instead of one. Professional tower and antenna erectors never hoist in the manner K7NR suggests. Rather, they rig a second block, usually a snatch block for ease in rigging the hoist line, at the base of the tower. Thus, the pulling tension is applied horizontally along the ground to this pulley, thence vertically and parallel to the tower to the top pulley. This results in only thrust being imposed upon the tower, rather than a possibly significant lateral strain. The method shown in K7NR's sketch is particularly dangerous, in that the pulling strain is over the tower and against the restraint of the temporarily relocated guys. This could possibly result in pulling the tower over — even onto the people pulling on the hoist line.

2) It is safer to use mechanical power, rather than human power, to hoist an antenna, gin pole and the like. With the rigging described above, assuming fortunate lawn or driveway space, one can use the family automobile to pull on the hoist line. Lacking adequate space for such, a husky lawn or garden tractor can be used anywhere there is room enough to put up a large antenna. My then-11-year-old son operated my tractor some years ago in helping to install one of my Yagis. In any case, even with people furnishing the motive forces, horizontal pulling is to be preferred.

3) The temporary relocation of guys is not unusual in these kinds of installation jobs. However, a guying angle of 170 degrees is potentially hazardous to people on and near the tower. With such an arrangement it is difficult if not impossible to properly tension such guys. An improperly guyed tower is no place for someone to work, especially with a large antenna swinging from a hoisting line and gin pole. If it is necessary to relocate one or more guys temporarily, a much smaller angle should be used. It is generally possible to rotate the elements in a vertical plane as they pass the guys to obtain the necessary clearance. If not, elements can be actually attached at the top of the tower as the boom moves up. This latter method is inconvenient, to say the least. — *W. R. Gary, K8CSG/5, 14834 Falling Creek Dr., Houston, TX 77068*

MORE WOODPECKER THOUGHTS

☐ Regarding the Siberian "woodpecker" which was reported in October 19, 1979, *Ham Radio Report*, no. 273, I too have noticed this buzz-saw phenomenon for the last several years. At first, I likewise thought it was deliberate jamming from some unwanted source.

However, since I have been checking WWV every night for the last seven or eight years, I've heard this jamming at times (even on CHU). I am an amateur meteorologist and am studying the weather. I noted this "woodpecker" effect occurred whenever there was a deep storm (intense low pressure) over the Midwestern states: The woodpecker would buzz away, making reception intolerable. When the storm center moved along, reception would clear!

Back in 1929 we thought the weather occurred in only the troposhere. During WWII the jet stream was discovered above this lower level. To this day no one has a good explanation for the cause of this effect. Anyway, this means the weather extends into the stratosphere.

Now, noting the propagation from WWV and correlating it with the progression of weather storms, the effect of these deep lows must extend into the ionosphere, affecting the Heaviside layers. The waves or ripples of these layers will seriously distort the reflection of radio propagation, thus causing the so-called woodpecker buzzing. If this is the case, don't we owe the U.S.S.R. an apology? — *Keith Rhodes, WB2AOT, 448 Plymouth Dr., Syracuse, NY 13206*

[Editor's Note: It is entirely possible that other phenomena cause buzzing types of radio interference, but it is well established that Russian over-the-horizon, high-power radar is the primary source of that woodpecker sound that has disrupted communications in many parts of the world. Apologize? The government thus far has been unable to get cooperation from the U.S.S.R. concerning the protests it has filed!]

BROADBAND BALUN BENEFITS

☐ This is a comment on W1FB's "Antenna Accessories for the Beginnner" (February 1979 *QST*) and KA4GMG's letter in "Technical Correspondence" (November 1979).

In *QST*, baluns are offered for sale at prices from less than $10 to almost $50. It is to be expected that there will be differences in quality and performance among them, and no balun is perfect. Nevertheless, it is possible to build transmission-line baluns that are essentially flat over a 100:1 frequency range, particularly if a ferrite toroid core is used. See W2FMI's article (January 1976 *QST*).

It is not the purpose of a 1:1 balun to improve SWR or to increase radiated power. The purpose is to transfer power to a balanced antenna from an unbalanced coaxial line. Thus the name "balun" from *bal*anced-to-*un*balanced.

If the balun is terminated properly it can prevent radiation from the coaxial line by currents that otherwise may flow on the outside surface of the coaxial shield. On transmit this probably is of little consequence, although it may cause TVI. But on receive it is a different story. Most manmade noise is vertically polarized. A horizontal dipole discrimmates against this noise. But if there is pickup from the vertical coaxial cable the discrimination is reduced. I have observed improvements in signal-to-noise of 2 or 3 "S" units by use of a balun in a noisy location. — *Jack Althouse, K6NY, P. O. Box 455, Escondido, CA 92025*

VARIABLE MEMORY FOR THE "TO MSG. KEYER"

☐ This unit is made for the keyer described by Chet Opal in February 1978 *QST*. The unit is connected so that it counts bits after a character has been sent. If space exceeds a number of bits selected on this unit, the binary counter (CD4040BE) will be reset. The circuit diagram of Fig. 4 is shown wired for 12 bits. It will vary, however, between 12 and 13 bits. Theoretically, distance between words is 5 bits, and if space exceeds this it means there is no more message to be sent. But, only the well-trained operator can hope to keep this figure strictly, and a higher number of bits should be selected. If 12 is used, that will sound like a suitable space between the end of one message and the repeated one.

In order to make the keyer automatic (repeating messages) an spdt switch should be wired in parallel with S2. A switch should be connected (as shown) to determine whether the unit shall be *out* or *in* use. The original circuit board must be modified by inserting a 33-kΩ resistor between Q11 (CD4040) and 8 (CD4013) as shown. — *Jan Martin Noeding, LA8AK/G5BFV, A/STT Televerket, N-4801, Arendal, Norway*

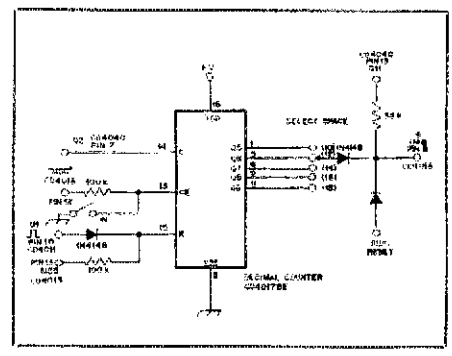


Fig. 4 — Circuit for the variable memory.

The WB6ZNL Beacon

This new, unique, usable, basic beacon has everything you need to calibrate your "S" meter and frequency settings. You can even use it to set your clock.

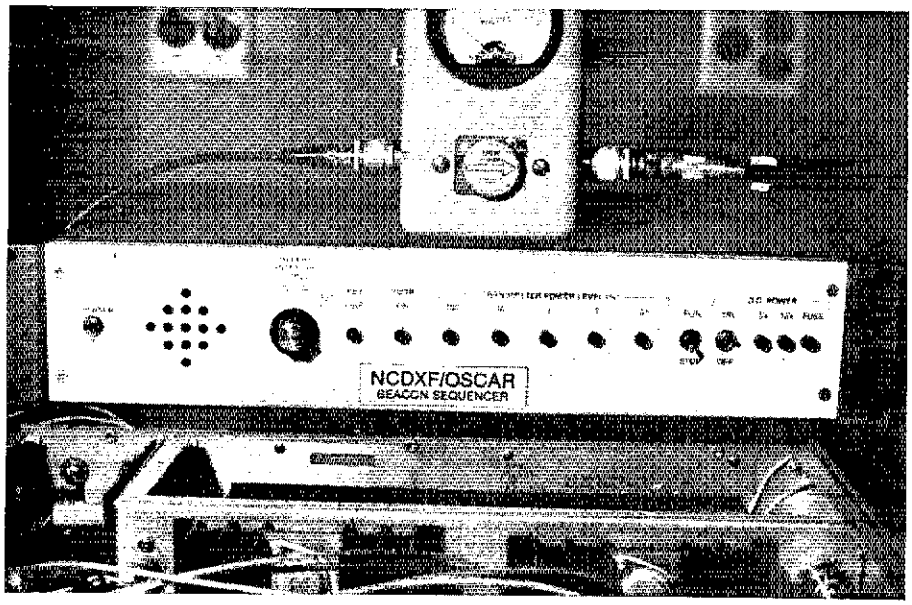
By John G. Troster,* W6ISQ; O. G. Villard, Jr.,** W6QYT; James K. Ouimet,*** K6OPO; and Cameron G. Pierce,**** K6RU

QST QST DE WB6ZNL BEACON . . . . Yes indeed, that is a cw beacon you've been hearing every 15 minutes on 14.100 MHz. So who needs a beacon to tell if 20 is open to W6-land? Or, perhaps who cares? The answer is that this is a very different kind of beacon, one which is designed to provide the listener with certain previously *unavailable* services. Actually, it is the first beacon of its kind, either amateur, scientific or commercial.

The Message

First consider the beacon's present 75-second message: QST QST DE WB6ZNL BEACON . . . . This preamble is transmitted at the 100-watt level. Then follows a series of five nine-second dahs at power levels decreasing from 100 watts to 0.01 watt in lab-calibrated 10-dB increments. Each dah is preceded by one to five dits to identify the power level: "·——— (100-watt level), ··——— (10 watts), ···——— (1 watt), ····——— (0.1 watt), ·····——— (0.01 watt)." After the 0.01-watt dah the 100-watt signal is switched back in for the sign off . . . 73 SK WB6ZNL.

The two quad loop antenna employed by the beacon is essentially nondirectional. The above power levels are accurately metered, and careful attention has been given to avoiding accidental signal leakage. The transmitter can, in fact, be thought of as an automated, digitally controlled, high-power standard signal generator.



The front panel shows control function and operational status of the beacon transmitter. This unit was designed and built by Jack Curtis, K6KU, of Curtis Electro Devices. *(photo by K6RU)*

Basics

What really counts in radio communication is not which antenna or piece of equipment gives the strongest signal, *but which antenna or piece of equipment gives the best signal-to-noise ratio in the case of very weak signals.* For the first time, with the stepped-power beacon, anyone can make this determination.

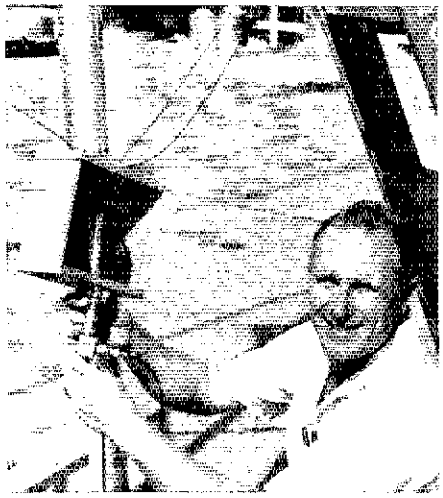
In the past, the quality of transmission over a path has traditionally been measured by recording the strength of a constant-amplitude signal (and noise in the absence of signal). This requires accurately calibrated receivers.

In contrast, with the WB6ZNL beacon, the accurately calibrated part of the experiment has been removed to the transmitter. All an individual amateur has to do is to decide at what level the stepped signal becomes inaudible. In practice, this can be done with surprisingly good repeatability.

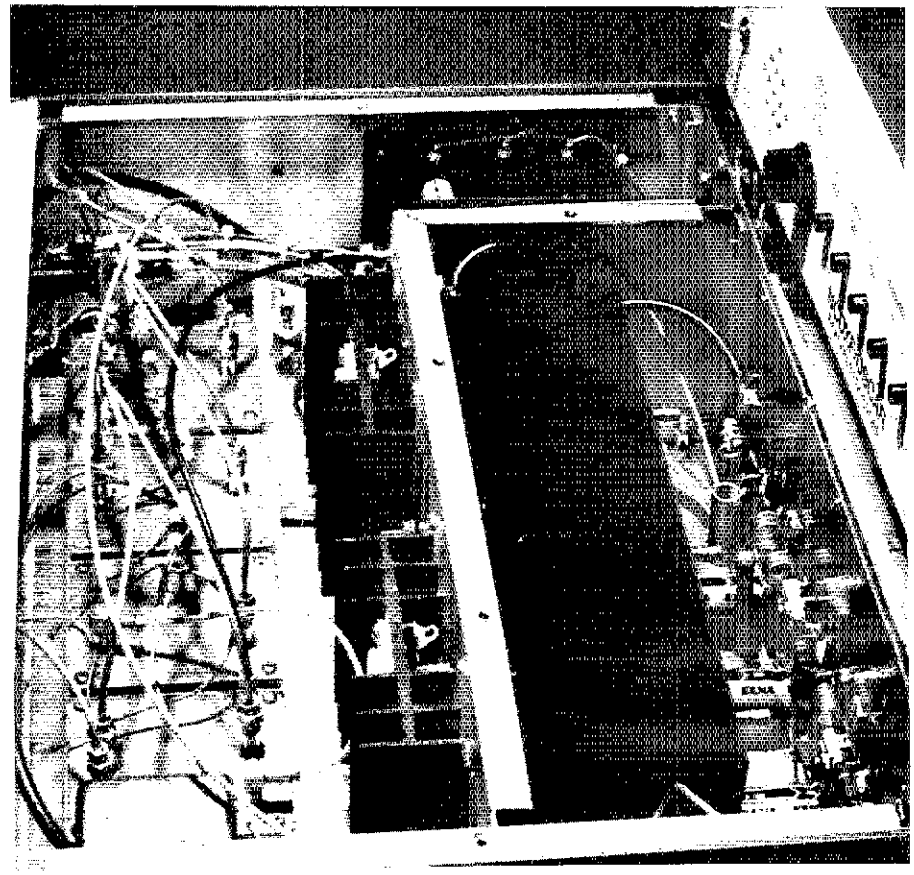
Uses

The amateur may use the message and its content in several practical ways.

*Contributing Editor, *QST*
**c/o Radioscience Laboratory, Stanford University, Stanford, CA 94305. Technical Advisor, Northern California DX Foundation
***Project OSCAR
****Technical Advisor, Northern California DX Foundation



Mike Staal, K6MYC, of KLM Electronics, attaches the balun and phasing network to dual quad loop antennas during tests. (*photo by K6RU*)



The modules at the left contain the 10-MHz, temperature-controlled crystal oscillator and the 14.100-MHz and 100-kHz signal generators. The operating frequency, on-off time intervals and the code speed are all derived from the crystal oscillator, whose accuracy is better than one part in 107. The circuit board at the right is the all solid-state driver and final amplifiers. The black box at the right center contains the harmonic filter, which attenuates all harmonics more than 70 dB. The black box at the top contains the oil-cooled rf step attenuator. The assembly at left center is the 13.8-V voltage regulator. (*photo by K6RU*)

1) *Determine the minimum power* to support communication over the path between you and the beacon as a function of time. The ionosphere is incredibly variable. The number of propagating modes continually changes. So does the attenuation per mode, and the noise and interference background. In addition, the season and sunspot number have an effect. Superimposed on all this are the partial or complete fadeouts because of solar flares, plus the longer-lasting effects of ionospheric storms. The new beacon gives a "bottom line" answer regarding propagation effectiveness around the clock.

2) *Make intercomparisons between antennas, preamplifiers or receivers.* While listening to a beacon dah, switch from one antenna or piece of equipment to another, so as to make instantaneous comparison. In view of signal fading, try to switch rapidly from one antenna or receiver, for example, to another. You may even have time to switch back and forth more than once, which will improve accuracy.

3) *Make intercomparisons between sites and stations.* Get your friendly competitor across town to log the weakest signal he can hear as a function of time. In that way you can tell whether his site-station is better or worse than yours, and you can even estimate the decibel difference!

Tests of this sort should be invaluable in sorting out the effect of variable power-leak noise. If you can say that line noise in your neighborhood has reduced the effectiveness of your station by (say) 20 decibels, your local power company has a much better basis for spending money to try to help you.

4) *Calibrate your receiver's "S" meter and frequency settings, and set your clock.* The 14.100-MHz frequency is stable to within a few hertz. The "Q" of the first "QST" begins on the hour and repeats every 15 minutes thereafter, within less than a second of WWV. The power changes are in 10-dB increments.

The usually resourceful amateur will surely figure out other helpful applications for the beacon. We'd like to hear of them.

It is planned to change the message text from time to time, such as to give a 30-second dah to allow better equipment comparison. In addition, there will be time to rotate your antenna to check the beam pattern. Whatever the message, the total air time will be a minute or so.

Background

The beacon project is sponsored jointly by the Northern California DX Foundation (NCDXF) and Project OSCAR. This unique project was conceived several years ago in discussions with Mike Villard, W6QYT, the NCDXF's technical advisor. Jim Ouimet, K6OPO, of Project OSCAR, took over the chore of designing the system and constructing the transmitter. Jack Curtis, K6KU, of Curtis Electro Devices, designed and built the digital keying and control system, and Mike Staal, K6MYC, of KLM Electronics, designed and built the dual quad loop antenna system. Finally, Cam Pierce, K6RU, acted as chief technical coordinator of the project.

Location

The system is temporarily located at an elevation of 350 feet, on the Stanford University campus, a half-mile north of the famous "big dish" used by the moonbouncers in many intercontinental uhf tests. Stanford is about 30 miles south of San Francisco.

The Ultimate

To provide maximum potential information and usage, the NCDXF/Project OSCAR group is planning for the ultimate use of this type of system . . . a network of beacons all on the same frequency, transmitting sequentially at five-minute intervals, to be located on the East Coast, West Coast and Hawaii. Hopefully, one day the net will extend around the world, east-west plus north-south. Operation on other bands is also a possibility.

It is hoped this beacon, and perhaps those to come, will give the amateur one more dimension to meet the amateur's obligation under FCC Regulation 97.1, Basis and Purpose. To wit: ". . . advancement of the radio art . . . advancing skills in communication and technical phases of the art . . ."

France: Land of the Friendly Ham

An American learns how to deal with bureaucracy in a foreign culture — with some timely help from friendly French amateurs.

By Caron J. Keenan,* WA1OMJ

"What can I do for you?" said the impeccably dressed gentleman coldly as I advanced toward his desk. He was clearly bothered by the interruption. A feeling of having made a serious mistake made me hesitate. "Oh wonderful," I said to myself. "Now what? I suppose I have to go through with this."

Taking my courage in hand, I said, "You are F8OP, aren't you?"

"Yes," he replied, somewhat puzzled now.

"I'm WA1OMJ. Pleased to meet you," I ventured, extending my hand in friendship.

The frigid wall melted before my eyes. "Well, what a surprise! What are you doing in France? How long are you staying? Is your family with you? Please sit down."

My wife and three children were indeed with me. We had just arrived in France so I could study at the local university. We arrived with very little luggage and a great deal of apprehension about the wisdom of such a move.

Making Friends

We had no radio equipment with us, but just before leaving the United States, I took the time to leaf through the latest *Callbook* and scribble, on the back of an envelope, the call signs and addresses of some amateurs living in our new QTH, Rennes, France. At the first opportunity I set out to find the first name on the list. The address turned out to be a junior high school. But I knew that I was at the right place when I saw the long wire stretching the full length of the school property.

Georges Vialet, F8OP, standing center, and the author, Caron J. Keenan, WA1OMJ, to his left, are shown in front of the junior high school in Rennes, France, where the two first met. Other amateurs and their spouses are also shown.

Within a few minutes I was in the office of Georges Vialet, F8OP, the vice principal of the school. Although my first encounter with the world of French Amateur Radio began badly for a moment, Georges quickly confirmed my faith in the amateur fraternity by being gracious, friendly and sincere. In fact, he insisted that the whole family come to visit and meet his wife and children. That afternoon the two families began what appears to be a lifelong friendship.

Georges took me to the next monthly meeting of the Rennes Amateur Radio Club where I was made an honorary member for the year. No dues accepted, thank you. As innocents abroad, undergoing some culture shock, we found a warm and kind reception by all the French amateurs. We had to refuse more dinner invitations than we could accept.

Activities

We found Amateur Radio flourishing in Northwest France. The 80 or so members of the Rennes club are constantly gearing up for the next activity: *la chasse au renard* (fox hunt), a weekend visit to the English island of Jersey, or the return visit by the Jersey amateurs later in the year. They hold classes in code and theory for future amateurs as well as picnics for the whole family. Particularly pleasant was the business-family meeting on January 6, the Feast of the Three Kings. All of France celebrates the day by eating a kind of cake in which is baked a plastic replica of a king. We finished our short business meeting, joined the families in the hall and consumed the Kings' cake and some champagne. Those of us who found a plastic king had the pleasant duty of wearing gold cardboard crowns and exchanging kisses with the women who had been crowned queen. In addition to the monthly club meeting, there is an 80-meter net on Sunday morning with so many stations on the frequency that is difficult to find a spot on the round table. My fellow amateurs immediately noticed my pining for some time on the air. From the ranks of the Rennes amateurs appeared an unexpected, practically new hf transceiver, vertical antenna, roll of coaxial cable and three willing helpers anxious to install the antenna on the roof of our

*139 Miro St., Fairfield, CT 06430

apartment house. It was then that we ran into problems.

I Need an Antenna

In order to install the antenna, it was necessary to gain access to the roof. Wishing to be the best possible representative of my country, I presented myself politely, hat in hand, to the concierge (building manager) and requested permission to inspect the roof for the purpose of mounting a small, innocuous-looking antenna. "*Pas possible, Monsieur!*" she said violently. "I cannot give you the key without permission from the director of our condominium. His office is downtown. Go see him!"

Several days later the director spent a half hour speaking the most flowery French I have ever heard. It roughly translated to "No way." Rennes radio club and *Reseau des Emetteurs Francais* (REF) to the rescue.

Thanks to legislation proposed by REF some 15 years ago, the French amateur has some interesting legal rights which dictate the procedure to follow in cases like the one I was encountering. I first applied to REF Paris for an insurance policy which guarantees the payment for any damage done by a falling antenna, for an annual premium of $7. I then sent the building manager a copy of the insurance policy, a detailed sketch of the antenna to be installed and a statement indicating my intention to mount the antenna 30 days hence. The owner then had 30 days to provide valid reasons why the antenna should not be set up, a refusal which is almost impossible to justify. In my case he requested that a qualified technician perform the installation.

On the 31st day after sending the letter, a Rennes amateur, who runs a television repair shop, presented himself to the concierge and obtained the key to the roof. We easily installed the antenna and snaked the coax down six floors through the ventilator duct, which evacuates the air from the bathroom, and leads nicely to the rig in the living room.

Operating

To operate in France I needed a few new words added to my French vocabulary. Instead of "CQ CQ from WA1OMJ," I started with "*Appel general, Appel general, ici FØBKY.*" It was amazing to sit back and listen to the exotic call signs coming back.

Two meters is just now coming into its own, with about 15 repeater stations spread throughout France. The 2-meter operator must follow a strict band allocation — 144 to 144.150 MHz for cw, 144.150 to 145 MHz for ssb and 145 to 146 MHz for fm. Those little 2-meter antennas are sprouting on Renaults, Peugeots and Citroens all over France. CB is not authorized, so it is easy to spot a fellow amateur in a traffic jam.

Thanks to F8OP and the amateurs of France, our stay in a foreign country was like staying at the home of loving and interested friends. Instead of a feeling of separation and loneliness, we found a new family, one that was interested in our welfare and ready to give us moral support. I cannot imagine what our stay might have been like without the contact that Amateur Radio afforded us.

American amateurs can easily obtain reciprocal licensing privileges for operating in France. Write ARRL hq. for the proper forms.

Strays

More than 100 Des Moines (IA) hams, under the direction of Ralph Wallio, WØRPK, provided communications for medical teams and traffic controllers during the recent visit of Pope John Paul II. Four command posts linked the Lucas State Office Building, Des Moines International Airport, shuttle transportation control at the intersection of Interstates 30 and 80 and Living History Farms, site of the Papal Mass. The photo on the left shows operators of the "airport control" group; the other photo shows Pope John Paul II and Father John Richter at St. Patrick's Church, near Cumming, IA. *(photo by Bob Eaton, KØHFU)*

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 377
November 18, 1979

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Incorporated, met at 1403 EST on November 18, 1979, at the American Radio Relay League Headquarters, Newington, Connecticut. Present: President Harry J. Dannals, W2HD, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN, Richard Egbert, W8ETU, and Larry E. Price, W4RA. Also present were Directors Maurice O. Carpenter, KØHRZ, Jay Holladay, W6EJJ, Harry A. McConaghy, W3SW, William Stevens, W6ZM, John Sullivan, W1HHR, Robert Thurston, W7PGY, L. Phil Wicker, W4ACY, Acting General Manager Laird Campbell, W1CUT, General Counsel Robert M. Booth, Jr., W3PS, and Washington Coordinator Harold M. Steinman, K1FHN. Director Gar Anderson, KØGA, joined the meeting at 1336.

The Committee reviewed a further draft of an ARRL response to the FCC's Notice of Inquiry in Docket 79-140, concerning the possible creation of an additional Personal Radio Service in the 900-MHz range. Comments were offered by members of the assembly and these, along with additional comments in transit to Headquarters, shall be incorporated into the League's filing.

General Counsel Booth presented a report on Senator Barry Goldwater's revised version of S.622, concerning amendments to the Communications Act of 1934. Many of the League's recommendations appear in this bill, and General Counsel Booth will prepare comments expressing the League's appreciation.

The Committee next discussed the FCC's Notice of Proposed Rulemaking in Docket 79-285, concerning the deregulation of FM emission on the 6-meter amateur band. It was decided to solicit input from the VHF/UHF Advisory Committee and the VHF Repeater Advisory Committee, and to then refer the matter back to the members of the Executive Committee.

Washington Coordinator Steinman presented a report on the excellent and professional-quality work of the Ad Hoc Committee on Biological Radiation Hazards.

In accordance with previously established Board policy, the Committee reviewed a report from the General Manager on the status of action taken on motions adopted at the July Board meeting. Action has been completed on Minutes 17, 32, 34, 39/47, 43, 61. Action is in progress on Minutes 22, 27, 28, 36, 40, 42, 45, 48, 57, 59, 60, 62 and 65.

On motion of Mr. Clark, seconded by Mr. Egbert, the Committee recognized the names of 270 individuals who had been recently elected to Life Membership, and instructed the General Manager to list their names in *QST*.

On motion of Mr. Arnold, seconded by Mr. Anderson, the Committee approved the affiliation with the League of the following Amateur Radio societies: Amateur Radio Association of Bloomington, Bloomington, MN; Anderson Repeater Club, Daleville, IN; Bloomfield Senior High School ARC, Bloomfield, NJ; Chattahoochee Valley ARC, Lanette, AL; Convention Amateur Radio Society, North Canton, CT; Converse Amateur Radio Club, Douglas, WY; DX Association of Connecticut, North Haven, CT; Kodak Colorado Division ARC, Windsor, CO; Lac Qui Parle Amateur Radio Club, Marietta, MN; Lincoln County Amateur Radio Club, South Beach, OR; Loveland Repeater Association, Loveland, CO; Machine Contest Club, Jackson, MI; Minford Amateur Radio Club, Sciotoville, OH; South Jersey Contest Coalition, Glassboro, NJ; Southern California Rag-Chewers ARC, Bloomington, CA; Southern Illinois Amateur Radio Society, Carbondale, IL; United Electronics Institute ARC, W. Des Moines, IA; University of Central Florida ARC, Orlando, FL; Yadkin Valley Amateur Radio Club, N. Wilkesboro, NC. (With the above action, the League now has 1816 class I affiliated societies, 7 class II and 338 class III.)

On motion of Mr. Egbert, seconded by Mr. Arnold, the following convention dates were approved: Georgia State, June 21-22, 1980, Atlanta, GA; Southwestern Division, September 5-7, 1980, Los Angeles, CA; New England Division, Sept. 19-20, 1981, Hartford, CT.

On motion of Mr. Anderson, seconded by Mr. Price, Byron Goodman, W1DX, John Huntoon, W1RW, and John Sullivan, W1HHR, were selected as a Committee of Tellers for the special Directors election in the Great Lakes and Canadian Divisions. Ballots for this election will be counted at ARRL headquarters on December 14, 1979.

The Committee then considered a petition for recall of the New York City-Long Island Section Communications Manager, Paul A. Lindgren, WA2UWA. Having received no written response to an original request for further information sent to Mr. Lindgren, the Committee directed that a second letter be sent to Mr. Lindgren soliciting further written facts in the case.

On motion of Mr. Price, seconded by Mr. Arnold, it was unanimously VOTED that the allocation for 1979 Section Communications Manager expense be increased by $5000.

On motion of Mr. Egbert, seconded by Mr. Anderson, it was unanimously VOTED that the budget of the Legal & Regulatory Committee for 1979 be increased by $1000.

On motion of Mr. Anderson, seconded by Mr. Arnold, it was unanimously VOTED that the budget of the Southwestern Division for 1979 be increased by $350.

During the course of the meeting the Committee also discussed, without formal action, financial assistance in the Schroeder case, accommodations for the January 1980 Board Meeting, the problem of malicious interference to amateur communications in the Southwestern Division, ARRL-FCC relations, the disposition of unclaimed QSL cards by local QSL bureaus, correspondence between the ARRL and Sears, Roebuck Co., the revision of Article II concerning potential conflicts of interest, staff correspondence, and the World Administrative Radio Conference.

The next meeting of the Executive Committee is scheduled for 1400 EST, January 16, 1980, at ARRL headquarters.

Respectfully submitted,
Harold M. Steinman, K1FHN
Secretary of the meeting

LIFE MEMBER APPLICANTS
November 18, 1979

Fred H. Allen, Jr., KA5ESC; David Ray Andelin, WA6NNR; Loren A. Anderson, WBØLDV; Walter J. Anderson, W8ERB; Robert M. Anthony, WB8CHV; Robert D. Archambeault, K1SI; Wesley Argue, WBØOBU; James R. Bell, KA4BVI; Bernice F. Bennett, WB8FTS; David H. Benson, WN8MUP; Wesley R. Bicknell, WB3HWH; Dennis P. Bishop, N6RN; Jacques Blais, VE2BWK; Lorraine L. Blanchard, WA4DPO; Michael C. Bliss, WB5QJW; Barry B. Bogart, WB3GXD; Thomas L. Bohn, N6AAA; Daniel R. Bolander, WB9TYT; Joseph Bomakowski, WB2MIC; Roger Bonnett, WB9NOF; Douglas Bosco, WB9NNI; Dean Bouchard, N7ANR; James L. Bovenkerk, WD8MKY; Charles F. Bowen, WB3EVP; Kenneth W. Boyd, WA4UNZ; Paul K. Brace, W2HII; Joseph H. Bradley, WB4PCP; Theodore L. Brenthinger, WB9QLE; Denisville C. Bumgear; Richard O. Bristow, WB6ICT; Charles S. Brunetton, WB4LEM; Walter J. Bryant, N4OV; L. R. Buckler, N4NE; Norman Burkett, WA5WIY; Michael C. Burns, Jr., W4NOJ; William A. Burns, WA6QYR; Thomas A. Bush, WB6GLB; Douglas M. Butcher, VE1AAV; Coleman P. Callaway III, N4IM; William M. Campion, K9WSS/WØKCH; Lawrence Wayne Canaday, WB5UFR; Harold C. Cantrell, WØPU; Robert G. Carter, WB8OQL; Dennis E. Casey-WA5RCL; Tracy G. Caser, WD5LZR; Guy S. Chabot, WA1SYQ; Dennis L. Chaney, A3BY; E. Thomas Chesworth, W3IA; Martin F. Chronister; David F. Christ, KØEUM; Herbert E. Church, Jr., W3EPA; Frank Cirillo, WA2MSD; J. M. Clark, WA5JQQ; Peter N. Clark, WB8OLI; James A. Colonna, WA2PVN; Robert A. Comunale, WD4DPB; Richard Cooney, WB3DJV; John R. Cooper, WD5IRB; Roy L. Cordaro, WB6QJK; Michael A. Cognale, KA4ABD; Kenneth A. Crump, WB4FQB; Earl W. Cunningham, K6SE; Bert Curwen, KL7IR; David Charles Dale, WB2PCT; Thaddeus A. Danley, WA1UGR; Guy A. Davis, W9NFN; James R. Davis, K3OZS; Manuel G. DeLeon-Barcos, XE1XI; W. J. DeZonia, WD4KWG; Frank R. DiCarlo, WB2GVD; Mark J. Dickelman, WB9LXE; Roger D. Dickson, WA8WIZ; Sheldon H. Dike, W5HAG; Winford H. Dillard, WB8ESB; Robert W. Dobbins, K6KLI; John H. Durr, K1AR; Harry W. Dougherty, WB2MHI; Donald Drake, WA6JPW; Mickey A. Driver, AK5Q; Donald J. Duman, WB8APT; Kenneth R. Dush, N4FN; W. Stanley Edwards, WA4DYD; Kurt G. Eifert, WA3IUF; James D. Ek, WD8OUG; Peter L. Ellena, KH6JNT; Robert E. Enslem, WB1DGX; Earl J. Enseline, WB7OOZ; John F. Falk, WB7THF; Joshua H. Felton, WA4HXZ; Clark A. Fishman, WA2UNN; James J. Flannery, WBØNZM; Joe Flickinger, WB7SLD; George B. Foote, Jr., N1AG; Don N. Foss, WB9ICU; Donald C. Fox, WBØGBZ; Frances P. Fox, WA6GLX; Jeremiah H. Frazier, WB2CVS; Terry Frederick, WB8EZH; Stephen J. Gammaitoni, VE3HKT; Carl R. Gardner, Jr., WBØRYP; Scott N. Gauldine, N5AIL; Robert R. Gay, Jr., K1TCA; Karl Ten Eyck Gebhard, WB3AVV; William V. Gioia, K2EK; Carmine Giordano, WB2DIX; Eugene P. Gildow, W2INO; David I. Glaze, WØYVZ; Louis D. Godat, W6ZRY; Owen T. Godwin, Jr., WA4YOS; L. Judd Goodman, WB4VMT; Jan Gould, WA6YQW; Larry Greenberg, KA5CID; Norman D. Grove, WAØKIO; Bruce T. Gugler, WD4SGO; Richard Harston, N6QB; Ronald A. Hall, Sr., NP2AB; Donald K. Hanson, KØGON; Haine Harrell, WB5RSA; Billy B. Hass; Arthur C. Hartman, WB9KHU; Dennis P. Hards, WBØPVL; Kenneth L. Harwood, WA5QZI; Frank Hengewald, K7/DH; Paul A. Helminger, K4DNW; Louis Lee Henson, KA7BGH; Fernando Hernandez Torres, KP4BMP; Richard C. High, WØHFP; Lad F. Hlavaty, W1CRT; Larry A. Hoffman, KØLEF; Richard L. Hole, Jr., N8RI; Irvin L. Horton, Jr., WB5ILC; Al Houston, WB4ENW; Donald Hubert, W8BSW; Richard B. Huntington, W6SkW; Jack Van Hoss, N8ABY; Maria A. Imhof, WB2BXR; Albert N. Isaacks, Jr.; David A. Jacobs; Gene G. Jacobson, WA7TAI; Donald F. Jahncke, WD8ELO; Martin W. Janci, WD9HEP; David L. Jarrell, WA4CAD; Richard D. Jennings, K3ISX; Jimmy G. Jinnette, WA4LVD; Bob Johnson, K9GI; John W. A. Jones, WB5WBS; Laurence S. Jones, WØAY; James P. Jorgensen, AA6JJ; Dennis Jump, WB6OCQ; Vladimir Juranek, VE6AYH; Joseph L. Jorczyk, WA9CPB; Charles B. Juvenal, KØKKI; Robin Duane Keller, WA4WPD; Skip Kendel, WA5KQU; William F. Keown, WB4PLP; Jeffrey W. Kincaid, WA6BIL; David J. Kir, WA3DJG; John Koch, WA3KJN; Alpha M. Koster, WA0GTD; Dennis Krakenberg, WA6PKY; Richard A. Krier, N6MJ; J. D. Krisell, WB5IBT; Kim D. Kromer, WA2ZQS; Donald L. Kuehne, K7DK; Anthony LaScala, WA1MTI; Rosie Lamb, KA4S; Donald R. Leal, N6EO; William F. Lee, KL7IUI; Alan K. Lefcort, WB3GPR; D. D. Lenhem, WB4CCK; Ten Lenov, W9NUZ; William R. Lewis, Jr., W8NZX; Duane Alan Lewis, KBØHB; R. G. Lomnis, WA1SXR; Mark G. Lowenstein, N1SL; Manuel Herrera Lutteroth, XE1RX; R. I. MacKee; Timothy D. Mallory, A14B; Howard N. Mark, WB8OBW; Richard H. McGinn, WA1IMS; Larry McKinney, WB5LIO; John E. Meade, W2XS; Russell D. Merkel, WB9GIU; Matt Mitchell, K3CIU; Ronald E. Moody, AA7Z; Albert B. Morelli; Wilse G. Morgan, KL7CQ; W. H. Mullican, WB5RXP; Stanley R. Mundy, WB7BLE; Robert E. Munsey, Jr., K6PIU; Larry Murdock, WD4KWM; Yoshi Nakamura, WB6QKS; Kenneth R. Nartowicz, WA5DIQ; Thomas E. Nelson, WA8TTS; David A. Nowotnik, WB9PXH; Donald M. O'Brien, W3HBB; James R. Oates, WB7UUT; John A. Ourland, WB4PJU; Constance L. Owens, W1WS; Joseph Papp, WB2OIM; J. Dean Paterson, KH6IRZ; George A. Pellenes; Frank J. Perl, WA5HAU; Diego Perozo, HI3DJP/W2; Robert J. Postel, WBØNYO; Joseph Allen Powell, WB4IXM; William H. Powell, WB1GOI; Alan J. Price, WH1YV; James M. Prichard, WA6IND; Raymond L. Prime, W1MAR; Bruce Rattray, VE5RC; Michael C. Rau, KB3BO; Richard E. Ravich, WD6EIU; Leighton M. Reed-Nickerson, W2HIE; David M. Rees-Thomas, VE3JHE; Gary L. Reichow, WAØVEE; John Douglas Reid, WB2DGI; Donald A. Richardson, WA7QKI; William J. Roberts, WA9UVW; Thomas W. Roney, VE5AAI; Richard Rothwell, WB2TZW; Eugene L. Roy, Sr., N8ER; Robert W. Rue, WØRMM; William H. Salisbury, WB6QUG; Michael R. Samarco, W1IZ; Charles H. Saunders, W5FMJS; Alan D. Scher, WD8PKE; Paul L. Schneider, WB7WEQ; Jack "Wayne" Schollian, KB5EI; Nancy R. Schollian, KB5BU; John L. Schreibmaier, WA3YIV; John H. Schroeder, WD9EUD; Duane L. Schuldt, K9ASI; David J. E. Scrivens, WB2VMU; Don V. Schuster, W4LSC; Cathy Schwager, WB3ATX; Jean M. Scott, K1IS; Terence Shilhanek, WØPLR; Samuel E. Showalter, WB4OIF; Anthony L. Shipko, K6LLQ; Shirley L. Smith, KA7DPA; Wayne R. Smith, WA5SEC; Robert R. Snyder, WB2PGA; Stephen Gary Spak, W7ZVV; R. G. Spindler, N9AAI; Donald M. Squires, WA8SPV; Richard A. Strand, KL7RA; Donald L. Szwassink, K7ZIO; Charles R. League, WA2UYR; Stephen Tessler, WA6TYQ; Paul D. Tibbens, K1PT; Jay D. Tineler, WD5BUQ; Richard H. Torrence, WA6BIX; A. Valdettaro; Jerry Van Vactor, KØIV; Edward Westemeier, WD9GRO; Johnnie L. Westerfield, WD5GBK; Lewis D. Wetzel, WIECQ; Mark J. Wharton, KØLO; Ronnie Whitten, WB5GGD; Bradford L. Williams; Glenn L. Williams, WA2SLC; Sydney I. Wolfe, WB6ROE; John W. Woodfield, VE3CYK; Malcolm F. Woodward, W6PLI; Stanley E. Yates, WB8WMU; Thomas D. Yost, WB8ZRP; Randall Young, WB4TTW; Clifford Zigler, WB4DVD; Robert Brent Zook, N9HZ.

WARC Countdown

Conducted By David Sumner,* K1ZZ

Dateline Geneva: The Closing Days

By the time this issue of *QST* reaches League members, WARC-79 will be history. The bulk of what is printed below was written about two weeks before the end of the conference, with last-minute updates to provide for changes which were made in the closing days. For that reason the discussion which follows is somewhat general, but it should give you a good idea of what the ham bands will be like in the aftermath of WARC-79. Any changes in the regulations under which we operate are still a couple of years away, and in any event must await the revision of national regulations such as the FCC Rules. A complete report on WARC-79 is in preparation for next month's *QST*.

Footnotes

Overall, the Table of Frequency Allocations has become less an "international" table and more a collection of "national" tables. That is, through the expansion and addition of footnotes which modify the Table in named countries, bands frequently have been allocated differently in different countries — even neighboring ones. In particular, there has been a proliferation of footnotes for fixed and mobile services in the uhf and higher-frequency bands. We will not try to describe these footnotes in detail here; however, it should be borne in mind that exclusive bands (that is, bands which are allocated to a single service, and which are not shared by more than one service) are extremely rare for *any* service above 30 MHz. In most cases, we find ourselves with new sharing partners in the bands between 220 MHz and 24 GHz, while retaining present allocations and adding much-needed amateur-satellite segments between 1260 MHz and 10.5 GHz. These new amateur-satellite bands are summarized in Table 1.

Here is how the bands shape up, beginning at the lowest frequency allocation and working our way up through the spectrum.

Bands Below 30 MHz

At 1.8 MHz we went into the Conference with no allocation at all in Region 1,[1] except for a footnote permitting amateurs in about a dozen countries to use no more than 10 watts. In Regions 2 and 3 we had a 200-kHz band, shared with several other services. U.S. and Canadian amateurs have operated for many years under frequency and power restrictions. The conference adopted a 40-kHz exclusive allocation for Region 1 (20 kHz in some countries) with a continuation of the existing footnote provisions in many cases. Region 2 will have a 50-kHz exclusive band, with continued sharing in the remaining 150 kHz in most countries (including the U.S. and Canada). There is no change in Region 3. This is a definite improvement in Regions 1 and 2 and should enhance the usefulness of the band, especially for DX. Incidentally, the U.S. proposal for expansion of the standard a-m broadcasting band was carried only to 1705 kHz.

At 3.5 MHz we had a shared band of 300 kHz in Region 1, 500 kHz in Region 2, and 400 kHz in Region 3. The bandwidth has been retained, although a few countries (*not* including the U.S. and Canada) have limited their amateurs to certain portions of the band. In Region 2 the lower 250 kHz will be exclusively amateur in most countries — a significant improvement. Partially offsetting this is that Canada and Greenland will be permitted to use 3950 to 4000 kHz for domestic broadcasting, Canada on the basis of noninterference to services listed in the Table (such as Amateur) and Greenland with a power limitation of 5 kW.

The 7-MHz band posed one of the most difficult issues of the conference. Despite lengthy consideration, no solution could be found which was an improvement over the *status quo*, where 100 kHz is a worldwide, exclusive amateur band and 200 kHz is shared between amateurs in Region 2 and broadcasting in Regions 1 and 3. Given the number of proposals to reduce the Region 2 amateur allocation to 100 kHz (see the July column), maintaining the *status quo* was a substantial victory. In fact, in the final hours of Committee 5's work we came very close to losing the 7100- to 7300-kHz part of the band altogether, and it was only through an amazing show of solidarity by Region 2 countries that it was retained. One of the biggest problems, out-of-band broadcasting operations in the exclusive amateur band, is likely to remain with us because broadcasters got no extensions of their bands at 6 and 7 MHz, although the Conference resolved, by a very narrow margin, ". . . that the broadcasting service shall be prohibited from the band 7000-7100 kHz and that the broadcasting stations operating on frequencies in this band shall cease such operation." Footnotes for fixed services at 7.0 to 7.05 MHz in some African countries may cause some problems, but this will be nothing compared to how the band suffers at the hands of out-of-band broadcasters.

The existing fixed service bands were staunchly defended by the USSR, Eastern Europe and many developing countries. The lower hf fixed service bands were especially difficult for other services to penetrate. At 10 MHz, our most-needed new band, the best that could be obtained was a 50-kHz band on a secondary basis, shared with the fixed service. That is, amateur stations in the band will be prohibited from causing interference to the fixed service, and must accept interference from that service. How best to utilize the band under these circumstances will be a question worthy of extensive study and discussion in the coming months. Even so, this should be a very useful allocation, as it bridges the very wide gap between the 7- and 14-MHz bands.

The 14-MHz band remains unchanged, although a small number of countries have added themselves to the footnote which permits the fixed service to operate in the USSR at 14.250 to 14.350 MHz. These stations will be limited to 250 watts, however. The 21- and 28-MHz allocations are also unchanged.

At 18 and 25 MHz we have some of the best news: new exclusive bands of 100 kHz at 18.068 to 18.168 and 24.890 to 24.990 MHz for the Amateur and Amateur-Satellite Services. The bandwidths are not as great as we were seeking, but along with the new 10-MHz band the allocations will provide great flexibility in adapting to changing propagation conditions. The 25-MHz band will be especially interesting for U.S. and Canadian amateurs who have television interference problems when operating at 21 or 28 MHz, because none of the harmonics from this band fall into the lower five television channels. It will be five to 10 years before we are permitted to operate at 18 or 25 MHz, because existing fixed stations first must be reaccommodated elsewhere.

Bands Above 30 MHz

The 50-MHz band remains essentially unchanged. The 144-MHz band is unchanged in Regions 1 and 2, but in Region 3 the fixed and mobile services have been added to the 146- to 148-MHz segment on a primary basis. No doubt this means that some Region 3 countries will restrict their amateurs in this part of the band in preference to land mobile and similar services. The 220-MHz band is maintained in Region 2, but fixed and mobile have been added as sharing partners. The U.S. proposal for a worldwide maritime mobile allocation here was not adopted.

One of the biggest problems for us is the 420- to 450-MHz band, which was already limited to 430 to 440 MHz in Region 1. In Regions 2 and 3, the amateur secondary allocation was cut back to those limits, although the U.S. maintained the band as 420 to 450 MHz by footnote and Canada did the same for 430 to 450 MHz. A few other countries joined these footnotes but, in general, administrations opted for fixed and mobile allocations in this extremely valuable part of the spectrum. In fact, about 50 countries (nearly all of them located in Regions 1 and 3) are listed in footnotes for the fixed service in the band 430 to 440 MHz, and about 40 of them are also in footnotes for mobile in 430 to 435 and 438 to 440 MHz. It was only through a last-minute agreement in Committee 5 that the amateur-satellite segment, 435 to 438 MHz, was kept clear of the mobile service. Seven Region 2 countries upgraded the Amateur Service to primary in 430 to 440 MHz by means of a footnote, but the U.S. and Canada did not join them.

Table 1

New Amateur-Satellite Allocations Between 1260 MHz and 10.5 GHz (all on the basis of noninterference to other services)

1260-1270 MHz	(earth-to-space, or uplink, only)
2400-2450 MHz	
3400-3410 MHz	(Regions 2 and 3 only)
5650-5670 MHz	(earth-to-space, or uplink, only)
5830-5850 MHz	(space-to-earth, or downlink, only)
10.45-10.5 GHz	

*Assistant General Manager, ARRL

[1]Region 1 is Europe, Africa, the Middle East and the USSR; Region 2, North and South America including Hawaii; Region 3, the rest of the world.

Table 2

New Amateur and Amateur-Satellite Allocations Above 40 GHz

Exclusive amateur/ amateur-satellite	*Shared**
47.0-47.2 GHz	——
75.5-76.0 GHz	76-81 GHz
——	119.98-120.02 GHz**
142-144 GHz	144-149 GHz
248-250 GHz	241-248 GHz

*Shared by amateur/amateur-satellite service with other services, on a secondary basis.
**Amateur only (no amateur-satellite).

Region 2 amateurs picked up a new band at 902 to 928 MHz on a secondary basis, shared with several other services. This gain was partially offset by the expected loss of 1215 to 1240 MHz where amateurs were excluded in order to protect a new radionavigation-satellite system. The amateur allocations between 1240 MHz and 40 GHz remain unchanged, with the addition of the new amateur-satellite segments and the new sharing partners mentioned earlier.

Above 40 GHz, the future of the Amateur and Amateur-Satellite Services looks very bright. Early in the Working Group 5E proceedings, a philosophy favorable to our interests was adopted whereby exclusive amateur/amateur-satellite allocations would be made adjacent to wider, shared allocations. This pattern was followed in most of the new bands above 40 GHz (see Table 2).

Non-Allocations Matters

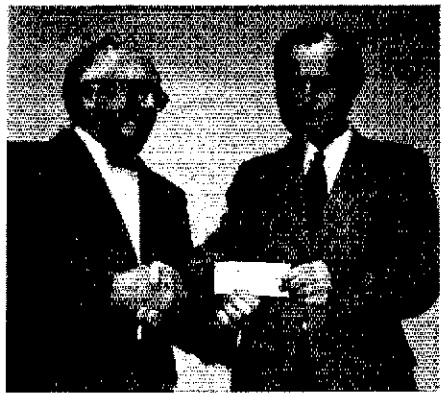
As noted in the November *QST* editorial, the frequency above which administrations may waive the Morse code requirement has been lowered from 144 to 30 MHz. This is likely to have no immediate impact in the U.S., even at 50 MHz, because the U.S. does not waive this requirement for any of its amateur licensees. Other than that, the definitions and miscellaneous regulations which apply directly to the amateur and amateur-satellite services have been modified only in very minor fashion. A resolution recognizing the value of the amateur bands for communications during natural disasters was adopted, in place of proposals which would have given priority to such use in narrow segments of the bands.

While the IARU fielded an experienced, hard-working team (see September and October columns), the real heroes are those members of national delegations, amateurs and nonamateurs alike, who spoke up time and again in defense of amateur interests. Of course, they would not have been able to do so had it not been their national policy to support Amateur Radio, and in most cases this reflected a lot of effort over the past several years by the amateur societies of those countries.

In general, the atmosphere of the conference was favorable to the Amateur and Amateur-Satellite Services. To most administrations, there was no need to justify our existence; opposition generally was based not on an anti-amateur attitude, but on the feeling that other services had a greater need or deserved a higher priority. In parts of the spectrum where we made gains, few other services made greater gains; where we suffered setbacks, many other services also suffered.

The changes mentioned above will not take effect until January 1, 1982, at the earliest, so the amateur community will have plenty of time to consider what changes in operating patterns will have to be made. A more complete report will appear next month. QST

Strays



Robert York Chapman, W1QV, president of the ARRL Foundation, presents a transfer of Foundation Life Membership monies to Laird Campbell, W1CUT, who receives the check in behalf of the ARRL. The funds are to be used for WARC-79 and future protective conferences. Those who wish to contribute to the Foundation should address their donations to: The ARRL Foundation Hq., attn. W1QV, 225 Main St., Newington, CT 06111. Contributions are tax deductible.

HELP US UPDATE FILM LIBRARY

☐ As many members may have noticed, some of our training aids are becoming outdated. We are looking for ideas on how to acquire better films, at little or no cost. If you have ideas, or slide shows on topics such as EME, RTTY, etc., that we may make copies of, please contact Donna McManus, Film Librarian, Club and Training Department, at Headquarters.

John Graham, W2NZT (left), member of the Belleville (NJ) ARC and the Belleville Civil Defense radio group, was a recent recipient of the Belleville "Radio Amateur of the Year" award. The proclamation, signed by the mayor and town commissioners, and presented by Mr. Rocco Saletta, commissioner of Public Safety, was in honor of 25 years of faithful service to the town. Congratulations, John!

HAMS IN OLYMPIC FOREFRONT

☐ The new year has arrived and the amateur community looks with excitement on its first extensive involvement in the Winter Olympic Games. The role of the amateur is really twofold. Activity is already brewing on the low-band nets in preparation for traffic once the games begin.[1] Meanwhile, 11 selected amateurs are preparing to rally in Yorktown, VA, on January 31. They will provide mobile communications for the transport of the Olympic Flame which will be relayed by a contingent of 52 runners. A caravan of vehicles will accompany the flame through small towns and metropolitan areas. Major ceremonies are planned at George Washington's homesite in Virginia, the Capitol steps in Washington, DC, Independence Hall in Philadelphia, City Hall in New York City and the Capitol Building in Albany, NY (the host state). Here the communications caravan will expand to 17 vehicles. Part of the convoy will take a route through Saratoga Springs, Glens Falls and Ticonderoga. The remainder of the convoy will pass through Amsterdam, Indian Lake, Tupper Lake and Saranac Lake, thereby enveloping a large portion of the Adirondack area in the Olympic spirit.

The full complement of overnight participants is complete. Selection was made by the SCMs of the six states through which the torch will pass. Qualifications were radio experience, anticipated endurance ability and free time to fully commit one's self to long hours of communications, under pressure, during the journey January 31 through February 8.

Amateur Radio was selected by the Olympic committee as the best means of communications for the job since instant contact, over both short and long distances, is essential. Each vehicle will be in touch with the others — some within a few miles of each other, some up to 150 miles away. Hf equipment in the command vehicle will provide the long-haul communications to Lake Placid and to the families of the troupe. Two-meter simplex will be used as much as possible and repeaters are on tap for those cases where direct contacts will not be suitable.

Amateurs wishing more information should contact one of the SCMs involved: WNY, ENY, NNJ, SNJ, VA, NYC-LI, EPa, Del, MD-DC or their local public relations assistant. Local clubs are invited to participate to the extent that they can provide interface with officials in their local area. When this project is completed, it is certain that Amateur Radio will have carved another name for itself in the annals of public service. — *Bobbie Chamalian, WB1ADL, ARRL Olympics coordinator*

[1]*Winter Olympics Radio Amateur Network (WORAN)* Frequency: 7238.6 kHz Tuesday, Thursday and Saturday — informal net, 10 A.M. EST.

Correspondence

Conducted By Perry F. Williams,* W1UED

ARTICLE 41: CODE REQUIREMENT

☐ Congratulations on your excellent editorial in November *QST*, on ITU's Article 41 requiring Morse code. I'm still in the Novice class; I had considerable trouble passing the code test in 1977. But I still say, *We cannot afford to give up the Morse code requirement!* In my personal experience, mental stagnation (which tends to creep up on us as we grow older) was beginning to take over. I was 67 years old when I passed my Novice on the fourth try. Nevertheless, I am as strongly in favor of keeping the Morse test as ever. If ham radio is to maintain its high standard and not degenerate into a confused mess, we cannot afford to give up the code requirement! — *William H. Updegrove, WD5FRD, Marlow, OK*

☐ It was a distinct pleasure to learn that a committee of the World Administrative Radio Conference rejected the U.S. proposal to drop the Morse code proficiency requirement below 144 MHz.

When I passed the code after two years of diligent practice and received my General ticket, I had that wonderful feeling of accomplishment which only comes from hard work.

I became a member of a select and dedicated group of 350,000 U.S. operators who had earned their spurs. Just like graduating from college, it was a major highlight of my life.

The FCC conduct was typically bureaucratic — "Don't make people work for something; just give it to them." I deplore this moral degradation and do hope that *Washington was listening.* — *Frank B. Lee, WA7OYL, Prescott, AZ*

[Editor's Note: Yes, some of Washington *was* listening! Private Radio Bureau Chief Carlos Roberts did an excellent job of presenting the amateur viewpoint on Morse code to the Commissioners during a November meeting, a viewpoint gleaned from hundreds of letters he received as a result of the October and November editorials.]

☐ Sad indeed if we lower the standards for Amateur Radio, especially the cw requirement.

The International Morse Code is the best people to people program ever devised. It has enabled me to converse with people of all lands in, over and including the so-called Iron Curtain countries. Without cw I would be stuck with working DX into the English-speaking portion of the world, and to me that would be a tremendous loss. I hope this facet of Amateur Radio is not overlooked by the shallow-thinking people who are always looking for the easy way out. — *Benjamin F. Harrison, W8MHK, Romney, WV*

☐ The "Code Is Art — Let's Compromise" letter by K7DCG in October *QST* shines brilliantly with true words of wisdom from a professional and unselfish individual.

The code indeed is an art form and shouldn't be the deliberate stumbling block to an Amateur Radio license. Why do so many Novices each year lose interest or never make it as far as Technician? What about the struggling of the new amateurs who are handicapped? Surely the FCC is aware of these difficulties and many more. Why not ease those 16th century regulations as K7DCG proposed? — *John Reisenauer, Jr., KA7BKI, West Richland, WA*

CENSURE-Y CLUB

☐ I have just read in September *QST*, with great pleasure, your new "Happenings" item, "FCC Censure-y Club."

I believe that the more information about such cases you can provide your readers, the better the chances are that you will deter amateurs from such practices. I suggest adding the class of license held by the offender and the length of time of any suspensions invoked. — *Meyer A. Minchen, AG5G, Houston, TX*

☐ I was touched with sorrow to see that *QST* would print details of a revocation proceeding against a fellow amateur by the FCC for using salty language on the 40-meter band.

The ARRL should have helped, aided and assisted our brother ham rather than publishing his trouble or holding him up to scorn. The League should have filed a brief on his behalf.

FCC regulates cable television. Section 76.215 prohibits cable system operators from transmitting material that is obscene or indecent. Yet many of the "R" rated movies carried on cable by Home Box Office contain salty language and themes. The FCC should be even-handed when it administers justice. — *Ray Escoe, WA2MMT, Massena, NY*

[Editor's Note: The first time an amateur is caught out by FCC, he gets an "Official Notice of Violation." If he makes satisfactory reply in 10 days and doesn't commit the same offense again for a year, it is the end of the matter. The second time an amateur is caught on a given offense, he gets a Notice of Forfeiture — a fine of $50, usually. Only on the third violation are revocation or suspension proceedings begun. Even then, the amateur has a right to a hearing, and can have it transferred from Washington to a city near where he lives. What you'll see in "Censure-y Club" will be, for the most part, hard cases. The only other exception will be of an offender whom FCC can't reach, because the amateur has not informed the Commission of his current address on a Form 610. Look at *your* license; is the address on it the right one *now*?]

MODE MIX

☐ I enjoy DXing in cw very much, and spend a large portion of my time on the air in the cw mode. Despite this, I think the cw exclusive frequency allocations are a great deal larger than they need to be.

Today, the largest congestion on the air is definitely found in the hf phone bands. I do not think we need all those 250 kcs of cw exclusive frequencies on 15, 200 kcs on 20, 150 kcs on 40 or 275 kcs on 80. I think the upper 50 to 100 kcs of cw exclusive frequencies on any of these bands could be transferred to phone and still leave plenty of frequency space for those of us who are active on cw. After such a change, cw would still be legally permitted anywhere in the Amateur Radio bands, as it is now. — *Roald Steen, AJ0N, Woodbury, MN*

[Editor's Note: The upper portions of the "cw bands" also serve another purpose: They have traditionally been regarded as "foreign phone bands," places where non-U.S. stations can work other non-U.S. stations direct (and U.S. stations cross-band). In practice, only 14,000 to 14,080 is really used much for cw; 14,080 to 14,100 is commonly reserved for RTTY and the next 100 kHz is voluntarily left to "foreign phone."]

☐ Last year I wrote a letter urging that the FCC establish rules separating ssb and cw in the 160-meter band. No interest was shown, because WARC was coming up and the band was subject to change.

The effect of WARC on the band will be several years coming. In the meantime, we need some temporary rules because 160 meters is no longer the "Gentlemen's Band" it once was. The ssb stations have moved down into the 1800-1810 section of the band and tell the cw people to "get lost." Why won't somebody stand up for the cw gang? Is it genocide for cw operators?

I am an old brasspounder who just enjoys cw and see no reason why I should give it up. But until someone establishes some rules we'll have nothing but more fighting between cw and ssb. — *Ed Marriner, W6XM, La Jolla, CA*

MISLEADING ADVICE

☐ As an attorney I have received numerous questions from ham friends concerning the "Washington Mailbox" column, page 74, October *QST*. Your article seems to contradict things I have been saying in the past about the advantages of incorporation for a radio club.

Generally, a club or association has no status as an entity in the law. Every member of the club could be individually and jointly liable for the activities of that club if it is not incorporated. For example, if a Field Day antenna erected by a club in a negligent manner fell over on a passerby, that person might conceivably get a judgment against all the unincorporated club members. If the club were incorporated, the judgment would be collectible only from the club's assets in most jurisdictions.

The members or club officers of an incorporated club could (in most jurisdictions) only be personally liable in very unusual circumstances. These unusual circumstances would, for the most part, involve situations where the officer or member owed some duty to the club by virtue of his position, which duty he failed to perform properly, causing thereby a loss to the club. — *Richard A. Freedman, N2HH/K2DEM, Dix Hills, NY*

*Manager, Membership Services Dept., ARRL

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

The Ride for Friendship

Although in the normal course of events the lead article on this page is devoted to noteworthy events on the national scene, the following article prepared by Noreen Nimmons, VE3GOL, qualifies in a different sense. It is, in our opinion, an outstanding bit of dedication which certainly deserves this recognition.

Chris Taylor, VE3JPL, is new to Amateur Radio but quick to grasp and generate that feeling of true fellowship. This young man had a goal — not to buy bigger and better equipment *for himself*, but to procure a 2-meter radio for a blind fellow ham. George Charlton Stone is lucky to have such a friend. Thanks to Chris, there are a lot of new friends who are hoping to hear VE3GCS on 2 meters. Chris has called his venture the *Ride for Friendship*.

Toward the end of June, he visited a few clubs asking for sponsors, per mile, for a 100-mile 10-speed-bicycle ride from Toronto to Peterborough (uphill all the way). A commercial ham distributor, Ham Traders, immediately offered to accept collect phone calls from sponsors. The Toronto FM Communications Society and the Skywide club fully supported Chris. Bulletins were put out on the traffic nets. A sage group, known as the Wednesday Morning Koffee Klub, of the Kitchener-Waterloo area, had such faith in the project that a cash donation was sent forthwith and traffic man VE3KK placed a donation in a unique container with a fully serviced formal message covering the front.

Alas, too new to the amateur service to know that clubs wind up their season at the end of June and that members scatter for the summer, Chris fell short of the number of sponsors required. Therefore, after several setbacks, he decided *to go it alone!* Unsolicited, VE3KDT appeared on the scene to give assistance. Leaving Toronto at 3:45 A.M., Chris started out!

VE3KDT set up autopatches along the way to report progress and welfare and then went the last 30 miles with Chris, who arrived in Peterborough around 2:45 A.M., September 1 (a very hot and humid day). Chris, VE3JPL, expresses his sincere gratitude to those who did support him and said, "Hams renewed my faith in mankind." (I think that he did the same for the rest of us.) The goal was reached physically, but not financially.

Any club or individual ham who wishes to make a donation may send such to Noreen Nimmons, VE3GOL, 114 Babcombe Dr., Thornhill, ON L3T 1N1.

MEET YOUR CRRL DIRECTOR

Over the period of the next few months, we shall be presenting all of your CRRL officers and directors. Inasmuch as Director Tom Atkins, VE3CDM, is lucky enough to have a surname commencing with the letter "a," we start off this series with him.

Tom, currently one of the founding fathers of the CRRL and therefore a charter director, in addition to being the Canadian member of the newly formed ARRL Public Relations Advisory Committee, has served organized Amateur Radio in many different capacities for the past 11 years. From 1969 to 1978 he was a member of the Executive of the Radio Society of Ontario, Inc. — as an elected delegate, associate editor of *The Ontario Amateur*, chairman of public relations and external affairs, director, vice president and president. For two years he was the Ontario director of CARF and an active member of the CARF WARC Advisory Committee. Since 1978 he has been an assistant director of the ARRL Canadian Division.

Tom's beginning in Amateur Radio came in 1943 when he joined the Radio Society of Great Britain. He holds the call G4ABN and is an Advanced Amateur. He was on the Executive of the West Side ARC and chairman of public relations for the Ontario Science Center ARC, in addition to being one of the founding members of the Ontario ATV association. Other affiliations include life memberships in the ARRL, Royal Signals ARS, RSO and membership in the Canada DX Association, Toronto FM Communications Society and the Collier County ARC in Florida, where Tom operates portable W4 from Naples as often as he can visit the family condominium. He is active on 80 meters through 75 centimeters, trustee for the club station VE3XTV, and sponsors a white-caner.

With formal training in law and business administration, Tom has been professionally involved as an executive in the advertising, marketing and programming areas of commercial broadcasting since 1954 and is presently a vice president of Standard Broadcast Sales Company Ltd. in Toronto. With his wife Jo and two daughters, he currently resides in North York (Toronto).

*Director, Canadian Division

CRRL Director Tom Atkins, VE3CDM.

CRRL CERTIFICATE OF MERIT AND AMATEUR OF THE YEAR

Following a revision of the criteria, approved by the CRRL Board of Directors, we wish to advise as to the new rules which now apply: Certificate of Merit — any amateur and/or amateur organization in Canada may make a nomination and the award qualification will be determined by the CRRL executive committee.

CRRL Amateur of the Year — (1) Award of Merit holders for the year of the award and all those of the year previous shall automatically be on the ballot. (2) Directors may make additional nominations and they, in turn, may solicit same from their respective ADs, PRAs and SCMs. (3) Ballots will be sent to CRRL directors only and the president will only vote in the case of a tie. (4) The CRRL executive committee shall consider financial assistance (if requested) for the travel expense of the recipient to be present at the place of presentation.

We are pleased to advise that the following have been awarded the CRRL Certificate of Merit (1978) and that presentations will be made by CRRL officials as soon as possible and/or practical: Noel Eaton, VE3CJ, for his exemplary work and dedication in connection with WARC; Bud Punchard, VE3UD and Bob Eldridge, VE7BS, for their WARC service on behalf of Amateur Radio; Bob. Rouleau, VE2PY, for his leadership in connection with digital techniques; John Henry, VE3DNM, the president and founder of AMSAT Canada, for his work and dedication to the amateur satellite program; Alan Leith, VE3FRA, for his long-term dedication and excellence in editing *Long Skip*, which enjoys a worldwide reputation; and John Tessier, VO1FX, the founder and current president of the Society of Newfoundland Radio Amateurs.

POTPOURRI

☐In early November the CRRL addressed a personal appeal to the Prime Minister of Canada, requesting him to take concerted action in connection with the flagrant disregard of the Geneva Radio Regulations by the Soviet Union and their "Russian Woodpecker."

☐Because of the fine efforts of Noreen Nimmons, VE3GOL, Assistant SCM and STM of the Ontario Section, an agreement with the Canadian Red Cross (equivalent to what exists with the American Red Cross) appears imminent.

For those members who have reason to complain over the lack of prompt attention from CRRL headquarters, we feel a responsibility to expose the culprit — "Ms. CQ" — the official, unofficial secretary of CRRL. Additionally, being responsible for all filing, she is the reason your president can never seem to locate *anything*.

Conducted By Stan Horzepa,* WA1LOU

FM/RPT Down Under

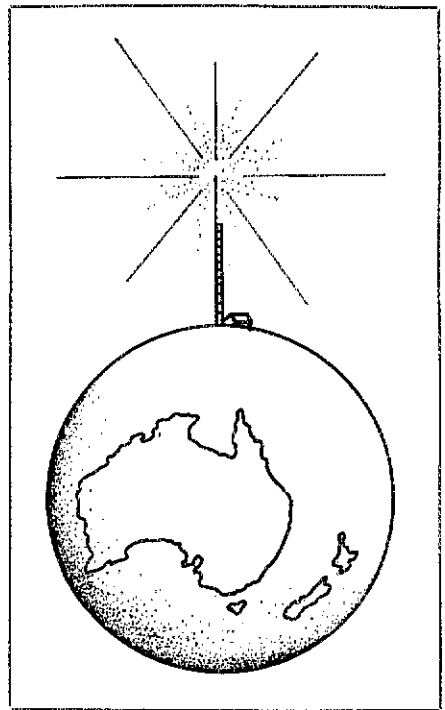
Three things are required to contact Australian and New Zealand amateurs on 2 meters: a reciprocal license, a rig and an airline ticket. We had been planning a long vacation Down Under for years and we decided to bring along some 2-meter fm gear. We purchased a Wilson WE-800 because of its size, weight and ability to run on either NiCads or a car battery. The rig covers the frequencies used in both countries, but we added a +700-kHz offset crystal for repeaters in New Zealand. Since the 800's battery charger will operate on either 110 or 230 volts, we anticipated no difficulties in homebrewing an adaptor to charge the rig (more about that later).

With the rig set, the next item to attend to was the reciprocal license. Licensing information and applications were obtained from the ARRL. Each country requires a completed application and a copy of your U.S. license. The New Zealand license is free, while Australia charges $12 (approximately $14 U.S.) and they mail the license to your stateside QTH. When we were completing the applications, we were concerned that we could not list a fixed location as required since we intended to tour the countries; however, this turned out not to be a problem as the licenses were issued for portable operation.

Australia is a huge country, virtually the same size as the conterminous United States, but only the East Coast has any significant population. And, despite the physical size of the nation, there are only approximately 50 2-meter repeaters, and all but a handful are located on the East Coast. Even in the major cities, there are few machines. Sydney, for example, has a population of over 3,000,000, yet, we could only find two machines (we were told that a third exists, but we never found it).

All repeaters operate on assigned frequencies. Outputs are located every 50 kHz from 146.70 to 147.20, with their inputs offset at 600 kHz, as in the U.S. While there are a lot of channels available, most of the activity takes place on the four "major" frequency pairs: 146.10/70, 146.20/80, 146.30/90 and 146.40/147.00. In each major city, there will be at least one repeater on one of these frequencies. The other frequencies are used for secondary machines in large cities and four machines in rural areas. Simplex activity is mostly on 146.50, but there is also activity on 146.45, 146.55 and 146.65.

As we mentioned, we did not anticipate any difficulty in rigging an adaptor for our battery charger. We were wrong. Since all Australian appliances are "earthed," they do not have adaptors for two-wire American devices. We were able to rig an adaptor, but the task would have been simpler if we had brought an electrical extension cord, removed the plug and attached a standard Australian/New Zealand plug, which was readily available in any electrical supply store Down Under.



We had wondered how well the 800 would work in the Australian systems which are typically listed as having "up to 10-kHz deviation." As we found, most repeaters run about 5-kHz deviation and we had no difficulty receiving or transmitting — comprehension was another matter! Australians, with their slang, accents and rapid speech, will leave you mystified (QCWA is the Queensland Country Women's Association). However, when the station you are working realizes you are a "Yank," he'll slow down and intelligibility will improve. You'll find the hams friendly and helpful and a few hours on the air will produce at least one invitation to tea.

Australia has many vhf enthusiasts on 2 fm and the topics discussed include satellites, sporadic E, tropo and transequatorial skip. The latter two are apparently quite common and furnish QSOs around the country, as well as with hams in New Zealand, New Hebrides and even Japan! Rarely will you hear a "73"; most QSOs will end with a pleasant "cheers."

New Zealand is a much smaller country. The two main islands, North and South Island, are nearly equal in size, and combined they are about the size of California. The population of 3,000,000 is outnumbered 20-to-one by sheep. While nearly two-thirds of the people live in the northern half of North Island (Auckland, the largest city, is located there), most tourists devote their trips to the magnificent scenery of South Island.

New Zealand has approximately 35 repeaters on 2 meters, each on one of seven frequencies. Outputs are 145.50, 145.525, 145.60, 145.65, 145.70, 145.75 and 145.80 MHz. Inputs are 700 kHz above the outputs. There is some talk of a change to 600-kHz separation, but just as we find resistance here to talk of a new band plan, most Kiwis don't fancy having to purchase a new batch of crystals. Simplex activity is concentrated on 145.00, 146.00, 146.05, 146.10 and 146.15.

While most of the major cities have two machines, there are many small communities frequented by tourists with no repeater coverage. On South Island, where there are fewer than 10 repeaters and where the terrain is mountainous, coverage is spotty.

We found it a bit easier to understand the average New Zealander, but this may have been due to our sojourn in Aussie, which initiated our education in Down Under speech. Most New Zealand amateurs speak slower than their Australian neighbors and that also makes copy easier. Again, we found that the people were quite friendly and we received several invitations to visit.

On the whole, we used the rig less than we thought we might, especially mobile — driving on the left side of the road posed enough problems. Also, the spotty coverage inhibited activity in some areas. Yet, we enjoyed having the rig along because it provided the means of meeting so many friendly people. It's definitely the way to go Down Under. — *Buzz and Sue Gorsky, K8BG and WB8FPB*

*72 Stiles St., Waterbury, CT 06706

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

RACES

Those of you who think that RACES operation takes place on Sunday afternoons at the New England Dragway are right — it does. But, those of you who think it has something to do with emergency communications are right, too. Founded in 1952 with the help of the ARRL, the Radio Amateur Civil Emergency Service is fed and cared for by the Federal Emergency Management Administration (FEMA). RACES works principally at the local level through local and state civil defense agencies organized by state governments to provide emergency communications in the event the FCC authorizes its use. Part 97, subpart (F), is totally devoted to this most important part of the Amateur Radio Service.

Emergency communications preparation is rapidly becoming one of the top priorities for many radio amateurs. Government agencies are beginning to realize the potential service that hams who are familiar with emergency communications procedures can provide. This month's column is devoted to subpart (F) of the rules: RACES. Get ready, Get Set, *Go!*

Q. What is RACES, and what does it have to do with me?

A. The Radio Amateur Civil Emergency Service, as part of the Amateur Radio Service, provides radio communications for civil defense purposes *only*, during periods of local, regional or national civil emergencies. These emergencies are not limited to war-related activities, but can include natural disasters such as fires, floods and earthquakes. As defined in the rules, RACES is a radiocommunication service, conducted by *volunteer* licensed amateurs, designed to provide emergency radiocommunications to local, regional or state civil defense organizations. It is important to note that RACES operation is authorized by the FCC upon request of a state or federal official, and is strictly limited to official civil defense activity in the event of an emergency communications situation (97.161, 97.163).

Q. Does this mean that I can volunteer as a RACES station?

A. At the present time, there is a freeze on the issuance of new RACES licenses. RACES operation is conducted by amateurs using their own primary station licenses, and by existing RACES stations (97.163[b]).

Q. Then to volunteer as a RACES control operator, all I need is a valid Amateur Radio license?

A. Well, not quite. You must *also* be officially enrolled in a civil defense organization (97.177).

Q. While engaged in RACES operation, does my license class limit me as to frequency use?

A. Affirmative. Operator privileges in RACES are dependent upon, and identical to, those for the class of license held in the Amateur Radio Service.

*Membership Services Assistant, ARRL

Table 1

RACES Frequencies

kHz

1800-1825	3984-4000
1975-2000	7097-7125
3500-3550	7245-7255

MHz

14.047-14.053	53.300
14.220-14.230	53.350-53.750
21.047-21.053	145.170-145.710
28.550-28.750	146.790-147.330
29.450-29.650	220-225
50.350-50.750	

Q. What frequencies are available to an operator conducting communications in RACES?

A. All of the authorized frequencies and emissions allocated to the Amateur Radio Service are also available to RACES on a shared basis. But in the event that RACES is activated by the FCC following a request from a local, state or federal official, Amateur Radio stations engaged in RACES operation will be limited to the frequencies listed in Table 1. The FCC is considering possible amendments to this list. Additionally, there are specific operating limitations with respect to these frequencies (listed in Part 97.185 of the Commission's rules). At this point, it should be noted that in all cases not specifically covered by the provisions in subpart (F), amateurs engaging in RACES operation will be governed by the provisions of the rules governing Amateur Radio stations and operators (subparts A through E of this part) (97.165).

Q. As an operator in RACES, what types of other stations can I communicate with?

A. As a RACES operator, you may communicate with: (1) Amateur Radio stations certified as being registered with a civil defense organization, (2) stations in the Disaster Communications Service, (3) stations of the U.S. Government authorized by the responsible agency to conduct communications with stations engaged in RACES operation and (4) any other station in any other service regulated by the FCC, whenever that station is authorized by the Commission to exchange communications with stations in RACES operation (97.189).

Q. Is there anything else in particular I should keep in mind while engaged in RACES operation?

A. It is important to bear in mind that any communication you make while operating in RACES *must* be specifically authorized by the civil defense organization for the area served. Furthermore, RACES stations may transmit only civil defense communications of the following types: "Communications concerning impending or actual conditions jeopardizing public safety, or national defense or security during periods of civil emergencies including: (1) communications directly concerning the immediate safety and protection of life, property and the maintenance of law and order; the alleviation of human suffering and need, and the combating of armed attack or sabotage; (2) communications directly concerning the accumulation and dissemination of public information or instructions to the civilian population. Also permitted are communications for the purpose of training (drills and tests) when necessary to establish and maintain the orderly and efficient operation of RACES as ordered by the responsible civil defense organization. However, these communications must not exceed a total time of one hour per week." Additionally, brief one-way transmissions for the testing and adjustment of equipment are allowed (97.191).

Q. Will I be paid for this work by the civil defense agency?

A. No. Just as in the Amateur Radio Service, no compensation of any form is permitted (97.193).

Q. I thought the emergency communications aspect of Amateur Radio was provided for in ARES. What is the difference between RACES and ARES?

A. This is an important distinction. ARES, the Amateur Radio Emergency Service, is the "emergency" division of the Amateur Radio Public Service Corps (ARPSC) sponsored by the ARRL. It consists of licensed amateurs who have voluntarily registered their qualifications and equipment for communication duty in the event of a disaster. Every licensed amateur, whether or not a member of ARRL or any other local or national organization, is eligible for membership in ARES. ARES is administered on a local, section-wide and national basis. RACES, on the other hand, is sponsored by the federal government and is under the jurisdiction of the FCC. It is a means by which amateurs may serve civil defense agencies in disaster communications on an organized basis, using their own bands and, to a large extent, their own equipment. It is intended that RACES, when properly authorized, will remain on the air in the event of any officially declared emergency, although the rest of Amateur Radio may be silenced.

RACES is a separate entity from ARES, although we advocate dual membership in and cooperative efforts between both groups whenever possible. In fact, the Federal Emergency Management Agency has recommended that civil defense organizations throughout the country affiliate with already-existing ARES groups in their state.

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by FCC staff. Interpretations contained herein concur with those of the FCC's Personal Radio Branch. Numbers in parentheses refer to specific sections of the FCC rules.]

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KHT

Free for All?

One has only to listen in on amateur bands to discover that amateurs are, by and large, human beings pursuing human pursuits. What sets us apart from our fellowman is our interest in things electronic. Most of us have inquisitive minds and our interest in things electronic blends to form new interests not directly covered by the Amateur Radio umbrella, but amateur (as in not professional) none the less.

In this column in October we touched upon a matter not strictly amateur (as in radio), but something this conductor felt was close enough to Amateur Radio to warrant discussing. The subject was unauthorized interception of nonamateur shf signals, radiated by common carrier transmitters, intended only for those receivers authorized by the FCC to receive the attendant transmissions. Two examples were (1) television programming (largely premium or pay-movie) transmitted now in more than 40 "market centers" by 2.15 GHz Multi-Point Distribution Systems and (2) television or other transmissions from U.S. licensed geostationary 4-GHz range satellites.

W6PSD responded, "Aw, come on, Bob! As we say in the military, why shake up the troops?" This reader noted, "Your October column in *QST* seems to be an example of needless bother to most, if not all, amateurs. How many are going to install earth terminals in their backyards?"

Indeed, how many of us will install (satellite TV) earth terminals in our backyards? There is no way of knowing how many (amateurs) might *ultimately* tackle such a project; I am in a position to know that several thousand have already done so. I am one of those.

The October column was prepared only 24 hours after a three-hour session I attended in a Federal Courtroom where I had to answer charges that *I* was "planning" to violate Section 605 of the 1934 Communications Act. As the co-sponsor (with my XYL, N5AVC) of something called the "Satellite Private Terminal Seminar" this past August in Oklahoma, I was ordered into the Tenth Circuit Federal District Court to show cause why an injunction should not be issued against my technical seminar. The plaintiffs, including a group called the Common Carrier Association of America, charged the seminar was going to *teach people* how to *illegally* intercept transmissions from (1) MDS transmitters and (2) satellite TV transmitters. The plaintiffs asked the court to rule that I could not hold the seminar; that I (and the dozen-plus instructors scheduled to teach at more than 50 sessions) could not *teach* microwave technology because in so doing we would be in violation of Section 605.

*Rte. 5, Box 364, Guthrie, OK 73044

Section 605. What in the world is that? I labeled it a rather "obscure piece of regulatory law" in my October column. W6PSD saw it another way. "The secrecy provision (Section 605) is part of an Act of Congress, specifically the Communications Act of 1934, taken almost verbatim from an earlier act, the Radio Act of 1927, Section 27; which is based on an earlier act, the Ship Act of 1912."

Among other things, Section 605 states: ". . . *no person not entitled thereto shall receive or assist in receiving any interstate or foreign communication by radio and use such communication (or information therein contained) for his own benefit or the benefit of another not entitled thereto* . . ."

I was hauled into Federal Court because it appeared to the plaintiffs my seminar was about to ". . . assist (persons not entitled thereto) in receiving (common carrier signals they were) not entitled (there) to . . ."

K1VR, an attorney like many responding to my October column, takes the position it is not illegal to *receive* common carrier transmissions; only to receive *and* divulge their content. He notes "I think the statute says it is illegal to receive and divulge; it is not illegal to receive. Congress wisely chose to recognize that it is impossible to regulate mere passive reception." K9AQJ, another attorney, points out an item appearing in the November 1979 *QST*, page 79, reporting the FCC, citing Section 605, had denied an author access to FCC (and private amateur) audiotapes of amateur traffic between the People's Temple in California and their counterpart in Guyana. In that decision the FCC noted ". . . one of the purposes of Section 605 is to protect radio transmissions of a private nature."

W6PSD contends that in spite of the 1912 origins of Section 605, he is not aware of any FCC prosecution for violation of this act. Certainly sanctions have been the exception and not the rule. He also notes ". . . violation of 605 seems to have become the norm," citing examples of a San Diego newspaper, publishing unpurged conversations on vhf two-way of a S.W.A.T. group and a New York television station broadcasting (radio) transmissions from the cockpit of an airliner in process of being hijacked. Many respondents insisted 605 has lost its teeth because of the proliferation of vhf and uhf "scanner" type receivers largely marketed for tuning in "private" transmissions.

K9AQJ adds, "As a practical matter, enforcement of any law which would prohibit reception of signals without at the same time restricting ownership of equipment to make such reception possible would not be enforceable." K4ZN writes, "We don't need amateurs getting into trouble with the law by crashing the Home Box Office gate." He also notes amateur understanding of 605 has perhaps changed through the years, citing a 1940-era ARRL *Handbook* that warned the fraternity "You may copy anything you hear, but you must preserve its secrecy."

When the October column was written, I was fresh from a Federal Court appearance where the judge wisely determined 605 was not the issue in *my* case, but rather, any attempt to restrain (free) speech prior to the fact was definitely prohibited by the Constitution. The seminar went on. More than 500 attended, including well over 100 fellow amateurs. A similar event early this February in Miami will draw more than 1000 people.

At that time the FCC was only granting "home" satellite (receiving) licenses after a lengthy and expensive "frequency coordination" procedure. In the interim the FCC on October 18 removed the mandatory licensing; individuals may build home satellite terminals *now* without a license. The license was only a portion of the hurdle. While K1VR, W6PSD and others may maintain no "permission" is required to tune in (common carrier) broadcasts privately in your home, the FCC still contends you do require such permission. K1VR has openly challenged the FCC to take one of *his* installations into court, hoping for a favorable ruling of course. Many contend that Section 605's prohibition against receiving and *benefitting from* reception of private (common carrier) transmissions means what it says. If you tune in *Smokey and the Bandit* from HBO, there is some logic to the contention that you benefited from the experience. W6HD, K1VR and others disagree, contending that benefit means monetary gain, not personal pleasure. If you share the reception with others, even your family, you may be running afoul of the prohibition against "divulging" the content of such transmissions. K1VR responds even *that* is immaterial noting that you are protected from uninvited "invasion" of your home by the Constitution and without "catching" you in the act would-be prosecutors would have a difficult time prosecuting.

This is a highly controversial, fluid situation. Yes, with the October 18 FCC ruling, you may now build your own satellite TV terminal and at least four of the present TV programmers on "the bird" grant no-charge permission to view. Nobody really knows what a judge will rule (if the opportunity arises) on the question of "benefit." MDS transmissions are another situation since *all* charge for reception services. Scrambling or coding of transmissions is coming on rapidly. Virtually all MDS transmissions are apt to be encoded within two years, although perhaps only a handful of the satellite services will be encoded.

My October message stands. In a fluid situation everyone gets trigger happy. K1VR wants to go to court; you may not. Be guided accordingly and protect your amateur license.

Happenings

Conducted By W. Dale Clift,* WA3NLO

ARRL Elections Results for 1980-1981 Term

Though the elections for director in the Canadian and Great Lakes Divisions are still in progress at this writing, the results are in for nine other races for ARRL division director and vice director. The newly elected officials become members of the ARRL Board of Directors, which is the governing body of the *American Radio Relay League, Incorporated*, as chartered under the laws of Connecticut. Vice directors can fill in when directors are unable to serve. The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and services that will be made available to the membership.

There are 16 ARRL divisions (see page 8). Half the divisions hold elections in the even-numbered years, half in the odd. ARRL full members are eligible to vote. The new directors and vice directors take office starting January 1, 1980. Here's how things size up in the divisions which were slated for elections activities in 1979.

Atlantic Division

This year, former Vice Director Jesse Bieberman, W3KT, takes over the directorship from Director Harry A. McConaghy, W3SW, who retired. Jesse received 4585 votes, which put him far ahead of the closest challenger, Thomas R. Sundstrom, W2XQ, who polled 877. George S. Van Dyke, Jr., W3HK, came in third with 680 votes, and Harry W. Robinson, W2AZ; Lawrence J. Solarczyk, WA3TSD; and Dennis D. Voorhees, AD3O, trailed with 671, 399 and 366 votes, respectively. Director Bieberman, who is from Malvern, PA, is retired, holds an Extra Class license, and for 32 years operated an outgoing QSL service. He served as ARRL vice director from 1966-1967 and 1970-1979, and as assistant director from 1968-1969; he held various offices in local clubs; was third call-area QSL bureau manager, 1947-1979; received the first DXCC-CW Award; has confirmed *all* countries on the DXCC list, phone and mixed modes; holds 5BDXCC; is a member of QCWA; has an ARRL 50-year membership plaque; and was first licensed in 1920.

The race for vice director in the Atlantic Division was won by Hugh A. Turnbull, W3ABC, who received 4692 votes. Harold C. Smith, K2HC, the closest challenger, garnered 1769 votes, and Alan H. Komenski, AC2K, came in third with 1026 votes. Hugh, who resides in College Park, MD, is retired. He holds an Extra Class license. An assistant director of ARRL from 1974 to 1979, Hugh is a charter member of the Goddard Amateur Radio Club and has held many offices in local radio clubs and the Foundation for Amateur Radio. First licensed in 1932, Hugh has received the following appointments and awards: FOC, OOTC, OO, ORS, DXCC, WAS, A1-OP and RCC. He is a life member of QCWA and AMSAT.

Canadian Division

The director election is still in progress at this writing because the disqualification of one of the candidates made reballoting necessary. The vice director election votes have been tabulated, however, and Frederick H. Towner, VE6XX, is the new vice director with 1423 votes. Fred's closest competition was Aaron D. Solomon, VE1OC, who got 850 votes. H. Gordon Steane, VE3BMG, came in third with 689 votes. Fred is from Calgary, AB, and holds the Advanced Amateur license. He is presently employed as the Calgary branch manager of Rogers and Associates Management Consultants, Ltd., in data processing. Fred is a former vice president of the Canadian Amateur Radio Federation (CARF) and originated Amateur/Department of Communications symposiums. He assisted with packet radio and tariff filings, was an organizer of the Canadian Packet Radio Network, and is a charter member of the British Columbia Emergency Net. Fred comes from a family of active hams: his father is WD6ERN, his brother KA6BNI, and his son VE2DNW. Fred was first licensed in 1954 as VE7MG.

Dakota Division

In this division, the incumbents for director and vice director ran for reelection unopposed. Garfield A. Anderson, KØGA, will continue as director for another two-year term beginning January 1, 1980. A resident of Minneapolis, MN, Gar is retired from the Northwestern Bell Telephone Company where he was assistant secretary and assistant treasurer. He was an ARRL assistant director and then vice director in 1975, becoming director in 1976. Gar is a past civil defense radio officer for the State of Minnesota and is a past president of the Radio Teletypist Society of Minneapolis. He is the president of the Zuhrah Temple Amateur Radio Club, and director on the National Advisory Committee of Courage Handi-hams. He is a member of the Twin City FM Club and 3900 Club, and holds a 50-year continuous-license certificate from the QCWA. First licensed in 1926 as 9DOP, Gar is a life member of ARRL and AMSAT.

Vice Director Tod Olson, KØTO, will also begin his new term this year. Tod is chairman of the board of ARES, Inc., and consultant for TAO Products. A past SCM, Tod has served as ARRL vice director since 1976. He is also a past ARRL assistant director of the Dakota Division, 1970-1975. He has served as president and vice president of the Minneapolis Radio Club and as president and secretary of the Minnesota Wireless Association. The founder and current managing editor of the *National Contest Journal*, Tod was licensed in 1952 as WØIYP. He is an ARRL life member and holds the 5BWAS and A1-Op awards. He is a former NCS in the National Traffic System and has been active as an OO, OBS, ORS and OPS.

Delta Division

Max Arnold, W4WHN, returns for another two-year term as director, having received 2030 votes, to 1034 votes garnered by challenger Malcolm P. Keown, W5XX. Max, who resides in Nashville, TN, holds an Advanced class license and is vice president of the Clarence Sutherland Company, which specializes in architectural millwork. Before becoming an ARRL director in 1970, Max was vice director from 1966-69 and assistant director from 1964-1965. He is president of the Springbrook Operating and Transmitting Society; past editor and publisher, *The Tennessee Ham*; founder, Radio Explorer Post 15, BSA; Amateur Radio instructor, community education program; member of Army MARS, ARES and RACES; custodian of the "Ten-N-Tenn" Award; and a member of the A1-OP Club. Max has also been a member of the ARRL Executive Committee, 1974-1979; director, ARRL Foundation, 1975-1977; and Board liaison, Emergency Communications Advisory Committee. Licensed and a League member since 1952, he is a life member of QCWA and AMSAT.

The vice directorship of the Delta Division goes to Lionel A. "Al" Oubre, K5DPG, who got 1657 votes. O. D. Keaton, WA4GLS, ran a close second with 1406 votes. Al, who is from New Iberia, LA, is retired and holds an Extra Class license. He held the office of assistant director of the Delta Division, ARRL, 1975-1979; founded the Louisiana Council of Amateur Radio Clubs; served in various offices of responsibility in the Lafayette and Iberia Amateur Radio Clubs; and was Iberia Parish RACES Radio Officer, 1964 and 1978; he has served as Louisiana Region II RACES RO/EC since 1978. Licensed since 1960, Al has also been assistant Louisiana SCM, 1978-1979; Louisiana State Air Force MARS director; Region 4 operational analysis manager, USAF-MARS; editor, *LARC*; EC, Keesler AFB, MS; OO; and DEC, Instructor Corps. He was a member of the 1979 ARRL National Convention Committee and was general chairman of the 1974 ARRL Delta Division Convention and the 1974-1978 LARC hamfests/banquets.

Great Lakes Division

The director election is still in progress at this writing because omissions of some biographical data on the first ballot made reballoting necessary.

The new vice director is incumbent George H. Goldstone, W8AP, who received 3484 votes. Anthony W. DePrato, WA4JQS, came in second with 1942 votes. A resident of Bloomfield, MI, George is an attorney and senior partner in the firm of Goldstone and Ott. He holds an Extra Class license and was ARRL vice director, 1978-1979, and assistant director, 1955-1977. He is presently director of

*Deputy Manager, Membership Services, ARRL

the Detroit Amateur Radio Association, and is active in the Detroit Area Repeater Team, Great Lakes Repeater Association, and the Amateur Radio News Service. First licensed in 1934, George is an ARRL life member and is a member of DXCC, QCWA, IEEE and the 10-X Net.

Midwest Division

Incumbent Paul Grauer, WØFIR/WAØLLC, has been elected to another two-year term as director of the Midwest Division with a total of 2173 votes. Challenger W. R. Rowe, Jr., NØTG, came in second with 565 votes, and Leland L. Bahr, WØVT, came in third with 559 votes. A former mayor of the City of Wilson, KS, Paul is president of the Wilson Telephone Company. An ARRL life member, he is active as an EC, OPS and OBS, and is involved with ARES, Army MARS, NTS, QCWA and AMSAT. In 1967, he received the Kansas Amateur of the Year Award. Paul, who holds the Extra Class license, was first licensed in 1928 as 9FIR.

Vice Director Claire Richard Dyas, WØJCP, who was unopposed for reelection, will continue as vice director of the Midwest Division for another two-year term. Dick, a resident of Lincoln, NE, is a lieutenant colonel, U.S. Army, retired. He has been the vice director of the Midwest Division since 1976, and was assistant director from 1973-1975. Dick is a director, secretary and past president of the Lincoln Amateur Radio Club. A member of Army Mars and a Charter Life Member of the ARRL, he was SCM of Nebraska from 1974-1976 and was first licensed in 1957 as K5LJD.

Pacific Division

William J. Stevens, W6ZM, has been reelected as the Pacific Division Director with 2435 votes. Challenger Michael W. Delich, WA6PYN, received 797 votes. Bill resides in San Jose, CA, and is a retired electronics instructor and chairman of the Industrial Education Department at James Lick High School, San Jose. He is currently an independent educational consultant. A past ARRL assistant director of the Pacific Division, Bill is active in the Northern California DX Club and the 10-10 International Net. He is also on the DXCC Honor Roll and is active in ARES. A life member of ARRL and QCWA, Bill was first licensed in 1934.

Robert C. Smithwick, W6JZU, who ran unopposed, has been reelected vice director. Bob, who lives in Sunnyvale, CA, is a dentist specializing in children's dentistry. He was ARRL assistant director from 1969-1977 and became vice director in 1978. He is president of SARO, Chicago; a member of the Board of Directors of the Electronics Museum Amateur Radio Club, Foothill College, the Northern California DX Club and the Medical Amateur Radio Council; member, AARN; and is president of the Board of Trustees, Foothill-DeAnza Community College District. He is also a charter member of Project OSCAR and a member of QCWA and AMSAT. He holds DXCC and WAZ, and is the author of several articles which have appeared in *QST* and other magazines. An ARRL life member, Bob was first licensed in 1940.

Southeastern Division

Director Larry E. Price, W4RA, who ran unopposed, was elected for another two years. Larry resides in Statesboro, GA, and is chairman of the Department of Finance and Law, Georgia Southern College. Southeastern Division director since 1973, he has also served as vice director in 1973 and assistant director in 1970 and 1971. Incorporator, secretary and past director of the ARRL Foundation, he also became chairman of the ARRL Legal and Regulatory Committee in 1974 and chairman of the ARRL Plans and Programs Committee in 1976. Larry served as Board Liaison to the ARRL DX Advisory Committee in 1975 and 1976. Presently, he is a member of the Executive Committee of the ARRL Board of Directors and is chairman of the ARRL Management and Finance Committee. He is a contributor to the ARRL *Antenna Book* and a *QST* author. He is also a past president and a past vice president of the University of Arkansas Radio Club and past faculty sponsor and secretary of the Georgia Southern College Radio Club. Active in ARES, Larry is also the communications officer for the Statesboro-Bulloch County civil defense. He is a member of the Radio Club of America and the QCWA. A life member of the ARRL, Larry was first licensed in 1951.

In the race for vice director, incumbent Frank M. Butler, Jr., W4RH, has been elected to another two-year term. Frank amassed 2828 votes to defeat Robert H. Reid, W4TK, who received 945 votes, and David Novoa, KP4AM, who polled 827 votes. A resident of Fort Walton Beach, FL, Frank is an electronics engineer with the Civil Service, U.S. Air Force. He has served as assistant director in the ARRL Southeastern Division, 1963-1969; SCM, Northern Florida Section, 1957-1979; president, and secretary/treasurer of the Eglin Amateur Radio Society; secretary, Playground ARC; and secretary, NW Florida FM Association. He is presently communications officer and RACES radio officer for the Okaloosa County Civil Defense. He is a member of Air Force MARS, and is the MARS repeater manager for the Eglin AFB in Florida. Active as an OO and OPS, Frank holds the Extra Class license. He is an ARRL life member, and was first licensed in 1950.

Pending Elections

Director elections in the Canadian and Great Lakes Divisions were to have been concluded December 14, 1979. The results of those elections will appear in next month's "Happenings."

AMATEUR EXAMS AT CONVENTIONS, HAMFESTS DISCONTINUED

The Federal Communications Commission will no longer be able to schedule special examinations for Amateur Radio license applicants at locations away from field offices. This policy will discontinue all special examinations conducted in conjunction with Amateur Radio conventions; however, requests for special examinations which have already been confirmed will be honored.

This policy will not affect regularly scheduled examinations at field offices or at examination points in cities where the Commission does not maintain offices. The policy of permitting handicapped applicants for amateur licenses to be examined by Commission-appointed volunteers is also unchanged.

Special field examinations are being discontinued as a result of congressional action reducing travel funds for fiscal year 1980 and the President's desire to reduce travel by government employees.

FCC EXPLAINS NOVICE 250-WATT RULE

When operating on the Novice subbands, all U.S. amateurs may not exceed the 250-watt power input limitation of §97.67(d) of the Amateur Rules. In 1973, Ronald J. Potaczala filed petition RM-2277, which asked that the 250-watt rule be amended so the electrical power associated with the grids of vacuum tube final amplifiers would no longer be included in the ". . . power input to the final amplifying stage . . ." Mr. Potaczala supported his petition by arguing that Amateur Radio operators may unintentionally violate this rule by adjusting the vacuum tube-type transmitters to operate with a plate input power of 250 watts. In these cases, the power input to the final amplifying stage would exceed 250 watts.

The Commission recently dismissed RM-2277, but it also clarified the rule in its Order. According to the Commission: "When determining the total input power, only the power associated with heating the cathodes of vacuum tubes may be excluded. Consider, for example, an Amateur Radio transmitter using two type-6146B vacuum tubes in the final amplifier, driven to full rated output.

operating frequency: 3725 kHz, A1 emission
plate input power: 180 watts
screen grid power: 3.5 watts
control grid power: 0.4 watts
heater power: 15.75 watts (not included)
input power to the final amplifying stage supplying power to the antenna: 180 + 3.5 + 0.4 = 183.9 watts.

Since 183.9 is less than 250, this transmitter would comply with the rule."

LETTER FROM ARRL PRESIDENT DANNALS TO PRESIDENT CARTER

October 26, 1979

The President
The White House
Washington, DC 20500

Dear Mr. President:

The attached article concerning what is known as the "Russian Woodpecker" appeared in the September 12, 1979 edition of the *Washington Post*. It describes a type of radio interference that has disrupted U.S. radiocommunications and radiocommunications throughout the world for over three years, in violation of the 1959 Geneva Radio Regulations, and continues to do so. These regulations are equivalent to a treaty commitment. The source of the interference is the Soviet Union.

As you can see from the attached article, the Soviet Union is a signatory to the 1959 Geneva Radio Regulations which specifically state that no administration shall deliberately cause harmful interference to another administration. The Soviet Union has been informed by the U.S. and other administrations many times during the past three years that it is causing harmful interference to amateur and other radio services, yet the problem persists.

As the binational society representing radio amateurs of the United States and Canada, the American Radio Relay League has been working to rid the airwaves of the "Woodpecker" since it first appeared in the summer of 1976.

The League has received thousands of complaints of radio interference from radio amateurs. The League has forwarded many of these complaints to the Federal Communications Commission, and many radio amateurs have written the FCC directly to express their frustration at having to endure this interference for so long with apparently no relief forthcoming.

The FCC and the State Department have been unable to persuade the Soviet Union to honor its obligation not to cause harmful interference. We, the 365,000 radio amateurs of the United States, now appeal to you.

Sincerely yours,
Harry J. Dannals
President

PROPOSAL TO COMBINE AMATEUR AND COMMERCIAL EXAMS DENIED

Petition for Rulemaking RM-2574, which proposed combining Amateur exam elements 4(A) and 4(B) with commercial exam elements (1) through (4), has been denied by the Commission. The petition, which was filed by Erling R. Jacobsen, proposed that the elements be combined in such a way as to enable an applicant to receive simultaneously both the Amateur Extra Class and the Radiotelephone First Class license. It also proposed that an Amateur Extra Class licensee be issued a Radiotelegraph Second Class operator license, provided that the licensee pass elements 5 and 6 of the commercial radio operators' examination.

The Commission disagreed, because "While there are some technical similarities between the two services, the operational characteristics of the two services differ considerably. The purpose of the Amateur Radio operators' examination is to determine an applicant's qualifications to operate Amateur Radio transmitting equipment, and to deal with noncommercial radio communications among Amateur Radio stations solely with a personal aim, and without pecuniary or business interest. The purpose of the commercial radio operators' examination is to determine an applicant's qualifications to install, maintain, service and operate radio transmitting equipment, and to engage in commercial radio communications or transmissions with a pecuniary or business interest."

RECEIVE-ONLY SATELLITE EARTH STATIONS DEREGULATED

The Federal Communications Commission has made the licensing of domestic receive-only satellite earth stations optional, by its First Report and Order in CC Docket 78-374. In a summary of its decision, the Commission stated that the public interest would best be served by the: (1) immediate implementation of a voluntary licensing program for receive-only earth stations, (2) complete deregulation of unlicensed receive-only earth stations, and (3) initiation of a rulemaking proceeding to revise existing rules and establish new rule sections in part 25, including, but not limited to, specific procedures for possible further deregulation and the investigation of possible total deregulation of all receive-only earth stations.

The old rules had a three-step licensing process for domestic receive-only satellite earth stations: frequency coordination, construction permit and license. Under the new rules, a receive-only domestic satellite earth station does not have to be licensed; however, the builder would then have no enforceable right to interference-free reception. A builder who goes through the voluntary licensing and frequency coordination would have some protection from possible interference.

Discussions related to whether or not continued regulation of the earth receive-only stations was necessary to enforce Section 605 of the Communications Act (the secrecy provisions) figured prominently in many of the comments in the proceeding. Some parties argued that licensing is necessary for enforcement of Section 605 since the threat of revocation of the station's license is an effective deterrent to violations. These parties raised the specter of theft of signals and argued that this is a significant problem which any form of deregulation would tend to encourage. Other parties asserted that the threat of revocation has little or no deterrent value and noted that other means of enforcement, such as the Copyright Laws and Title III of the Omnibus Crime Control Act are significantly more effective.

In a separate statement, FCC Chairman Charles Ferris pointed out the benefits of deregulation. He stated that the Commission had eliminated what could have become a massive administrative burden, thereby enabling the agency to more efficiently allocate its future personnel and financial resources. He also pointed out that the Commission's action ". . . lowers the economic and procedural barriers inhibiting unrestricted competitive entry into the satellite field."

ENFORCEMENT ACTIONS ORDERED AGAINST IMPROPER AMATEUR LICENSES AND CALL SIGNS

On June 14, 1976, the Indianapolis, IN, office of the FBI received information that persons were obtaining Amateur Radio licenses without taking the required examinations. The results of an FBI investigation indicated that Robert Kirkham, a local Amateur Radio licensee, was arranging for the improper issuance of amateur licenses through Richard C. Zeigler, who was then chief of the Commission's Special Licensing Section at Gettysburg, PA. In an interview with an FBI agent, Kirkham acknowledged this practice and listed 46 such instances or attempts, including an upgrading of his own license without examination. Kirkham told the FBI that in some instances he accepted money, goods or services in exchange for these "favors," but that none of the proceeds were sent to Zeigler.

On June 29, 1976, the FBI's Cincinnati, OH, office received information that a Commission official in Gettysburg was accepting money in return for issuing preferred call signs to Amateur Radio licensees who did not qualify for them. The results of an FBI investigation into this allegation indicated that Zeigler had accepted $100 payments from four licensees in the Columbus area in connection with the issuance or reservation of specific call signs. On April 28, 1977, Zeigler was indicted on four counts of violating Title 18, United States Code, Section 201(c)(1), in connection with allegedly accepting money relative to the issuance of call signs to John R. Sheller, John C. Gallucci, Terry R. Dillahunty and Richard Bennett. On June 6, 1977, Zeigler was convicted on two counts. He subsequently resigned his position with the Commission. On November 18, 1977, the chief of the Safety and Special Radio Services Bureau released an order directing the four persons to show cause why their licenses should not be revoked and suspended for apparently engaging in this conduct. Because of the hearing status of these cases, the circumstances surrounding these particular transactions were not explored in the present investigation.

After his conviction, Zeigler was interviewed by Commission personnel in an effort to identify persons who had received "favors" through him. He corroborated information already in the possession of the Commission and volunteered some new information. Commission personnel also attempted to interview Kirkham and all persons named by him as having received call signs or licenses without qualifications. Some of these people, including Kirkham, refused to answer questions. None of the interviews was conducted under oath.

The commission also became aware of other questionable amateur licensing and call-sign practices, in addition to those revealed by the FBI investigations. In some instances, the licensees involved were Commission employees. On October 19, 1977, the Commission released an order instituting on its own motion an inquiry into the alleged improper issuance of licenses and call signs in the Amateur Radio Service. It found that in addition to helping friends of Kirkham obtain Amateur licenses, Zeigler had, sometimes on his own and sometimes at the direction of his superiors, granted "favors." These favors included waivers of amateur exams and preferred call signs. For example, the report reveals that former FCC Chairman Rosel Hyde had directed that three amateurs be upgraded without their having taken the usual examinations. In another instance, James E. Barr, who was chief of the Safety and Special Radio Services Bureau, had waived the examination requirements for himself based on tests he had passed several years prior to the upgrade. A. Prose Walker, another chief of the Amateur and Citizens Division from 1971 until his retirement in 1975, also on occasion instructed Zeigler to issue specific call signs for individuals who, he believed, were "friends of Amateur Radio." The record reflects additional instances where call signs were not assigned "systematically."

Former Commissioner Charlotte Reid's office obtained specific call signs for at least two licensees; former Commissioner Benjamin Hooks' office also apparently requested and received a special call sign on behalf of an amateur licensee. And former Chairman Rosel Hyde's office helped a station from the Boy Scouts of America obtain a "BSA" call sign.

The FCC report said that the Commission had erred in assigning call signs in this manner. It said that absent a misrepresentation or the payment of money, however, the assignment of call signs in this manner did not raise questions as to the qualifications of these licensees. They did not violate any rules; rather it was the Commission itself that did not adhere to its own rules in assigning these call signs.

In conclusion, the Commission stated that its employees must maintain a high standard of conduct, and it directed the staff to order call-sign changes for those present or past Commission employees whose current call signs were not assigned in accordance with Commission Rules. QST

50 Years Ago

January 1930

☐ At League request, F.R.C. has opened 14,100-14,300 kc. for voice use by holders of extra class licenses. Editor Warner urges careful attention to good signal quality and operating courtesy on this international band.

☐ Bev Dudley says with proper design you can get most of the hum out of a fully-a.c. powered receiver, and discard those bulky and expensive batteries.

☐ Top winners in the Sweepstakes (January) will receive actual straw brooms, appropriately decorated, with certificates for the others.

☐ VE2AC contends that the new 28-Mc. band has lots of potential, if only we can get a receiver operating satisfactorily there, and locate the band on the dial! A simple coil wound on an old tube base, plus a tickler, is his recommendation.

☐ For an inexpensive power transformer, yet saving laborious winding of thousands of turns, W9CRR suggests the use of second-hand unmounted honeycomb coils for the secondary, after winding a simple primary on an old core.

☐ Crystal control has become a near-necessity for successful operation in today's crowded bands, and W9DRD educates us as to the various angles of cut and thicknesses appropriate to the 80- and 40-meter bands.

☐ Growing public interest in amateur radio has prompted a series in *QST* describing the government's written exam; this month the likely regulations questions are treated in detail.

☐ Filtering and keying are two subjects of major importance in working our smaller and more crowded bands, and Signal Corps engineer Coe offers some suggestions for improvement, particularly dealing with power supply regulation.

☐ A spot of humor by W5LS has "Souphone" Groves, W5NW, and his "brother-in-law" as central characters.

☐ More than 250 amateurs copied the 1929 Navy Day message transmitted last October by NAA and W1MK.

☐ W1BFT finds that the first and sixth districts are the most consistent in replying to QSL's.

25 Years Ago

January 1955

☐ A recap of 1954 shows amateur licenses and League membership at all-time highs, with peaks also in Field Day and Sweepstakes participation.

☐ W2TTU reports on progress in Cornell's ionospheric propagation studies, largely involving auroral contacts between amateurs on 50 and 144 Mc. In September and March, which Rolt says are the best months, point your beam north for a sample of this phenomenon.

☐ We shouldn't neglect the cubical quad just because lack of sunspots has spoiled 10-meter DX; W5DQV built one equally effective on 14 Mc.

☐ Dropping down one more notch in the spectrum, W1ICP describes his simple, one-element rotary for improved operation on 15 meters.

☐ WØSYE of Collins untangles for us many of the mysteries and problems of receiver performance, particularly sensitivity, noise figure, cross-modulation, s/n ratio, and blocking.

☐ If you have a hundred-watt rig now, WØVTP suggests it will nicely drive a 304-TH grounded-grid amplifier, and at the same time avoid neutralization problems.

☐ Noise still is a major headache in 10-meter receivers; W4MJJ contends that rejection by use of tuned traps or chokes is as effective, or more so, than by-passing techniques.

☐ After ten years absence, hurricanes descended on the east coast with destructive fury in late 1954; W1NJM reports yeoman work by amateurs in providing emergency communication during "Carol" and "Edna," with information on "Hazel" to come next month.

☐ W1HDQ finds that the new 6524 dual tetrode works beautifully on 432 Mc., giving u.h.f. enthusiasts the first practical chance to produce a potent signal.

☐ Radio Shack has opened a second store — this one in New Haven, Conn.

☐ The League supports the Commission's proposal to permit Technicians on 50 Mc., but says it's not yet time for the opening of 144 Mc. to that class.
W1RW

Club Notes

Your club members plan to buy a new transmitter but haven't raised all the money yet. You need ideas on how to do so. What have other clubs tried? El Dorado County (CA) ARC entered "booth competition" at the El Dorado County Fair and won $125! (And got good publicity to boot!) Livermore (CA) ARK reports that groups selling soda pop at outings, such as air shows, raise as much as $900. The owner of an electronics store let ARC of El Cajon (CA) members take the store's used equipment to swap meets. The store set a minimum price. Anything earned over the set price could be kept by the club.

Your club program chairperson begs for suggestions. Again, what do other clubs do? Atlanta (GA) RC premiered "The Gong Show" this fall, where members with stories, tips or presentations that could be done in two minutes competed for prizes! PHD ARA (MO) held "Operation Christmas Tree." Members and families convoyed to a tree farm, picked out and cut Christmas trees and shared a memorable afternoon get-together over cocoa, coffee and cookies. Charlotte (NC) ARC President Thelma, WA4JLW, announced that club members were working on a project to aid a local man in communicating with family and friends. The man is paralyzed from the mouth down. Members have taught Morse code to the man and hope that through the aid of a computer, he'll be able to "talk."

Your club needs new benefits to offer in order to pull in new members. When Northern Alberta RC puts on functions open to all area hams, tickets are discounted to club members, as a membership benefit. Clubs could purchase other area clubs' hamfest tickets, etc., and discount these to club members, too. Bowie (MD) ARC member, K3PI, suggests that clubs collect catalogs from electronic parts suppliers and surplus houses. Members can then check the catalogs at club meetings, when ready to start building a project. The club may want to ask to be placed on the mailing lists! Egyptian RC (IL) initiated a column in their club bulletin, *Podunk News*, where members send in "Things I Would Like to See at ERC." Chevrons for club jackets are offered to Triple States RAC (OH) members for participation in events such as Field Day. The chevrons are awarded at the Christmas Recognition Dinner. Sheboygan County (WI) ARC prints a breakdown in their club bulletin, of where the dues go . . . keeps members happy.

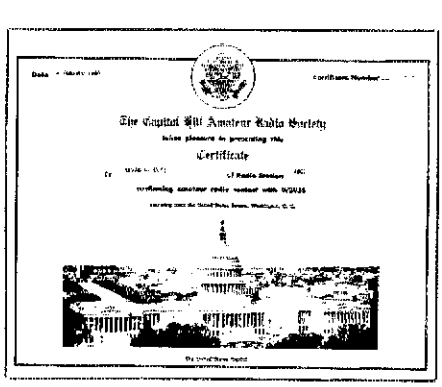
Speaking of where the dues go, Arrowhead RAC (MN) members considered a general policy whereby expenditures exceeding 25 percent of the treasury would be announced in the club bulletin and then voted upon. Another consideration was to adopt a budget with set percentages for club operating expenses and particular activities. A third idea was to have members fill out a form showing which areas and what percentage of the treasury they'd like to see spent for each. And on a tangent, if clubs always keep business meetings short, a good compromise is to reserve three club meetings a year for business only.

KØNB of Lincoln (NE) ARC suggests that club members keep a log of mileage for club-sponsored activities, such as storm watches, toy-a-thons, etc. The log can be kept for tax purposes.

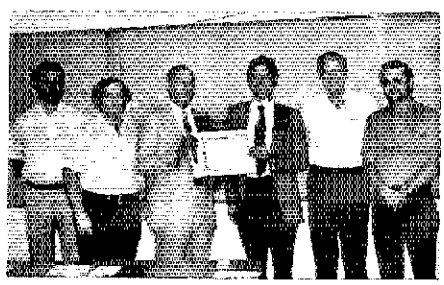
Kudos to Rocky Mountain VHF Society and Boulder (CO) ARC who teamed up on Field Day, checking out emergency capabilities. Their communications van's facilities were demonstrated to area authorities — fast scan TV from a remote location; quite impressive.

Another item of interest: Radio Association of Erie (PA) and Indiana County ARC recently held a certificate exchange mini-QSO Party. Each club awards a certificate for working a set amount of club members. At a scheduled time and frequency, each clubs' members got on the air and made contacts with each other, earning the certificates. — *Rosalie White, WA1STO*

Labor Day weekend by the Bill Gremillion Memorial (GA) Radio Club, K4SEX, at a local fair and arts festival. L to r: Gloria, WD4HEO; Mike, WD4PAG and Rudy, WA4PUP, sign up people for a future Novice class, handle radiograms and monitor National Weather Service reports for Florida exhibitors and visitors who were concerned about the ongoing Hurricane David.



A most impressive certificate of Capitol Hill Amateur Radio Society, W3USS. The club, located in the United States Senate and founded in 1968, has sent out over 5000. You can get one by working the station on any band, any mode, sending your QSL and a business-size s.a.s.e. (for DX stations, 3 IRCs).



ARRL club affiliation charter presentation to one of our new affiliates, the Williamson County (TX) Amateur Radio Club. Congratulations and welcome. L to r: Treasurer WB5TER; Activities Chairperson WD5GWO; Vice Director of West Gulf Division W5EDZ; President N5TT; Vice President WD5HQH and Secretary N5ALS.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AIR, H. R. Stickney, Bridgewater, MA
W1AJE, Clarence Bierkamp, Hooksett, NH
KA1ALC, Rossie T. Bright, Groton, CT
W1DDB, Allison R. Macomber, Segreganset, MA
W1DRV, Robert J. Earl, Ridgefield, CT
WA1EAI, Joseph F. Daley, Brookline, MA
W1EKG, John E. Brennan, Braintree, MA
W1EV, Harold A. Hutchinson, New Britain, CT
W1HOG, Monroe M. Farwell, Billerica, MA
W1LJZ, Parker W. Frost, Revere, MA
W1NIG, John R. Sprague, Jr., Pittsfield, ME
K1UZT, Ernest E. Venezia, Saugus, MA
W1WIV, Edward F. Gibson, Lynn, MA
W2BCU, William H. Lewis, Lincoln Park, NJ
K2CIQ, Bradford B. Thompson, Albany, NY
KB2FT, Arnold F. Hamm, Valatie, NY
WB2GTR, Edward P. Nielsen, Shirley, NY
W2JEV, John L. Russell, Stony Brook, NY
WA2LPZ, George R. Caterham, Minoa, NY
W2LVQ, Gerald S. Gibbs, Yonkers, NY
W2OMM, Robert H. Clark-Duff, Middle Village, NY
W3AVY, Robert M. Francis, Pittsburgh, PA
W3BDY, Allan H. Burns, Sr., Baltimore, MD
WB3BRR, Bernhard F. Becker, Cheverly, MD
W3HT, Herman Lukoff, Ft. Washington, PA
WA3MQU, Max R. Stirn, Greensboro, MD
K3OFI, Francis J. Lineham, McKeesport, PA
WB4ACE, Perry D. Bradley, Nashville, TN
WA4DYW, Norman O. Howard, Hopewell, VA
WB4FHH, Kenneth R. Odom, Kings Mountain, NC
WA4FIN, Rosalie M. Billman, Sarasota, FL
WB4GTS, Frederick H. Vogel, Naples, FL
K4MZD, John M. Griner, Bushnell, FL
W4PPA, Richard C. Chatfield, Miami, FL
K4PYJ, Raymond L. White, Nashville, TN
WD4SBD, Robert A. Versoma, Sebring, FL
WA4VKI, Clarence W. Williams, St. Petersburg FL
WA4VLG, William A. Godbout, St. Petersburg, FL
W4VTO, Suzanne C. Burt, Sarasota, FL
W4ZV, Rudolph W. Raabe, Richmond, VA
W5ARS, Robert D. Clark, Wichita Falls, TX
W5GEX, Everett W. Wilgus, Brownfield, TX
W5II, Otto L. Groff, Littleton, CO
K5ODH, George W. Martin, Midland, TX
WB5WGB, Richard C. Poston, Conroe, TX
W6ASW, Herbert S. Gross, Running Springs, CA
W6CRN, Charles J. Sherburne, Rowland Heights, CA
W6FOG, Henry A. Hopkins, Paradise, CA
W6PC, Lyman W. Packard, Oakridge, OR
W6RCE, J. Howard Zurcher, Oakland, CA
W6UOK, Glen Baker, Menlo Park, CA
WA6WAI, Herbert E. McCann, Napa, CA
W7AIW, Joseph B. Kellar, Seattle, WA
N7BL, Fred G. Bartholomew, Parker, AZ
W7BZC, Floyd H. Kirkland, The Dalles, OR
W7CBB, Francis H. Johnson, Portland, OR
WB7DZY, Diomede J. Brillon, Seattle, WA
K7ED, Keith A. Martin, Bellevue, WA
W7GWQ, E. Walden Byers, Marysville, WA
WB7PGG, William P. Rank, Gresham, OR
K7VFR, Dr. Raymond E. Gillett, Mead, WA
KA8DEM, Joel D. Gottlieb, Ann Arbor, MI
W8EVT, Leon C. W. Kettring, Toledo, OH
W8HJR, Edward D. Alverson, Wyoming, MI
W8HPR, C. Emerson Price, Denver, CO
WD8MGA, Claud C. Bolyen, Pickford, MI
W8MZJ, Carlysle O. Rogers, Traverse City, MI
WD8OSN, Milton A. Monahan, Southfield, MI
WB8SNW, Kenneth Schipper, Hudsonville, MI
WA8UHE, William C. Brodt, Blue Creek, OH
W8YAF, J. Darrell Douglass, Rocky River, OH
W9AFO, Ralph M. Billings, Three Lakes, WI
ex-9BHF, Verdon Stones, St. Louis, MO
WD9CSY, Harold F. Clark, Chicago, IL
WD9FZI, Nye L. LaBaw, DeKalb, IL
WB9PFH, Nicholas S. Koruschak, Escondido, CA
WB9WMW, Clyde Ritter, Crawfordsville, IN
KØAHV, Kenneth W. Miller, Sioux City, IA
WØARQ, Charles V. Crane, Olathe, KS
WØCOF, William W. Anderson, Colorado Springs, CO
KØKMI, Dr. Merrill C. Mattson, Vernon Center, MN
*KØOBT, Michael D. Ahlberg, Minneapolis, MN
WØOXC, Myron G. Jones, Pierre, SD
WBØPJN, Lester H. Miller, Lakewood, CO
WØPLJ, Matthew E. Schuch, Jackson, MO
WØQO, Harold R. Dornquast, Robbinsdale, MN
WBØRND, Max P. Goulet, International Falls, MN
WØRPA, Harold E. Dutton, Buena Vista, CO
WØRVK, Edwin R. Yaeger, St. Louis, MO
VE1EL, W. E. Lockhart, Lewisville, NB
VE1FT, Fred M. Park, Sydney, NS
VE2AX, Gordon Southam, Morin Heights, Quebec
KP4ADR, Oswald I. Cameron, Rio Piedras, PR
KP4CPG, Luis D. Beltran, Aguadilla, PR
KP4DMI, Leocadio B. Rodriguez, Guaynabo, PR
VP2VBG, Henry Milstrey, Tortola, VI
VU2GW, Dr. G. Ranganthan, Madras, India
ZS5A, C. Eric Lowe, Durban, S. Africa
9Y4T, J. M. MacDonald, Petit Valley, Trinidad
*Life Member

In Training

POTPOURRI OF CLASSROOM IDEAS

How do you keep your enthusiasm up for teaching year after year? This is one of the toughest parts of teaching and one of the most important. Your own enthusiasm as an instructor is what motivates your students. The fun you are having is contagious and so is the boredom . . .

The letters we receive from Amateur Radio instructors indicate that there is a constant need for new ideas to use in the classroom. Here are some of the best ones we have recently come across.

On Code

Code practice is divided between sending and receiving. The class elects the best fist of the night. So far, no one has been elected two weeks in a row. The competition is *brisk*! — *N5ACM*

In the first "indoctrination" session of a Novice class, AB5F tuned in a prearranged QSO and stood at the blackboard translating the cw into written text. The students were fascinated. — *Kilocycle Club, Fort Worth, TX*

Include in an early code practice tape a few standard messages of traffic. Have a workshop later in the course and use a game similar to the child's game of "gossip" or "telephone." Pass the same traffic around a group, from one person to the next, but don't reveal the original text until the end of the game. At the end of the session discuss slow speed nets and give out schedules of the Novice nets in the area. — *K2IZ and W1RM*

On Theory

Because math is often a stumbling block for would-be Technicians and Generals, teaching the formulas involved in the basic "Electrical Principles" chapter in the *License Manual* is quite often a challenge. One approach is to teach a formula in combination with its practical application. For example, in the session on inductance, provide a number of air-core coils. Have the students use the formula for calculating inductance to determine the value for each of the coils. Another example would be to provide a large pile of resistors or capacitors in the center of the table and hold a contest to see who can be the first to produce a given value of resistance or capacitance by using more than one component.

To demonstrate the principle of amplification, conduct a demonstration using the following circuit. With the circuit you can show how the small cell can control the flow of current through the load and, in effect, light the large lamp using the power from the other source. — *WA8MHO*

Do you have an activity that works especially well for your class? If so, we'd like to hear about it. Please write and tell us — perhaps we'll be able to use your idea in a future column. — *Jeanie Zaimes, ABIP*

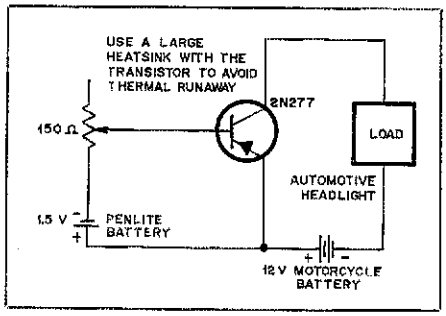


Fig. 1 — This circuit demonstrates amplification. Use a large heat sink with the transistor to avoid thermal runaway.

Strays

The World Scout Bureau's station, HB7S, operating on the weekend of October 20-21, 1979, at an international camp at Satigny, near Geneva, was helped by a team of volunteer operators drawn from WARC delegates. Shown are (l to r) Dick Baldwin, W1RU; Chuck Dorian, W3JPT; Len Jarrett, HB9AMS; Bud Punchard, VE3UO; Gerald Lander, HB9AJU and Lou Bradley, W4SWP. Other helpers were VE3CJ, WØBWJ, G2BVM, W3OKN, VE3DA, HB9BMM, HB9AZD and HB9APA.

Coming Conventions

1980
January 4-6
North Florida Section, Orlando, FL
January 26-27
Southeastern Division, Miami, FL

ARRL NATIONAL CONVENTIONS

July 25-27, 1980
Seattle, WA
March 13-15, 1981
Orlando, FL

SOUTHEASTERN DIVISION CONVENTION

January 26-27, 1980, Miami, FL

The 1980 Convention combines with the 20th annual Tropical Hamboree for two sun-filled days of activities with an international flair. Miami is the crossroad for travelers from near and far so you will meet hams from around the world. The rare DX and the ham next door will be in Miami in January. During your free time you can visit the sights in the Miami and Miami Beach area (map available from committee), drive the world-famous Overseas Highway to historic Key West or even arrange a post-convention cruise to the lovely tropical islands in the Caribbean.

Convention activities include technical forums, ARRL forum, WARC aftermath, Communications Department forum, plus organizational meetings and exhibits for all interests in Amateur Radio. AMSAT President Perry Klein, W3PK, will discuss "AMSAT-Phase III" for OSCAR users. ARRL speakers are headed by President Harry Dannals, W2HD; and Southeastern Division Director Larry Price, W4RA; and from the Hq. staff Bob Halprin, K1XA, and Doug DeMaw, W1FB.

Major manufacturers will have exhibits of their latest equipment to whet your operating appetite and skills. For the bargain hunter the famous "Hamboree Swap Shop" will be filled with used gear and parts. The glittering Hamboree awards will have you checking hourly to see if you have been honored. South Florida DX Association will host a seven-hour DX forum and dinner. Southeast Chapter QCWA are hosts for the QCWA-SOWP-OOTC Luncheon. QFN will NCS the traffic handlers breakfast. Don't miss the "New Products Series."

Site of all these events is fabulous Flagler Dog Track. Ample free parking for 6000 vehicles, plus overnight RV parking for self-contained units. Convention registration is $3 advance, $4 door. Swap Shop tables are $5 each, per day, plus registration. Special hotel rates at Ramada Inn-Airport are $37 single, $42 double (reservation card available from committee). For further details and convention brochure, write: Dade Radio Club, Inc., P. O. Box 350045 — Riverside Station, Miami, FL 33135. QST

Hamfest Calendar

***Illinois:** Get rid of your winter doldrums! Attend Wheaton Hamfest, portable nine, sponsored by the Wheaton Community RAC, Sunday, January 27, at the Arlington Park EXPO Center, Arlington Heights Race Track. 300 free flea market booths, 100 commercial booths (for booth info call WB9TTE, at 312-766-1684). Acres of clear, paved parking. Plenty of prizes. Tickets $3 at the door, $2 advanced. Send s.a.s.e. to WCRA, Box QSL, Wheaton, IL 60187. Doors open at 8 A.M. sharp.

***Michigan:** The Oak Park ARC annual swap & shop will take place on Sunday, January 13, at the Oak Park High School, Oak Park Blvd., Oak Park, MI. Doors open at 8 A.M. For info, table reservations or tickets write to Oak Park ARC, 14300 Oak Park Blvd., Oak Park, MI 48237. Talk-in on 146.52, info frequency 04/64. Club station is W8MB.

Pennsylvania: Get rid of your post-Christmas blues! Attend the 3rd annual Mercer County RC Seminar to be held January 19 at the Holiday Inn, West Middlesex, PA, off I-80, from 9 to 5. Speakers and prizes.

*ARRL Hamfest

Advance registration $2, $3 after January 11. For details write K3LA, P. O. Box 673, Sharon, PA 16146.

Pennsylvania: The Lancaster hamfest will be held on February 24 at the Guernsey Pavillion, Route 30, east of Lancaster, at the intersection of Route 896. General admission $3, except children and XYLs. Doors open at 8 A.M. Inside spaces by advance registration only, $3 each 8-foot space (includes table), deadline February 15. Vendors set up 6 to 8 A.M., reservations not held after 10. Free tailgaiting outside, weather permitting. Two-hour Dutch Country tour, $4 advance registration. Tour tickets returned by mail February 20. Food served at hamfest, restaurants and accommodations in area. Motel reservations $17 double. Talk-in on 01/61. Airport pickup by advance request. Write: SERCOM, Box 6082, Roherstown, PA 17603.

Virginia: Richmond Frostfest III, sponsored by the Richmond Amateur Telecommunications Society, will be held Sunday, January 13, at the Bon Air Community Center. Homebrew contest with four awards. FCC exams start at 10. Completed Form 610 must be received in the Norfolk Office, FCC, 870 North Military Hwy., Bank of Virginia Building, Norfolk, VA 23502, no later than January 9. Admission $4, indoor flea market tables $3, tailgaters $2. Talk-in on 28/88 and 34/94. Contact Richmond Amateur Telecommunications Society, P. O. Box 1070, Richmond, VA 23208.

Wisconsin: The 8th annual Midwinter Swapfest of the West Allis RAC will be held Saturday, January 19, beginning at 8 A.M. at the Waukesha County Expo Center. Food, refreshments and prizes. Tickets $1.50 advance, $2.50 at the door. Reserved tables $3 until January 11 or when half of available tables are gone. Write: 1980 Swapfest, P. O. Box 1072, Milwaukee, WI 53201. QST

Strays

AMSTERDAM DX CERTIFICATE

The Amsterdam DX certificate is available for hf and vhf contacts with Amsterdam DX Club members. Details from H. J. Klijn, P. O. Box 9, 1000 AA Amsterdam, The Netherlands.

11,348 MILES-PER-WATT

Steve Miller, WA3JJT, Erie, PA, reports a 216-mile QSO with Craig Szczutkowski, N2DA, while running 19-mW output to a 40-meter dipole. Power measurements were made on a Tektronix 453 oscilloscope. Who says you need power?

AMATEUR TELEVISION REPEATER ON LONG ISLAND

The Syosset (NY) High School Amateur Radio and Television Club, an ARRL-affiliated club of approximately 25 students, is involved in an exciting project that they would like to share with other groups. For the past three years they have worked with the Long Island Mobile Amateur Radio Club (LIMARC) to expand the educational use of amateur television in their area. After extensive negotiations and enormous effort by many dedicated individuals, the LIMARC ATV repeater is now located on an excellent tower in Syosset, Long Island, and is available for use, covering about a 20-mile radius. The repeater's (WR2AOV) input frequency is 439.25 MHz and the output is 426.25 MHz (carrier activated). The signal can be received on a standard TV receiver with the use of a simple converter.

Ed Pillar, K2KPQ, LIMARC ATV committee director, has designated noon to 1 P.M. and 7 to 8 P.M. as testing periods. The Syosset club encourages other groups to join them on the air during the noon to 1 P.M. testing period, and then arrange future schedules. They wish to determine what other clubs would like to work together on an interactive Novice licensing course via ATV. They are video-taping segments, taught by James Teeple, KB2I, that could be used for this course. They plan to continue adding tapes of special topics and guest speakers to their library. Please contact James Teeple, KB2J, Syosset High School, South Woods Rd., Syosset, NY 11791, for further information. — *Rosalie White, WA1STO*

HAMS ON HAND AS WEDDING BELLS RING

Sherry Elson, WD9FQQ, of Farmersburg, IN and Dwayne Gorder, WDØGTT, of Estelline, SD, who met on 40-meter cw, were married recently in Estelline, SD. The bride's father, William Elson, W9CBU; photographer Keith Miller, WØTLD; and usher Dave Nystrom, WDØGTU, were also on hand for the ceremony.

In Ojo Sarco, NM, an August wedding united Fe Ana Burke, WB5YOH, and Larry Brooks, WBØECV. Minister Bruce Maxwell, N5GB; maid of honor Pauline Albee, WB7ROF; best man Steve Cavender, WBØECU; father and mother of the bride Clem, W5IXR, and Helen Rose Burke, W5IXS; witnesses Paul Albee, W7ZEA, and Dace Balsie, WBØDMQ; and photographer Bill Grogan, WBØKSW, were among approximately 50 hams who attended the wedding and reception. *QST* congratulates both couples.

David Ross, age 10, WD6FLP, has been an Amateur Radio operator since February 1978. At the ARRL Southwest Division Convention, in Anaheim, CA, in October, he visited the AMSAT OSCAR booth to view the OSCAR slide show.

YL News and Views

Conducted By Jean Peacor,* K1IVJ

Resolution Time

Try something new! Resolve that 1980 will be the year to try an entirely new aspect of Amateur Radio. What with OSCAR, moonbounce and excellent propagation, there are any number of exciting things that perhaps you have yet to try. Here's one idea that the whole family can enjoy. It's fun and even more so if you bring the "OM and kids." Try a fox hunt.

Fox hunting dates back to 1732, King George's era. It caught on in the United States in 1775. George Washington was an avid fox hunter. You too can identify with kings and presidents — just hunt the fox (some areas prefer rabbits).

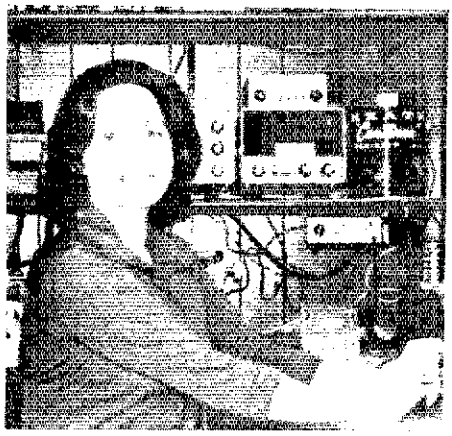
Perhaps you've already decided that transmitter hunts are for the young? Not so! When our local radio club first announced a 2-meter hunt, prevalent thoughts ran to "that will be great for the kids." Proof that we are all kids at heart, who participated? All ages. It was planned for the club's 2-meter repeater to be shut down during the hunt. In this way, it was hoped that those who had never tried a hunt might, in trying to use the repeater, end up listening to the fun, thereby creating a new interest for them. It worked. As a listener, you end up being absolutely certain where that fox is hiding. Most times it's a wrong guess, but listening in on just one hunt is all it takes to have you building the necessary directional antenna in order to be ready for participation in the next hunt.

Where does the whole family come in? It's possible to hunt alone but far better to have others sharing in the excitement. It's adult "hide and seek" and the more minds for sorting out clues the better. For mobile hunts, one can drive, another take bearings, both decide where to head next and the children can keep their eyes peeled for the fox. Children's eyes are sharp and have proven themselves to be great assets among hunters.

Antennas can be most simple. The "ZL Special" can be made in an hour — this is a favorite from ARRL's *Antenna Handbook*.

There are tricks of the trade that can only be learned from experience. Your time spent hunting will diminish with every successive hunt as you become more and more proficient. Should there be occasion to track down an unknown radio signal, this experience can be valuable.

Jan Shillington, N9YL, of Glendale Heights, IL, is a member of The Wheaton Community Radio Amateur Club and until recently served as editor of their newsletter. Jan is also an experienced hunter as the Wheaton club sponsors many "open country" type of hunts. The only real rule for this type hunt is that the fox must hide within DuPage County. There is no central starting place, which is where luck comes into play — you can start a little late and still have a chance. If the fox makes it too difficult,



Wheaton Radio Club's Jan Shillington, N9YL

he is the one who must wait until found, or the amateurs give up (which almost never happens). How about the time Jan found the fox in the top of a tree that looked unclimbable?

Jan and her OM Tom, WB9OKL, are not the only YL/OM team in the Wheaton club's hunts. Char Mayer, KA9CAV, and Nancy Grabenhofer, WD9HBE, along with their OMs, are also regular hunters.

The Wheaton club has also joined with the Schaumburg ARC and the Elgin ARC for a three club fox hunt. In that case, three foxes hid simultaneously using three different radio frequencies. Following discovery of all three foxes, all clubs then joined together for one grand picnic.

Rules for the Mt. Tom Repeater Association are slightly different. There is a central starting place, which is announced by the fox, and he must hide within a 10-mile radius of this point. The hunt begins when everyone is assembled and mileage at the starting point has been recorded. The fox then transmits at five-minute intervals, for one minute. Some transmissions give clues; some don't; some even become quite poetic. The winner is determined by a point system, so many points for each mile, so many for each 15 minutes taken, low score wins. Regardless of score, comparing notes during the social hour at the finish makes it all worthwhile.

Mt. Tom isn't without its regulars as YL/OM teams. Eunice Gordon, W1UKR; Heather Hall, WB1ABF; Bernice Lambert, WB1DHA, and their OMs are all enthusiasts.

Win or lose, it's exciting playing the game. Hunts have taken inactive-licensed YLs out of that category and added them to the active list. They've created interest in radio for children. They make a nice family day. They're fun! Does your radio club run their fox hunts differently? Let's hear from you.

LAST-MINUTE NEWS

The Quarter Century Wireless Association, Inc. has just issued a charter for Chapter number 120. What makes this of special interest in a YL column is that the new Chapter will be known as Quarter Century Wireless Women (QCWW) and is open to membership worldwide.

Pending organization and the first election of officers, Acting President is Blanche Randles, W4GXZ; Acting Secretary, Onie Woodward, W1ZEN. Membership in QCWA is a prerequisite for joining the Chapter. For further information and applications, contact Onie Woodward, W1ZEN, 14 Emmett St., Marlboro, MA 01752.

YL ACTIVITY DAY — A NEW YEAR IDEA

What do you do on the sixth day of each month? It's an easy day to remember and a fine suggestion has been made for it. Let's increase YL activity on the bands on the sixth of each month.

Peggy Arciero, WB2OHD, whose idea will help everyone in getting DXCC-YL.

Peggy Arciero, WB2OHD, recently talked with Diana Hughes, G4EZI. During their QSO, Diana offered the above suggestion. Peggy agreed to help in getting it off the ground and all of us onto the airwaves between contests. Their thought is to have on the hour attempts by calling CQYL (e.g., 1500Z or 1600Z). Suggested frequencies are 14,288, 21,388 and 28,688 kHz (ssb) — 14,088, 21,088 and 28,088 kHz (cw).

Peggy has recently upgraded and now holds her Extra Class license. She and her OM became Novices together in 1977. The calls issued to them were, his, WA2OHD; hers, WB2OHD. They've both upgraded but those calls they will always keep.

Peggy and Diane have made a good suggestion. January sixth is a Sunday and would allow working YLs the opportunity to join in the kick off of this new idea. Give it a try. See you on YL Activity Day.

REMINDER

Upcoming YL/OM Contest — February and March. See "Contest Corral" for details.

*Country Club Dr., Monson, MA 01057

QST Profiles

Conducted By Dave Bristol,* KA2BNV

Courage in Minnesota

Bruce L. Humphrys, KØHR, Courage HANDI-HAMS director, was born January 19, 1943 in Hattiesburg, MS. He lives with his wife, Lynda and two daughters, Lena-Marie (8) and Briana (5), in North Minneapolis, MN. Bruce was first licensed, as KNØGVW, in 1955. He earned his General class license in 1956, Advanced class in 1960 and Amateur Extra Class license in 1976. During the Kennedy presidency he was stationed with the presidential radio station aboard Air Force One. After the assassination he worked with another governmental agency in communications in Latin America and the Far East. He holds a Bachelor of Arts degree in International Relations from the University of Minnesota (1969). A Drake TR-4, homemade trap dipole and vertical antennas, homemade Transmatch and Autek QF-1 audio filter make up his amateur station.

Courage HANDI-HAMS Director Bruce Humphrys, KØHR, demonstrates transmitter design to HANDI-HAM student Malcolm MacKay.

QST: *What is Courage Center and the HANDI-HAM System?*

Humphrys: Courage Center is a comprehensive rehabilitation facility for persons with physical, speech, hearing and visual handicaps, based in Golden Valley, MN. Besides the Courage HANDI-HAM System, Courage Center offers a tremendously wide array of services for handicapped people, ranging from vocational training and guidance, through occupational and physical therapy, counseling and physical recreation, to leisure time activities. Essentially, the goal of Courage Center services is to provide appropriate "holistic" rehabilitation to an individual to help him/her to lead a full and self-satisfying life, regardless of any physical dysfunction.

The Courage HANDI-HAM System is one of Courage Center's services — serving more than 1000 people all over the world. The System provides three direct (and many indirect) services: (1) educational material, fraternity and close personal supervision; (2) Amateur Radio equipment, on loan; and, (3) specially designed devices for ease of station control. The System relies on a trained cadre of radio amateurs to help provide these services. We help not only new students to get their first license, but handicapped licensed hams to upgrade.

QST: *What are your interests in Amateur Radio?*

Humphrys: I get really excited about operating cw and the OSCAR satellites. I think that chatting with another ham on cw is very satisfying, from a number of aspects. First — it involves using a skill that 99 percent of the earth's population hasn't developed. That puts the ham operator in a very select group. Second, operating cw carries a special kind of magic, whether you're chewing the rag, handling traffic or contesting. A person has to bring a whole bunch of skills into play in order to really enjoy the mode. It feels good to be able to do something well.

And OSCAR — I'm like a little kid, I guess. It's still hard for me to realize that the amateur fraternity has launched communications satellites of such high quality and comparatively small cost. Hearing your own signal come down from space is a real kick. Copying telemetry, I can visualize myself right up there, in the spacecraft itself. It's not every day that an ordinary guy can get so wrapped up in space technology.

QST: *Who are some hams that you have helped get on the air?*

Humphrys: One of the most interesting projects I've been involved with is getting Bill Savada, KA4DAA, *back* on the air. Bill developed a universal allergy (he's allergic to everything!) and has been living completely isolated in a porcelain and stainless steel mobile home in Texas. Bill holds a Novice ticket, but has had no way of getting on the air with his Century-21.

We have designed an all-stainless-steel, airtight container for the transceiver, using some shaft extensions of stainless, with knobs donated by a ham in Missouri, and a "Puff 'N' Sip" keyer designed by a handicapped ham in Washington, DC. This is an exciting project — especially when you consider that Bill has a lot more to gain by getting on the air than most of us.

QST: *The FCC has recently ruled that handicapped prospective amateurs will not be given special cw or written exams. Do you have any comments on this?*

Humphrys: Yes, First, I'm encouraged to see that the Commission is following the suggestions of the many respondents to the Notice of Inquiry that the requirement for demonstrated proficiency in cw not be dropped or altered. Second, I would hope that the Commission has included official recognition that some applicants, because of their disabilities, require special consideration. I am hopeful that the Commission will allow the Field Offices to permit volunteer examiners some latitude in verifying cw proficiency at the prescribed speeds.

QST: *What do you see in the future for the Courage HANDI-HAM System?*

Humphrys: Unfortunately, society is "making" handicapped individuals at an undiminished rate. As long as persons with handicaps wish to enjoy this wonderful hobby, as long as funding is available, and as long as there are dedicated hams willing to "go the extra mile" to help someone, there will be the System. Techniques may change, licensing requirements might be different, but our basic goal of helping individuals will stay the same — no matter how many individuals that might be. Five years ago we had only 34 students, most of whom were located in southeastern Minnesota. By the end of 1979, we had over 300 students, plus more than 226 student-members (handicapped hams upgrading through the System) in 45 states and half a dozen other countries. We look forward to serving even more people more ways. QST

*Editorial Assistant, *QST*

How's DX?

Conducted By Clarke Greene,* K1JX

Century Clubhouse Visit

The yardstick by which most DXers measure their success is their standing in the DXCC rolls. While there are many prestigious, difficult-to-attain awards available, DXCC membership has consistently maintained its stature as the number one award among DXers.

With all this notoriety, you would presume that virtually everyone with more than a passing interest in DXing would be familiar with the mechanics and administration of the DXCC award. After all, how can you play the game if you don't know the ground rules? The rules for DXCC are printed on the first page of the official ARRL DXCC List,[1] but how these rules are applied and how the award is actually administered is a mystery to most hams. We traveled to New England and talked with Don Search, W3AZD, the man who runs DXCC.

Upon walking into the DXCC section of the Communications Department, one conclusion is immediately reached: The amount of DXCC paperwork is incredible. The page of DX Century Club award winners which follows this column every month represents one heck of a lot of cards. Each one of these cards has to be checked, recorded — more on that later.

Don gave us a rundown on what a typical awards application complete with cards goes through, once it arrives in Newington. "The first thing that happens to the application takes place in the mailroom. Any funds sent along with the application are removed and credited to the member. Then the cards and the application are sent down here.

"The cards are put in boxes until it's their turn to be looked at. We've usually got such a backlog that it takes a while before those particular cards are looked at. When it is their turn, we take out the applicant's file. If he is applying for DXCC for the first time, we make up a new file for him. We keep a detailed record of each DXCC submission. That way we know exactly what cards have been submitted, and what countries have been confirmed. The cards are looked at very closely, to make sure that they are authentic and have all the necessary information filled in.

"If all the cards are okay and the fellow is eligible for a new award or an endorsement, we make up the award and send it out with the cards. The cards are sent out by different means, depending on how much in the way of funds were sent along. Most of the time the guys want their cards sent back by registered mail. If they didn't send along enough to cover registered postage, we send them back by the highest class mail that the funds allow for. Usually, this means we ship U.P.S. This has worked out to be even faster than registered mail in a lot of cases. We can't send via U.P.S. to a post office box, though."

Don understated a little when he said that the cards are closely checked. We saw each card looked at *very* carefully. Any modification to the card is cause for rejection. Don explained why.

"We know that usually the DX station or a QSL manager is the one who crosses out a date or changes a D into a B on the card. He might make a mistake while filling out the card and just correct it. Unfortunately, most everyone in the world has ball-point or felt-tip pens, nowadays. That means that anyone who has had the card could have changed the writing. We can't tell who made the change. Usually it's the guy who issued the card, but we can't be sure, so the card is rejected."

If a card is rejected, a note is enclosed with it telling the reason for rejection. Another card for that country can be sent in its place and credit is given. For you cynics, Don reports that he very seldom comes across a card that has been "doctored" by the applicant.

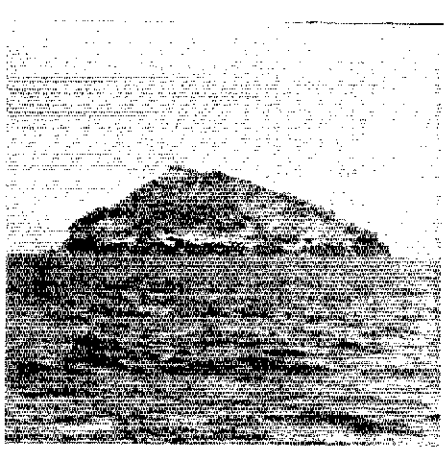
The conversation turned to another topic which he aways gets questioned about: documentation of DX operations. It seems that several years ago there were some DXpeditions to countries that had never been activated or at least hadn't been on for some time. Lots of DXers worked these for new ones and they were all counted. Back in those days, a ham's word that he operated from where he *said* he did was good enough. Some DX stations had difficulty working these expeditions, though; the beam headings weren't at all right. Other irregularities popped up, too. To ensure that all future operations were carried out as claimed, written documentation is required of all operations from countries that are rare or out of the way. Proof of actual presence in the country at the time of operation *and* official permission to operate an Amateur Radio station at that time are required.

"Let me give you an example. K5CO operated from a couple of places in Africa a while ago. He didn't have much trouble proving that he was where he said he was; his passport proved that. The problem was that one particular country he went to didn't ordinarily issue ham licenses, so the government was unfamiliar with the procedure. Scotty got permission to operate from an official in charge of communications for the local district. Since that official had jurisdiction over communications for the district where the operation took place, we decided that was okay. If he had been the official for another district of that same country, the decision might have been different."

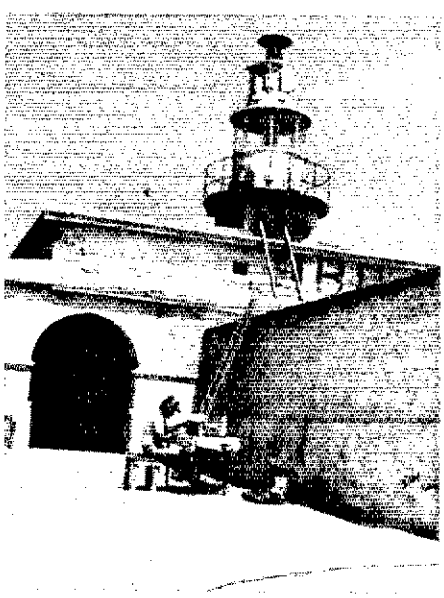
This turns out to be one of the biggest stumbling blocks for those well up on the DXCC ladder and still climbing. Once your DXCC total is well up toward 300, many of the new ones you work are the result of a DXpedi-

*7815 Mandan Rd., Apt. 102, Greenbelt, MD 20770

[1]Available from ARRL headquarters upon receipt of a self-addressed, stamped envelope.

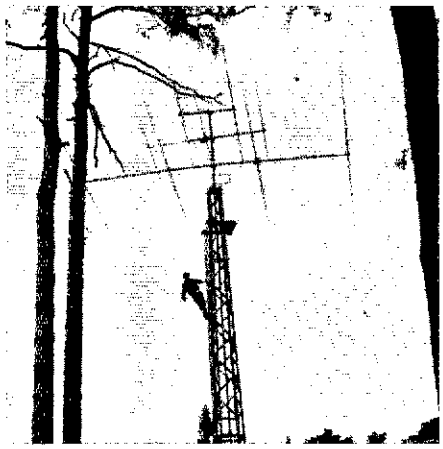


OE6XG/A made Abu All available to all who needed it last May. This is what Abu All looks like from the point of view of a fish. The high point of the rock is 300 feet above sea level. *(I2CBM photo)*



Downtown Abu All. The keeper of the lighthouse, Mr. Saverio, was the host for the DXpeditioners. *(I2CBM photo)*

I2CBM working the crowd. Bert, along with JZ8AZ, DJ9ZB, OE6EEG and I2FGP, made 7500 ssb contacts and 4500 cw contacts during their three-and-a-half-day stay. *(I2CBM photo)*



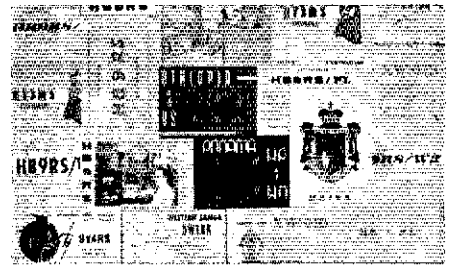
Milan, OK1AWZ, inspects his antenna system in Prague. (*K7ZZ photo*)

tion or a new station coming on the air from a country where there was little or no activity in the past. Regardless of whether you have a bona fide card, it might not count if that DX station of yours doesn't have the appropriate documentation recorded at ARRL headquarters. That may seem grossly unfair, but think of this: How would you like it if a few hundred or even a thousand hams worked a station in a country you've been looking for for eight years and you just happen to find out that the operation really took place from a boat anchored off of Maine? Any legitimate operation has the documents to prove he is where he says and official permission to operate. That not only protects you, the DX chaser, but also protects him from being arrested for operating a ham station where he shouldn't be!

Another conversation topic we hit upon was what does and doesn't qualify for country status. This is currently a hot topic among DXers.

"The DXCC rules pretty well define what counts as a country," Don explained. "Sometimes, though, someone finds a loophole in the rules or some political situation comes up that requires close examination. The rules have pretty well been updated to fill in those loopholes. There are a lot of countries on the list that were added before these rules took effect, so they're on the list to stay."

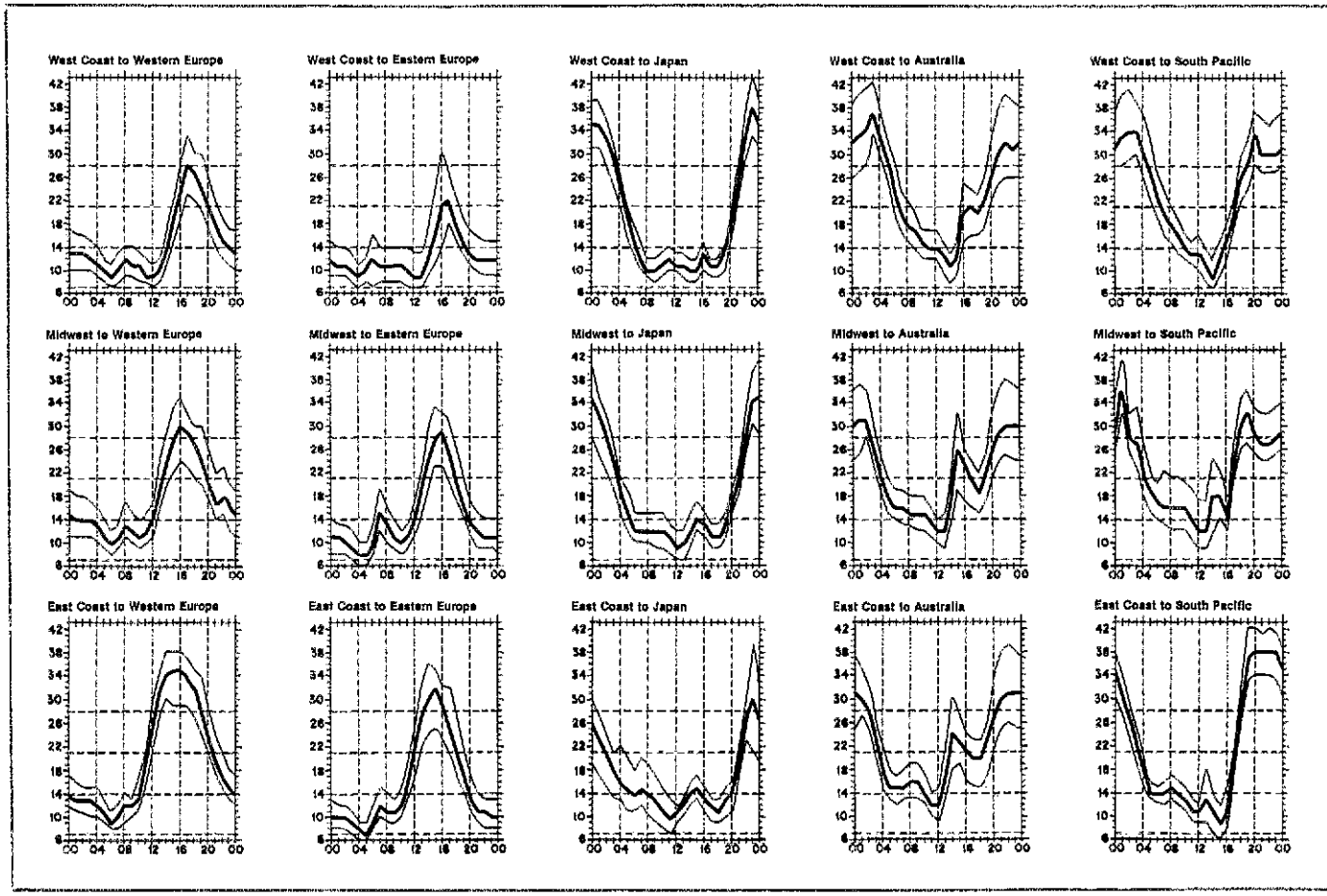
We asked him why these countries aren't deleted to conform to the new rules. Don felt the biggest reason was demand. A lot of the DXers want a big country total. Even though everyone's status would stay pretty much the same relative to everyone else's, the big numbers wouldn't be there anymore. It might also mean more people on the DXCC Honor Roll, since a lot of the countries that



Some people really get around. This is the card collection of HB9RS; not the ones he's received but the ones he's sent! Max has the distinction of Working All Continents from All Continents. (*W1CKK photo*)

presumably would be deleted have only been activated by a small number of expeditions to each one. Anyone who didn't have the good fortune to work these expeditions for whatever reason would move up those notches. The unusual political situation is well illustrated by the homelands in South Africa.

"I recently saw an article in *Time* Magazine about these states," Don said. "Apparently they're just that — states — even though they issue their own postage stamps and money. You know, a long way back each state in the United States issued its own stamps and



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

money. Obviously that's not true anymore, but way back toward the beginning it was. Another good indicator is the United Nations. They haven't recognized these states as countries either. Our DXCC countries list obviously doesn't reflect what the United Nations does, but at least it's an indication of a lot of these countries' status. We'll have to wait and see what develops."

By the way, in addition to the experience Don has gained by working at the DXCC desk, he is also on the DXCC Honor Roll. Don made it on the Honor Roll after working at it for nine years. Sure he used a kilowatt but the antenna was a triband beam at 50 feet. Don points out, that to the best of his recollection, *every* DXCC country has been active at least once since 1964.

"A lot of guys with their big beams and kilowatts work 250 countries in their first year or two. After that it gets really slow and the important factor is patience, not a big station. A lot of guys want to get to the top right away. It just doesn't happen."

If patience and dedication are what is needed to get from 250 to the top, then the patience and dedication learned by the "little gun" as he works his way up to 250 countries confirmed in five or 10 years, rather than just a year, should prove to be the ticket to entrance to the DXCC Honor Roll. QST

QSL Corner

Administered By Joan Becker

K5KG/J3ABP would like to offer some suggestions for *QST* readers which, if followed, will make the life of a QSL manager much easier. All of these suggestions arise because of actual problems encountered in processing return cards. A small percentage of cards creating these problems can increase the processing time tremendously.

1) Make sure date and time are correct, and that time is GMT/UTC. Time is frequently off by one hour, and date is frequently wrong past midnight, when the next day's date goes into effect.

2) Put date/time/band/mode on the back of your envelope to facilitate bulk sorting.

3) Enclose a self-addressed, stamped envelope, and fold it so a lightning-fast letter opener will not slice it in two.

4) Put your call on the same side of the card as the QSO information.

5) Use a standard-size personal envelope or a standard-size business envelope. Odd-size envelopes are extremely clumsy to handle.

6) Enclosures of IRCs, stamps, and so on should be loosely contained in the envelope and not buried in the inner sanctums of the return envelope.

"I realize these suggestions are old hat to many; however, there are many newcomers to DXing who are not familiar with them. We are experiencing many of the above problems, especially from stations we worked on 10-meter ssb — the newcomers."

Manager of the W7 call area, W7GUR, requests that the bureau does not take cards for Alaska, such as AL7, NL7, WL7 and KL7. Neither does it take A7, as quite a few such cards are arriving at the bureau.

Late word from WA2FIJ: Palmyra (K6I PO/KH5) and Kingman Reef (WA2FIJ/KH5K) DXpeditions will run from January 4 to January 9. Palmyra QSLs to WA6YQF; Kingman to WA2FIJ.

Now on to QTH and QSL notes. As always, the accuracy of the QSL information is not guaranteed. It is passed along to you as we receive it.

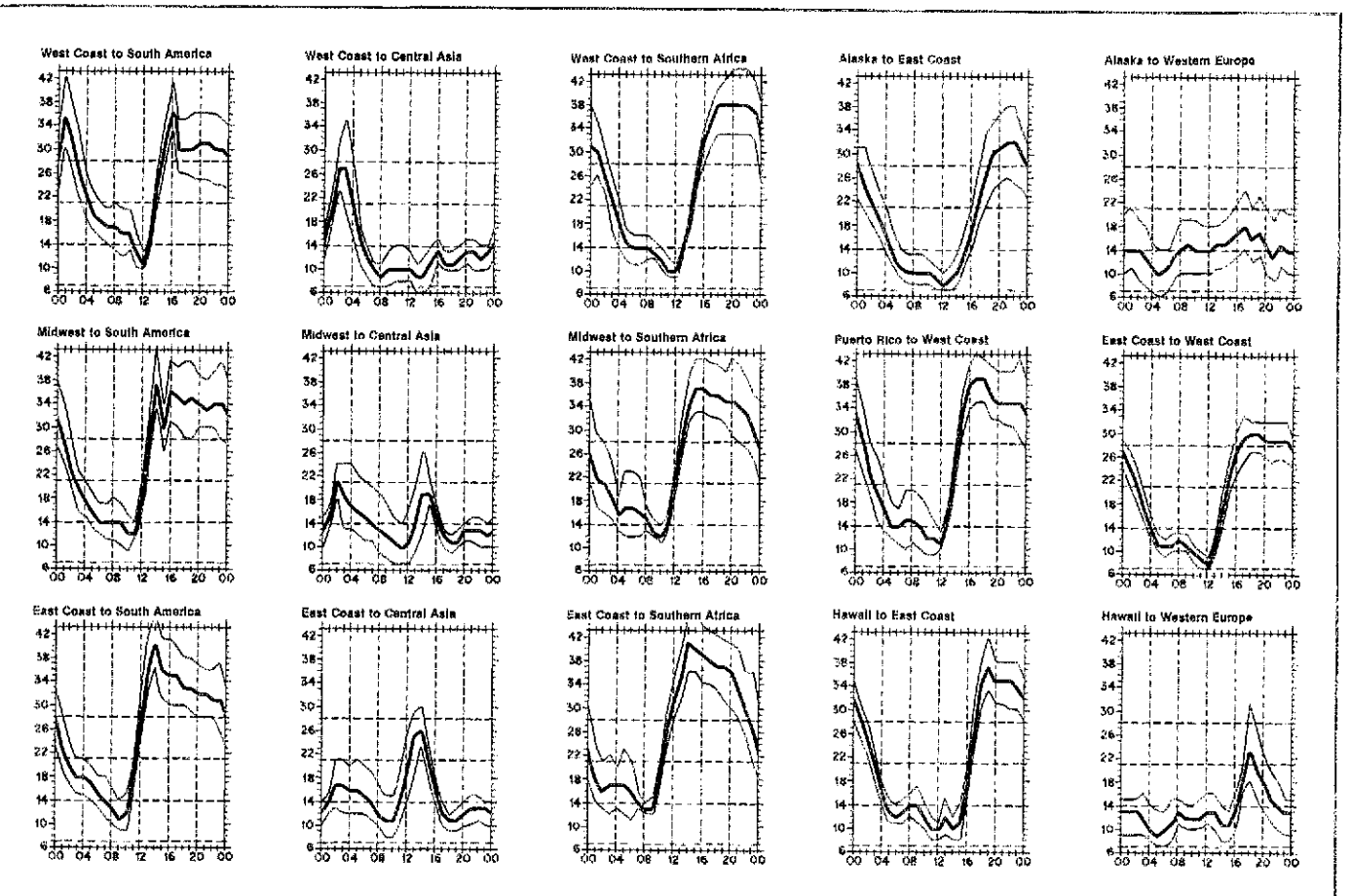
C31SR (WD6KGM)
CP5NK (P, O. 3343, Cochabamba, Bolivia)
DJ1WR/5N0 (DJ1WR)
EA3ALD/EA9 (EA3ALD)
FK8BG (W7OK)
FO0KW (WB6RFJ)
FR7BU (P, O. 32, St. Paul Reunion Isle)
HH2VP (N4XR)
HP1XOJ (WB3KGY)
JA7IT/JD1 (JH7BRG)
J28AZ (J8IN)
KX6PP (WD4NVH)
KZ5EK (DL1IH)
OK3TAB/D2A (K3ALE)
P29IA (WA7OPZ)
TG4DX (WD8MOV)
TR8RG (DA1CZ)
T2AAA (Weather Station, Tuvalu Central Pacific)
T4A (ZS6AK)
VK0BC (VK8VV)

DX QSL MANAGER VOLUNTEERS

WD9DZV	WN3CWW
N0ASV	KA3ARF

A big TU to the following who did their bit in sending the foregoing for your benefit: W9LNQ, W7GUR, WD9DZV, WN3CWW, N0ASV and KA3ARF.

Do you have some information that might help? All contributions are always most gratefully received. QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions, for January 15 to February 15, 1980, assume a sunspot number of 157, which corresponds to a 2800-MHz solar flux of 200.

DX Century Club Awards

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. There are now 319 countries on the list, and the DXCC Honor Roll (published in the March and September issues) highlights those ops who are within 10 countries of that figure. Each DXCC certificate may be endorsed for additional countries over 100 — in increments of 20 up through 240, increments of 10 through 300 and increments of 5 over 300. This listing contains the call signs and exact country-totals of amateurs who've joined the DXCC or increased their country-totals during the period from October 1, 1977 through September 30, 1979. Think you may be ready for DXCC? Write Headquarters for details.

Cw annual listing will appear in February 1980 *QST*.

Mixed

365 W6AM W5BG

364 W2AGW W2BXA W7MB

363 K6ZO W1GKK W4EX W9ZM

362 LU6DJX PY2CK VK4QM W1HIH W3KT W3MP W4AIT W4OM W5KC W8GT W8GZ W0DU W0ELA ZL1HY

361 W2JVU W5MMK W7KH W8BF W0BW

360 DL7AA K8OJ OE1ER W1HX W2QHH W4AAV W0MLY

359 W2AG W3LMH W4BQY W4IM W6BZE W6HX W8LKH

358 W2LV W2OKM W3EVW W5IG W5PQA W6EE W7PHO W8DMD W8RT

357 DL1KB G3FXB I0AMU K4PDV ON4NC W1DK W1FZ W1HZ W2AO W6PT W8IUV W0SYK 4X4DK

356 DJ2BW G3FKM G5VT K2FL K4SM K6DC W1JH W2BOK W2CR W2OOD W3CWG W3NKM W4ML W6BA W6CHV W6ID W6HT W7LDC W8AH W5MPW W0AX W0PGI W0QGI

355 DL6EN HB9MQ K2BZT K3GL VE3NV W2AYJ W2GT W7NUT W7UM W2SSC W4DR W5MMD W6KZL W7GN W7OF W9GIL

354 DL1BO DL3RK G2BVN K4KQ K4YR K5UC K6CH ON4DM W1JNV W1MV W2AX W3GH W4VPD W6GPB W6KUT W8PHZ W9FKC YV5AH 4X4JU

353 G3AAE IT9ZGY K2LWR K8EC LU4DMG SM3BIZ W1NU W2HTI W3AFM W3GAS W4EEE W4EO W6GAE W5EPZ W6TZD W8YK W7ADS W8OWQ W9HB W9SFR YS1O

352 DL1JW GI3IVJ K2BK K3MO K4LNM K6LGF KH6CD OZ3Y PY1HQ W1AA W2FZY W3GRS W6HKP W7AOB W9DY

351 DL9OH G2BOZ IT9TAI K5DX OK1FF W1HH W2GC W4WV W5FFW W5OK W6EI W6KPL W8OK W8OY W8ZCQ W9RCJ ZS6LW

350 DL7EN G3HCT HB9TL K6KII K8DR K9AB PA0FX VE5HU W1CKA W1PM W2BMK W4BAA W5UN W6BS W6KG W9RKP ZL1IS

349 F3AT HB9KB I1ZL I8KDB K3II K9ECE LU5AQ SM0AJU W1CBZ W2BHM W2FXA W2UE W4IF W5AQ W5GO W6FF W6ONZ W6ZM W0AIH WA2DIG

348 AE4X JA1DM OH2QQ W2TP W2YY W5FT W5NUT W7QK W0GKL

347 F9HM I5UA K2FB K5FJ K8ONV W1AXA W2SAW W2XN W5HDS W5KGX W6HYG W9GU W0LWG W9TJ

346 DL1HH DL3BK DL7HU HB9MX K2TQC K4EZ K4RPK ON4PA PT7YS PY1HX VE3HD W1WY W4SSU W5QKZ W6MUR W7OX W9CH W9TKD W0KF XE1AF

345 JA1BK N4SU PA0LOU W2IRV VE2WA W4NNH W4ZU W5HJA W5LCI W5OB W6ISQ W6REH W6UOO W9BM W0BTO

344 DL7AP JA1AG JA1BN K6GA K6RN K6WR ON4IZ SM7ANB W2TQC W3DJZ W6EL

343 DL1DC DL7HZ JA2JW K4JC KP4RK OH2OV W1AFF W1DGJ W1RLQ W1SD W2CP W4OO W4QM W6QNA W6QNM W8CUT YV5AIP YV5BZ ZS6RM

342 Z9GL GM3ITN K4MQG K8OHG N4XU N6AR OE1FF VE3BWY W2MJ W2PV W4MCM W4UG W5GJ W6KTE W7LLC W8DA W0DEI YV5ANF YV5BX

341 HB9PL K4AIM K4IEX K8FF N6FX OE1FT OK1AOM W4AVY W4MGN W4QON W5EJT W5SQP W8ARH W9HLY W9NA W9ZTD WA2RAU ZS6YQ

340 DJ2AA DJ7ZG HB9DX JA1BRK K2YLM K4YYL K6MA K6YRA K8DYZ OH2BH PY2PA PY2PE W1MIJ W1UU W4BFH W5RG W5HE W5UR W6BSY W6RGG W6RJ W7JYZ W9GB W9HJ W0BK W0BN W0ZV

339 DJ5DA JA1ADN JA4ZA JA8AA K2SHZ K5AAD UA1CK W1OO W2GKZ W2GQN W2NC W9BLW W9LT W0AUB

338 DL7BK DL7FT K2PXX K4ID K4KG K8EJ N4TO ON4QJ PY2BKO PY2CQ PY2SO W1AS W2GK W4DRK W5RUA W6EUF W6FW W9KNI

337 OJ0KO GI3OQR I5ARS JA1AD N9ZN W7BGH W8ZD W9PN

336 DL1CF I2KMG K2JMY K6EV K6QH K9BGM N6AV OZ3PO VE3MJ VE3WT VE6LU W2PN W6YA W9NFC W9QLD WB2HXD

335 DJ7CX HB9MO JA8ADQ K4FJ K4IKR K5YY K6JG K9KXK OH2BC SM1CXE SM5BHW SM6AEK SM0KV UA9VB W2LNB W2MZV W3KA W4BBP W4YN W6KZS W7OG W9KRU W9OA ZS6IW

334 DL8NU K1DRN K2LF K8FL LA1KI OH4NS SM0CCE W1QJR W5LZZ W6KNH W6TWZ W6YB W8PR W9EB WA6OET WB7ABK YV5AHR

333 G3JEC K2QL K2UR K6AO K6DT K6PU K6VUR PY4OD SM6CKS SM6CWK VE3NE W3PN W4BRE W4KFC W5IO W6QL W6YO W8JO W9ABA W9DC

332 AA4MM JA1IBX JA1MCU JA1MIN K1RM K1YZW K4CIA K4DJ K4MPE K9MM ON4UN OZ1LO PY1APS SM3CXS SM5AZU VE4DX W1FJ W3PVZ W4EEU W4JVU W4NL W8FET W8YGR W9AZP W9WNB WA4WIP WA9NUQ YU1BCO YU2DX

331 DJ5LA K5UL K5RC K7AHV N4WW OE2EGL SM6AFH VE3YL W1FTX W6ANB W7AO W7DY W9HZ WA3ATP YV5BBU ZL1AH

330 DL3OH F9IE G8JM I0JX JA2AAQ JA8JL K2LGJ K6KA KV4FZ N4EA N4MM N6GM OK1MP OZ6MI VE5GMT W1ELR W3GE W4GTS W5IR W5RNG W6EJJ W8CNL W9FO WA6GFE

329 HB9AHA I2SM IV3PRK K1OFC K2CM K4XO K9RA N5DX PY3CB W5SJ W6BVM W0GNX W0PAH WA0DAH

328 F8RU JA1JRK JA8ZO K4CEB K8MFQ K9AWK LA1K N6DX N6UC PY1DH PY4AP VE1KG VE3CTX W1GX W1YRC W2PPG W6KYJ W7JFO W0SD

327 DJ4PI G3JAG I2DEZ K5UR K6XP K6XW K9GM K9KA K0BUR N1XX N4WF WA3HUP WB2EPG ZL1AV

326 DJ6RX I7HH JA1EOD JA1UOP K2BT K3RS K4AUL N4KG N8OX SM6EOC W1MM W2HZ W4FPW W4OEL W8YHT W7CSW W7LFA W8YA W9DH W9KB WA9LOT WB8EUN

325 OK3PO F2IU JA3DY JA9BJ K3ZR K4BVQ K4HJE K8IFF KE4I N6CW N6ET OE1UZ SM6CVX W1DT W2FG W2LL W2VJN W3AC W3ZN W4AUH W4UKA W8ILC W8RCM W9RF W9ZR W0CPM XE1KS

324 DJ4AX JA1OCA K2AGZ K4BBF K5GO K5JW K9PPY OZ8BZ PY2DFR PY2ELV W1HRI W1JZ W4WG W6MI W6SN W8AO W9ZRX W0BL

323 KJ5GE LA8LF N4TB N0OA PP5UG PY5ATL VE3BX W3GG W3LB W4ORT W5EOX W8DCH W8KCJ WA4DRU

322 AB4H I3EVK K3AY K4RA K5ET K0BS ON6KD W1GME W4XR W5JW W7OM WA5REU WB4OSS ZL1AJU

321 G5RP JA7HNP JA6GDG K1BW K4EWG K6EXO K8CH K8RWL N4SA W1HGA W1OHA W5MUG W7ORH W8LBM W8ZCK W0MYN WA6DUG ZL4JS

320 CT2AK DJ5JH I2LAG K4IE K5LM K5OS K6LOA N4XX N5RR OE8HT OH3SR PA0VO SP7HT VE3GCO VE7IG W1BR W2ZZ W4DHZ W4JO W6AF W6EYR W6GMF W7ETZ W7MI W8CFG WB2YQH YV5AE

319 AA4A DL6KG K1JO K6JR OE7III SP3DOI W2SY W4NO W6BUO W6GC W8XX W0OQK

318 K1SS K2OF K6AQV KL7PI N4CC OH8SR OK1ADR W1AM W4KN W5SP W6BIL W8GW W9HK W9TKR WA0KDI

317 JA1AAT K5AQ K6OJO N4RA SM3RL W5MJQ W6MUM W8HN W9SS WA2CBB WA9WJE

316 JA2KLT K2QOU VE7HP W4ZDW W4PZV W5UP W8OA W9KOD YU1AG

315 DL3ZI JA8MS K1LWI K2VV K3NL K5OA K6UFT K8IP N6HR SM5DQC VE4HJ W1AB W1BFA W1QWU W2LW W2REH W2UI W3BTX W4FLA W4HHN W5GEL W5ZWX W6QFR W9AG WA4FFW

314 EA1BC JA2AN K2SB K9SM W1OA W1KG W2FP W2JB W4XJ W9DE W9RX

313 IT9SEZ K6IR K6UZL K9FN W1NG W5CKT W5HTY W9JA WA2BRI

312 DK3GI DK9FB I1XK JA1CRR K1KNQ K2KGB K5JA OE12GA PY2BW W4BMX W4FX W4GYP W5RO W6UY WB5BID YU3EY YV5AK

311 AA4CJ I3LLO JA1ELY JA1GTF JA1KE JA2AH JA8KB K5GH K6PZ K7KG K9XJ LA9CE N3ED N9MM OH2BCV OH3NY W1GG W4AFS W5JC W5NBI W6DN W7XA WB9EBO ZL1HW

310 DJ5VQ EP2TW K3EH K4OXO K4GFI K4UTE K4XI K5KX K6HTM K7BR K8UJG N7RO N8AA N0RH OK3EA W1OR W2GA W2YD W4TK W4YV W5MCO W5XJ WB2YG W7OQM W9GDI W0PT WA8PYL WA0DUB YU3ZV

309 JA3KM K4OCE K8RA N8AW W1GDQ W6VBI W9LW WA2EAN WB6DXU

308 AE4Q K8CW W2BXG W2MP W5DJ W9LNQ W0CAW

307 DL6MK K9AJ N4OL VE4SK W1GL W2BAI W2SUA W3FYF W4BV W6AI W9KHD YS1RRD

306 AA4S JA2HGA K1ZSI K4TO K8ZR K9KXA N7NG W2IYX W6BYH W7TE

305 DL1YA JH1VRO K2UEL K4SMX K5QR K8NN K9IUF K9PQG K9RF KP4A PA0TAU W1LQQ W1YY W2PSU W2QKJ W2RS W7KS W7PHO W0GKE WA2HIN WA2JBV 9H4G

304 AJ2E K3OTY OH2SB W3AP W6NNV WA0UFS YU1NYP

303 DL1KS JA8AYN K9IN SM7DMN W5MN WA9VOL

302 AE3T F2VX HB9RX IT9PUG JA3DGC K2GBC K7UR K9KU N4WB SM5BBC W3NV W4EJN W0SR WB4LFM

301 OK5PR DL3ZA G3TOE K4PI K5KLA K8ST K0GVB K0SGJ N4KE N5UD N5XR SP9AI VE3EOC VO1FB W1RLV W3SO W4OTX WB2AIO WB2AMO ZS4MG

300 AF4H DK3SF DL1LO F2BS G3GIQ HB9IK I7TGT JA2IOD JA3EMU K3UA K4GLA K4TSJ K4UFF K4XL K4XP K4ZYU K6XT K8CSG K9CT K9VQK K0IFL KB9EZ N4JJ N4UH N6BB N6JV SM5AQB SM6FQS SM7TV SP6RT VE3IR W1EOA W1EW W4FDA W4LRP W4LVM W6CS W6JZU W8GS W8IBX W9VIN W0CE W0HBH W0NGJ WA4JTI WB2VFY YV5CWO ZL1AMO ZL1TY

299 K2UO K3GYD K3ND K3NN K4SB W7MVC

298 JF1PJK W1UN W2MIG W3YX

297 K6GWN

296 K8IA W1ESN WA2AUB WB4EDD

295 G3KAA JA6CNL K4RD K6SSZ N4VZ N5FG W2CC W6BE W9ZWH WA9TVM

294 EA2IA K1UM K3FN W2LZX W2SM W5IHG W7CNL

293 HB9AQW K0GSV N2CW W6WO YU2CBM

292 JA1JAN JA3DWT K6BZU OY7ML W3RJ W4CZU WA1CIR WB8OFG

291 F2NB K1UO K3WS K5DUT N3RI N4NX VE3II W5QIX W9VA WA4SMU WA8TNJ

290 DK9WB EA4CR G3HTA G6VQ I2PNB I0ZG IT9WGI JA8JO K1MEM K5JZY K7AA K8NA N2AP N4GG N4RR PP5YC SM6DBB W1QV W2YYX W3CDG W3GL W4JII W4ZR W5OPI W7DH W7DV W7JUO W8FF W8LU W8QBG W9MCR W9NB W9HY WA3SXH WA4TLI WA6GFY WB4SJG WB6RIU WB6WHM YO4WU YU2RTW

289 K5KR N4HH N5OK N6GG OE1GHC SM6CMU VE3FRA W1RED W4YH W6TC W6VD W9LF W9PIO

288 HB9AIJ JA1FNA K1VR K6UD N4CQ W2TA W7NA W0NAR

287 N4IA SK6AW VO1AW W1KGH W1RR W4DXI W4EZ W4HNW W4KA W4MWT

286 K3NZ K4RZ W1PFA W4DZZ

285 I0DUD K4HRG W0WP N9NS W5NJ WB4EOQ

284 DL1BS DL1FK VE3BZ W6KNH

283 JA3BQE K5PP N4DW W8GIO

282 DL1QT HB9BMO K3RT K4IR K7CVL K0LUZ OZ5VT PA0INA SM7DMN W6OMR W7FR WA0TKJ XE1FR YU3CM YU4HA

281 DK5WS K4AEB K4SV K6YCM K8NW K0HTH SM7BIP SP2AJO W2OB W2RSJ W6RFX W7ZHZ WA3GJZ WA5ALB WA0OMA WB4RUA

280 DJ1BV DJ4XA JH1OOJ K2ZRO K4OPR K6AG K8NM K6SP K9BWO KA4S KH6CF KI4M N7AC N3II N5NW OE1CP PY8JO VE6WQ W1AW W2CC W2HAZ W3ACE W4OHZ W4OMQ W4OWJ W4RNP W5KFN W7OS W9ALI WA1EOT WA1JMP WA4DCP WB6ZUC WB9BGJ

279 JA3GM JA9ESZ N4ATK W4HY W9AND

278 FY7AN N5AX OH2LU W3XX W4IQ W6KPC

277 VE5YA W4PB W4TFB W6SC W7DO WB4HOK

276 JA6BXA N1UN SM7BBY W3GOH W3LMZ W3UJ W4DJJ

275 AB4X HI8LC JA2INS K6WD K9CW W8ZR

274 K2UFM K5WE K8IL N1DL W6HT W6POZ W8CC

273 F6DCQ JA1OXY K4UWH K9EVB N6MB OH2VZ W2HUG W4JFE W7IYW WA4WYN WA8LSO

272 AE6U K6RK K7OXB N4OM PJ2VD SM7BAU VE7BBD W1RM W7OK W0YZB WA4LOF WB6JEY YB7AAU

271 AA4DR AA4M AG4Z AF5M DJ5GG DL7NS EA3NA I1SBU JA5PUL K7KD K9UWA N7RP SM5BFJ W1BL W2BBK W2DPL W3AX W3TVB W8NPY W8ELL W9TA WA4VDE YU1NEO

270 AE0K EA1FO HB9KC JA6EYD K1CC K2PP K3LWM K4SXD K6CBL K8ELX K7LAY K8CMO K9CW KP4AM N6VR N8BM N8JW OE3HOW PY2DBU VE3BHZ W1VV W1WLW W4HG W5XX W7PEZ W8CTR W0RV WA4HPF WA5EZO WA5UBV WB4NDX YV4BK

269 CE0AE K4LR K7RI K9QXY N4TX W1IKB

268 JA8GDT JH6HPL K4KBL K4KFH W2JGR W2TXB W4BD W9LJL

267 G3VBL N2KA W1AJG W6NZX W6TSH W7EOI

266 K2BXG K4CG N1AC W9NGA W9SC WB4OSN

265 CO2FA K2HVN K4OD K6DG LA8CJ N5AN OH6RA W5LW W0CDC

264 JA4BBN K3AO K5ETA N4NW N5FW PY1DG W0VX WB4YHV

263 K1AWP K1SF K1VSK K8BCK W5VX W6ATO W7BCT W8LZV WB2BNJ YU1BPQ

262 AI8S F6CUK JA2ETQ K1FI K1TZO K9RL LU2AFH N3RL N5AB VE1AI VE2AFU W7FP WA1AEH WA4HDD

261 DJ2MN DL9TJ JE1BSD K1WJ K4IBP K5BDS K9HQM K9QVB KH6IGJ N6BK VE3AK VE7DP W1OUS W2KE W3IRE W6OK W0TRF WA2LMW WA4OOM WA4OUF WA8TLA WB9SEJ

260 AA4SC AA4T AA4VK AA9M AB4Z AB0K HB9AOU I8RFD IT9AZS JA6RIL K4WSB K8AAW K9WJU K9ZO K0BJ K0SVW N4GE N4PM N4WX N5DD N7SW OE3EVA SM6CST VE3DMC W1KLY W1IUU W2ABM W2GL W3SQ W4YOD W6IR W6MA W7NP W9IY W0JH WA8QIY WA0VKF WB4PJO WB4PAB

259 I3OBO VE3AKG W2PO W3KJ W4OUP W7CF WB2QAX

258 K4SE N4XZ VE3GJH W6INH W8BIP W8GE W8UVZ W9IT

257 JA2BP W1CNU W1NB W3NF W7QON

256 AF5H DL1ES F9YZ N4BP N5UI N6ND W3FM W7BJ WA3OSD WA6EKL

255 AA4PP GM3AWW JA7JAA K2IJ K4ILX K4JPO K8IEC K8YK N1YL N9BB VE3DGX W2QXA W7LH W9UO W0BA WA3EPT YU3TYX

254 K1CV KB0EN N4HU N6OJ PA0GMM SM6DYK VE4SW W3HXO W6JD W9DYG W0UO WA6OIU WB0NHD

253 JA1VN K1HMO K1HZ N1UN N6SV PY1SJ W6OKX W6TFO WA0TXC W8III W0SI WA1TPR YU3QI

252 AB8Y AB9E DL7SY G4BUE HB9BGN K2MFY K2OLG K4JNM K7CQ K9BB N2DI N5AW N9KV OH3TH W6PMT

251 AA1K DL1RB F6BWJ HI8MOG JA1ILN JA1XGI JA5CAX K1SA K4BYN K4LTA K5ISQ K6RSY OK1DH SM0BZH SM5AJR W1YN W4HSJ W4HYY W4SNR W6BZ W6CO YU1OCV YU1OBC

250 AC8L DJ8CR DL7MQ G3DOG HB9HT HB9T JA1TNV JA2KVD K5CSK K5QEA K6OYE K9HA K0YST KA6RH KL7IAK N8BB PY2BBO VE2YU VK2BC W1JDE W2AXZ W2BTG W4WXZ W8NJC WA3LJP WA4DAN WA7GVM WA7ZLC WB2LOF WB8OBA WB8ZRV YU3TDX

249 K2SP KP4EBQ W3KH W0BX WA8MOA 4Z4DX

248 K3RB KL7H N6CH N7MW W1YZL W2TDQ W5FL

247 DL0WW JI1WRM KD4S OH3XZ PJ2FR W6VW WA3KCY

246 JA7GBS K1OT SM0GMG W2HT W9OBF WA2WSX WB3HAZ

245 F6ACV I1JLA K2YGM K8ROT K9JS OH2BFJ W0NB

244 EA8BK HB9AZO I2VDX K6ZXS K8PO OE2VEL W9QWM WB9ZBF YU3DJK YU3DQ

243 JW5NM K9TUS N1ACW N4TJ VE3AMJ W2PK W4YKH W6MUS

242 JA5EN K0CS N9AGC PY5WD SM0CCM VE2UN W1OOH W2FHY W3US W7GUR WB2HPP WB6KIL WB7DKV

241 AB8K F6BEE G3JFF K2IGW K2WT K8FD K9IW VE1MX VE6HI W4LF W6AYQ W9UI W0VIP WA5SUE WA6TOO WB4TDH

240 AA4NA DJ9ON F2GL HP1AC I2MQP JH1AGU JR1INE JR6CWC K1VTM K4AVC K4RDU K7AOZ K8DID K9GN K9HLW KB8KW KH6DL N6OZ OH1LA PY4ALC VE3CE VE7KL W2GB W9MYG W0KH WA4JJW WA9AUM WB2MIY WB5ZDO YU3SO

239 DK6WA K4BIY K4LE N4VA N8LIE W3ARK W3HAO YU2CAL

238 K0SVX N1ZZ SP9DH WB4ICK

237 JA1IDY K9MK KP4R OE1BFW SM0DJZ WB4RFZ ZL1JJ

236 PY4AKR VE4EW W5VSZ

235 JA6AXD K1TN K4JYS K0MOL YU3TU

234 K7UT K9BG N7UT N0SS W4BUW WD8BOH

233 DJ6OZ K1EM K2AGJ K4JS LA3XI N7RK N6MO SM7BOL W1PL

232 I2AY JA6SVP N9DR W9EQP W0LR YU3NR ZP5AO

231 JA2EIV JH7BRG K3GBZ K9UIY YS6AI WB9NKH

230 K2KA K2TV KL7AF N1ZT WB4CSW

229 SV0AA W6TJI W8PBO WA1HJZ WB9POH

228 KB4SA WA1KJL YU2OH

227 CT4BD JA7ZP JA8AJS K5EOA K9ARZ N4QF N4SX W3AAU WA2GEZ WB6ZHD WB7OUL WB7WIM YU1DZ YU1LW

226 AE2A W7NI

225 DK8NG JA8AGS K2NI K5EJO K9IJA KL7RW N5JR N6JM W8KI WA4MFS W6OMM W6YO W7XN WA0IOK WB4OPG YU2AAU

224 G2AFQ K0KES LU1SF N2MM W2ZO W8HJ W7SF W0FDH W0JIN WA4CTA WA4FVT

223 DK3VV K4CXY K4PHE N3US WA2BEX WA2MTI WB4MAR WB5EAY YU3TKL 4Z4GH

222 OE6TQ JA1BA K1KNM K0DEO N3JC N4UF N6JT SM5AUD W2GWI WA5TOS WA6OEC WB9YXY YU1GMN YU2CG

221 AA4CK AG4L DL7HT JA6MPJ JA9CZF K1DKX K2SD K4KA W4VN K7SFN N8VI VE3HLC VE4AE VE7DFW W2NJ W0JF WB4ASV YU3TFA

220 AA4TP AA4US AB1U AF6D DL7UX HK7UL I5FOS K4TXJ K4XR K5FC K5MK K6GLV K7MKS K8TMK K9ES KD4M KH6HU N4YO N5RQ N6FT N6VF N7MC N7RU N0AI SM4FMO SM5BMB SM0GMZ VE3BVD W1EWD W7HN W2JVZ W2KN W2OXR W4MGX W5ISF W0MHK WA4DPU WA4OBO WA6CPP WA6YQW WA9USE WB4PRU WB4QFH WB4SXX WB6JQP YU3GI ZL3BK

219 AA4KT DL9EY I8MTQ K2GAT K9OFR KZ5FR N6DS W2CKR W4CEB W5VJG W6HU W6SWM WA7OSO WB8ZRL WB9SLV YU1ELM YU4VTU

218 I3MQ W2FLD

217 K2OPJ K6VT W1ID W2MT W4JVN W7IOG

216 JH0CAZ K1YHM K4LRA K0OO KA4C N9BX W2FC WA2JOC WB1CRG

215 JF1OMY JA2YKA K1NWE K2LX K0LST YU1NPG

214 I1ILA I5IZ K7GLL W1UO W7ZR WA4BEC [illegible]

213 DL0AA JA1JKG K3IE SM5AKT WA4PYF

212 DM4RDA JA1KJW K9GX K0EOU N4ZJ 6Y5MP

211 EA3AFA K8HV K9YBC OH7RF W3EV WA4GKR W4KFB WB6RSE

210 G3ZDW K5NV K5OG KC4U N9RB OZ9PP FY6TM W4PIH W8IA YU3AR

209 AD7Z I1ANP K8GG N4AVV W2ZXI W7UAZ W0DAD WB4FIU

208 FP8OX K9NB W3BZN WA5HEC WB2IZN WB4LPP ZS6BOK

207 AD1C JA2JWF JA7HMZ JH1BAN K8ASI N8FI W1AGA W4LBT YU3BH

206 AE8B DK2XX N0EL VE3ECP W4WEG

205 EA3RF JA1SGU K3WOK W6CLM K6RIP K0AXU W7FY W4ZMC W9KM

204 AB1A EA7GH HB9AMG JA1QER JF1EZH K1WJL K2UVV K5KV K7CU KB5DO KZ5EK N2NN N4OH N6CN N8SW N9GT OE8SH W3GTL W5YMH W8HWJ WA7SLC WA7URW WB9TIG

203 FR0YG K1WB K5GK K6MT K0CF OK1AEH W1HSP W1VH W3GK W8AP W9KBV WA3JZR WB6NJW

202 EU9UM JA1IOA K1GFH K1NG K1YO K2SX K2WS K7EQM K0HQF KA1BU N1KZ N4IB N6ANN ON6BC SM0FKD W1DYH W1XS W2CVW W7FF W7WA WA1NSJ WA9MAG WB8UIA WB9HIP

201 AF7S DJ3AR F6DHB G3JZV HB9ZF K8MN N2UN N3GH N8II OZ3GW SM3DMP SM5ACQ UV0EX VE1MF VE4SN VE6CV W2GND W4WBC W6DZ W8GO W0PFG WB1OXH WB9FIW WD8ILM WD9CWJ YU1NFR YU3CC YU3EP

200 AB5P DA2UC DJ8WD DK3NU GW4BLE HB9AIB JA3ANW JA7BMR JH7LMZ K1DP K1WJB K3HBP K4GFH K4KPH K4NV K6BUD K6ZMH K7SB K9KQ K9KT K9WA K0LD KB4BU KP4EQF N2VW N4RG N4LI N4ZS N5NP N8VL SP5HS SP8MJ VE3DKE VE3GFN VE3LAX W1ETV W1PY W2NCG W2DIP W2TS W3KL W3GIA W3JUM W3YY W4BTZ W0OWS W4TJC W5IB W6TPR W9ODX W0OP W0NO W0RT WA2FIJ WA4QHV WA5IGD WA6AJP WA0FBO WA0JYJ WB2GOK WB4FUT WB8ZPO WB0NAA WB0SNG WD8IXV WD0BNC YU3DZ

199 AD5O DK5FJ IS0LYN JA2IU K4JEX K5VRX KB5FH N5MM VE3CPU W5CTM W7IUV WA9CYV WB9VIO YU2CDO 9J2IE

198 WA8QE W9RW WD8BJK

197 KA6SS VE3IPH W5KNZ

196 N4EF SM6BXV

195 FR0B JA8KSF K8MO VE3MV W7TVF YU1NGO

194 FY7YP YU1MV

193 JR6BU VE2JQ VE3LEF W1HBU YU2ACF

192 W5HK WA4LZR WA4VMZ

191 JA8SW K2FJ K8JK K9GSU

190 DK5VO DL9PR K1ALP K4TFI K6ZF K9IHM KC4B W6PKA WA7RKJ

189 K5VY W4VWV WB9TIY

188 DK5AD/W3 K1BUR K9ZZ W1HV W1JHU YU2CDI 4X4FQ

187 AD8P JH3LJD K6ZD W1BMR W9YH YU2CCB 5H4HF

186 AC1O G4FAM JR1URH K4UDB N0RF PY1ZHJ WA1YAY WA4SKE

185 JA1FIJ K2FW N2JA OZ4HW W1ISP W2ROH WA3INW WB7EEI XE2MX YU4JHI

184 OF1KM EA6CE K1VJH K3EW N9RR W4DGJ

183 FAVO K1KIB K1RH K8UQN

LU8ADK N4HB W1GUW WB1DGD WD4IHV

182 CT1DF I5BOL I0UCM KB2EN KP4V N4OT VE3HHS W1LK W2KI W4FUI W6ME W9HR WA7LAG

181 DL1EV EP2OD JH5RYY K4TIA K5RW K7KH K8PCZ KC4G OH2KP W1GNC W3CRG WA2FUE WB1ANT

180 AE5H F9XL FG7XA I5AFP JA8DNZ K1GX K1LLU K2MQ K4CTD K4TWJ K6XN K7WF K0AL KB9DE KG6RT N2MF N4IR N4YY N5CB N5HB N7DS N8AC OH3NM SM7RS VE3WW VE4IU VE7BAF W2HKE W2SEG W3FAE W5HNS W7EEJ W7HX W0CYY W0JSN W0MJA WA2YUH WA4UVG WA4VXG WA8KEM WA8SWM WB2HJW WB4BHQ WB5ZDO WB6WQA WD9IIX

179 JF1DSN K4CK K5IF N8HI W1AIO W2HG WA2AOG WA9TAA ZS1FD

178 DA1RA G3VKW SK5AA WA5VUW WB4VUA WB0GZR XE1PF ZE2KV

177 AE3S DL9CC HA5KKN JA8SUO VP9GD W1ERW W1RFW WB0YUI

176 JA2DMO JH6XOD K0CN WB3BMX YU1NZW

175 AA6RF UK1II N4QS OE2JZ W8TIV WB0RRX

174 VE3FZW W5QEE WA2MUA

173 K1PMJ K2GI W2SUE W6NHX

172 AA4NC AF4K DJ4XC K3NR K3VOU K4FYM N6YI W4OUN

171 AA7C LA8EU JA6GYG K5GL N1NA N8IM WB5UCS

170 CT1BY DL3TN EA7TV JA9AQE K7AII KB4FQ VE3DUS VE7IQ W1OU WA2OHD WD9DEE YU3TKT

169 K9MIE LA1ND W4QO W5UFF W0RK W7ZI WB9MFC YU3BO YU3FOP

168 EA2HW N2WS W8LJP WB4NFO YU2CDB

167 N4AOB OZ1CTK SM0DGO W6CRE W0IUB WA4MCH

166 DK6ED DL9YG JA8FBM JA8HQI W8JI WB9KBV YU4FTU ZS2EM

165 EA8IR JA3CSZ JA4GXS N0LK N6MA W0EJ WA3WIP WB4KSQ WB9NOV WD4NKP

164 DJ2OW JH1QJC K1WVX K8ZPB K0BX PY2ZEM W1GDC W8GMH W0TT WA2HQH WA4WEB WB2SJG WB6BPZ WB6JPZ WB9ZKK

163 EP2MW HA5DE JA1KQX JG1OOZ K1THP K2RN K8VFV OK1DKR W1WEF W6VUN W7FOP W7TS WB2FKF WB7TLE YU1AAO YU1OCQ

162 AC0S AE1T JA1IZ K4JEZ K5DEC K6UGS K9KBW N5IH W4NZR W4ZC W5VFJ WA2MVQ WA2QAU WA4GIQ WA7JBE WD8KCQ WD9CUP

161 HB9AXB JH6RIM K1RB K5KT K9APW K9BK N4VG SM6AYM W1ND W3OH W4FL W4JIK W4YAH W7YKN W8CZN W9HE WA4WPN WA4ZEC WA5CST WA9BGK WB9LFQ WD4CXV WD4HPZ YU3FK YU3TXU

160 AC4CW AF2L DJ2MH F6CLH F9BB HB9BFS K2UPR K3OIA K4IGJ K4JAF K4LNO K5FNQ K6ZOR K7JH

K7PY K8EH K9UR K0DN KB6J KD4Z KH6GI KL7HR N1RI N3GW N5UX N8RA ON4JV VE7CHK W1DMD W1OPJ W1YNE W3EEK W3KWH W3YQ W4NQI W5GAI W5JE W5NCB W6EGX W6RZ W8LKG W9RJM W9XK W0JIG WA2ECA WA2KWP WA4UBM WA5OUW WA5KTZ WA8DZM WA9WWT WB5ZGP WB7QXK WB8SBH WD4RCO YU1KMN YU4VBR YU5CZ

159 AC2P DL0BY G2HKW G3YOG I0A6C JA1PIG/PZ JH1BZJ K2UFT K4KKJ K5SHQ K8OT KP4CKY W4KEB W8KBZ W9ECF WB4YFF WB9AAQ WD8IIC

158 AA4RC AA8DX K2ON K2TJ W1YRO W5RBB WD4KRK YU2RON

157 K4EJO W5QPH WA1RGP

156 K0JFV ON8OS VE2AQS/TG9 WB9EEE

155 JA2BJC K3SME W7III WA6TYO WB5SCI

154 DJ4WP G3RTU G4BWP JA7YOJ JF1KKV PT7VJZ W1PWK WB1FSW ZL1ADI

153 JH2CJW K3RH K4HAV K5AS PJ2AAX VE1AJP W6MPG W0JRN WA2PCF WA9JWL WB3DNA WB6SRK 4X4UH

152 JH7DNO K2GBH K5GUU K6NN N4DA N4YM PA9WRR PT2VE SV1IO W2IQB

151 HK3AXT JH1LMG OK3IF W3JF W9JXN WB5PLD WD9GPX

150 AG5X DF3FI JA6CRP JF1HOH K3UC K4NFE K7BHM K7SZN N4MA W3TEF W4OGG WA4MDS WA4PSW WA7SCN WB6FKR WB9OQU WD4ABN

149 I1FY N6QY W9HI WB3HDP XE1FL YU3UAR

148 AA4MI F6AZT HA5FA K2IAB K6OC SM6FKF VE2UF W8AN

147 JA3DAY K5RE VE7XL

146 AA1M OZ3YI W3EE W6BL W8DAC WB8VPA WD8KKF

145 AA6R DM2YLO K2QF K2ZWI K9BOL K9RU OZ4CF W2VAV W0RIC WA2MNM

144 AA4MW HM2JN JA4AEZ K4OAH K0OAM KH6LW LA8KD OK1AUP W2SR W3BBL W4HLY W4TYZ WA2DFC 5Z4PP 9J2CL

143 DL7WL DL8JL I0ZSG K8JH VP2SQ W8RPK W8EY WA3EEE WB4ZUW

142 HB9CI K2CHS K2ZQ K3NS K5DZT K5QD N2GC OZ8AE VE1RQ W2WZ WA1VYF WB3FJF YU1ADO 5Z4CW

141 AC0A AF4Z DJ1ND G3VMW HB9BLQ HB9SO JA5NG JE1BQE K1FB K3KO K8DL KL7JDR N4PY OE2BZL OE8HFL W2ARO W2YWK W3KLR W3SRK W5VD W7YS W0TL WB2GTB WA3FXJ WA0LKL WB1AMQ

140 AB0S OK3QE I5JFG JA1BWA JR1FYS JR6CF K2JT K2OVS K2ZGC K5PR K7EG K8AC K9MBQ K9WG N8FB N8WW N9BT VE8AM VK2BAN W1GWA W1TEE W2IOZ W2JQ W2YC W4OYI W4RW W7FLD W8NK W8QBA W9BB W0KC W0RYW W0UBT W0UY WA1LOU WA1IFF WA2URD WA3WNU WA4GHO WA4MOQ WA5NOM WA7CWM

WA7NEQ WA8EUK WB1EMN WB4IWW WB4KVM WB8EYL WB9TIZ WB0BIY WD6ATC

139 AA3E AF1U FR7AK K9WC N9TN VE8AYI VE6KY W0DYI WA0PFV WB8LMN

138 CT1UM K4CNW K6JEN K7YBX ON6HX VS6DD WB2KPE YU1NOT

137 G8PX JA7BAL N6SA W1RHN W8CD WA5YTX WD9DNL

136 AA4NC K7WA N6HI W1VD WA2IKO WA6RPF WB2OHD WB4DBK WB4INF ZE4JH

135 G4EDG N2US S79DF WA6AWF

134 K1GVW K2TGE OZ6JE VE1BDT W4ZWZ WA1ZLK WB0FCY

133 HA0HW K2PLF N5TV W1HSS WD8DXG

132 OK2WU EA2IK K4YCK K6OKW VP2MBB W1XX W5TSF WA9RAT WB1GOO WB3JUK

131 JA2APV JA7ARH K2RU N6ML W5SNU W9PWZ WA4MIT WB1GZE WB5QBV

130 DF8XP HK3YH I2DMI JA1PMS JR1WDE K2CP KZ5UH N4VM OH1LF W1GUE W1OD W2DHI W0QAC WA4VDN WB2QEU

129 GM3LYY K6UV K8WD KB6FT KM6FC PY2ZGF W6AN WA6QND

128 JA6OKK LA4AT OH2CE OH3NE VE1APY W4VRO WB4EBX WB4WHE WB8RJX WD6AKO YU1PEU

127 AA0M DK7XX DM2COJ JR1VAY K3FB K4CGV KA5ACC VE7AYJ W4BFB WB1ASL WB4AGT WB9RNF WD4IKM

126 JA9CKA JH1IAQ K2PV KB8BS OK1AMR W7MY W0ULU WA1UVX WA2NDB WB6GFM

WB0AFO WD4LWC

125 AA2F DK1HZ DL4WD JH8XJW K1LDK K4HWW K5ZK KA2AD N6PV OH2PQ W8CEF WA2CBU WB4RJG WB7UXK WD5BCY WD8LVQ YU3TIQ

124 AB1P AF0O G4CXM IS0DTK JA2HMF JF1VSA K1LA K2DQJ K3LHD K8KBB KA7MS N6HE SK4BX W2ULO W3EVG W7TIZ WA3LOS WA4ZMM WA6IGU WA9LBO WB9EKM WB9ZPU ZL2AHD

123 EP2LA G5BEF JH1BMV K8SY K0GJD N1CC N4AXR W3GRW W5QOT WA1STO WA2PID WA4OMI WA4YDK WD5HRX WD9GNZ XE1OM

122 DJ5EJ DK0BZ DL7SW F8DCE GU4EON JA1AUC JT1AN K7HRW K8MNP K0JPX KH6CPJ N4EY N4GJ N4OE PA0FRA SP1ADM VE3EIM

VE6CJO VP3GCO W3WGS W9WI W0SL WA1SOB WA4EJX WA7ZLC/CT1 WA9FFZ WB1ARX WB2KBH WB0OTA WD4EFI WD4HFK WD8MGO

121 DJ4BC OK3YD G8VR JA5BZL JH6KXG K1VRT K4YKZ K5OK K6WJ K6YB K8AQM K8HF K0LIR KA2BD N2JO SM6DUA VE3BMR VE3PE W6SJC W9CA WA4WQH WA7PQL WB1AHF WB1AIE WB1BVQ WB5TZZ WB6VFF WB9OCU WD5CBA WD8KZS YU2RJG

120 DJ8SG DL3ME I0OGT JE2IBV JA3ARM JA3BVD JH7BDG JA9YE K2DEB K2PF K2VC K3NB K5IO K6SMH K7KFE KA4P N4DX N5ZZ N8JK N0YC OE1KJW OZ3RC PY2GWF SM5EX SP6FER VE2BLW

VE7AQR W1BFK W1SE W2CHV W3IBL W4CLO W4IVN W4RAL W5UXE W7MPZ/HK3 W9FAM W9RR W0JIE W0RJW WA1MYX WA1UUA WA4NHP WA4OAX WA5OJI WA6TKT WA0OVU WA0YEF WB2JZK WB4FMJ WB4PRM WB4UME WB4WHE WB6VRE WB9ACR WB9FRF WB9KHK WB0RSH 4Z4UW 6Y5DA

119 AF7F CM2HB DJ9AS F6DJV JA3YDS JR2XRH K1PCE K1ZDI K3RL K4OAQ K9AEG N6NF N9ABS OE2LCL VU2IJ W2XI W3AMF W5EW W0GA WA4DEP WA6JUD WB2AWL WB2JXZ WB3ANF WB4WOW WB6ITM WB8GWB WD4LCO

118 DF2ED DJ4MJ JA4CTL JA7AMA K4AVU K9MFI KB4BH KB4CD PY6AJG VE3IUE W2SEC WA4OHX WB8DUC WB9BXX/3 WB0TXV

117 DL0FU JA1CZG JF1SEK JH1BUW K2ZO K3MD K3VW K8DJC N6HZ WB7TJC YU2CAO

116 I0YGV JA1EHA JA1GYT K1NM N1II N7EG W8IM WD8MOV

115 AF2C DK6OR HB9BOI K1BJ K5ARH K8AV K9IJ VP2SM/W2 W1ETH W2HKM W4RT W7HZL W0RJU WA1UZH WA3QED ZS1LM 4X4GD

114 DJ1TI DK8BW HB9G HS4AFD JA3BAG JA3VPA JW2CF K1PAD K2AIO K2XK K3TC K7OFW N0ALL OK1KRS PP5AJA VE3HGD W6JCE W6KPJ W6FI W8ISG W0DF WA1CCR WA1YTW WA6RAV WB5ZKR WD5JFM

113 AA4KA F6ARI EL2ET F6CWA JA7AOU K4TAZ K5MFE

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112 DF3TJ DJ0NU DL3JU DL6BB DM2DOD EA5DE HA0LM K5GY K6UM KB6BJ N4XG WA3YXD WA8LFF WA6TLV WB3FYL WB4AGH WB5WOG WB6QBZ 4X4HU 4Z4OZ

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107 AA0T AI3N DA1AZ DJ5PX OK6US DK0EK DL1OM JA1EL JA4YEY JA8BLD K3VXV K5BDX K5JUC K5XE K8MZA K0WA KA1EP KB4FH N1QY N3EB N4FO N6KM OA4BZ OH5LP OH6JW SM5BOF SM6CYU VE3EZU VE7CML W3GVR W5SOD W6SUJ W7JGL W0HSC WA6EJL WA6EKH WB4AKY WB4EGX WB4UBD WB5VCI WB5YJX WD5CSK WD0FSI YU1NWO

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VE2FGO VE3XM VP2VDJ W2LRU W2TV W5VBX W6SMD W7JKA W0VV WA1LJB WA3CXG WA4SOH WA4WLI WB1EYZ WB2UXS WB3ERY WB4TAI WB5PYL WB5SSD WB5LBJ/DU6 WB6DMB WB8DSU WB9EJE WB9OXV WB9UJP WB0MCO WD5JQB WD9AHJ WD9GIC 4U1UN 8P6IB

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WA6NKK WA8QEP WA8RXL WA8VDC WB1ARC WB2GEX WB2IHN WB3COT WB3JNX WB4ETD WB4FMU WB4LIB WB4RDV WB4SYP WB4ZPM WB6PGX WB7FFG WB7PST WB8ZJW WB9OTX WB9VWI WD4CKS WD4CYN WD4KOC WD4LGE WD5GXI WD9EMI WD9EPG N5AEP N5CE N5FN N5JM N7ALX N7RC N0AJZ PY2ZBG SM7FYK VE2DPJ VE3BTQ VE3JKZ VE7CIX VE7DGI VP1MPW W2KHQ W3APR W3XN W3ZDF W5IYR W6SMS W7BUN W9NM W0RTB WA1RGT WA1ZAK WA2IZN WA2VCZ WA3UXU WD0FZJ YU4EZC W6MZO WB3BUP WB9YXY

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363 W6AM

362 W2BXA W8GZ

361 PY2CK W4EX W6GVM W8BF

360 TI2HP ZL1HY

359 K4HEF

357 I0AMU W5IO W7PHO 4X4DK

356 G5VT W8AH W0CM

355 ON4DH W0BW

354 ON4DM

W1JFG W2OKM W3CWG W3NKM W4OM YV5AB

353 LU4DMG VK5MS W1ONK W3DHM W3KT W4EEE

352 DL6EN W2HTI W5PQA W9RNX

351 DL9OH SM3BIZ W1AA W4SKO W9ZM

350 VE3OA W4DR W5ACE ZS6LW 4X4JU

349 DJ2BW GI3IVJ I8KDB K5UC LU9DAH VE5RU ZL1KG

348 G3FKM W3GH W4LMX W9WHM W0MLY

347 F9RM I5UA K6LGF K9ECE PY4TK W1HX W5LZW W6RKP W0GKL

346 DL1KB I0ZV K2FL K5DX W2LV W6CHV XE1AE

345 W2TP W7ADS W8MPW W9HB YS1O

344 K2BZT W7GN

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338 DL7AA EA2HX I6FLD K6YRA KP4CL OZ3Y VK4QM W2NUT W2YYL W4CWV W4UWC W6KTE YV5AJK ZS6YQ

337 DL7FT F3DJ K4JC K4MQG

KH6OR W2FGD W6HYG WA8AJI

336 F9GL K4YYL VE3MJ W1GKK W2GK W2GQN W2XN W6EUF W6FW W8GMF W8JT WA2EOO

335 I5WT JA4ZA K2JMY K5FJ K5YY KP4CK VE3WT W5IO W6RGG W8HPS W9KRU ZS6RM

334 F2MO I2KMG I8AA K1DRN K8DR UA1CK W2GKZ W5LZZ YV5AHR YV5AXQ

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328 EA4LH JA1IBX JA2AAQ K6TXR K9AB N6NA PY2CYK VE3CTX W3RX W4DRK W6ARJ W7JFO W8VHY W9BZW W9DC WA0OAH YV1KZ

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JA1JRK JA2JW K5UR K6GA K0BUR W4DPS W7LFA W9HZ W9IKQ W0TJ WA5IEV

325 G3TJW K5AWR KH6BB KV4FZ W6BSY W6CCB WA6AHF XE1KS 6W8DY

324 CT1UE DJ5LA F8RU I4ZSQ I5FLN I7SCA JA1EOD K2CM K4HJE K5OVC W1JWX W1SEB W0SFU

323 I2DEZ JA1OCA JA9BJ K4BBF K4FJ N6AR OE1FF W5KC W6KUT

322 DK3PO FG7XL K6EV K8IFF N4MM W5UAW W5UR W8KOE WB8EUN YV8ANQ

321 G5AFA HB9AHA JA1UQP K0BS N4WW W1BIH W1HGA W5EDX W6LQC W0MYN WB2WOU

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315 EA7IR G3WW HB9AAA I1BGJ JA1AAT JA6GDG K5LM K6XW KE4I W4AVY W8USG W8RT W9NWE W9ZHX WA2VEG

14 DJ5DA DL6KG JA1MCU LA8LF VO1CU

W1DO W1SD W2MPK W5JJA W8XX

313 AA4A K6IR W2FG W5HTY W6FET W8JXM

312 DL9DY K2QOU K3SGE K4BVQ K5JA K5OA W4PZV W5RO W6XP W8ILC

311 F5VU I3EVK JA1DM K8AG VE4OX W2VO WB5DJA

310 DJ9ZB F5JA F6AOI JA2AH K4GFI K4LSP OK1MP VE3BX W1QWU W4AVY W4ELB W4NYN W5AQ W8KYJ W0BK WB7ABK

309 I2LPA JA1ELY K8XP VE7HP W7DQM W8PR W9RXC WA6RTA WB6DXU

308 K2KGB K4CAH K4IEX W3XM W4PJG W6ZC W8LBM W0BN

307 F6BFH G2BOZ W9LT WA2EAN YS1RRD

306 I1UW K8HTM K9FN OE3WWb W2IYX W3GE W6ZYC W7OM WA4GUZ

305 DJ7CX K6MA K8LJG LA1ZI OA4BS W2QWS W5UP W6MBV W7EKM W9DH W9QQ WA4DRU 9H4G

304 DJ6VM I3ADI K1KNQ K3OTY K5OR K8ZR VE8LU W2AQ WB6UJO ZL1AV

303 CT1RM EA3OJ K1QMV K4DXQ W2GA W6GTL

302 DL6NX JA1KF K2UU N4YD PY2BW VE7WJ VK6LK W3ICQ W3NV W6NTX W6UY W8NXF W9GU W9RX WB4OSS

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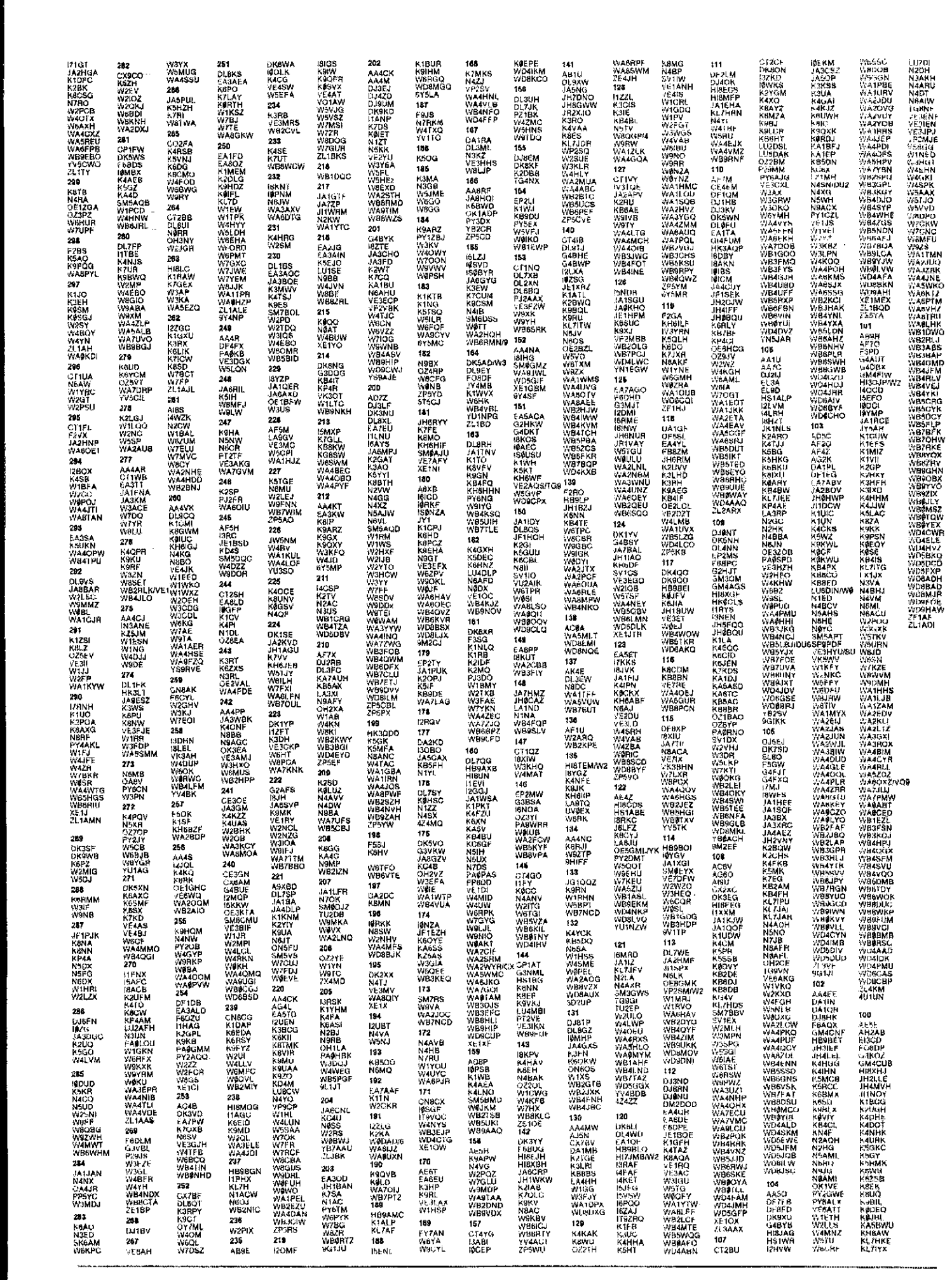

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The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

The Coming Decade

This is the season normally devoted to looking back over the accomplishments of the past year and peering ahead for an inkling of what may be to come in the new one. Now, as the decade of the 70s gives way to the 80s, it is especially appropriate to engage in some of this backward and forward viewing of where the world above 50 MHz has been and where it may be headed in the next 10 years.

Although the principal coverage of this column, and the main interest of its readership, is in the area of narrow-band techniques as typified by cw and ssb, we must recognize the strides made by other techniques with which we share the vhf/uhf spectrum. The best known of these, and the one which has scored the largest over the past decade is, of course, fm and the extensive repeater network which the mass adoption of fm has spawned. This significant development in the use of the spectrum above 50 MHz has, for the first time in our history, provided Amateur Radio with a really good facility for accomplishing reliable local communication, so important in emergencies. It has also resulted in a common meeting place where hams of various interests can get together and compare notes. Certainly the rise of fm and repeaters represents one of the major developments in the vhf bands during the 70s. In the decade ahead, I see some continued growth in this area, much of which will take place on the 1-1/4-meter band. But the fm mode has essentially matured and the big job now will be to maintain, at their present high efficiency, the facilities we presently enjoy.

There will be a new factor bursting on the vhf scene very soon, and I predict that its impact will be even greater than that of fm and repeaters — the Phase III series of amateur satellites. For what fm and repeaters have done for local coverage, these satellites, with their high orbits will do for worldwide communication at vhf and uhf frequencies. This new capability will make possible a variety of communications, ranging from intercontinental ragchewing to nets, bulletin transmissions to international computer linkups. In a future column I will have some specific suggestions on how we, as vhfers, can use this new tool to enhance our enjoyment of more traditional vhf modes.

But the first Phase III satellite, to be launched sometime in 1980, will be only the beginning. Assuming that we receive suitable frequency allocations at WARC, additional amateur satellites will be built and launched, making use of the higher bands, thus providing wider bandwidths and the ability to handle many more users. There will hopefully be opportunities for amateur packages to ride on geosynchronous satellites, making possible 24-hour-per-day coverage of an entire hemisphere. Yes, a great new day in amateur communication is in the offing and the decade ahead should see it come to pass.

What about other modes of vhf/uhf operation? While most of us use our local repeater, much as we would the telephone, to accomplish specific communication, we do not derive any particular thrill out of talking through repeaters, just as we don't get a thrill out of calling people on the telephone; it's simply a useful way to exchange information. What we do get a thrill out of is overcoming natural barriers and completing QSOs over difficult distances without the aid of any intermediate manmade devices. Just as some of the best work in the history of the world above 50 MHz has been accomplished in the same decade in which fm and repeaters have come into their own, so in the coming decade, in which we will see the rise of satellites as an important facet in Amateur Radio, the 80s will be a time of great developments in the area of weak-signal, nonaugmented communication. What new triumphs could possibly match the achievement of WAS on both 2 meters and 70 cm, or the spanning of some 5000 miles across the equator on 2 meters? Such super accomplishments of the 70s constitute hard acts to follow; the 80s will have to go some to top those monumental feats. What might we expect over the next 10 years? Probably several hundred 2-meter WASs and nearly as many on 70 cm, for openers. Through the use of microcomputers and the signal-processing techniques they make possible, moonbounce and other ultra-weak-signal modes should come into much more general use and afford real communication, not merely the exchange of calls and abbreviated signal reports. This increased activity will, of course, make the attainment of WAS, not to mention DXCC, via EME much more feasible. Terrestrial contacts across the equator of 4000 to 5000 miles on 70 cm are likely to occur soon. Crossband 6- to 4-meter QSOs between North America and the UK will probably happen also, if not via F2 during this year of high solar activity, then eventually via multihop Es. Use of the higher bands will increase dramatically, with 23 cm leading the way, probably followed a close second by 3 cm. Viable designs for high-power equipment using readily available, inexpensive components such as oven magnetrons will be presented and duplicated widely, just as has the RIW amplifier for 70 cm.

In other vhf/uhf pursuits, packet radio, now just getting started in Canada, will become quite commonplace with systems working in most U.S. metropolitan areas. The popularity of amateur television is bound to increase dramatically, what with the increased availability of video gear, from color cameras to tape machines. If it is to become widely used, however, ATV will have to avail itself of the higher bands in order to find the necessary space to expand. I predict that the video gang will be up to the challenge and that many shacks will sport color cameras and monitors by the time 1990 rolls around.

I hope the readers will forgive this spree of soothsaying. This juncture between the 70s and 80s presents so appropriate an occasion to engage in this pastime that I couldn't resist. Of course, the degree to which these predictions are realized depends greatly on events outside the sphere of Amateur Radio. Given a stable world, we may well be in for one of the most exciting periods in our history. It will be interesting to look back, 10 years from now, and see where the world above 50 MHz has gone in the decade we are now beginning.

ON THE BANDS

6 Meters — It's happened! The fireworks that all of us have been waiting for are going off all around us and their intensity exceeds the fondest dreams of most of us. In last month's column, I listed the state standings for a number of DX stations as presented in the December 1961 column. I did this to indicate what might be in store if conditions even approached those that prevailed during Cycle 19. Little did I know when I mailed last month's copy, in mid-October, what the next 30 days would bring. What took place between October 15 and November 15, as this is being written, all but eclipses those outstanding records from 20 years ago.

Attempting to chronicle what has been going on is all but impossible, especially with the limitations of QST space, but here goes anyway. The fireworks started in earnest October 18 when VE1s AST and AVX, along with other Northeast stations, experienced a transcontinental opening, and later the two VEs landed several JAs. Who would have thought it would begin this way? There had been crossband openings to Europe for a few days but the first "big day" was October 20. VE1AVX lists 14 QSOs via the 28/50 MHz route as well as a two-way contact with EI2W. This was the first confirmation that EI2W was, indeed, able to operate on 50 MHz. Many rumors had been flying but with Bob's contact we all know it was really true. The following day, WB2WIK reports crossbanding 22 Europeans including SM7PU, with Gs and DLs making up the rest. Steve makes a number of observations on crossband operation, one of which is that the strongest station on 10 meters is not necessarily the one that will hear you best on 6 meters. Watch for the weaker stations on 10; they won't be as popular and your chance for success will be improved. Others, including K5ZMS, immediately observed several problems associated with crossband work, not the least of which is the QRM caused by stations transmitting on 6 but not listening there. Ray urges that crossband operation take place above 50.15 or in the cw band below 50.1, thus leaving relatively QRM-free space for stations operating two-way on 6 meters. In the same vein, it has been suggested that during those super transcontinental sessions, we avoid the first 25 kHz of the phone band when working domestic stations. In this way the 6s and 7s will have a better chance at EI2W and ZB2BL, and we Easterners may be able to snag some of the Pacific stations.

But October 20 was not a fluke. It was just the beginning. There followed daily propagation to Europe, usually beginning about 1300 UTC and a few hours later transcontinental openings between the East and West Coasts, resulting in literally hundreds of contacts. Unfortunately, because of the 50-MHz amateur allocation situation prevailing in Europe and Africa, the pickings in that direction have been limited to crossband contacts except for EI2W and ZB2BL. EI2W contacted many stations in the Eastern part of the country, penetrated well into the Midwest and even worked several 6s and AZ 7s. Not bad for a barefoot FT-620B! Although crossband is not like two-way 6-meter contacts, it is better than nothing and the activity has been at a high pitch. Numerous Gs are active, with GM and GW also represented. German stations are also very much in evidence. Other active European countries include SM, LA, HB, PAØ, OK and EA. When not watching 10 meters for crossband contacts, many have periodically monitored 50.5 in hopes of catching SB4AZ, but no luck as of mid-

*Send reports to Bill Tynan, W3XO, P. O. Box 117 Burtonsville, MD 20730, or call 301-384-6736 and record your message.

70-Cm Standings

For WAS holders, listing is WAS number, call state and call areas. For others, call, state, U.S. states worked and call areas. Call areas are 10 U.S. call areas plus KH6 and KL7, plus each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico.

WAS Holders			
1 WØYZS	MO	12	
2 K2UYH	NJ	12	
W1JR	MA	35	11
K1FO	CT	23	8
K1WHS	ME	21	9
K1LPS	VT	20	10
K1PXE	CT	19	8
WA1TZV	MA	17	7
K1HTV	CT	17	5
W1AJR	RI	16	5
W1SL	NH	15	7
W1XJ	RI	15	5
K3EAV/1	—	14	6
K1BFA	MA	13	5
K1JIX	MA	13	5
W1GXT	MA	11	5
WA1JTK	—	11	4
W1HDQ	CT	11	4
K2RIW	NY	26	11
K2LGJ	NY	24	10
K2ACQ	—	24	8
W2VC	NJ	23	7
W2AZL	NJ	21	7
K2CBA	NY	20	8
W2BLV	NJ	20	6
W2CLL	—	20	6
K2vDK	NJ	18	6
WA2EMB	NJ	18	6
WA2FGK	NJ	17	6
K2ARO	NJ	17	6
K2YCO	NY	16	6
W2DWJ	NJ	16	4
K2OVS	NY	15	5
W2PGC	NY	14	9
W2CNS	NY	14	6
K2BF	NY	12	4
WB4NXY/2	NJ	12	4
WA2EUS	NY	12	4
WA2DKB	NJ	11	4
W3RUE	PA	28	8
W3OZ	MD	25	8
K3WHC	PA	23	6
K3QCQ	PA	23	7
W3IP	MD	23	7
W3HMU	—	19	6
K3IUV	PA	19	5
WA3JUF	PA	14	5
W3XO	MD	13	5
W3OMY	PA	11	7
K3SWZ	—	10	6
W3CJK	—	10	5
W3IJG	MD	9	4
WA3DMF	MD	8	5
K4QIF	VA	35	21
WA4IPI	KY	26	8
W4FJ	VA	25	8
*W4ATC/4	VA	24	8
WA4CQG	AL	23	5
W4NUS	—	22	8
WB4NMA	GA	17	6
W4ISS	GA	16	5
W4HJZ	NC	15	5
K4SUM	VA	15	5
W4VHH	NC	15	4
WA4GPM	VA	14	4
N4CD	VA	14	—
K4GL	SC	13	6
WA4SBC	VA	12	6
WD4MUO	VA	12	5
K4PKV	NC	10	4
WB4EXW	NC	9	4
K4NTD	—	9	2
K4QF	AL	8	6
K4KAE	SC	8	2
WA4MVI	NC	7	1
K4IXC	FL	5	2
W4AWS	FL	4	2
WB5LUA	TX	41	10
K5JL	OK	33	11
W5FF	NM	27	18
W5HN	TX	21	7
W5RCI	MS	19	6
WA5HNK	TX	16	6
K5LLL	TX	11	6
W5SWV	TX	9	3
W5DC	LA	8	—
W5GVE	TX	7	3
W5LPV	OK	7	2
W5UKO	—	6	2
WB5QQG	LA	5	3
K5UGM	TX	5	2
W5SXD	TX	5	2
W5HPT	TX	4	3
K5MWH	AR	4	2
W6ABN		16	9
WA6HXW		6	4
W6DOJ		4	2
W7LUX	AZ	5	3
K7ICW	NV	4	2
W7JF	MT	3	2
K8WW	OH	40	10
W8IDU	MI	27	8
K8DEO	OH	24	8
WA8VPD	MI	22	8
W8YIO	MI	22	7
K8AXU	OH	20	8
W8HVX	MI	19	7
W8CVQ	MI	13	7
W8MNT	MI	13	7
K8BR	MI	10	6
W8PQI	MI	10	6
W8QOB	—	8	5
W8FWF	MI	8	5
WB9SNR	IL	27	10
W9JIY	IN	27	8
W9AAG	IL	26	8
W9UD	IL	25	9
W9WCD	IL	22	9
WA9HUV	IL	22	7
K9HMB	IL	21	8
W9YF	IL	17	6
K9IIF	—	16	7
K9XY	WI	13	5
K9AAJ	IL	12	5
KØTLM	MO	42	21
NØIS	MO	27	8
WØDRL	KS	24	9
KØDAS	IA	22	7
WØLER	MN	18	6
KØCJ	MN	17	6
WØRAP	IA	16	8
WØPW	CO	15	5
WBØXU	IA	14	7
WØOHU	MN	14	5
WBØIUT	NE	13	4
WBØCOR	MN	12	5
KØALL	ND	11	3
KØWLU	SD	10	3
WBØWAO	KS	6	3
KH6IHP		7	7
VE2HW	PQ	6	3
VE3DKW		19	7
VE3EVW		12	6
*VE3ONT		11	7
VE3AIB		9	5
VE3EZC		7	5
VE4MA		17	13
VE7BBG		12	—
VK2AMW		9	8
F9FT		8	7
ISMSH		6	5

*Multioperator contest station

November. Reception of the 5B4CY beacon has been reported, however.

Another beacon that has been driving everyone crazy is that of FY7THF in French Guiana. The 50.038-MHz tsk signal from this station has been received many mornings, sometimes with strength running well over S9. I am told that reception reports should go to F8SH. Unfortunately, FY7AS, who operates the beacon, is seldom available to add another country to many logs. Other than reception of this beacon and occasional openings to HC1JX, north-south propagation has been conspicuous by its absence. One unfortunate result of this was the apparent failure of HP2XPW (KZ5NW) to complete WAS before leaving Panama on November 12. Phil hooked up with WL7ACY, November 5, for state number 47, but the last I heard, he still needed WY, AR and ND to round out the 50. Another DX station that is close to WAS is HC1JX. John is up to 45 states and has a good shot at it.

If 6-meter stations are scarce in Europe because of allocations and in South America because of lack of propagation, there is no scarcity in the direction of Japan. Who in their wildest imagination could have predicted the number of openings we would get in that direction, how widespread they would be and the number of stations that would be worked. As just one example, between 2310 UTC November 2 and 0120 November 3, N6CT worked 83 JAs plus HL9TG. The honor for the highest number of Japanese stations worked, that this conductor has heard about, goes to WA7RTA. As of the middle of November, Art reports logging 700, in all JA call areas, and was going for the Worked All Japanese Prefectures Award. Nor were these openings confined to the West Coast. Many Midwesterners got in on the act as well. For example, KØWM, SD, hooked up with 16 JAs during a 1-1/2-hour period November 5. Some signals got as high as S9. WBØUIP reports QSOing 68 Japanese while WØVB worked 40. Even East Coasters were favored. Among those stations who made the grade were N3AHI, W3ILG, K1IKN, W2UTH, VE1ASJ, AVX (of course) and a number of other 1s and 2s.

Probably the best days of the period between October 15 and November 15 were November 5 through 8. On the 5th a short, somewhat localized, opening between several CT stations and the KL7s took place, resulting in WA1UQC working his 50th state. Dave claims to be the first in New England to accomplish a 50-state WAS. The following day was what many of us had been waiting for, a massive KL7 opening to most of the country. This produced many new WAS claims, including one for this conductor. It was very satisfying to finally accomplish this goal after 30 years of trying. Altogether, in that afternoon, this conductor hooked up with seven AK stations, including KL7HMH, the first since statehood, and WA4TNV/KL7 on Shemya, well out in the Aleutians. To illustrate the widespread nature of this opening, WL7ACY contacted 270 stations in 45 states. The following day produced a good KH6 opening, providing more WASs, including one for VE1AVX. On the 8th, it was KH6 again with widespread propagation and excellent signals. KH6IAA notes working well over 100 stations. For awhile, signals were so good that Al reported to his IC-502 and its built-in whip, with which he contacted some 20 stations. That same day a number of 6-meter operators, including WB4RDT here in the Washington area, worked KX6AQ for a nice new country. Taking his place and putting signals into the East Coast, again on November 16 and 17 was KX6PF. Another Pacific-area station noted was KG6DX. This conductor was lucky enough to work both for my best DX to date, I'm still looking for Japan, however.

Many were successful with low power and simple antennas. WA2EAH was one, snagging several West Coast stations using his IC-502 and whip. W3IP worked a 6 with 20 milliwatts and a dipole. WA1UQC made a mobile crossband contact with G3FXB. Is this a first?

In summary, it's been wild, and continues to be. This has been a mere sketch of the conditions which certainly rival, if not surpass those of 1957-58. Let's hope "old Sol" keeps it up. This conductor is having fun; how about you?

JA1UT announces that about the time you read this, another DXpedition to Indonesia will be underway. In cooperation with the Organization Amateur Radio Indonesia (ORARI), a group of Japanese and Indonesian amateurs will activate YBØX/9 from the island of Bali with operation on 6 meters as well as the hf bands. Period of their stay is to be December 29 to January 5 and QSLs should go to JA1UT.

How many countries do you have on 6 meters? This is an often-asked question in these days of mufs exceeding 50 MHz. I plan to include a 6-meter country-standing box in a forthcoming column but am not sure how totals should be listed. Should only two-way 6-meter confirmed contacts be counted or should unconfirmed contacts be listed also? What should be the status of crossband QSOs? I would appreciate comments on this. Meanwhile, send an s.a.s.e. for the special form, to be printed soon, for reporting 6-meter DX totals.

2 Meters — As might be expected, most of the mail this month deals with the super conditions on 6 meters but there is some 2-meter news too.

As guessed in last month's column, that traveling moonbounce station operated by K6LEW and K3LEO was, in fact, in WV over the October 13-14 weekend, operating this time from the mountain retreat of W4PSJ. As in DE, a month earlier, Owen and Jim were successful on all of their schedules, providing that hard-to-get state to a total of 15 stations: WA7BJU, N7NW, W5IJU, W7UBI, W7EN, W5FF, K5FF, WBØQMN, W6PO, VE7BQH, W7CI, W5DC, WAØLPK/KL7, G5CSZ and SM7BAE. This success was achieved despite the fact that they did not see the moon all weekend and the more-active-than-usual sun provided increased solar noise. Future plans call for a March trek to MS or TN with both 2-meter and 70-cm, equipment.

Another 2-meter EME practitioner who has performed above and beyond the call of duty to make a rare state available is WAØLPK/KL7. Jim says that he expects to be in AK approximately another two years and will continue to maintain skeds. He credits W1JR along with W6PO and WBØQMN for his being on moonbounce at all. In particular, W1JR provided the preamp along with phasing harness and relays, not to mention hours of consultation via telephone. The biggest problem with operating EME from Anchorage is caused by winds of 75 to 80 miles per hour that, Jim reports, spring up every few months. So far, he has had to rebuild the "H" frame twice. The last time was a year ago with the mercury hovering around 10°F.

Not all the 2-meter news concerns EME. W2PGC reports good success in the Orionids meteor shower, completing contacts with N5KW OK, W4WD FL, K4GL SC and WBØUIT NE. This brings Sam's state total to 34.

SWOT, that worthy 2-meter-activity-promoting organization, is now issuing membership numbers in the 1800s. The group puts out a fine newsletter, sponsors contests and regional nets and generally boosts 2-meter ssb and cw activity. For information on joining, send an s.a.s.e. to Len Hoops, W5JTA, 1704 Glenn Dr., Forth Worth, TX 76131.

K9AKS, W3EP/9 and W9IP are conducting a study of the massive tropo opening which took place around the time of the September contest. In order to obtain a data base for their work, they ask that copies of logs for 2 meters, 1-1/4 meters, 70 cm and higher bands covering the period be sent them. Address is Curt Rosenian, K9AKS, c/o Department of Geography, University of Illinois, Urbana, IL 61801.

1-1/4 Meters — K2DNR, Hopewell Junction, NY, reports that he has 90 watts of cw and ssb to four 11-element Yagis up 75 feet. Sam is particularly active on Tuesday evenings, the designated 1-1/4-meter activity night. On most other evenings between 2000 and 2200 he runs an automatic CQer with the antenna southwest.

From NM, K5FF reports that she has her 8877 amp going and is always looking for any kind of 1-1/4-meter sked.

Another very active 1-1/4-meter station is WB9SNR, IL. Jim has 140 watts out and a 2.5-dB front end. Antenna is an 8-element quagi at 30 feet. Skeds are welcome. Call 312-426-6378 between 1900 and 2300 CST. Meanwhile Jim will be calling CQ Tuesday evenings on 220.020 or 220.1. Calls will be to the east and southeast between 2000 and 2100 CST and to the north, west and south after 2100. That's the kind of activity we need to get this band going. Keep up the good work.

70 Cm — A letter from N4CD, Lynchburg, VA, tells of schedules which he has been running with WA2AAU, Schenectady, NY, operated by WB2BXP. So far, under average conditions, they have worked once over the 463-mile path and heard weak signals on a number of other attempts, despite the fact that N4CD is running just 60 watts output and feeding a single 16-element KLM at 40 feet, through 70 feet of RG-8/U. At WA2AAU, a 28-foot dish does a lot to make up the difference. WB2BXP is interested in exploring just how far two 70 moonbounce-capable stations can regularly work via terrestrial paths. Those willing to try tests, especially those in the range of about 600 miles, are invited to contact WB2BXP.

In the October issue of the *432 EME News*, K2UYH wonders whether the average 70-cm EME station is better than a few years ago. What prompts this speculation is the fact that on many of the recent schedule weekends, "conditions" have been exceptionally good. This fact seems especially puzzling to this writer as we are now at a period of very high solar activity and hence higher solar noise. This should not be helpful to moonbounce. Does anyone have an opinion on this?

What must be one of the longest lived 70-cm schedules is that held between W9IIY, Indianapolis, and WA9HUV, Elmhurst, IL. These two have contacted weekly for the past 12 years. Although signals are sometimes weak, they have always made it. QST

Public Service

Conducted By Robert J. Halprin,* K1XA

RTTY — The Story Continues

Recent articles, here and especially in the *QCD* bulletin, have focused on radioteletype traffic handling in relation to the National Traffic System (NTS). This article is an attempt to bring to light a few ideas on the necessary standards that must be formulated before RTTY can become an everyday medium in traffic handling.

In our present system of traffic handling, only two modes are in general use: phone and cw. Cw, being the earliest mode used, is quite well developed and has very strict rules with respect to message format and procedures. Phone traffic handling has proceeded at a rapid rate and most amateurs using this mode are well versed in procedures and format. This is not so for RTTY. Apparently when RTTY enthusiasts try their hand at traffic handling, anything goes. I have received messages that have no breaks or line changes in the whole batch. Needless to say, the man who has to take these to a voice or cw net will have a very hard job. Now, it must be mentioned here that all traffic handlers do develop their own method of formatting written traffic. They may write the heading line on the same line as the address, etc.; however, when they send that message, the actual sending is formatted in the same manner as they received the message. In RTTY work it becomes much more important to keep the format standardized, as the receiving operator has no control of what is printed on his machine. The traffic he receives will usually have to be relayed to its destination via another mode (cw or phone). Additionally, as an aid to the receiving operator, traffic should be bunched by region, rather than sent helter-skelter. It should also be arranged by area. In this manner the receiving operator will not have to look through 25 feet of Teletype printout paper while he is sending the traffic on a region or area net. If the receiving operator is to relay the traffic via RTTY, he will probably reperf the sending station. In this case, it is important that he be able to break the long tape for transmission to region level RTTY stations. The transmitting operator should therefore allow a large amount of LTRS between regions, and use some method of designating the end of one area's traffic before the start of another. If you have ever received 200 messages without a break, you will realize how large a pile of tape will be used.

This is an illustration of message format:

NR 13 R W5GHP 11 NEW ORLEANS LA 0200 Z AUG 15
JOHN BARTONS
835 PAN ST.
PENSACOLA BEACH FL 39669
TEL 329-656-8932
THANK YOU FOR THE MESSAGE X WILL MEET YOU ON ARRIVAL
JIMMY
CFM 13 11 15 835 39669 329-656-8932

As can be seen from the above, any station receiving this message would have little or no trouble in retransmitting it on either cw or voice. The main points of this format are as follows:

1) The heading is all on one line. There are very few headings that would take more than one line. If this were to happen, the second line would be right under the first. This heading is straightforward, and should present no problems.

2) Between the heading line and the first line of that address, two line feeds are used (LF key). This allows the receiving operator to easily locate the parts of the message. Likewise, there are two line feeds between the end of the text and the signature.

3) The text. Note that we did not break the text at 10 words, but this could be done to help the receiving operator check the count. This may depend on who is making up the tapes.

4) The line after the signature is the confirmation line, labeled CFM. On this line all numerals in the complete message are repeated, with sufficient space between them to allow quick separation. This will allow the receiving operator to check the numerals quickly. This confirmation line would take only a few seconds to send and could possibly save several fills.

For easy separation, at least eight and possibly 10 line feeds (LF) should be used between each message. This will allow the operator to tear off each message for convenient grouping. If the whole string of messages were for one area, or one region, it would save a little paper to lower this spacing to four or five line feeds. The standard rule should, however, be eight line feeds.

A word about machines. On some of the model 14 and 15 machines, just keying carriage return (CR), line feed (LF), and immediately keying the next letter or word will give trouble, mainly due to the slow return of the carriage. It is possible for the machine to print the next letter in the middle of a line. The procedure to be used here is to always key a line change in a certain sequence. In the military this sequence consisted of the following: LINE FEED, CARRIAGE RETURN, LETTERS, CARRIAGE RETURN, LETTERS (LF, CR, LTRS, CR, LTRS). If this sequence is used, no matter what model of receiving machine is used, the carriage will always return to the left-hand edge of the paper. On the newer models like the 28 or 35, where the type is on a ball, this would be unnecessary. But the transmitting operator may not know what machine will be used, especially if the traffic is being reperfed, and relayed to another station. Once you get into the habit of following this sequence, you will use it automatically.

This is an illustration of book message format:

THE FOLLOWING IS A BOOK OF THREE FOR THE FIFTH REGION

R W5GHP 16 NEW ORLEANS LA SEPT 11

HAVE QSL CARDS FOR YOU X PLEASE SEND SASE TO FIFTH DISTRICT QSL BUREAU X 73

WD5XXX QSL MANAGER

NR 167
BOB JAMES W5ZZZ
2135 CENTER ST
PICAYUNE MS 37689
CFM 167 2135 37689

NR 187
BILL GUILMAIC WD5OOO
1036 WEST DIVISION ST
HOUMA LA 73245
CFM 187 1036 73245

NR 182
GLORIA SMITH WB5ZZZ
RFD 1 BOX 89
JAMESVILLE TX 75643
CFM 182 1 89 75643

END OF BOOK

Note that the first line not only designates the region (or area) but also lists the number of book messages to be sent. After this introductory line, three or four line feeds are used, then the heading line for all messages is sent, with the exception of the message number. There follow two line feeds, then the text of the message, then two line feeds and the signature. This is the same format as the previous example. After the signature we have the confirmation line, just like the regular traffic. The number of line feeds used in book messages can be as short as two, or could be as long as four. Two line feeds are used in the illustration. Another point to remember is that the older machines do not have "UNSHIFT ON SPACE." This feature on the model 28 and later machines returns the machine from FIGURES to LETTERS whenever the space bar is pressed. This means that when transmitting a string of numbers that requires spaces, like the standard telephone number, the sending operator must allow for this operation. The telephone number as used on our messages is a perfect example. Normally it would be sent like this: 504 567 4104. When sent on RTTY, there could be several added key strokes (i.e., 504 space bar FGRS 567 space bar FGRS 4104). The simpler method would be to use a dash, which is the upper case A on the Teletype keyboard. Two key strokes would be saved if the telephone number were sent in this manner (504-567-4104). In any string of separated numbers, even in the CFM line, the use of the — (dash) is recommended.

Another procedure that may help in RTTY traffic work is the use of the standard RYRYRYRY line. After both stations are in contact, the sending station should send at least two or three lines of RYRYRY, to allow the receiving operator to get his equipment all set

*Assistant Communications Manager, ARRL

and lined up. After, say three lines of RY, the transmitting operator should stop and ask the receiving operator if he is ready (QRV?). The receiving operator then can answer on RTTY or CW with QRV, or GO TRAFFIC, and the transmitting operator would then send one more line of RYRYRYRY, then send the words TRAFFIC FOLLOWS, and start his traffic tape. In the case of a long tape, the transmitting operator must remember to stop his transmission every 10 minutes, and send the call sign of the station he is working, as well as his own call sign on CW, then he can activate his tape again.

The above are a few ideas that I believe will assist all traffic operators who may be starting into RTTY. Many others have ideas that I am sure are as good as these, and I would like to hear from these operators. In the future we may see such advances as automatic CW-to-RTTY interface, with the use of the small computers now on the market. However, CW being a human effort, it may be quite a while before computers small and cheap enough will be available. — *Bob Schmidt, W5GHP, TCC Director Central Area (evening), National Traffic System*

SOME THOUGHTS FROM THE FIELD

I cannot understand the obsession that some net managers and traffic handlers have with *rate*. Who cares if the net stays in session for a few minutes longer? Does the *rate* prove anything about the net's ability for handling traffic in an emergency? I say let the *rate* take its course and let's stick to basic clean sending, good order and accuracy of copy! — *Tom Fry, WB1CPF*

A situation has arisen on some of the nets that has a few of us up the wall. What I'm referring to is the sudden spate of traffic from fairs and college stations originated without telephone numbers and ZIP codes. The ZIP is not too necessary as long as the telephone number is provided. Without it, we are practically licked as far as getting the traffic to its destination quickly is concerned. What some of us have been running into is that when we try to get the number from Directory Assistance, we are either told that there is no such number for the party we are inquiring about or that the phone is unlisted, which amounts to the same thing. — *Bill Miller, K2GCE*

THE NET OF THE MONTH CLUB

The Heavy Hitters Traffic Net — Far and away the finest traffic net on the 04/64 Waltham, MA, repeater (WA1VDW/R), this NTS net meets at 10:30 each night to handle traffic into and out of the metropolitan Boston area.

The HHTN provides four very useful functions: (1) An outlet for traffic coming into EMass not covered by the section nets; (2) Liaison to the National Traffic System for persons without low band capability; (3) A means of familiarization with proper traffic and net procedures used throughout the system, and (4) It supplies a reservoir of trained radio operators familiar with net procedures for the purpose of providing communications in the event of an emergency. Beyond all this, participation in the HHTN is a good way to meet people and have fun (fun is not prohibited by FCC) while providing a viable public service. — *Rich Palm, K1CE*

PUBLIC SERVICE DIARY

☐ Papette, French Polynesia — September 30. WA6CUT picked up a faint signal from a ship which ran aground on a sharp reef 200 miles off the coast of French Polynesia. He contacted W6TIO, an airline pilot, who copied information about the ship and its whereabouts while WA6CUT contacted the Coast Guard in San Francisco. The French Navy ships were notified and the crew was saved. (W6QO/7)

☐ Fullerton, CA — October 4. Ham radio operators took up positions throughout St. Jude Hospital when the phones went dead cutting off communications within the hospital as well as with the outside. WA6OPS, the hospital director of occupational therapy and a member of ARES, maintains her own ham radio equipment in the building. She aimed her signal to the Anaheim repeater and within minutes hams started arriving at the hospital to assist. (WA6DXQ)

☐ Saipan, Mariana Islands — October 15. N2AIH was in QSO with W4YID when they were interrupted by a distress signal from KG6RL in the Mariana Islands. A secretary had accidently swallowed Canclene, a treatment for mange in dogs, instead of her cough medicine. W4YID called a veterinarian and found out that the liquid contained poisonous lindane. N2AIH contacted a poison control center and learned the treatment. After relaying the instructions, both hams stayed on frequency until the doctor assured them that the woman was alright. (N2AIH)

☐ Columbiana County, OH — October 18-21. The Triangle ARC, using their repeater, WR8AJL, assisted in their first search and rescue for an elderly man. Accustomed to working quite closely with the disaster services for the county, they contacted "Rescue Forty," a search and rescue team. The Triangle ARC headed up by EC, Chuck Burke, K8JDI, established communications for all searchers.

On the 19th a bloodhound was brought in and was able to track the man to a mile from his home before losing the trail. The search was officially called off but the Triangle ARC continued.

K8ZIP established a base station on the 20th when the power went out in the repeater. After the repeater was repaired, WB8QQO set up a remote base to improve communications. With no success, the search crews decided to try one more day.

Heavy underbrush, streams and abandoned strip mines made the job more difficult. The search came to a tragic end when the man was found dead. The sheriff's office was notified via repeater autopatch. (K8HGY)

☐ Sparta, TN — October 23. W4BSA, responding to an emergency call on the Sparta repeater, averted a potentially life-threatening situation when a woman had a severe allergic reaction caused by a bee sting, and the necessary drug was not immediately available. After learning there was no physician available at the nearest hospital to dispense the drug, he relayed directions to WD4NEK who transported his wife to a nearby clinic where the medical staff was ready for immediate treatment. (WD4NEK)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Santa Maria, CA — April 12. Twenty-nine hams assisted in a search and rescue effort in Las Padres National Forest. SBar County ARES was active providing phone-patch support with the southwest-division coverage area. The search was successful. (WB6BWZ, EC SBar)

☐ Crawford and Harrison Counties, IN — July 26-28. A flash flood with up to six feet of water rushed down the streets of English and Marengo causing residents to be evacuated. Over 50 amateurs in the southwestern part of the state, including amateurs who manned the Red Cross club station WA9LGQ, provided communications for two and a half days, between shelters set up in Crawford County and with the Red Cross Headquarters in Indianapolis.

The telephone exchange building was among the many buildings damaged in the business district of English. WA9IJS assembled an emergency communications team consisting of K9IE, N9TV, AB9P and himself to set up a communications link in N. Harrison to replace the damaged phone system. They set up 2-meter stations using the N9RM repeater on 25/85 and W9BGW on 22/82 which they used to pass flood-related traffic.

On Friday WA9TJS took one of the 2-meter stations and other equipment from N. Harrison to English where he joined WB9JHD to recruit and assign operators for further service. K9TE stayed at the command post in N. Harrison because it had telephone service.

Saturday a damage survey group of five teams was formed consisting of one Red Cross recorder and one amateur. They made periodic reports and received instructions using 52 simplex. The N. Harrison operation was terminated and operators went to English for the wrap-up. (W9UMH, SEC IN, W9NBO, K9TE EC CLARK CO.)

☐ Anaconda, MT — August 5. Anaconda and Butte area amateurs were requested to provide disaster communications when the 2900-acre Barker Creek fire threatened evacuation of the city of Anaconda. The fm repeaters, WR7ABY and WR7ALM, in the Butte and Anaconda area, proved invaluable during this emergency. (W7TYN, SEC MT)

☐ Median, OH — August 15. A tape of the central processing unit of the electronic switching unit failed, leaving 45,000 customers of the General Telephone Co. without service. K8OIA called the emergency net, liaison with Ohio Single Sideband Net, into operation. The net was secured seven hours later when power was restored. (W8GSR, EC Medina County, OH)

☐ ARRL Section Emergency Coordinator Reports. For October, 32 SEC reports were received, denoting a total ARES membership of 15,728. This is an 18-percent decrease as compared with reports received last October (39) and a 2-percent decrease in ARES membership (16,131). Sections reporting were Alta, Ariz, Ark, Conn, Del, Ind, Iowa, Kans, Ky, Mar/NF, Mich, Minn, Mo, NFla, NTex, Ohio, Okla, Org, Que, RI, SV, SBar, SDgo, SJV, SCV, SFla, STex, Va, Wa, WVa, WPa, Wisc.

COMMUNICATIONS SERVICE OF THE MONTH

On October 9, at 8 A.M., a simulated disaster involving a train wreck in New River Gorge, near Hawks Nest State Park (with some 150 "casualties") went off as planned. Sponsored by the West Virginia Hospital Association, this exercise involved eight area hospitals, seven ambulance companies, law-enforcement units, fire departments and Amateur Radio operators.

The chain of events was for the C & O Railroad to call a dispatcher, who then alerted emergency crews and state police. They, in turn, called the sheriff's department who then called ambulances, local police and fire and amateurs. We received our call at 8:10, immediately initiated our emergency plan and called our members via 2 meters. Twenty-seven amateurs responded and went to their assigned stations. Our part in the drill was to relay, from the scene of the accident, the departure of loaded ambulances, the number of patients and their condition to the hospitals of destination, and to assist in traffic control. Two-meter stations were set up at all hospitals and ambulance companies involved and at the EOC in Beckley, WV. The local repeater (WD8OQJ/R, 19/79) was used to relay information to the hospitals and 52 was used for traffic control. One of the first to arrive at the scene was WA8AZM, who landed his copter at the site and assisted other rescue helicopter pilots with weather reports and landing instructions. Phone patches were handled through K8KT to helicopter flight service from a 2-meter handheld at the scene. KA8DMJ was in charge of the drill and was also one of the first to arrive.

An evaluation meeting was held afterward to determine what went right and what should be changed. Most services involved found that the drill was a success, although they had some suggestions for improvement. After all, that's the whole purpose of the drill.

Our Amateur Radio operations went well and received much recognition from the agencies served. Should a real disaster occur, we are better prepared to be of service to our community. Our thanks to all the amateurs who participated. — *Plateau Amateur Radio Association*

REPEATER LOG

According to reports received between October 20 and November 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Miscellaneous	Total
VE1CBC						2		2
VE2RRU						1		1
WR4ACY		1	2	33			1	37
WR4ALW			1					1
WR4AXO				2				2
WR5ABA				2				2
WR5ABE				1				1
WR5ABI				2		1		3
WR5ABY				34				34
WR5APK				2				2
WR5APN				2				2
N5DD				1				1
WA5FYI				1				1
WR7AEL				1			1	2
W7WGW				2	1			3
WR8AJK						1		1
K8ZIS		1						1
WRØAFT				1				1
Simplex						3		3
TOTAL	0	2	3	84	1	8	2	100

NATIONAL TRAFFIC SYSTEM

The just-concluded, combined-area, NTS staff meeting, an historic first in the annals of the National Traffic System, resulted in some significant recommendations to the communications manager that will affect the progress of the system as we enter the '80s. Details, including the complete minutes, will follow.

October Reports

Area Nets

	1	2	3	4	5	6	7
EAN	95	3950	41.6	1.312	93.5		
CAN	95	1888	19.9	.565	99.7		
PAN	64	2125	33.2	.706	97.9		
Region Nets							
1RN	101	1076	10.7	.536	71.1	90.5	
2RN	139	1381	9.9	.636	96.0	95.8	
3RN	96	652	6.8	.619	100.0	98.9	
4RN	127	1966	15.5	.604	84.8	97.9	
RN5	87	1217	13.9	.773	85.1	100.0	
RN6	117	1224	10.5	.345	76.0	98.9	
RN7	124	1473	11.8	.895	99.8	100.0	
8RN	121	926	7.7	.443	89.9	98.9	
9RN	124	893	7.2	.392	95.0	100.0	
TEN	93	600	6.5	.287	70.4	99.2	
ECN	65	313	4.8	.430	77.4	78.9	
TWN						99.0	
TCC							
TCC Eastern	187[1]	1170					
TCC Central	212[1]	1090					
TCC Pacific	110[1]	870					
Sections[2]	5729	28,425	5.0				
Summary	7177	51,239	7.1				
Record	6351	34,077	16.4				

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (181): ASN (AK), AENB AEND AENJ AENK AENM AENS (AL), ARN (AR), ATEN HARC SWN (AZ), NCN NCN/VHF NCTN SBARES SCN SCN/RTTY SCN/VHF (CA), CN CWN HNN (CO/WY), WESCON (CT), DEPN DTN (DE), AFPN DEN FAST FPON FPTN GN MEN NFPN PBTN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), GSN GTFCN GTN MAEN (GA), I75MN IACN TLCN (ID/MT) IMN MTN (IA), ILN ILPN (IL), ITN QIN (IN), KPN KSBN (KS), 2STN 4DARES 5ARES 6ARES KNTN KRN KTN KYN MKPN SEKEN (KY), LAN LRN LSN LTN (LA), MACS (MA) EM2MN EMRI EMRIPN EMRISS HHTN NEEPN RIEMTN WMN WMPN (MA/RI), APN (MAR/NF), MEPN MMN MTN WRIN (MB), MDD MEPN AEN MPSN OCRN PTN SGN (ME), MITN MNN QMN UPN (MI), MSN MSPN MSSN (MN), NEMOE (MO), MTN (MS), NCSSBN (NC), WNN (NE), GSFM (NH), MCN NJN NJPN NJSN NJVN OBTTN UCETN (NJ), NMRR (NM), BAVTN CDN HVN NJN NLI NLIPN NLIVHF NYPON NYS OCTEN SDN STAR WDN (NY), BN BNR BRTN HCARC ONN OSN OSSBN TSRAC (OH), NWOKSN OAN OLZ OPEN OTWN STN (OK), CMN LN ODN OLN OPN OSN (ON), 16/76 AREST BSN LBARES OSN PDXAARES (OR), EPA EPAEPT NWPA2MTN PTTN WPA WPA2MTN WPAPTN (PA), CMN SCSSBN (SC), SDESSN SDMN SDN SDHJO SDTEWN (SD), SATN (SK), MCRN RCARESN TN TNN W1VHFN (TN), DFW TEX TTN (TX), BUN UCN (UT), VN VNTN VSN VSBN (VA), WARTS WSN (WA).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP
7 — % REP. TO AREA NET

Transcontinental Corps

TCC-E(E) certificates to W2GKZ (12th annual), W4SQQ (sixth annual) and W3PO (second annual).

	1	2	3	4	5
TCC Eastern	197	96.9	2908	1170	
TCC Central	322	95.5	2001	1090	
TCC Pacific	124	88.6	1741	870	
Summary	643	93.3	6650	3130	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (October). Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA FIR GN SSH XA, W2s DS QQB FR GKZ MTA RQ ZOJ, K2NY, WA2s ICB SPL, W3s FAF PO, WA3WQP, K3s KW NGN W4s JK MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, KB6FR/3, W8PMJ, WA8WPW, WB8WTS, K8KMQ, VE3s GOI SB. Central Area (W5GHP/W9JUJ, Directors) — W4ZJY, WD4HIF WN4KKN, N4MD, W5s KLV RB, WA5s BHF INJ RKU, WB5s MVR OXE, 7DD, WD5HHK, K5s GM MC, N5s TC TS, W9s CXY DNO HOT JIJ JUJ NXG, N9TN, W0s AM HI, WA0TNM, K0s CW EZ, AF0Q, Pacific Area (W5KH, Director) — N6s MR NG, W5KH, N6s GW PZ WP, W6s EOT OA SX ZT ZRJ, WB6PVH, W7s DZX EP GHT LYA YSF, K7s HLR KSA MC, AD0A, K0s BN DJ, VE7ZK

Independent Nets (October 1979)

	1	2	3	4
Amateur Radio Telegraph Society	31	1870	428	
Central Gulf Coast Hurricane	31	210	2097	
Clearing House	31	239	427	
Empire Slow Speed	31	76	348	
Hit and Bounce	31	367	474	
Hit and Bounce Slow	17	69	27	
IMRA	27	378	1011	
Mission Trail	30	263	1297	
New England Novice	23	35	105	
New England Teleprint Net	6	25	18	
North American SSB	26	310	297	
North American Traffic and Awards	15	13	260	
Piconet All Day Watch	173	209	3225	
West Coast Slow Speed	31	186	352	
20-Meter ISSB	27	212	463	
75-Meter ISSB	31	581	1047	
7290 Traffic	51	569	2674	

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll October 1979

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

332
KA9CPA
264
K4TH
182
KL7JEB
173
KA2CNN
172
WD8KZX
171
WA4CNY
168
WD8LRT
167
W2ZOJ
164
WD4COL
163
K4DZM
160
WA4PFK
153
WB3GZU
137
WA3NAZ
135
KA1CC
132
KA1BJY
131
WB1DXR
130
VE3JIR
129
WB5NKD
128
WA2SPL
WA3PXA
127
K5OWK
126
W7VSE
W2UEZ
125
AA5J
WB2MCO
124
WA5RVT
123
WD5EUE
KB4OZ
121
WA3WOP
121
N4CCT
W2RQ
120
KB6FR
WD4HIF
118
N4NK
117
AA2H
115
K8AAZ
K4SCL
114
AF4T
VE3GOL
113
WB8YRY
W0OYH
112
WB5NKC
K1BA
WB2EAG
111
WA2ZJP
WA2UWA
110
WB2RMI
109
N8ABA
W5KLV
KB4N
N2APB
108
W9JUJ
KL7HSF
WB4FVV
107
K5TL
106
W5DTR
WB3JZA
W1TN
105
WA4EYU
AA3S
104
K7JV
WB2TUMQ
103
K7GXZ
WB5LAT
102
W7GHT
101
AF8V
WB6PVH
WD5IVD
WA4JDH
100
WD4AWN
99
AF2L
98
WB8SYA
K4EV
N2CR
97
N6AWH
AK5N
KB4OW
K4JGW
W6OA
96
WB6QJW
W6NTN
KA6A
95
WB8YDZ
94
AE9H
WA4STG
K4BKX
WB1ANT
93
WB8MTD
W8GGX
WB2PJU
W4NWM
VE1WF
VE3DPO
92
W5HMR
W4ZJY
WA4VKD
W4CKS
91
WA8GMT
WA4YIU
WA4CCK
W2YJR
90
K0PIZ
K2VX
W0OTF
89
N5TC
WB5MMI
W1RWG
88
WB0ZBJ
N0ACW
WB7WOW
N6GW
W6DXL
87
WA7IHS
WB5LBR
78
K4XE
W5VMP
W1EOF
N5RB
86
77
WB9JSR
W4NOL
WE8OMQ
W2PZL
K4HRF
75
WA2MFV
W8IHX
K0EZ
KB4OG
W0FT
WD4LYV
85
VE1RI
KB8GC
K1BSO
W4JK
VE3GT
K3ORW
75
KB2IT
W8VPW
84
WD8NKA
W9NXG
KB6OT
WB4ZOJ
WA5RKU
N4WA
WB2HIQ
VE5HG
K1JHC
VE3FGU
82
74
N8CW
WD9BCM
K6YD
WB7QEX
N3AIU
N5EK
WA1VAB
KK4M
WB1BYR
WB2IOP
81
73
WA2EQW
AJ5F
80
WA2OVE
WB7OFI
AF1L
N3AKC
72
79
N4LE
W7EP
KB2HM
WD4CNQ
W1HL
W4ANK
71
K3JL
W9XD
WA5QFO
K4VHT
70
KA0AIT
W9JIJ
KA8GMJ
W7JMH
WB5CIT
VE1OC
WB1FZX
VE3KK
69
W7FJZ
WB5EKU
68
WB8WTS
WB2OTC
WA2CUW
KA1BUJ
67
KB6FC
W5JOV
KA2DBW/T
KA2BGX/N
66
WD4PDK
N3EE
WA1TBY
VE3IFP
65
N0AHA
WB8SIQ
WB2RWW
64
AF0O
W8BUBR
K7FR
WA6LVO
WD5HHK
WD4KDG
WB2AIU/T
63
KA9ALR
WD8KBW
62
WB0HOX
W9HOT
W7LNE
WD4EPO
K3RHI
WA2SDY
W1WP
61
WD0BMR
KB8MX
W7LYA
W4HON
K1EIC
60
W9IEM
WD5AHH
W2XD
W6JXK
53
N2BDW/T
51
WD5JYI/T
49
WD8PMW/T
47
WA2MEE/T
WB2RMJ/T
45
WD4SIH/T
43
WB7CFH/T

Brass Pounders League October 1979

BPL Medallion (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: KA9CPA.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

	1	2	3	4	5	6
W3CUL	683	805	1298	203	2989	
WA4JDH	0	771	762	0	1533	
WA0HJZ	0	816	20	523	1359	
W4MEE	6	661	644	25	1336	
WA3WOP	8	562	524	28	1122	
KA9CPA	10	718	67	290	1085	
W9JUJ	2	517	541	7	1067	
KL7JEB	75	322	331	78	806	
WB3GZU	101	274	342	72	779	
W7DZX	43	327	349	2	721	
K4TH	19	336	191	169	715	
N4MD	2	471	230	4	709	
W4JK	1	366	337	1	705	
K1BCS	134	212	300	58	704	
WB4PNY	4	385	300	5	694	
W2RQ	2	374	292	20	688	
KB4N	55	273	347	13	688	
WA0AUX	27	212	442	4	685	
W6DXL	68	291	278	13	650	
K8AAZ	8	344	280	6	638	
W3VR	275	111	239	5	631	
KB6FR	84	241	238	61	624	
W2ZQ	160	212	206	6	584	
N4CCT	36	249	267	27	579	
W5KLV	5	312	227	31	575	
W5TI	4	337	157	67	565	
VE3JIR	1	269	250	39	559	
WA4CNY	25	258	184	91	558	
WB3JZA	7	221	291	5	524	
N4NK	0	251	258	12	521	
WB5YDD	3	217	255	42	517	
WA4VKD	0	261	239	13	513	
K5OWK	222	37	224	21	504	
WB6PVH	5	246	237	18	504	
Multioperator stations:						
W4IZ	1615	17	1659	12	3303	
WA2SDY	296	17	302	2	617	

BPL for 100 or more originations plus deliveries:

WA3ATQ	271	W5UH	107
WB7OAS	139	KA2CNN	105
WB6QBZ	137	WA4PFK	105
W3EGJ	136	N3AIU	103
W0FIR	119		
WA4SWF	115		
W3BBN	110		
Multioperator station:			
WA4PUP	110		

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL
6 — TOTAL

1980 Novice Roundup Announcement

Novice and Technician licensees take note; this is your contest. Achievement certificates are available.

The 29th annual Novice Roundup will be upon us before we know it. It's a good idea to start to get it all together and finalize your operating plan of attack. All that one needs to know about participating in the Novice Roundup is outlined below. Be sure to read *very carefully.*

Again, every Novice or Technician (single operator) who submits a *valid* entry of 200 or more QSOs during the Novice Roundup will receive a certificate attesting to same.

If you have read this far, keep going; the rules follow. Good Luck.

Since Novices are now issued permanent-type call signs, how do you tell the Novices from the others? This is handled rather easily by requiring that Novices sign with a slant bar (dahdididahdit) followd by the letter "N" after their call sign.

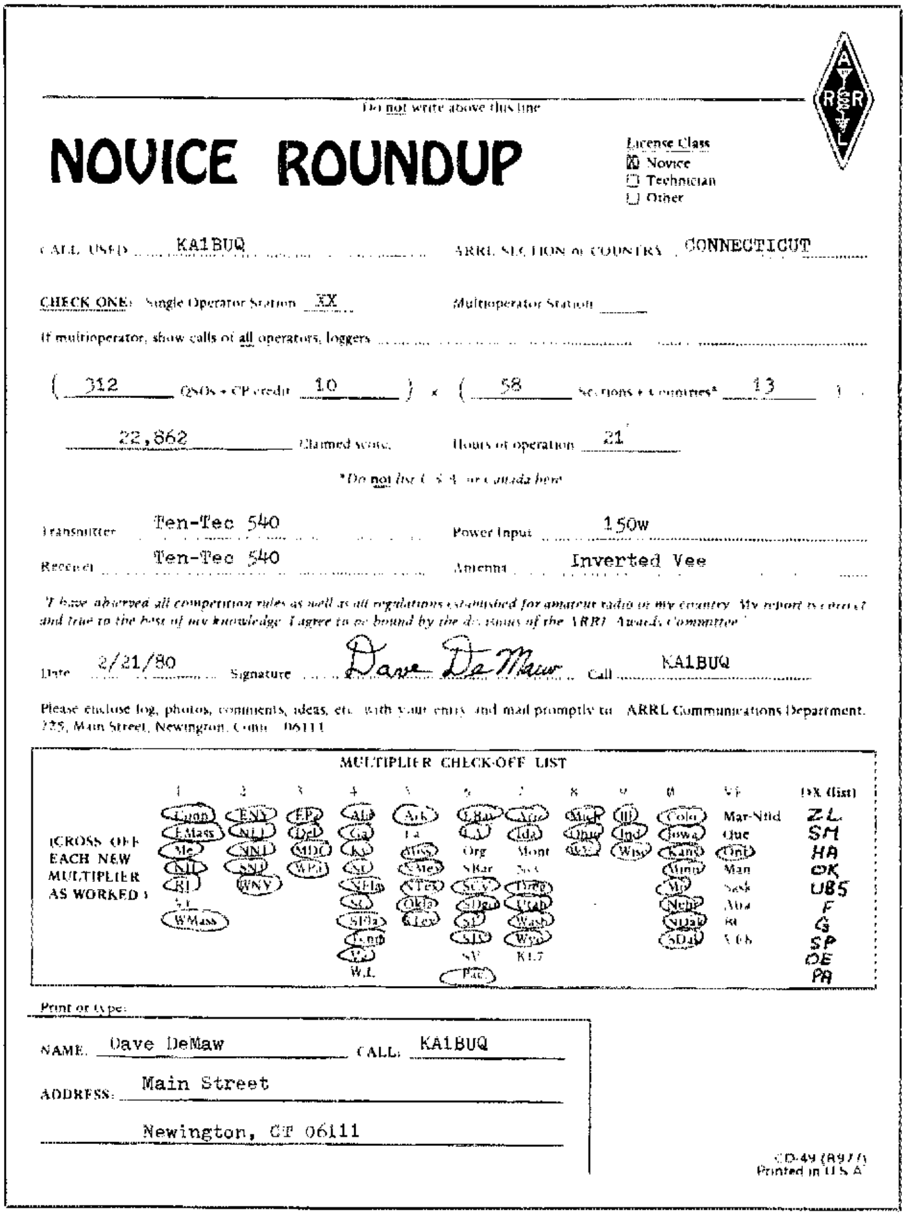
If a Novice operates portable from a call area other than that indicated by the number in his call sign, the general rule that now applies to all ARRL contestants also applies to Novices. The Novice will sign his call, slant bar, the number of the call area he is operating in, and "N." Example: A Novice, KA1ABC, is portable within the first call area, so he signs KA1ABC/N in the Novice Roundup. Another Novice, KAØBBB, is operating portable in New York (second call area); he signs KAØBBB/2N.

Technician class licensees may participate in the Novice Roundup on the same terms as Novices, but they will be competing against other Technicians and *not* against Novices in their ARRL sections. Techs will sign /T, for purposes of identification, and they may work Novices, other Technicians, and General, Advanced and Extra licensees, all for points. Technicians will be eligible for awards, same as Novices. All licensees other than Novices and Technicians will be working *only* those stations signing /N or /T.

Now that we've decided who can be in the NR (everybody) and who is competing against whom and competing for what (ARRL section winner awards), the big question is, How to do it?

How to Participate

The 1980 Novice Roundup starts at 0001



Do not write above this line

NOVICE ROUNDUP

License Class
☒ Novice
☐ Technician
☐ Other

CALL USED KA1BUQ ARRL SECTION or COUNTRY CONNECTICUT

CHECK ONE: Single Operator Station XX Multioperator Station ____

If multioperator, show calls of all operators, loggers ____

(312 QSOs + CP credit 10) × (58 Sections + Countries* 13)

22,862 Claimed score. Hours of operation 21

*Do not list U.S.A. or Canada here

Transmitter Ten-Tec 540 Power Input 150w

Receiver Ten-Tec 540 Antenna Inverted Vee

"I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date 2/21/80 Signature Dave DeMaw Call KA1BUQ

Please enclose log, photos, comments, ideas, etc. with your entry and mail promptly to ARRL Communications Department, 225 Main Street, Newington, Conn. 06111

MULTIPLIER CHECK-OFF LIST

(CROSS OFF EACH NEW MULTIPLIER AS WORKED)

1	2	3	4	5	6	7	8	9	0	VE	DX (list)
Conn	ENY	EPa	Ala	Ark	EBay	Ariz	Mich	Ill	Colo	Mar-Nfld	ZL
EMass	NLI	Del	Ga	La	LA	Ida	Ohio	Ind	Iowa	Que	SM
Me	NNJ	MDC	Ky	Miss	Org	Mont	WVa	Wis	Kans	Ont	HA
NH	SNJ	WPa	NC	NMex	SBar	Nev			Minn	Man	OK
RI	WNY		NFla	NTex	SCV	Oreg			Mo	Sask	UB5
Vt			SC	Okla	SDgo	Utah			Nebr	Alta	F
WMass			SFla	STex	SF	Wash			NDak	BC	G
			Tenn		SJV	Wyo			SDak	NWT	SP
			Va		SV	KL7					OE
			W.I.		Pac						PA

Print or type:

NAME: Dave DeMaw CALL: KA1BUQ

ADDRESS: Main Street

Newington, CT 06111

CD-49 (8/77)
Printed in U.S.A.

UTC on February 2 and ends at 2359 UTC on February 10. That means the NR starts on Friday, evening, February 1, local time. You may operate 30 hours out of the nine days. Rule no. 2 further details the timekeeping. Entry forms are available from ARRL headquarters: log sheets, summary sheets (one needed) and CD-77 forms (one needed) to keep track of whom you have worked in matrix form. The log sheets have room for 100 contacts each. Send your self-addressed, stamped envelope to Headquarters now and you'll have your forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

The idea in the contest is to work as many stations as possible, in as many different ARRL sections and foreign countries as possible. ARRL sections are listed on page 8 of every *QST*. You may work each station *only once*. Keep your contacts as short as possible; send your exchange (RST report and ARRL section) only once and repeat it only if requested. Keep your CQs short, too! Here's a sample:

CQ NR CQ NR DE KA2YYY/N KA2YYY/N K
KA2YYY/N DE WA1XXX/T AR
WA1XXX/T DE KA2YYY/N 579 ENY K
KA2YYY DE WA1XXX R 569 EM K
WA1XXX R 73 DE KA2YYY/N K

Note that once you have established each other's license class you can drop the /N and /T for the duration of the QSO; brevity is the name of the game!

Scoring and Rules

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6, KL7, KP4/KV4 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31 + 3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see "Contest Corral" on page 95 of this issue. You may work DX stations for contest credit; a multiplier of one is earned for each different foreign country worked.

Read the rules carefully. Keep a check sheet of stations worked (we have CD-77 available free) so that you don't have duplicate QSOs. Log sheets, CD-77, and a summary sheet are now available from your ARRL headquarters. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed, stamped envelope containing your full name, call and mailing address complete with ZIP code. We suggest 15-cents postage attached.

B C N U in the NR!

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 8 of *QST*.

2) *Time:* All contacts must be made during the contest period starting at 0001 Universal Coordinated Time (UTC) on February 2 and continuing until 2359 UTC on February 10, 1980. Time may be divided as desired but *must not* exceed 30 hours total. Off periods *may not be less than* 15 minutes at a time. Listening time *counts* as *operating time*. Times on and off *must* be entered in your log.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs may take place on the 80-, 40-, 15- and 10-meter bands. Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians *only*. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your RST and section, and receipt of an RST and section/country. A station may be worked only once, regardless of band.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The number of ARRL sections (see page 8 of any *QST*) plus foreign countries worked during the contest is the "total multiplier." Yukon-N.W.T. (VY1/VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold the ARRL Code Proficiency certificates. FCC code credit *cannot* be used in lieu of the above. If an entrant does not hold an ARRL CP Award, he can apply for credit by attaching to his Novice Roundup report a copy of the qualifying run from W1AW or W6OWP for January or February. CP credit equals the wpm speed indicated on the latest ARRL certificate or sticker held by the entrant. The final score equals the "total points" plus "ARRL Code Proficiency credit" multiplied by the "total multiplier."

5) *Reporting:* Contest work must be reported on forms from the ARRL, or reasonable facsimile. Make sure to include the time, call, RST and section received for *each* QSO. Reporting forms will be sent free upon request. Include a self-addressed, stamped envelope with your request. Indicate starting and ending times for each period on the air. All NR reports become the property of ARRL and none can be returned. Entries must be mailed to ARRL, 225 Main St., Newington, CT 06111, no later than March 3, 1980.

6) *Awards:* A certificate will be given to the highest-scoring Novice and Technician in each ARRL section and each single-operator Novice or Technician who submits a *valid* entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards. QST

Novice Roundup

CALL USED KA1BUQ SECTION CONNECTICUT

50 QSOs per side
Number each new multiplier as worked

FREQ.	DATE/TIME GMT	STATION WORKED	EXCHANGE SENT	EXCHANGE RCVD*	POINTS
28	2/3 1905Z	N7DS	599 CT	589 AZ *1	1
	1915	ZL2GH	569 CT	559 N.Z. *2	1
	1935	WB7TSH	599 CT	599 OR *3	1
	1940	KB6IE	599 CT	599 LA *4	1
	1955	KA7CDW	599 CT	579 OR	1
21	2049	KA4PJE	579 CT	589 KY *5	1
	2055	N7DS	559 CT	559 AZ (duplicate)	0
7	2/6 0635	KA6HHY	569 CT	539 LA	1

Strays

NOMINEES SOUGHT

☐ The Warrington Area (PA) Repeater Association is conducting a search for the Delaware Valley Radio Amateur of the Year. Nominees will be judged on the basis of both technical and humanitarian contributions to Amateur Radio. Interested hams from the 11-county area in and around Philadelphia may obtain nomination forms by writing to WARA, P. O. Box 253, Warrington, PA 18976, Attn. Award.

POLAR BEAR ANYONE?

☐ Santa Barbara, CA ham Beaumont Buck, WB6CRW, recently spent some time in the Arctic doing research, dispersing data buoys and studying underwater acoustics. Buck reports that one night last fall 15 polar bears came through his camp at night. One bear, with a massive stroke of his paw, tore Buck's tent open from top to bottom, missing his head by inches. — *from* Key Klix, *Santa Barbara ARC*.

N3AUC "golf cart mobile" at the Greater Baltimore Golf Classic, a charity event for the Children's Hospital held in conjunction with the Ladies Professional Golf Association. Twenty hams from the Baltimore ARC provided communications between the scorekeeper at each green, the press box, leader board and central control site. *(N3IC photo)*

Contest Disqualification Criteria and Club Competition Rules

Here are the ground rules for all ARRL-sponsored contests.

Various ARRL operating contests held each year are built around rules by which participants must abide. Through the years, means of enforcing those rules in a manner fair to all participants have evolved into a set of guidelines based primarily on recommendations of the ARRL Contest Advisory Committee. These guidelines are called the disqualification criteria, and are used as the basis for examination of possible rules infractions. The Headquarters Awards Committee provides a recommendation in each case to the communications manager, with whom responsibility for the final decision lies.

What follows are these disqualification criteria, along with rules for club competition in ARRL contests. The disqualification criteria apply to all ARRL operating activities, and the club competition applies to the VHF Sweepstakes, the DX Contest and the November Sweepstakes. Rules for all contests throughout the coming year will refer the reader to this page concerning rules enforcement and club competition.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings before being counted for a club.

In order for a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* is in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX Competition.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be an ARRL-affiliated club.

2) *Medium.* Any club submitting more than 10 but not more than 50 entries falls in this class. There are the same mileage and attendance requirements as the unlimited class club. The club must be an ARRL-affiliated club.

3) *Local.* Any club submitting 10 entries or less is in this classification. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be an ARRL-affiliate.

Single and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest-operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (i.e., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete).

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later so that the 50-percent attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single operator cw score and the highest single operator phone score in any club entry will be rewarded with a club certificate when at least three single operator cw and/or three single operator phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by two percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1980 phone SS prohibits submission of an entry for the 1981 phone SS, but 1981 cw SS participation is OK.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the border line of disqualification but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by Hq., three additional contacts will be deleted as a penalty. The penalty will not be considered as part of the two-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL hq.; s.a.s.e. please).

2) Mail to FCC, Box 1020, Gettysburg, PA 17325.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a one-year grace period under which you may still renew and keep your call sign without retesting, but you must wait until the new license arrives to operate. There is also a five-year grace period under which you may still renew; however, after the initial one-year period, you will be issued a new license with a new call sign. After this five year grace period expires, you must be re-examined for a new license. Normally, application should be made approximately 90 days before expiration; however, renewal can be applied for at any time during the term of the license.

4) If you are simply modifying your license (change of address, for example), you must fill out the Form 610; a letter is no longer sufficient. Incidentally, your license will also be automatically renewed at this time.

5) If you have any questions or problems, drop a note to the Membership Services Department, ARRL.

Table 1

The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities:

1800-1810 kHz	cw, DX calling	21.09-21.10 MHz	RTTY
1825-1830 kHz	"DX window" (no WIVEs)	28.09-28.10 MHz	RTTY
3610-3630 kHz	RTTY	28.68 MHz	SSTV
3845 kHz	SSTV	28.30-29.50 MHz	Satellite downlinks
7090-7100 kHz	RTTY	29.52-29.58 MHz	Repeater inputs
14.08-14.10 MHz	RTTY	29.60 MHz	FM simplex
14.23 MHz	SSTV	29.62-29.68 MHz	Repeater outputs

(In addition, on 20 meters in particular, the low end of the U.S. phone segment is reserved for DX, the high end for traffic, and ragchewing in between. The dividing lines are not definite, however.)

U.S. Amateur Frequency and Mode Allocations

Power Limits: All U.S. amateurs are limited to 250-watts dc input in the Novice segments. On all other segments, with certain exceptions in the 160-meter and 420-MHz bands, 1-kilowatt dc input is permitted. Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. Revised as of December 6, 1979)

Bandwidth Limitations

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz and between 50.1 and 52.5 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz, single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

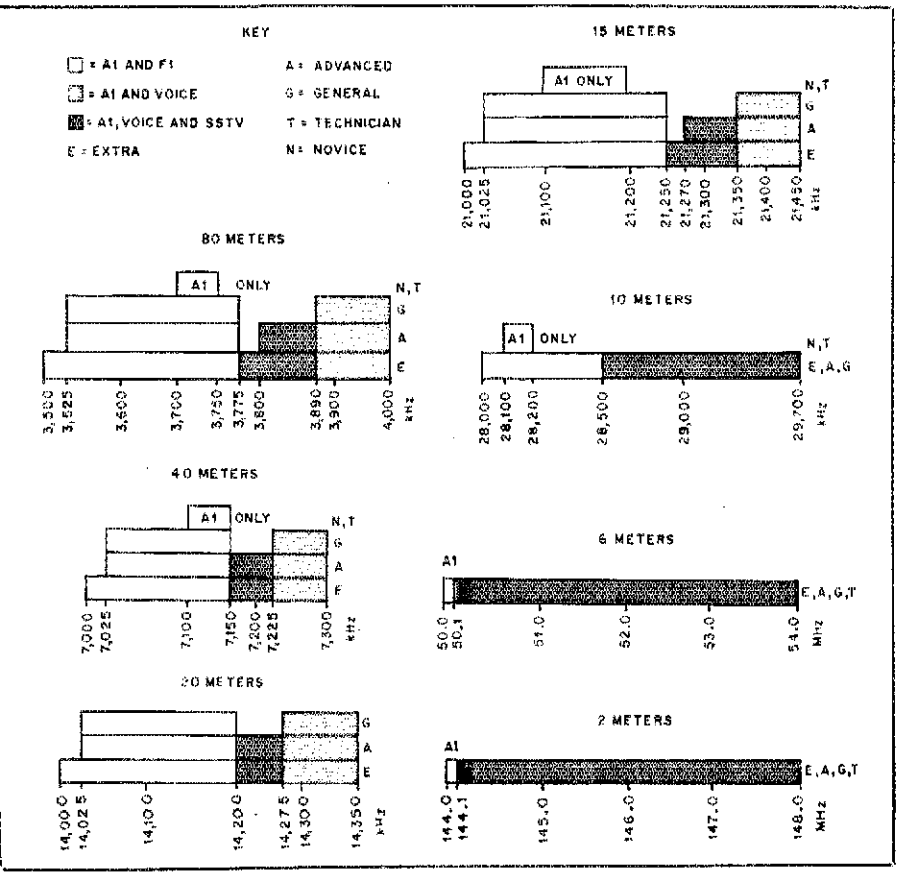
RTTY: When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate subbands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 420-MHz band. For details, and for information on specialized modes, see *ARRL License Manual*. For information on repeaters, see the *License Manual* and *Repeater Directory*.

160 METERS: Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see *License Manual* or request form MS/G-7 from ARRL hq.

Other — All modes, except as noted.



Extra, Advanced, General, Technician

MHz	*GHz***
220-225*	10.0-10.5*
420-450*	24.0-24.25
1215-1300*	48.0-50.0
2300-2450	71.0-76.0
3300-3500	165.0-170.0
5650-5925	240.0-250.0
	All above 300

*Pulse not permitted.
**1 GHz = 1000 MHz.

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1980

(Check *QST* monthly for updates.)

JANUARY

3 West Coast Qualifying Run
4-6 No. Florida Section Conv. (Orlando)
9 W1AW Qualifying Run
10-13 SAROC (Las Vegas)*
12-13 VHF Sweepstakes
CD Party
13 ARRL Hamfest (Oak Park, MI)
19-20 ARRL Hamfest (Sarasota, FL)
25 W1AW Qualifying Run
26-27 Southeastern Div. Conv. (Miami)
27 ARRL Hamfest (Arlington Hts., IL)

FEBRUARY

1-10 Novice Roundup
6 West Coast Qualifying Run
9 Frequency Measuring Test
12 W1AW Qualifying Run
16-17 International DX Contest, cw
23 W1AW Qualifying Run
24 ARRL Hamfests (Akron, OH and Davenport, IA)

MARCH

1-2 International DX Contest, phone
2 ARRL Hamfest (New Castle, DE)
6 West Coast Qualifying Run
9 ARRL Hamfest (Sterling, IL)
12 W1AW Qualifying Run
15-16 ARRL Hamfest (Winchester, IN)
22-23 ARRL Hamfest (Ft. Walton Beach, FL)
24 W1AW Qualifying Run
29 ARRL Hamfest (Sioux City, IA)
29-30 ARRL Hamfest (Kearney, NE)
30 ARRL Hamfest (Timonium, MD)

APRIL

2 West Coast Qualifying Run
5 ARRL Hamfest (Columbia, MO)
5-6 CD Party (open)
10 W1AW Qualifying Run
19-20 EME Contest (part 1)
19-20 Missouri State Conv. (Kansas City, MO)
25-27 Dayton Hamvention (Dayton, OH)*
27 W1AW Qualifying Run

MAY

1 West Coast Qualifying Run
9 Frequency Measuring Test
13 W1AW Qualifying Run
16-18 New York State Conv. (Rochester)
17-18 EME Contest (part 2)
24-25 Midwest/Central Div. Conv. (St. Louis, MO)
29 W1AW Qualifying Run
31-June 1 Kansas State Conv. (Salina, KS)

JUNE

4 West Coast Qualifying Run
7-8 Delta Division Conv. (Senatobia, MS)
8 ARRL Hamfest (Willow Springs, IL)
11 W1AW Qualifying Run
14-15 VHF Contest
21-22 Georgia State Conv. (Atlanta)
24 W1AW Qualifying Run
28-29 Field Day

JULY

2 West Coast Qualifying Run
10 W1AW Qualifying Run
12-13 IARU Radiosport Championship
13 ARRL Hamfest (Washington, MO)
23 W1AW Qualifying Run
25-27 ARRL National Convention (Seattle)

AUGUST

2-3 UHF Contest
7 West Coast Qualifying Run
9-10 ARRL Hamfest (Concordia, KS)
10 ARRL Hamfest (Lexington, KY)
ARRL Hamfest (Willow Springs, IL)
15 W1AW Qualifying Run
17 ARRL Hamfest (Des Moines, IA)
24 W1AW Qualifying Run
24 ARRL Hamfest (St. Charles, MO)
30-Sept. 1 Pacific Division Conv. (San Jose, CA)

SEPTEMBER

4 West Coast Qualifying Run
5-7 Southwestern Div. Conv. (Los Angeles)
6-7 Radio Expo (Chicago)*
7 Illinois State Conv. (Rockford)
9 W1AW Qualifying Run
13 Frequency Measuring Test
13-14 VHF Contest
24 W1AW Qualifying Run

OCTOBER

1 West Coast Qualifying Run
3-5 New England Div. Conv. (Boxborough, MA)
4-5 Simulated Emergency Test
5 ARRL Hamfest (Cedar Rapids, IA)
8 W1AW Qualifying Run
10-12 Midwest Div. Conv. (Lincoln, NE)
11-12 CD Party
26 W1AW Qualifying Run

NOVEMBER

1-2 Sweepstakes, cw
6 West Coast Qualifying Run
7-9 Hudson Div. Conv. (South Fallsburg, NY)
13 W1AW Qualifying Run
14 Frequency Measuring Test
15-16 Sweepstakes, phone
24 W1AW Qualifying Run

DECEMBER

3 West Coast Qualifying Run
6-7 ARRL Hamfest (Honolulu)
160-Meter Contest
12 W1AW Qualifying Run
13-14 10-Meter Contest
29 W1AW Qualifying Run

*Not an ARRL event.

Operating News

Conducted By John F. Lindholm, W1XX

The New ARRL DX Contest Ushers in the 80s

Olympic gold . . . the alluring appeal of rigorous training, determination and perseverance, culminating in being proclaimed the best in the world in your sport. American Al Oerter has had the Midas touch an unprecedented four times. He's come out of retirement to try for number five.

Just like Amateur Radio DX contesting . . . just a different event. In the Eastern European countries they call DX contesting "radiosport." The object is to be proclaimed champion. But who will be the champions in Amateur Radio DX contesting? This remains unanswered until the 1980 Amateur Radio equivalent to the Olympics, the ARRL International DX Contest. In 1980 this contest goes truly *international* with some significant changes in format. DX-to-DX contacts are now allowed. Single-band categories are open to single-operator stations. And, to top it all off, a vastly expanded awards program that will bestow handsome plaques on over 50 participants, the Olympic gold, if you will.

These are big changes intended to promote *the* premiere operating event of the year. That all adds up to more DX to work. And that spells *g-o-o-d* for DX-hungry W/VE participants.

In formulating these changes, extensive advice from the Contest Advisory Committee, the ARRL Awards Committee, discussion at convention forums, and much individual input aided your communications manager in weighing all the complex pros and cons. The goal is an obvious one for W/VE stations: a format that provides as much DX to work as possible. Effecting this involves putting one's self in the shoes of the DX station. For example, in the previous format, DX stations work *only* the USA/Canada. How interesting is that to operators like Willy, at UK9AAN, when propagation to North America goes sour? Some mathematical comparisons can be made to other universal-type contests and an undeniable fact comes screaming through: More DX activity can be stimulated than in previous ARRL DX contest endeavors.

But let us not forget our primary obligation to our stateside (and province-side) members. We need a format to not only encourage DX participation (with DX-to-DX QSOs), but also to encourage DX-to-stateside QSOs. Thus, the contest rules announced in December *QST* outline the *premium* three-point QSO for DX stations working W/VEs, and two points for other DX QSOs. Since W/VEs are recognized as the best operators in the world, DX stations produce bigger scores for everybody by making voluminous stateside QSO totals.

The single-band entry categories are like a breath of fresh air to the many participants who can't put in either the time or investment in hardware to compete "all band." Thus, we expect to see a dramatic *decrease* in the divorce rate, lawn height, and the national debt. Also, QRPers are now full family members rather than just poor relations.

We think that for this contest to be truly recognized as the world championship, the entrants should also be duly rewarded. Thus, we have embarked on a plaque blitz, with over 50 plaques to be offered for top scores worldwide, continental, Canada, QRP, both modes, each band, multioperator, and many more. February *QST* will list all the names of clubs and individuals who have donated these handsome plaques, soon to grace the shacks of prominent contesters throughout the planet.

Extensive publicity has been provided to our DX friends overseas to explain the new format. The tempo of this DX activity should definitely be upbeat.

We are proud of the American Radio Relay League and its role in the family of Amateur Radio nations . . . its prominence as the Headquarters of the International Amateur Radio Union . . . its leadership in concert with other IARU societies at the World Administrative Radio Conference. We think it befitting that lofty stature that *the* foremost *international* DX operating activity should be sponsored by *your* organization, the ARRL.

So, Al Oerter, you have come out of retirement to give the discus a fifth Olympic try, while the previous DX format of DX stations working only W/VEs has gone *into* retirement. As this Olympic legend once again struggles to catapult himself into contention, you too can seek to excel in a world championship event, the ARRL International DX Contest. Will you make your bid for the Olympic gold of international DX contesting?

See the complete rules on page 94, December 1979 *QST*.

Good luck and good DX!

W1AW NOTE

The complete W1AW winter operating schedule appears in October 1979 *QST*, page 111. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

SCM ELECTION NOTICE

To all ARRL members in the Wisconsin, Illinois, Northern Florida, Manitoba, Santa Clara Valley, Indiana, Vermont, Maine and Oregon sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)
Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . ZIP . . .)

SCM candidates must have been members of the League for a continuous term of at least two years and licensed amateurs of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 7, 1980.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, 1980, returns counted May 20, 1980, and SCMs elected as a result of the above procedures will take office July 1, 1980.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning July 1, 1980.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

*Communications Manager, ARRL

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Santa Barbara section as a result of notices in the July and August *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning January 1, 1980:

Balloting Results: In the Alabama Section, James M. Bonner, K4UMD, received 474 votes and Donald H. Steenburn, WA4VLB, received 236 votes. Mr. Bonner is declared elected.

In the Tennessee Section, C. Earl Leonard, Jr., KB4G, received 453 votes; David C. Goggio, W4OGG, received 321 votes; and Martha H. Colburn, K4VM, received 302 votes. Mr. Leonard is declared elected.

OCTOBER CD PARTIES RESULTS

Competition was toughest on cw during the October running of the CD Party. While activity was sparse at times, the enthusiasm was clearly very high. All but a couple of sections were worked in the 177 logs received, though some were very tough to track down. The leaders on phone and cw are shown below, with

complete results to follow in the winter edition of *QCD* to be mailed to all Communications Department appointees during December. Listings show call sign, score, QSOs, sections, hours, QTH. — *K1KI*

CW

N6TR	29,862-474-63-10-SB
W2GD	29,707-487-61-10-NNJ
N4ZZ	28,272-456-62-10-TN
K4BAI	26,940-449-60-10-GA
N1EE	25,620-427-60-10-EM
AA6RX	25,132-412-61-10-LA
K1XA	24,766-406-61-9-CT
K2SX	24,480-408-60-9-NLI
W2TZ	24,420-407-60-8-WNY
AG7M	24,156-396-61-10-OR
N6OP	23,973-393-61-10-EB
K5TM (K5ZD, opr)	21,480-358-60-8-STX
N6NF	21,299-361-59-10-SCV
K3YL	20,706-357-58-10-EPA
WBØPYD	19,942-338-59-10-IA
WB9JSR	16,963-292-58-10-IL
W9OP	16,665-303-55-8-WI
WB8WTS	16,112-304-53-10-OH
N4SA	15,964-307-52-7-NFL
K3NB	11,500-230-50-6-EPA
W4YE	11,183-211-53-7-VA
W6OA	10,918-206-53-8-EB
W3ADE	10,890-198-55-10-EPA
KA1FJ	10,755-239-45-9-VT
K9EYA	10,494-198-53-5-WI
WØVJD/3	10,452-201-52-10-MDC
AF2L	10,400-200-52-5-NNJ
WA3PXA	10,036-193-52-4-WPA

Phone

N6TR	13,878-257-54-10-SB
KB6FR/3	10,368-212-49-10-EPA
K5ZD	10,290-210-49-8-STX
N6DR/4	7285-155-47-7-NC
N6NF	5848-136-43-6-SCV
N4CCT	5593-119-47-4-AL

Strays

GEORGE WASHINGTON'S BIRTHDAY PARTY

☐ The Central Washington ARC will be celebrating George Washington's birthday from the town of George, Washington. Listen for W7WMO/7 on 15, 20 and 75 meters, on February 18 between 1700 and 2400 UTC. Two transmitters will be in operation, one on 21,425 kHz and the other alternating between 14,295 and 3950 kHz. Commemorative QSLs will be available, postmarked George, WA. Send s.a.s.e. to W7WMO, EuGene Bye, 18 J St., N.E., Ephrata, WA 98823.

QCWA QSO PARTY

☐ This year's QCWA QSO party will be held on 9 and 10 February for cw and 8 and 9 March for phone. For more information contact Wesley Ratdles, W4COW/1, 688 Boston Post Rd., Marlboro, MA 01752.

HUNTING LIONS IN THE AIR

☐ "Hunting Lions in the Air," sponsored by Lions Clubs International and coordinated by Lions Club Rio de Janeiro ARPOADOR-Brazil, will be held on Saturday, January 12, 1980. It will start at noon UTC, and continue for a 24-hour period. Bands will be 80, 40, 20, 15 and 10 meters, phone and cw. For more information write to Contest Committee — Hunting Lions in the Air, Lions Club of Rio de Janeiro ARPOADOR, Rua Souza Lima no. 310 Apt. 802, Rio de Janeiro 22081, Brazil, South America.

GUAM ISLAND AWARD

☐ The Mariana ARC of Guam has an award which is available to all licensed amateurs who conduct two-way communications with five different amateur stations on Guam. Contacts may be made on any band and via any mode. To apply, send log info plus $1 or 5 IRCs to Guam Awards Manager, P. O. Box 445, Agana, Guam 96910.

	OSCAR 7			OSCAR 8			
DATE (UTC)	*Orbit No.*	*Time UTC HR MN*	*Eqx W. Long. Degrees*	*Orbit No.*	*Mode*	*Time UTC HR MN*	*Eqx W. Long. Degrees*
1 Jan.	23,456	00:06	66.8	9295	AJ	00:38	56.0
2 Jan.	23,469	01:00	80.4	9309	X	00:43	57.3
3 Jan.	23,482	01:54	94.3	9323	A	00:48	58.5
4 Jan.	23,494	00:54	78.8	9337	AJ	00:53	59.8
5 Jan.	23,507	01:48	92.4	9351	J	00:58	61.0
6 Jan.	23,519	00:47	77.3	9365	J	01:03	62.3
7 Jan.	23,532	01:42	90.9	9379	A	01:08	63.6
8 Jan.	23,544	00:41	75.7	9393	AJ	01:13	64.8
9 Jan.	23,557	01:35	89.3	9407	X	01:18	66.1
10 Jan.	23,569	00:35	74.2	9421	A	01:23	67.4
11 Jan.	23,582	01:29	87.8	9435	AJ	01:28	68.6
12 Jan.	23,594	00:28	72.6	9449	J	01:33	69.9
13 Jan.	23,607	01:22	86.2	9463	J	01:38	71.1
14 Jan.	23,619	00:22	71.1	9476	A	00:00	46.6
15 Jan.	23,632	01:16	84.7	9490	AJ	00:05	47.9
16 Jan.	23,644	00:15	69.5	9504	X	00:10	49.1
17 Jan.	23,657	01:10	83.1	9518	A	00:15	50.4
18 Jan.	23,669	00:09	68.5	9532	AJ	00:20	51.7
19 Jan.	23,682	01:03	81.5	9546	J	00:25	52.9
20 Jan.	23,694	00:03	66.4	9560	J	00:30	54.2
21 Jan.	23,707	00:57	80.3	9574	A	00:35	55.4
22 Jan.	23,720	01:51	93.6	9588	AJ	00:40	56.7
23 Jan.	23,732	00:51	78.4	9602	X	00:45	58.0
24 Jan.	23,745	01:45	92.7	9616	A	00:50	59.2
25 Jan.	23,757	00:44	76.9	9630	AJ	00:55	60.5
26 Jan.	23,770	01:38	90.5	9644	J	01:00	61.8
27 Jan.	23,782	00:38	75.3	9658	J	01:05	63.0
28 Jan.	23,795	01:32	88.9	9672	A	01:10	64.3
29 Jan	23,807	00:31	73.8	9686	AJ	01:15	65.5
30 Jan.	23,820	01:26	87.4	9700	X	01:20	66.8
31 Jan.	23,832	00:25	72.2	9714	A	01:25	68.1
1 Feb	23,845	01:19	85.8	9728	AJ	01:30	69.3
2 Feb.	23,857	00:19	70.7	9742	J	01:35	70.6
3 Feb.	23,870	01:13	84.2	9756	J	01:40	71.9
4 Feb.	23,882	00:12	69.1	9769	A	00:02	47.3
5 Feb.	23,895	01:07	82.7	9783	AJ	00:07	48.6
6 Feb.	23,907	00:06	67.5	9797	X	00:12	49.8
7 Feb.	23,920	01:00	81.1	9811	A	00:17	51.1

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Soviet RS data have been discontinued.

O 7 progresses an average of 28.73778° W. per orbit in a period of 114.944764 minutes. O 8 progresses an average of 25.80445° W. in a period of 103.21556 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. OSCAR locators for O 7, O 8 and Soviet RS are available in the new *Satellite Communications* package at your dealer or direct from ARRL; $4.75 U.S., $5.50 elsewhere.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

JANUARY

2

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z, January 3. The run takes place at 9 P.M. PST on January 2. Frequencies are approximately 3590/7090 kHz. Underline one *minute* of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any), and complete mailing address. A large self-addressed envelope will help expedite your award/endorsements.

5-6

Zero District QSO Party, December *QST*, page 110.

9

W1AW Qualifying Run, 10-35 wpm at 0300Z January 10 (10 P.M. EST January 9). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. The complete W1AW schedule of code practice and bulletins appears on page 111 of October *QST*, or send an s.a.s.e. to ARRL for a copy. Other details are the same as in the January 2 listing.

12-13

ARRL VHF Sweepstakes, December *QST*, page 98.

ARRL CD Party, rules in winter issue of *QCD*.

3.5 MHz YU-DX Contest, December *QST*, page 110.

International Island DX Contest, December *QST*, page 110.

19-20

QRP Winter Contest, sponsored by the AGCW-DL, from 1500Z January 19 until 1500Z January 20. Single-operator stations must take a nine-hour break. Class A, less than 3.5 W input; Class B, less than 10 W input; Class C, less than 10 W input, multioperator; Class D, over 10 W input (contact Class ABC stations only). 160-10 meters, cw only. Exchange signal report, QSO number and input power. Add "X" if crystal controlled. If over 10 W input say QRO instead of input power. Crystal-controlled stations limited to three crystals. Count one point for contacts with your own country, two points outside your country but same continent and three points if on another continent. Count one multiplier for each DXCC country (call areas in IA PY VE VK W and ZS separate) and one for each DX QSO. Multiply QSO points by multiplier for each band and add scores per band for final score. Crystal-controlled stations multiply by two for final score. Awards. Separate logs for each band. One IRC for results. Logs must be received by March 9, 1980. Send to Contest Manager, Siegfried Hart, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Federal Republic of Germany.

25

W1AW Qualifying Run, 10-35 wpm at 2400Z (7 P.M. EST). See January 9 listing for more details.

26-27

French Contest, cw, sponsored by the Reseau des Emetteurs Francais, 48-hour period, UTC. (Phone: February 23-24) Single-operator stations operate 36 hours maximum. French stations work the world. Others work only those with F prefixes, including overseas French country (also YJ and DA1/2 French stations). Exchange signal report and serial number. Count three points for QSOs on your own continent and 10 for others. Multipliers are the 95 French departments (French stations will indicate their department after their call sign — F6BIG/74), each French overseas country and DA1/2 (French forces in West Germany). Overseas countries are FB (four different), FH, FG(3), FK(3), FO(7), FP, FR(5), FW(2), FY, YJ. Multiply QSO points by sum of multipliers per band for final score. Separate logs for each band. Send to REF French Contest, Sq. Trudaine 2, 75009 Paris, France.

CQ WW 160-Meter CW DX Contest, sponsored by *CQ Magazine*, from 2200Z January 25 until 1600Z January 27. This is cw-only. Exchange RST plus a three figure QSO number starting with 001, and your state or province. It is not necessary for DX stations to send their QTH, their call will identify them. Scoring: For W/K/VE/VO, 2 points per QSO with other W/K/VE/VO stations. All DX contacts are worth 10 points. (DXCC list less W/K and VE/VO.) For all other countries, 2 points per QSO with stations in the same country, 5 points with stations in other countries, except for QSOs with W/K/VE/VO, which count 10 points. Multipliers: For all stations, one for each state, VE province and DX country worked. (KH6 and KL7 are considered DX; The District of Columbia is the same as Maryland, VE1 is divided into three provinces: New Brunswick, Nova Scotia and Prince Edward Island.) The final score: total QSO points multiplied by the sum of multipliers. Three additional contacts will be deleted for each QSO shown to be a dupleate (or false or unverifiable). A second multiplier will be deleted for each one lost by the above action. Disqualification can result if in the opinion of the Committee the penalty total is considered excessive. Disqualified stations and operators may also be barred from competition in all CQ contests for a period of up to three years. Awards. Logs and summary sheets and U.S. rules for 160 may be obtained from *CQ* by sending a large s.a.s.e. with sufficient postage. Mailing deadline for the contest entries is February 28. Send to *CQ* 160 Contest, 76 North Broadway, Hicksville, NY 11801.

Classic Radio Exchange, sponsored by the Southeast ARC (Cleveland), from 2100Z January 27 until 0400Z January 28. Object is to restore and operate and enjoy equipment built since 1945 but at least 10 years old. Call CQ CX or CQ Exchange. Exchange your name, signal report, state/province/country, receiver and transmitter type. The same station may be worked with different equipment combinations and on each mode on each band. Suggested frequencies: cw — 60 kHz from low end; Phone — 3910 7280 14280 21380 28580; Novice/Tech: 3720 7120 21120 28120. Add the number of different transmitters, receivers and states/provinces/countries worked for each band. Multiply by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). S.a.s.e. for results. Send logs, comments, anecdotes, etc., to Stu Stephens, K8SJ, 1407 Hollywood Rd., Sandusky, OH 44870.

FEBRUARY

1-10

ARRL Novice Roundup, this issue, page 88.

3

North American Sprint.

6

West Coast Qualifying Run, 10-35 wpm at 0500Z February 7 (9 P.M. PST February 6). See January 3 listing for more details.

2-3

Marconi International DX Competition, phone, sponsored by Associazione Radiotecnica Italiana. (Cw — March 15-16) 48-hour period UTC, 80-10 meters. Single operator — all band, single operator — single band, and multioperator — single transmitter categories. Avoid the following frequencies: 3700-3760, 7040-7060, 14,300-14,350, 21,400-21,450, 28,150-29,700. (On cw avoid 3570-3600, 7030-7040, 14,080-14,100, 21,120-21,150, 28,150-28,200.) Exchange signal report and ITU zone. Stations operating from special locations will add SL to their report (D4 CT1 CT3 G HV I4 IY4FGM IT1IM JA LU-A-B-C PY UA1 VO1 VK2 W1 YU). Multipliers are ITU zones per band plus 50 multipliers for each special location per band (once only). Contacts between stations on the same continent but different countries count one point on 7, 14 and 21 MHz, two points on 3.5 and 28 MHz. On different continents count two points on 7, 14 and 21 and five points on 3.5 and 28. Multiplier credit only with stations in your own country. Final score equals sum of QSO points times sum of multiplier points. Awards. Separate logs for each band. Logs to be received by June 15 (June 30 for cw). Send to G. Marcoin Contest Committee, G. Nucciotti, I8KDB, Via Fracanzano 31, 80127 Napoli, Italy.

CWSP International DX Competition, sponsored by the Grupo de CW de Sao Paulo, 48-hour period, cw only. Single operator — all band or multioperator — single transmitter (club stations only). Exchange signal report and serial number. CWSP members will add /CWSP after the report. (Send one IRC for CWSP Award information.) QSOs with other countries on your continent count one point, others continents, three points. Multipliers are DXCC countries plus Brazilian prefixes (PY1, PT7, PS8, etc.). Multipliers count once regardless of band. Final score equals QSO points times multiplier. Awards. Send logs by March 15 to CWSP Contest Committee, Caixa Postal 15098, Sao Paulo, Brazil.

South Carolina QSO Party, from 1800Z February 2 until 2400Z February 3. Exchange signal report and county (SC only), state, province or country. SC stations count one point per QSO except two points for Novice/Technician QSOs. Others count one point per SC QSO, except two points for SC Novice/Tech QSOs. Multipliers for SC stations are SC counties, states, provinces and countries. Others count SC counties (46 maximum). Final score equals QSO points times multiplier total. Suggested frequencies: cw — 3550 3710 7050 7110 14,050 21,050 21,110 28,050 28,110; Phone — 3980 7280 14,280 21,380 28,580. Awards. S.a.s.e. for results. Mail logs by March 8 to Elliott Farrell, WA4YUU, Box 994, Walterboro, SC 29488.

New Hampshire QSO Party, sponsored by the Nashua ARC, from 2000Z February 1 until 0500Z February 2 and 1400Z February 2 until 0200Z February 3. NH stations exchange signal report and county, others signal report and state/province/country. Score one point per QSO, multiply by NH counties worked for final score (NH stations multiply by NH counties plus state/province/countries). Suggested frequencies: cw — 1810 3555 7055 14,055 21,055 28,055; phone — 1820 3935 3975 7235 14,280 21,380 28,575; Novice — 3730 7130 21,130 28,130; shf — 50.115 145.015 fm simplex. Try phone on the hour, cw on the half hour. Awards. NH club competition. S.a.s.e. for results. Mail by March 16 to NARC, Rex Lint, K1HI, 10 Hartwood Dr., Merrimack, NH 03054

9

ARRL Frequency Measuring Test, begins with a call-up at 0300 and 0600Z February 10 (10 P.M. EST February 9 and 1 A.M. EST February 10). W1AW transmitters will be on the air simultaneously on 20, 40 and 80 meters for the duration of the test but

*Assistant Communications Manager, ARRL

in order to correlate your readings with those of the umpire, measurements should be made during the specified periods. Approximate frequencies and measuring periods for the early run are 14,075 kHz between 0307 and 0312Z, 7030 kHz between 0315 and 0320Z, and 3565 kHz between 0323 and 0328Z. For the late run, 14,100 kHz between 0607 and 0612Z, 7090 kHz between 0615 and 0620Z, and 3525 kHz between 0623 and 0628Z. Submit your averages for each period to be compared with the umpire, a professional frequency measuring laboratory. Indicate how many readings you took to form your average. Your report must be received by February 21. W1AW will transmit official results in an ARRL bulletin beginning February 23.

9-10

PACC Contest, sponsored by VERON, from 1400Z February 9 until 1700Z February 10. Cw and ssb, 160-10 meters. Single and multioperator categories. Exchange signal report and serial number. PA/PE/PI stations will give their province (GR FR DR OV GD UT YP NH ZH ZL NB LB) and signal report. One point per QSO. Multiply QSO points by sum of provinces worked per band for final score. Awards. Mail by March 30 to D. J. Hoogma, PAØDJN, Schoustraat 15, 6525 XR Nymegen, Netherlands.

Two-Land QSO Party, sponsored by the South Jersey Contest Coalition, from 2100Z February 9 until 0800Z February 10 and 1300Z February 10 until 0300Z February 11. 160-10 meters. Exchange signal report and county (NJ and NY) or state/province/country. Each QSO counts two points. NJ/NY stations multiply QSO points by sum of NJ/NY counties, states, provinces and countries for final score. Others multiply by NJ/NY counties worked by band. Suggested frequencies: cw — 1805 3560 7060 14,060 21,060 28,060; phone — 1815 3900 7230 14,280 21,355 28,600; Novice — 3725 7125 21,125 28,125. Awards. Dupe sheets required if more than 200 QSOs. S.a.s.e. for results. Mail logs to South Jersey Contest Coalition, Mark Wilson AA2Z, 10 Adams Ave., Pitman, NJ 08071.

12

W1AW Qualifying Run, 10-35 wpm at 0300Z February 13 (10 P.M. EST February 12). See January 9 listing for more details.

16-17

ARRL International DX Contest, cw, revised rules appeared in December *QST*, page 94.

YL-OM Contest, phone

23

W1AW Qualifying Run

23-24

French Contest, phone

Vermont QSO Party

MARCH

1-2

ARRL International DX Contest, phone

8-9

YL-OM Contest, cw

15-16

Bermuda Contest

22-23

BARTG Spring RTTY Contest

29-30

YL ISSB QSO Party
CQ WPX Contest, phone

APRIL

5-6

ARRL Open CD Party
ARRL EME Contest-I

MAY

18-18

ARRL EME Contest-II

Strays

LOST BOY

When a member of Boy Scouts Explorer Post 73, on a fall backpacking jaunt, became lost high in the mountain wilds of the Arapaho National Forest, ham radio was instrumental in getting the search underway. After hiking to Surprise Lake, near Green Mountain Reservoir, the explorers spent the afternoon fishing, playing games and QRPing — Post 73 is the only Amateur Radio Explorer Post in Colorado. Part of their scouting gear was a QRP rig, coax, a 40-meter dipole and batteries. An impressive number of East Coast contacts were made using only 1 watt. The evening meal was followed by more fishing and QRP operating.

As darkness fell the scouts were gathered around the campfire to begin their evening activities. A head count was taken and it was discovered that one boy, Randy, was missing. Previously laid evening plans were put aside and preparations were made to look for Randy. A quick search of the tents and surrounding area turned up nothing. A large area was mapped out and the search began. What had happened to Randy? The Explorer Post Advisor Jim Reeb, WØMIK, got on the 40-meter QRP rig and was able to make cw contact with W9ILC and N5RQ, who had been having an ssb QSO. With the cooperation of these two, and other hams on the frequency, Jim was able to get his "SOS" message out. Before midnight the State Patrol and the Summit County search and rescue team had been contacted and advised of the situation and help was on its way.

Shortly after midnight two adult leaders began the long dark trek down to the highway to meet the search and rescue team. The situation up at the lake was explained to the team and at first light the rescue team headed up the trail to Surprise Lake. The rescue team split up and methodically searched the trails and stream beds in the area. As the search progressed, and one area after another was eliminated, the searchers moved to lower ground, near the highway where the vehicles had been left.

What *had* happened to Randy? He left camp after supper and explored the area around the camp. While returning to camp he came to a trail which he didn't remember crossing, became confused and wandered further away from the camp. After wandering around for some time he grew tired and simply looked for a place to sleep, settled down and went to sleep. While searchers combed the area around him, frantically searching and hollering, Randy was peacefully sleeping. After awaking the following morning, he walked until he found a stream. Remembering his Boy Scout training, he went downstream, and after walking about five miles he was found by members of the search and rescue team. He was in far better shape than the rest of the members of Post 73 who had been searching for him.

A 40-meter QRP rig was used to summon help when a member of Colorado Boy Scout Explorer Post 73 became lost in the Arapaho National Forest.

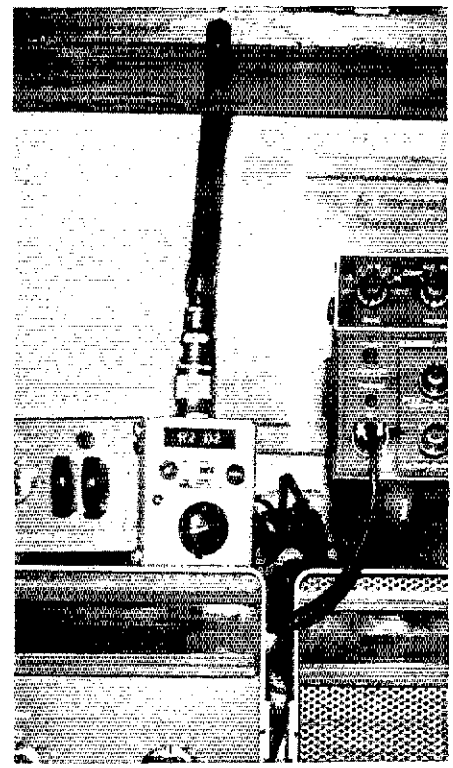
The Summit County search and rescue team performed like the professionals they are. Everything was beautifully coordinated. It was unfortunate for Post 73 to have one of their own members get lost, but they are all very grateful for their involvement with ham radio. The actions by amateurs, including W8IEC, AG7M, KØVBU, N5RQ and KB8GY, were greatly appreciated. Once again, ham radio came to the rescue. — *James Reeb, WØMIK, Parker, CO*

I would like to get in touch with . . .

Amateurs and SWLs who can donate old radio books, magazines, *Callbooks* and club magazines. I would also like help learning Morse code. Contact Kushal Harvant Singh, 83 Aulong Road, off Stevens Road, Kampong Boyan, Taiping, Perak, Malaysia.

SEAS COMMUNICATIONS BRIDGE

The Social and Educational Association for Seafarers, Inc. (SEAS) appeals to the goodwill of Amateur Radio operators for the donation of ham equipment. (See October 1979 *QST*, page 39, "I would like to get in touch with . . .") SEAS plans to encourage the children of seafarers to become ham radio operators in order to make contact with their parents. For more information contact Social and Educational Association for Seafarers, SEAS Institute, 45 De Graw St., Brooklyn, NY 11231; tel. 212-858-7327.



Hank Goldman, WA2OVG, Riverdale, NY, recently built the "RF Sniffer" (January 1979 *QST*, page 15) with help from his children. Hank departed from the "universal breadboard" concept, using solder-tie lugs from his junk box, and added a rubber-duckie antenna. The children thought that the finished project looked like "R2-D2" from *Star Wars* and so the name was changed.

Section Activities

A-1 OPR ✕ EC ✕ DXCC ✕ RCC ✕ WAS ✕ STM ✕ OES ✕ OTS ✕ NM

SCM ✕ ARES ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕

CANADIAN DIVISION

ALBERTA: SCM, S.T. Jones, VE6MJ — SEC: VE6XC. Net Mgr: (APSN) VE6AFO. Net Mgr: (ACWN) VE6BBL. We extend to VE6BAO and her family our deepest sympathy in the loss of her husband, VE6AW has undergone surgery and is reported to be on the road to recovery. We wish him well. VE4IM/6 now has his antenna farm in operation. Your reporter was pleased and very surprised at the October meeting of the Northern Alberta Radio Club to be presented with a merit award from the club. VE6FV is now the Emergency Coordinator for the Hinton Area. Traffic: VE6CHK 149, VE6AVZ 126, VE6BBL 104, VE6HO 47, VE6ABC 27, VE6VS 14, VE6JH 13, VE6MJ 8, VE6QN 6, VE6AAT 4, VE6XD 3.

BRITISH COLUMBIA: SCM, H.E. Savage, VE7FB — British Columbia Public Service Corp net, held it's annual discussion and vote on remaining on fast time or going back to standard time. Results 224 for standard time against 125. So we still meet at 0200 Z. VE7CN and VE7BK who have been some months in hospital are just so-so, sorry. Vancouver Island Senior Citizen ARCs general annual meeting was excellent day and good food. No change in the officers. Saturday A.M. is still the hams gathering at Dollards' new store. Thanks VE7PB. Traffic: VE7ZK 222, VE7COA 104, VE7FB 36, VE7BLO 11.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: VE4JP. SEC: VE4TR. STM: VE4RO NMs: VE4s VJ TE NM IZ AGB. On Oct 15 the evening phone net helped in an emergency concerning an accident. VE4IM has moved to Edmonto and will be missed. MTN is changing its time schedule from 6:30 P.M. to 7:30 P.M. local time. The frequency will remain at 3660. This will increase the QNI. The slow cw net is again active on Wed and Thur, but the time has been changed to 10 P.M. local time. The frequency is still on 3680. All nets report increased traffic and QNI, but more participation is requested for both cw nets. MEPN: QNI 1005, QTC 32, sess. 31; MMN: QNI 336, QTC 26 sess. 31; MTN: QNI 197, QTC 88, sess. 29; WRIN: QNI 90, QTC 9, sess. 6. Traffic: (Oct) VE4PG 121, VE4RO 103, VE4IZ 71, VE4TE 28, VE4JA 20, VE4AED 16, VE4FK 13, VE4HR 11, VE4LU 11, VE4AEJ 10, VE4QJ 10, VE4HK 9, VE4ID 9, VE4JP 8, VE4BO 7, VE4CR 7, VE4HA 5, VE4LB 5, VE4AAD 4, VE4ACX 4, VE4BE 4, VE4LN 4, VE4OD 4, VE4AAF 2, VE4DP 2, VE4AAU 1 (Sept) VE4TV 27, VE4AEA 7.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — AsSCM: VO1FG STM: VE1WF. SEC: VE1ASW. NMs: VO1JN VE1WF. Silent Keys: VE1ARH VE2BR/1; ex. VE1LU ex. VE1EF/NQ. Hospital: VE1LU. Ex hosp: VO1BT VO1EF. Prov.-wide NS SET exercise very successful. 13 HARC cond. gr. search for two missing youth at Harrietsfield, Hfx. Co. Rec'd newspaper PR on search. VE1AST VE1AIH showed slides on DX-QTH Sable Isl. W1HDQ gave talk HARC on Sun-spot Act. & propagation. HARC conducted successful flea market & auction. New SARC officers. VE1CH, ex pres.; VE1BVD, secy.; VE1ABM, treas. Ham Ceilidh'80 Com. VE1s QD AKO GNB BVD IG RI VR ZB. VE7BTV/1 St. Paul's Is. DX'ped worked 17K. contacts. SARC "Short Skip" Eds. VE1s XT FT replaces CB Am. Built. Ed. VE1Ri. VE1WO/1 rec'd PR on Boy Scout Jam. VE1BKE rec'd commend. from MAARC on Lobster Rally. MAARC: VE1BUE, ex pres.; VE1BRN secy.; VE1BUK, treas.; VE1JJ, dir. VE1s BRW BOS have new rptr. Moncton VE1MTN 147.69/09 VO Awards 79, Smallwood & Sterling Trphs. VO1AA/1. SONRA award VO1CM Bob Lewis Aw. VO1FG. Congrats. APN: sess. 30, QNI 146, QTC 92 NPN: sess. 31, QNI 1080, QTC 6. Traffic: VE1WF 298, VE1CH 65, VE1OC 40, VE1RI 30, VE1XF 20, VE1LCR/RO 17, VE1KR 15, VE1BMN 14, VE1BXA 10, VE1AUL 4, VE1YO 4, VE1ASW 1.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3APK. STM: VE3GOL. Special thanks to those Ontario traffic handlers who picked up the slack while this SCM experienced some nagging and re-occuring rig problems. The Ottawa ARC hosted a very successful 11th Annual RSO Convention at the Skyline Hotel with close to 900 registered. RSO Amateur of the Year Award went to VE3UD while the CRRL Amateur of the Year Award went to VE3HC. Both very deserving winners, congratulations. Nortown ARC retained the Keith Russell Memorial Trophy for the highest Canadian score in Field Day. The President's Award went to the Bruce ARC for their bulletin, "Zerobeat." Incoming RSO president is VE3OR. Next year's convention will be held in Toronto on October 3, 4 and 5, 1980. Regretfully the following have been reported as Silent Keys: VE3s BIW HBR KHH LM and PN. Our SET activities were very successful and participation in the NTS was heavy - very gratifying to see the efforts of our SEC and STM rewarded. VE3JIR earned his third BPL and will receive a handsome bronze medallion. At the annual Champlain Repeater Assn. banquet and meeting the following were presented with local net certificates: VE3s AAS AJN FHZ FSO GNW GT JGW and JRT. Ve3KK received his WAC on ssb. VE3IJU is now VE2AKR. Congratulations to VE3ILN on becoming a "Big Brother." W2HD has appointed VE3CDM to the ARRL Public Relations Advisory Committee. New calls from the Peterboro area are: VE3s MEW LUZ HFQ and LKQ. Section amateurs busy during and after Hurricane David included VE3s AML APK AUM FZG and GOL amongst many others. Full report to appear in a future issue of QST. The following have become League Life Members. VE3s CEB HVM FZU AZJ ILX AYR BBB CDJ IVH EES HRM and JBU. K6GMU/VE3 very active as the Port Colborne EC QCWA Chapt. 73 running two nets each Sun - 0900 and 1300 local time on 3773 kHz. May this year be your year. Traffic: (Oct)VE3JIR 559, VE3GOL 487, VE3JRT 215, VE3DPO 167, VE3HGJ 162, VE3SB 155, VE3KK 149, VE3APK 130, VE3GT 127, VE3ISW 108, VE3CYR 101, VE3GNW 87, VE3EWO 81, VE3GFN 78, VE3IFP 76, VE3HB 67, VE3GYD 60, VE3AJN 57, VE3JHE 51, VE3JJK 49, VE3HCS 46, VE3DUK 43, VE3EBC 43, VE3DVE 42, VE3ILT 37, VE3GJG 35, VE3JRO 34, VE3FZG 32, VE3FGU 28, VE3IMR 26, VE3LVE 26, VE3BZB 25, VE3EHL 22, VE3BMC 21, VE3ANJ 20, VE3FPI 19, VE3FHZ 18, VE3BVG 12, VE3JPP 9, VE3DZH 4. (Sept) VE3JJK 13, VE3HCS 12.

QUEBEC: Harold Moreau, VE2BP — SEC: VE2DEA. Few of us went to the RSO convention in Ottawa on the week-end of October 12-14. I am sure everyone enjoyed it. Well done by the Ottawa ARC. We are still looking for cw operators for the QSM, please contact your SCM. VE2WH is planning visits to the south and VE3 land for next winter. Felicitations a toutes les Stations qui ont pris part au Jamboree Scouts. Traffic: VE2EC 48, VE2EKC 22, VE2FFE 22.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3QQ W3WD. PSHR: N3AKC 80, K3JL 79. W3WYO is making a permanent move to the Titusville, FL area. Snowbird W3BSS is in FL with W3FEG ready to follow. W3HGA has had a serious bout with the flu, while W3DKX was discharged from Pelleport, hopefully for the last time. Keep March 2nd clear for the DVARS Winter Fest and Computer Show at Christiana Memorial Hall. WB3EOU and WB3LGC will be members of the Olympic Torch Run Communications Team accompanying the runners from Yorktown, VA to Lake Placid, NY. DEPN: QNI 77, QTC 18. DTN: QNI 315, QTC 59. Traffic: W3PQ 188, N3AKC 148, W3QQ 134, W3DKX 71, WA3WIY 34, WB3DUG 31, K3JL 22, W3WD 21, WB3GOI 13, WA3DUM 10, AC3T 4.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. STM: K3NGN. NMs W3VA K3KW WA5WQP AG3R. Net rpts: PTTN QNI 323, QTC 147; LVN QNI 14, QTC 21; LVN(2) QNI 31, QTC 13; AREC(2) QNI 15; PFN QNI 331, QTC 366; EPA QNI 625, QTC 378; EPAEP&TN QNI 350, QTC 143; EPAEP&TN(SET) QNI 27, QTC 18. OO rpts: W3CI W3KCM K3RDT W3KEK. OBS rpts: W3ID W3AVJ WB3JZA K3EBZ N3AIU WB3JYZ OVS rpts: W3CD WA3BJQ W3GOA WB3JZA N3CP. PSHR: WA3WQP KB6FR/3 WB3JZA N3AIU K3RHI. BPL: WA3WQP KB6FR/3 WB3JZA WA3ATQ N3AIU. PA QSO Party winner was N3AOT! W3CUL reports fm FL completing 30 yrs of ttc. KB6FR/3 and XYL going home to Australia for the Holidays. WA3ATQ visited by a bare friend, later found out it was a friendly BEAR. WB3JYZ active in string band, less time for 80 mtr band! WA3VIL making it to 2-m rptrs via beam ant. MURGAS ARC now has 10 active stations on 220. KA3CSN now Tech. Those club papers still look real professional! K3AKN reports new interesting net on 2-m on Sun eve, interest is two new stations are YLs! WB3CUF trying out ATV. W3WRE still silent cw op. W3EU trying all modes, all bands! W3GMK says its hard to build anything unless you build six at once. All parts come by the dozen! WA3YDC finally got station back together. Frankford Radio Club really going after the DX Contest. Mt Airy VHG Radio Club bracing for a battle this year for the Annual VHF Sweepstakes. Hope Santa was good to all of you, although coal in your stockings this year might not be so bad! Traffic: WA3WQP 1122, KB6FR/3 824, WB3JZA 524, WA3ATQ 445, K3KW 336, N3AIU 248, K3NGN 220, W3IPX 150, WB3JYZ 127, AG3R 126, W3DP 107, W3VA 89, WB3GUP 84, WB3GZV 78, W3FAF 61, AA3B 59, WA3CJF 54, N3CD 42, K3EIP 41, WA3VIL 35, W3ID 33, KA3BER 30, W3ADE 29, W3CL 19, WB3KHR 16, KA3CHG 12, K3AKN 11, WA3AKN 11, WA3CKA 7, K3EBZ 7, N3CP 6, W3HK 5, W3AVJ 4, K3RHI 4, WB3CUF 3, WA3BJQ 2, K3AI 1, W3EU 1, W3GMK 1, W3GOA 1, W3KCM 1, W3KEK 1, W3WRE 1, WA3YDC 1.

MARYLAND-DC: SCM, Karl R. Medrow, W3FA — WB3GZU breaks the local record for October BPL and PSHR. AA3S and K3ORW are right up there with PSHR. K3HPG is well settled at the new QTH. W3ZNW can almost use his writing hand. W3WBY reports GMRA has W3MZG, pres.; W3TFP vp.; K3KWV, treas.; W3RMO, secy.; WA3WTQ, tech. W3CDQ travels to AWA and has been doing a little DXing. N3IT is pushing a commercial key in Balto. W3ECN has sun and fun in the Barbados. W3EOV says it is yakkiting. The Frederick gang had a Crop Walk exercise for the SET. WA3CGS won the walk and lots of ham activity created. Congrats to K3CMN Advanced. K3RXK and WB3AIQ got their Sept. reports delayed in the mail. With the nets, Net/mgr sessions/TFC/QMI average. MDC: PON/W3OYY 4/7/20.8. WR: PON/W3DFW 18/27/17.4. MDD/W3PQ 62/341/10.4 Brass N3AKC W3QQ N3AQV. MEPN/AA3S 30/177/22.0. Topper W3ADQ. Others: N3AGM WB3BFK K3OMN K3ORW AA3S. Point winners: K3ORW AA3S W3DKX W3FA. WB3KDQ and N3AQV fill in the gap between Balto and AA3A who anchors Annapolis. W0VJD/3 is a traffic giant. K3ORW N3SJ and WB3JRW keep up the liaison duty. WB3CES installed a PA system for the scouts. WA3FUJ is in the mountains and WA3YNW on the flatlands. K3IU is to be found in strange places and winning contest as well! W3FZV keeps us represented in the GD parties. W5NZ/3 is ready for winter traffic. N3QA lives on an island. KB3AP is an MD as well as an MDC man. N3AFM finds 6 meters fascinating. FAR minutes and Ham Arundel News appreciated. This year the Anne Arundel Radio Club added ATV to their Chesapeake Appreciation Days communications with WA3HXY doing the honors. SET messages received from the following: WB3GZU WA3CUM N3EB N3ACI WA3BPC WB3LTS WB3EYS AA3S KB3AP KA3BKW W3DKX W3VR WA3HEM WB3DSF AD3W N3AGM WB3FWE K3EUG K3RMX KB3HF K3RA WB3JKV W3ZNW KA3BKZ WA3GYW W3QYL W3YJQ W3DFW W3VC W3BHE N3SJ K3ORW K3FT. Thanks to WA3UJE AA3S K3CRW for the relays. Traffic: (Oct) WB3GZU 779, K3ORW 268, W0VJD/3 222, N3SJ 171, AA3S 166, N3AQV 154, K3IU 145, W3FA 98, WB3KDQ 75, W3EOV 37, KB3AP 31, WA3YNW 20, N3QA 18, W3FZV 9, WA3FUJ 8, W3ECN 7, W3ZNW 6, W5NZ/3 3. (Sept) K3RXK 26, N3QA 6.

SOUTHERN NEW JERSEY, SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB STM: WB2LCC. The Oct SET was quite successful with almost all counties heavily involved. The pre-SET meeting was held in Cape May during Sept with the ARES staff the guests of AG2O, Cape May County EC. A major hurricane was planned for the weekend of Oct 6 and 7, nicknamed "Hurricane Boyd" after our friendly SEC. Many other topics of current interest to the ARES staff were also discussed. The post-SET meeting will be held soon in Mercer County, with AA2H playing host. K1XA spoke to a packed house at the Oct meeting of the West Jersey Radio Amateurs. For those who don't recall, he is one of the fearless assistant communications managers in Newington, or wherever it is that the ARRL is located! Holiday dinners are beginning to abound around the section, and I'll be looking forward to getting the names of 1980 club officers for inclusion in this column. The response received was so overwhelmingly favorable in reaction to net totals being deleted from this column that I've decided to run them only every 6 months or so, instead of every 3 months as originally planned. I haven't received so many comments on everything combined this year as I have about those darn numbers! Now what else should I do to spice up the old column? Traffic: W2ZO 584, N2AFN 366, AA2H 255, N2AJG 75, WA3YGZ 71, WA4JRP 65, WB2LCC 59, WA2GXU 56, N2ALS 48, WA2WUL 48, WA2CUW 44, WB2UGA 43, WB2GTW 29, K2UL 25, W4NLC 24, WA2HEB 23, WA2TWK 15, N2AXL 8, WA2GTJ 7, WB2GFM 4.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. SEC: WB2FTX. 1980 Locker Book ARA officials: WB2BGA, pres.; WA2WPI, vp; KA2EGX, secy.; WB2ZSV, treas. WB2RWW now up to 101 DX countries on QRP ssb. WA2ZXS (Griffiss AFB ARC) now back on the air after picking up a HW-101 at the Syracuse hamfest. N2ALB updating his Omni D to B series and having a ball on 10 m with a converted GB rig. W2ZOJ trying to convince the nets that there is a difference when he checks in with his new HW-8 QRP. WA2ZJP has a KLM 70 2-m amp adorning the shack. Congrats to new Generals KA2ATG KA2ATH WB2ODH WA2ODH; new Tech KA2GLR and Novice KA2GOH who has 29 states and 5 DX confirmed already. Also new Novices: KA2GLO KA2GLP KA2GLQ KA2GLR KA2GLF KA2GYR KA2GKY KA2GLU KA2GLB, all greaudates from the latest GRAM Novice class. RAGS received a National Certificate of Merit for their PR work with Field Day 1979. BPL to WA2SDY. PSHR to W2ZOJ WA2ZJP N2APB WA2MFV KB2TT W2PZL WB2OTC KA2BGX WB2RWW WA2SDY. Traffic: WA2SDY 617, W2ZOJ 416, WA2ELD 300, WA2MFV 211, WA2ZJP 205, N2APB 192, W4RUF 126, WA2HSB 121, WB2RWW 107, KA2BGX 100, W2PZL 98, W2IMO 76, KB2TT 60, WB2EOX 54, AF2K 49, WB2OTC 47, WA2AFE 22, WB2NAO 20, W2FR 15, WB2VSJ 7, N2ALB 6, WB2JAB 3, K2VR 2. (Sept) WA2ELD 329, W2RUF 108, K2GWN 78, W2ROF 65, KA2BGX 33, K2VR 7, WB2VSJ 5. (Aug) WB2VSJ 3.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM. STM: W3YO. SEC: WA3VUP. Asst SECs WA3LJW & WA3JBQ. NMs W3NEM W3KUN W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	32	341	115	3585	7:00 P Dy
WPAPTN	35	629	205	3983	6:15 P Dy
WPA2MTN	33	579	109	146.28/88	8:00 P Dy

WB3JDI Reports the Northwest Area two-meter Ttc Net had 194 QNI and 16 QTC. I must report two Silent Keys: an old friend K3RAD and WB3JZH they will be missed by their friends. New officers for the Two Rivers ARC are AG3H, pres.; W3OFM, vice pres.; WB3IAB, secy.; W3GUL, treas.; KA3GLJ, act mgr. New Novice is KA3EFP. New General is WB3HZB and new Advanced is WB3KRE. Congrats to all. The Nittany ARC at State College, PA, reports the best attended "party" during the PA QSO Party which they sponsored. N3AOT took the high score honors for the state, WA3UNX was high score for WPA area, VE3DAP won the out of state honors. The Irwin Area ARC provided communications for the Gasp/Athletes Foot/GPRRC Footrace. WACOM in Washington County provided comm. for the March of Dimes Bike-a-thon in their county. Worked WA3VUP WPA SEC and WB3EFQ EC of Blair Cty during the SET. The Steel City ARC site was used as the EOC during the SET. The Two Rivers ARC and the North Hills ARC plus non-club members assisted. Traffic: W3EGJ 444, WA3PXA 320, W3SMV 178, N3FM 165, W3YO 121, N3EE 116, W3MML 78, W3KMZ 70, WA3VRE 70, W3UHL 68, K3SMB 59, WB3JDI 56, WB3EFO 47, WA3UNX 39, K3HCT 35, KB3DT 28, W3KUN 25, N3KB 22, WB3HUJ 20, W3EXC 19, W3SN 18, WB3GWJ 16, W3TDW 15, WB3KBV 14, WB3BOB 12, K3VQV 12, AF3B 11, WB3IAB 9, WB3HDH 8, W3RUL 8, N3AZH 4, AB3X 4, N4DR/3 3, WB3GZR 3, WB3CIM 2

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst SCM: W9RYU. SEC: W9AES. NMs: WA9KFK WB9JSR. Cook County EC: W9HPG

Net	Freq.	Times/Days	Tfc.	Sess.
ILN	3690	0030/0400 Dy	379	64
ILL Phone	3915	2130 Dy	177	31
NCPN	3915	1200/1700	197	27
IEN	3940	1400 Su	9	4
W9VEY				
MEM Stn		2-meter	10	5

WA9UMA has a new IC 230 and TM3 MKII up 30 ft to bring in the hard ones. The Starved Rock Radio Club repeater is back on the air after extensive modifications on 147.72-12. The 9RND passed 243 messages during 62 sessions with Illinois participation of 97% with stations W9NXG W9JJJ W9YCE WB9WGD and W9HOT reporting. Our sympathy to the families and friends of K9YUS who recently joined the ranks of the Silent Keys. W9APX of Collinsville also joined the Silent Key ranks. W9QLZ of the Starved Rock Radio Club received the 33rd degree, Masonic's highest. He was honored along with Lowell Thomas, nationally recognized newscaster and also Wayne King, popular orchestra leader for many years. W5KLV reports that the CAND report for October had a total of 801 messages in 60 sessions with W9YCE W9HOT W9NXG and W9JJJ of the Illinois Section checking in. The Wheaton Community Radio Amateurs Hamfest will be held at Arlington Park Exposition Center in Arlington on Sunday January 27 1980. The newly elected officers of the Sangamon Valley Radio Club (Springfield) are. WA9KRL WA9AQN WD9APJ W9YCE and WD9IFF. KN9BAM has a 22 element 89 ft high antenna on two-meters. W9QLZ W9FDY ad W9CFV were elected for the coming year of the Central Illinois Chapter of the QCWA. WB9VZH and WB9YZB have recently upgraded to General class. The Saline County Radio Club new officers are: WB9TQQ WB9QDS WD9JDC and WB9UHR. K9HDE spoke on propagation conditions on hf bands at the latest Schaumburg Amateur Radio Club meeting. Traffic: (Oct) W9JJJ 430,

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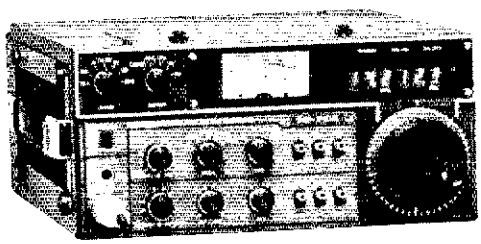

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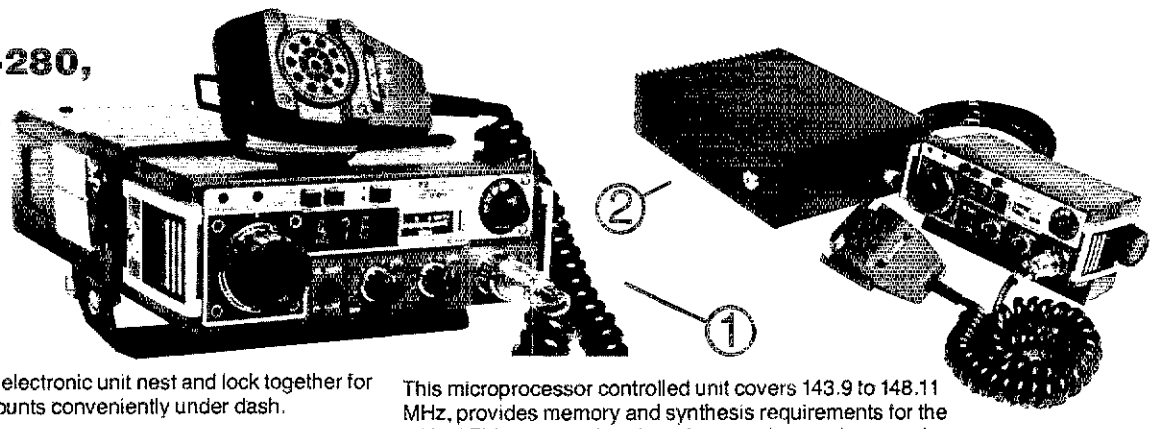

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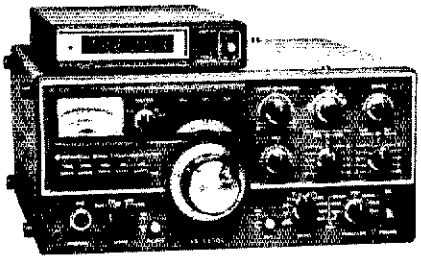

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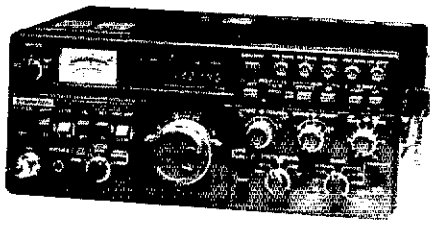

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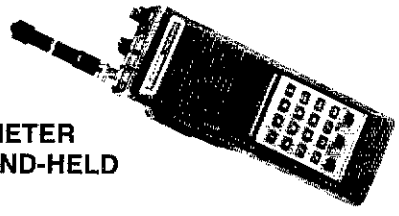

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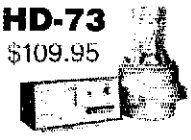

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Prices/specs subject to change without notice. Calif. residents add sales tax

W9NXG 407, WB9JSR 235, W9HOT 212, WB9PUK 198, W9OBS 124, K9UN 121, K9BVF 108, WA9KFK 105, N9TN 103, K9EEA 79, W9OYL 73, W9OK 72, WB9WGD 72, W9KR 68, K9SW 61, W9TLM 57, W9YCF 50, N9MX 49, WA9JJE 46, W9HBJ 39, KA9ALR 33, K9SW 33, WØRLW/9 28, W9LNQ 27, WD9HZF 21, WD9EVV 15, KA9DTF 13, WB9SGK 7, WA9BFV 6, W4IZI/9 6, WD9EBQ 2, AA9R 2. (Sept) W9NXG 203, WA9JJE 49.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9OYY OIN WB9UYU ICN N9AEI. October Net Reports. Time in UTC and Freq in kHz

Net	Freq.	Time	QNI	QTC	Sess.
ITN	3910	1330/2230 Dy	1934	342	62
QIN	3656	1430/0100/0400 Dy	834	470	93
ICN	3708	0015 Dy	—	—	30
IPN	3910	2130 Dy	1102	100	31

SE IN net reported handling 205 msgs during Oct which includes SET. Its good to see repeaters being used for more public service work. There are a number of repeaters around the state that have regular traffic nets on them. SET weekend several members of the Indianapolis ARC were providing communications for a canoe race. The Indy Club always puts on a good program at their meetings. They are 50 years old and still going strong. Indy now has an ATV repeater hid into the weather radar of a local TV station. ATVers can be heard on Sunday evenings on 147.3 fm in Central IN. I talked to my first 2-m ssb mobile the other nite. During the conversation he traveled from Anderson to Ft. Wayne. He was on his way to Mi. His rig, 140 watts and hb stacked halo's, I was impressed. This should be a mild January since there isn't any SET. Silent Key: WB9QAV. Traffic: W9JUJ 1067, WB9UYU 279, W9FC 261, WD9CIS 161, WB9WRC 119, W9XD 116, N9AEI 98, K9FZX 77, W9EI 66, WA9OCF 62, K9TKE 58, W9HUF 57, K9WWJ 47, W9UEM 33, W9WEI 25, N9HZ 23, W9DLF 19, W9IOH 16, K9CGS 10, N9AOJ 8, K9DIY 8, N9PS 8, KA9CVN 7.

WISCONSIN: SCM, Roy A. Pedersen, K9FH! — SEC: W9OAK. NMs: W9AYK W9IEM WB9IGH WD9EAO K9LGU W9DM. STM: K9UTQ. New LaCrosse KA9FXP. ARES conference that was held in Wisconsin Rapids had an excellent program although the attendance was down, seems that when there is something that ECs can use they don't show up . . oh well . . WB9CAJ is now Advanced from Tech. KA9CPA made BPL. Very sorry to report W9ZGO a Silent Key. D9RN has good participants. NWN had 486 QNI, 73 QTC in 1211 minutes. How about the other 2-meter nets in the state? Send me your monthly reports. KA9CPJ new General Appleton area. NMARC 2-meter net had 138 checkins and handled 23 pieces of traffic. W9UW has FM-10CS. Traffic: KA9CPA 1085, WB9YPY 202, W9IEM 148, AE9H 132, K9FHI 103, W9YCV 80, W9AYK 78, WD9BCM 75, AD9X 70, WD9DHF 61, WB9IGH 51, W9SFL 49, W9DM 48, WD9ESZ 44, K9KSA 44, AG9G 43, W9UCL 42, N9AUG 40, WB9ESM 40, W9FDY 40, WB9WHQ 36, W9UW 35, KB9GT 34, WB9JSW 33, K9CPM 30, K9AQ 30, K9AKG 30, WB9RRU 29, K9HDF 28, K9UU 26, W9SQJ 26, K9VSY 25, K9UTQ 21, KB9FM 16, WB9YPZ 16, W9GKO 14, N9CP 13, WD9LDX 12, K9ANV 10, WA9WYS 7.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — STM: AFØO. SEC: WAØQIT.

Net	CDST	MHz	NM	QNI	QTC	Sess.
MSPN N	1805 Z	3.945	WAØAIN	510	52	27
MSSN	2315 Z	3.710	WBØZBJ	36	6	20
MSPN E	2345 Z	3.929	KAØAIT	725	182	31
WX Net	0015 Z	3.929	WBØUKI	422	304	31
MSN 2	0400 Z	3.685	KØPIZ	93	58	31
MSN 1	0030 Z	3.685	AFØO	187	102	30
RARESN	0130 Z	146.22/82	KØTS	90	7	5

Greetings from the Ham Shack of WBØHOX. Upgrades known to me this month are Advanced to Extra WBØLRK; Tech to General WBØADE WBØSCN; Novice to Advanced KAØECM Interim PL; Novice to General WDØFMF; Novice to Tech KAØFLF Congratulations to all. Please notify your SCM when you upgrade or get a new license. Army MARS selection for the operator of the month was WAØTFC. At a recent Fox Hunt, the shortest ever I believe, the fox was found in 5 minutes despite the disguise. One of the original ideas for SET was that of KØJTA, EC of Dakota County. He came on 2-m and stated there were downed aircraft and a search was needed. 23 persons, half of them ARES members, began the search. Since there were no aircraft with which to work, they were told to look for yellow vehicles. WBØWKN located the most vehicles and used various methods to report his findings. WAØAIN, Morris, MN, has been named net manager of MSPN/N. As he takes over, and WØOPX, the interim net manager leaves, we want to thank WØOPX for her work and let her know that we are sure WAØAIN will do the net proud. Thanks WØOPX and good luck in whatever you do. KAØAIT, EC of Stearns County, and WDØFSL, EC of Carlton County, report there were no emergencies in Oct. Please note! WAØQIT needs more ECs and more reports on emergency nets. Why not check your county and if there is no EC, volunteer! If you have a repeater and a net, send you call and info to WAØQIT. WBØQN, pres Mankato Area Radio Club, entered St. Marys hospital here in Rochester October 14th and will be here about 2 - 3 months while training new muscles to be used due to loss of use of lower limbs resulting from ruptured blood vessels in his spine. What a tremendous spirit he has! Word was received here today that the XYL of WØROJ passed away in late Oct. Our thoughts and sympathy are with you. Traffic: WBØHOX 239, WAØIFG 214, WDØFLE 170, KØPIZ 134, KAØAIT 120, WBØUKI 100, WØHZU 98, WAØYVT 98, AFØO 95, WDØCGM 65, K6EA/Ø 65, WBØNZB 53, KAØBZP 35, KØTS 32, WAØLVG 29, WØRIO 26, WDØBAC 25, WBØZBJ 24, KØCSE 19, KØRMX 17, WBØSCN 16, WBØJUL 12, WBØLRK 10, NØJP 9, WØOPX 7.

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — The Dakota Division Convention at Sioux Falls was well attended by our section. Tnx guys for your interest and support. YL WX Nets is getting real good response NWS, also check into DATA at 0030 UTC with wx. The eastern part got a touch of winter Oct. 31 with 3-4 in. of snow. Congrats to KAØDNN NØAWJ and NØAWJ on upgrading to General. WBØFUO is now KAØBP. Novices classes reports are from WBØSHD Hettinger and WAØLPV Grand Forks with good attendance. WDØCCL of Fargo is moving to the West Coast to continue with the BN. WDØBMA is going to SC WAØEKT is active on 2-mtrs.

Net	kHz	CST/Day	Sess.	QNI	QTC	Mgr.
DATA	3996.5	1830 Dy	23	145	19	WAØCRH
YLWX	3996.5	0730 Dy	4	46	30	WAØRWM

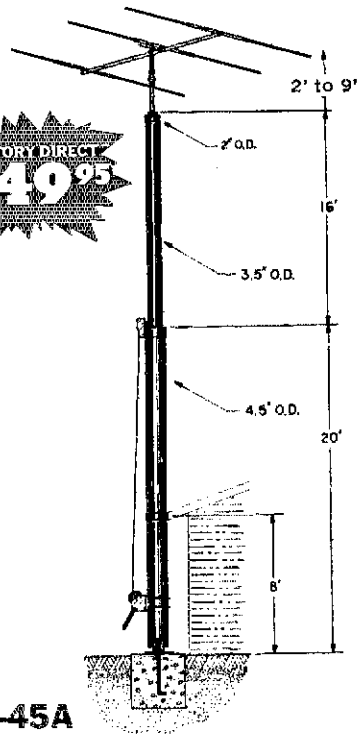
New, Improved Wilson Towers

Hinged Base Plate - Concrete Pad, Heavy Duty Winch

Mounting the House Bracket

The Hinged Base Plate allows tower to be tilted over for access to antenna and rotor from the ground.

FACTORY DIRECT $249.95



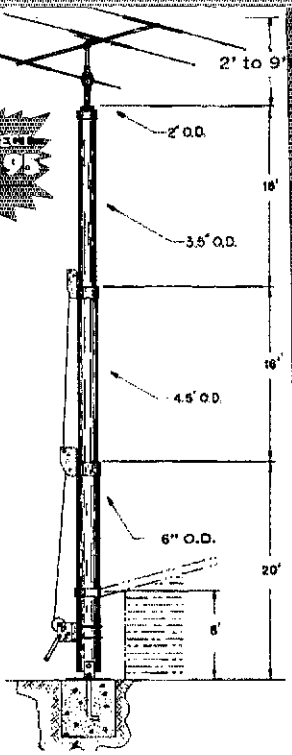
TT-45A

FEATURES:

- Maximum Height 45' (will handle 12 sq. ft. at 38') @ 50 mph
- 1200 lb. winch
- Totally freestanding with proper base
- Total Weight, 243 lbs.

The TT-45A is a freestanding tower, ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected. (Requires 12"x12"x36" of concrete.)

FACTORY DIRECT $449.95



NEW IMPROVED FEATURE

Heavier wall tubing greatly increases the stress capabilities over the older TT-45 and MT-61.

MT-61A

FEATURES:

- Is freestanding with use of proper base
- Maximum Height is 61' (will handle 12 sq. ft. at 53') @ 50 mph
- 1200 lb. brake winch
- 4200 lb. raising cable
- Total Weight, 400 lbs.

Recommended base accessory: RB-61A, FB-61A.

The MT-61A is our largest and tallest freestanding tower. By using the RB-61A rotating base fixture the MT-61A is ideally suited for the SY33 or SY-36. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used. (Requires 18"x18"x48" concrete.)

GENERAL FEATURES

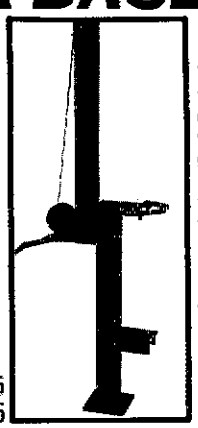
All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance-free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 10' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice. Prices and specifications subject to change without notice.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower. (Requires 3'x3'x5¼' of concrete.)

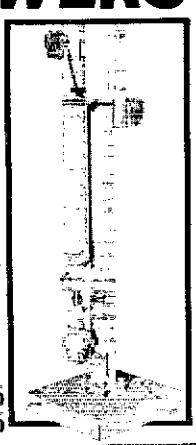
FB-45A . . . $109.95
FB-61A . . . 149.95



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system. (Requires 3'x3'x6' of concrete.)

RB-45A . . . $159.95
RB-61A . . . 219.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61A. Rotor is not included.)

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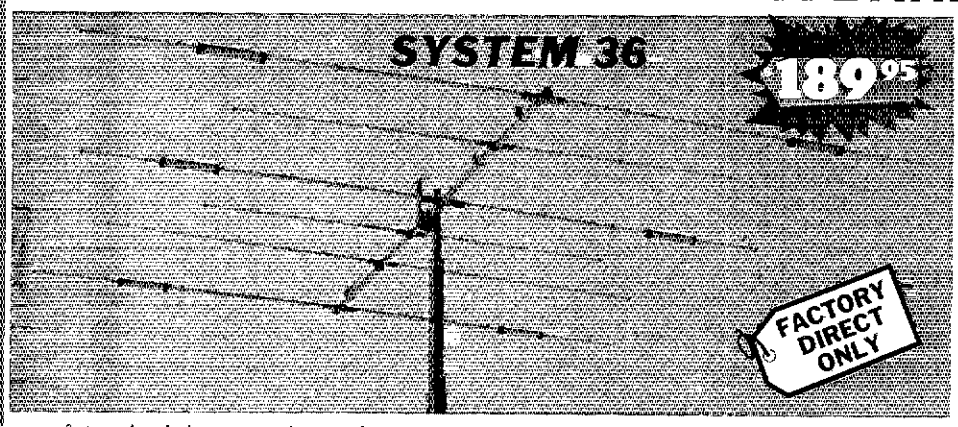
WILSON SPECIAL
TRISTAO TWS 771 TOWER
Sold in 1978 at $7,500. Have one only.
All new cables.
only $4,000.

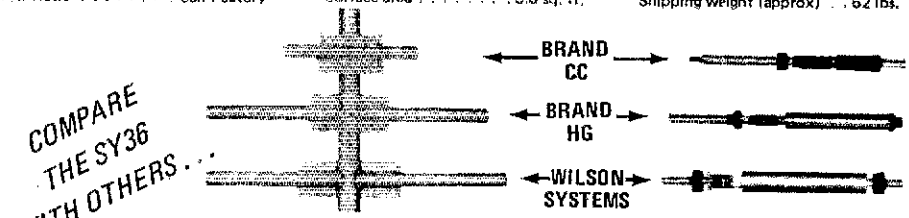
WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15 and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

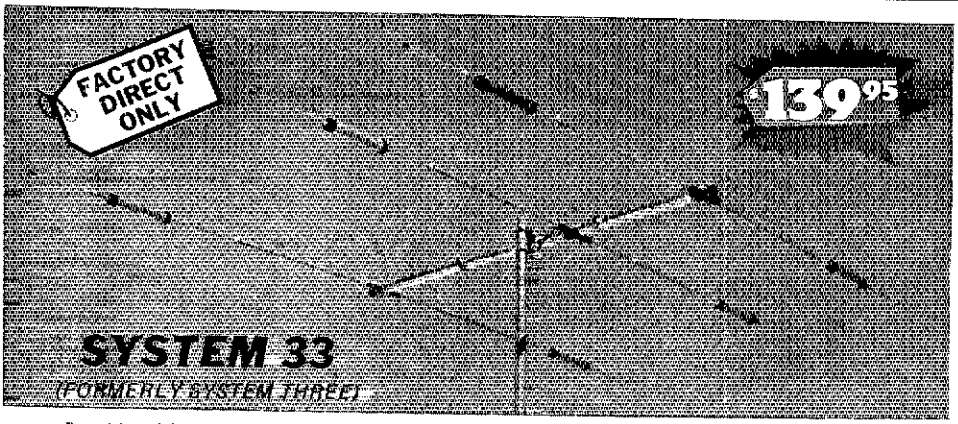
SPECIFICATIONS

Band MHz	14-21-28	Boom (O.D. x Length)	2" x 24' 2½"	Wind Loading @ 80 mph	215 lbs.
Maximum power input	Legal Limit	No. of Elements	6	Maximum wind survival	100 mph
Gain (dBd)	Call Factory	Longest Element	28' 2½"	Feed method	Coaxial Balun (supplied)
VSWR @ resonance	1.3:1	Turning Radius	18'6"		
Impedance	50 ohm	Maximum mast diameter	2"	Assembled weight (approx)	53 lbs.
F/B Ratio	Call Factory	Surface area	8.6 sq. ft.	Shipping weight (approx)	62 lbs.



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.



Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33". New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the "SYSTEM 33" quick and simple.

SPECIFICATIONS

Band MHz	14-21-28	Boom (O.D. x length)	2" x 14'4"	Wind loading at 80 mph	114 lbs.
Maximum power input	Legal Limit	No. of elements	3	Assembled weight (approx)	37 lbs.
Gain (dbd)	Call Factory	Longest element	23'4"	Shipping weight (approx)	42 lbs.
VSWR at resonance	1.3:1	Turning radius	15'9"	Direct 52 ohm feed — no balun required	
Impedance	50 ohms	Maximum mast diameter	2" O.D.	Maximum wind survival	100 mph
F/B Ratio	Call Factory	Surface area	5.7 sq. ft.		

WILSON SYSTEMS, INC.

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Prices and specifications subject to change without notice

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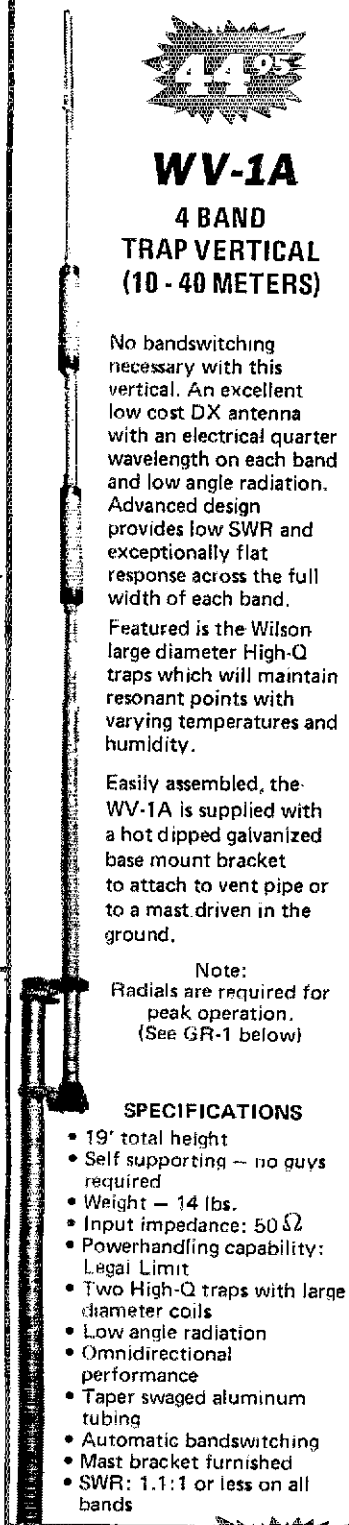


WV-1A

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(See GR-1 below)

SPECIFICATIONS

- 19' total height
- Self supporting — no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

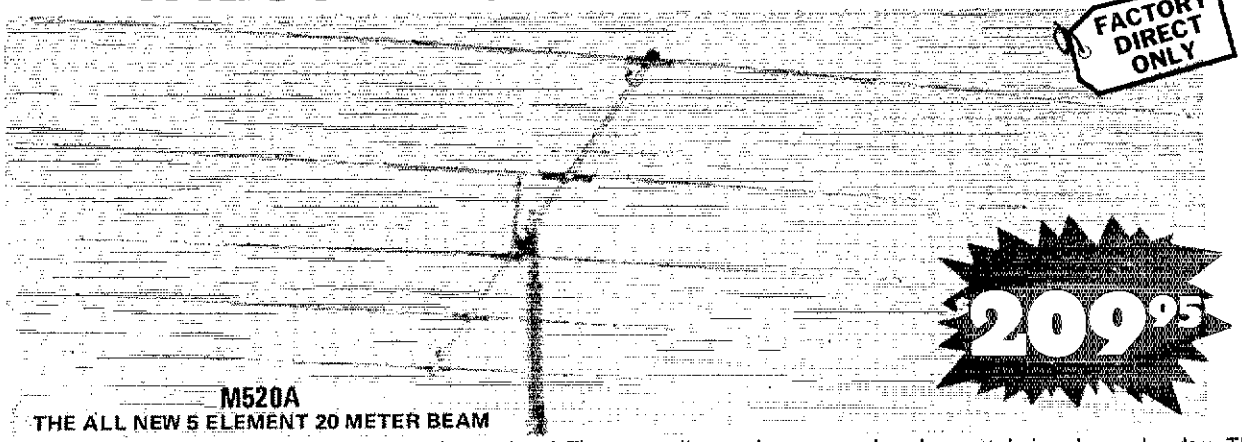
GR-1

$9.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded copper wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise.

WILSON MONO-BAND BEAMS

FACTORY DIRECT ONLY



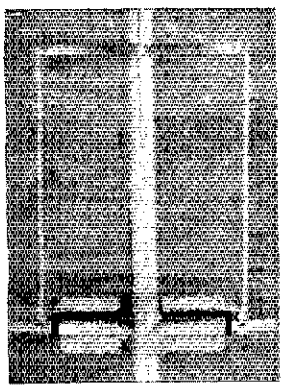
$209.95

M520A

THE ALL NEW 5 ELEMENT 20 METER BEAM

At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed monobanders. The Wilson System's new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom-to-element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:

1. **Taper Swaged Elements** — The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. **Mounting Plates — Element to Boom** — The new formed aluminum plates provide the strongest method of mounting the elements to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should land on one end of the element.
3. **Mounting Plates — Boom to Mast** — Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts and saddles for superior clamping power.
4. **Holes** — There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design has made it possible to eliminate this requirement as the use of holes adds an unnecessary weak point to the antenna boom.



Wilson's Beta match offers maximum power transfer.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the antenna on the ground, and using the guide-lines from the detailed instruction manual, adjust the tuning of the Beta-match so that it will remain set when raised to the top of the tower.

The Wilson Beta-match offers the ability to adjust the terminating impedance that is far superior to the other matching methods including the Gamma match and other Beta matches. As this method of matching requires a balanced line it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maximum utilization of space and gain. They offer the most economical method to have more antenna for less money with better gain and maximum strength. Order yours today and see why the serious DXers are running up that impressive score in contests and number of countries worked.

SPECIFICATIONS

Model	Band Mtrs	Gain dBd	F/B Ratio	Antenna Impedance (Feedpoint) Ohms	VSWR @ Resonance	Impedance	Matching	Elements	Longest Element	Boom O.D.	Boom Length	Turning Radius	Surface Area (sq.Ft.)	Windload @ 80 mph (Lbs.)	Maximum Mast	Assembled Weight (Lbs.)
M520A	20	CALL FACTORY		500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20			500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15			400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15			400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	3.1	84	2"	25
M510A	10			1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10			1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

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Las Vegas, NV 89103 — (702) 739-7401

FACTORY DIRECT ORDER BLANK

Toll-Free Order Number
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WILSON SYSTEMS ANTENNAS

Qty	Model	Description	Shipping	Price
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	$139.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	189.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	44.95
	GR-1	Ground Radials for WV-1A	UPS	9.95
	M-520A	5 Elements on 20 Mtrs.	TRUCK	209.95
	M-420A	4 Elements on 20 Mtrs.	UPS	139.95
	M-515A	5 Elements on 15 Mtrs.	UPS	119.95
	M-415A	4 Elements on 15 Mtrs.	UPS	79.95
	M-510A	5 Elements on 10 Mtrs.	UPS	84.95
	M-410A	4 Elements on 10 Mtrs.	UPS	64.95
	WM-62A	Mobile Antenna: 5/8 λ on 2, 1/4 λ on 6	UPS	19.95
	M-86	8 Elements on 6 Mtrs.	UPS	84.95
	M-66A	6 Elements on 6 Mtrs.	UPS	54.95
	M-46	4 Elements on 6 Mtrs.	UPS	27.95
	M-112	11 Elements on 2 Mtrs.	UPS	29.95
	M-92	9 Elements on 2 Mtrs.	UPS	24.95
	M-72	7 Elements on 2 Mtrs.	UPS	19.95
		ACCESSORIES		
	HD-73	Alliance Heavy Duty Rotor	UPS	109.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 guage	UPS	.21/ft.

WILSON SYSTEMS TOWERS

Qty.	Model	Description	Shipping	Price
	TT-45A	Freestanding 45' Tubular Tower	TRUCK	$249.95
	RB-45A	Rotating Base for TT-45A w/tilt over feature	TRUCK	159.95
	FB-45A	Fixed Base for TT-45A w/tilt over feature	TRUCK	109.95
	MT-61A	Freestanding 61' Tubular Tower	TRUCK	449.95
	RB-61A	Rotating Base for MT-61A w/tilt over feature	TRUCK	219.95
	FB-61A	Fixed Base for MT-61A w/tilt over feature	TRUCK	149.95

NOTE:
On Coaxial and Rotor Cable, minimum order is 100 ft. and in 50' multiples.
Prices and specifications subject to change without notice.
Ninety Day Limited Warranty. All Products FOB Las Vegas, Nevada

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Prices and specifications subject to change without notice

Goose River 1990 0 0900 Su 4 38 0 WØCDO WAØRWM 72, WDØGMD 6, NØAFP 5, WØDM 3.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB SEC: WAØTNM. Net Mgrs: WØs HOJ MZI NEO WE WAØs TNM VRE WDØBMR. PSHR was earned by WDØBMR 61 points and WAØTNM. New officers for Black Hills Amateur Radio Club Rapid City are: WBØPWA, pres.; WBØCGH, vice pres.; WBØNGP, secy.; KØCX, treas.; KØVKH WBØCGH WBØFPK, board members. New acting EC for Pennington Co is WBØPZO, his asst is WB9JPH/Ø. SET reports received from ECs WAØBWF WAØCUL WAØBZD WBØPZO. Dak. Div. convention successful with banquet attendance around 400. W2HD, ARRL Pres.; KØGA, Div. Dir.; WA4WME WØSD KØHR K1TD KØDTZ were some of the speakers. Traffic: KØFRE 124, WAØVRE 123, WØDVB 94, WØHOJ 83, WDØBMR 75, WØMZI 56, WØKJZ 35, WBØOMF 33, KØAS 28, WBØEVQ 15, WØIG 12, WBØBWF 3.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WD5IRB. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets freq time/day QNI QTC mgr. AHN 3.995 0030/Dy 1328 59 AD5D OZK 3.760 0100/Dy 188 46 W5MYZ. SGARC 28.765 0230/M&T 73 14 WD5HJC. APN 3.937 1200/M-S 940 40 W5POH. M-Bird 3.928 2230/M-F 895 47 WA5ZWZ. W5KL has replaced all his ant. which were damaged during recent storm. Endorse OBS of K5DW & WB5RCS. WB5BRD reports OUACHITA ARC meets 4th Thur. of month and will start radio school Nov. 12th. Izard/Sharp Co group meet 3rd Wed of month. For location contact W9DDK/5 or WB5NDR. WD5IRB (SEC) has new Omni-D and has been checking all Ark. Phone nets. Traffic: K5AO 47, W5SYH 39, AD5D 30, W5UAU 23, W5QFU 21, W5BLP 12, WD5IRB 11, WB5KUI 9, W5KL 8, WB5GQH 2.

LOUISIANA: SCM, S. T. "Tom" Losey Jr., K5TI — Asst SCM: K5DPG. SEC: WB5TPG. NMs: N5RB K5ARH WB5LBR WB5TPG. K5ARH stepping down as LTN mgr. thanks for a job well done N5EK W5YZL and K5BLV active on DRN5. WD5CWK WB5YRT WD4PPG KA4DGH WD5EMZ active on LSN. Congrats to N5IB and WD5CMA on a baby boy. New officers for SELARC are: WD5GJK, pres.; W5TJY v pres.; KA5CBT, secy/treas. Congrats to MTAARC of New Orleans for their recent assistance in Hurricane Frederic. WB5GFM cited for helping boost morale for Antarctica crew. Congrats, WD5CKF and N5ARH upgraded to General. Traffic handler of the Month is W5YZL for his fine assistance and support of the LTN. W5YZL is known country wide for his booming signal and net dedication. Congrats. Training grounds for fast speed cw traffic handling comes from slow speed nets and we have one of the best in our section, under the direction of WB5LBR. If you want to learn and move on to higher nets, QNI this net. We need more fast speed cw traffic handlers for the LAN. If you are already up there won't you help?

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	272	165	N5RB
LTN	3910 kHz	6:30 P.M. Dy	440	135	K5ARH
LSN	3703 kHz	7:30 P.M. M-F	100	22	WB5LBR
LRN	3587.5 kHz	6:30 P.M. Su	10	12	N5RB
LEN	3910 kHz	8:30 A.M. Su			WB5TPG

Traffic: (Oct.) W5GHP 248, K5TI 212, N5RB 179, WB5LBR 133, W5MI 109, W5YZL 89, K5ARH 60, W5VMY 49, WD5GJB 34, N5EK 32, WA5TOA 30, WB5TPG 21, KB5AS 19, WD5CWK 15, N5BFV 13, W5YN 6, WB5IKT 3, K5BLV 2. (Sept.) K5ARH 42.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Newsletters from various areas of the state giving more news as well as improved quality. Congrats to KA5FGO Tech, KA5FQY Tech, KA5FHA Tech, KA5FGY Gen. & WB5RLB Extra! Vicksburg 2-m repeater (VARC) now 147.87/27. Many club officer elections occurring this time of the year. Support your local club. My activities crippled by change in QTH-but please get your reports in the mail by the 2nd of each month. Thanks. CAND (W5KLV) sess. 64, QTC 801. DRN5 represented 100% for MS by N5AMK. CGCHN (K5UPN) sess. 31, QNI 2097, QTC 210. MSBN (K5MK) sess. 31, QNI 2201, QTC 79. MTN (K5OAF) sess. 31, QNI 88, QTC 88. MN (WA5OPT) sess. 28, QNI 584, QTC 12. RACES (N5AMK) sess. 4, QNI 166, QTC 1. JCARCEN /WD5DCI sess. 23, QNI 325, QTC 22. Traffic: K5OAF 124, N5AMK 103, WB5FHA 97, W5EQT 51, W5WZ 40, WB5SNB 35, WA5OPT 27, W5XT 22, K5MK 11, WB5UPN 10, WB5VFS 2.

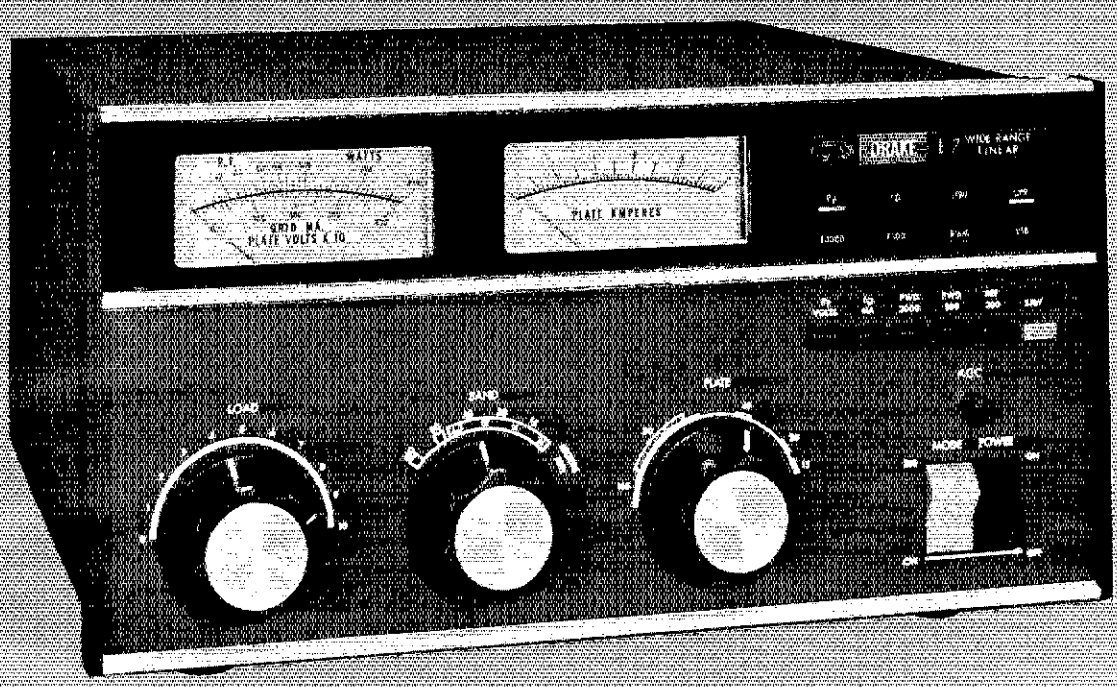
TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM: WB4PRF. STM: W4ZJY. SEC: WB4DYJ. Tenn. Amateurs have elected to become a part of the Carolinas-Virginia Repeater Association, Inc. I am acting liaison until the Tenn. District's officers can be elected and installed. Please contact me if you need info. The new officers of UTARC are: AF4T WB4EJV WA4GZT WA4FJF. N4BGA has been appointed NM of MTPSN. Memphis Hamfest was a success, prize recipients were, K4QNI WD4NZS N4BIU. Chattanooga Hamfest was a success, prize recipients were: Lyl Atchley, KB4MU WA4FMR. Cw Operator of the year Award was awarded to K4JGW at the Chattanooga Hamfest. We regret to report the resignation of WB4YPO as NM of the evening session of the TPN. TN honor roll: WB4ZSZ K4XE AF4T WD4NJR. KD4C & N4BGA have been appointed NMs. TLC has shut down. Tenn. cw net reports sess. 70, QNI 516, QTC 190. TPN reports sess. 174, QNI 6593, QTC 668. Traffic: WA4CNY 558, AF4T 274, WB4BKF 152, K4JGW 117, W4ZJY 110, KD4C 104, K4XE 86, WB4ZSZ 82, WB4PRF 73, WA4FMR 66, W4EBT 64, K4WOP 47, WD4NJR 40, WD4SBM 39, W4VS 31, KA4GSS 29, WA4GKT 18, N4BBB 17, WA4CGK 15, WA4GLS 14, WA4IQL 9, K4VM 9, W4TYV 8, K4AMC 7, N4BVY 7, W4VJW 7, K4FSK 6, K4DEC 5, W4PSN 4, W4RUW 4, WA4WVW 4.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joe Miller, K4DZM — STM: K4HRF. SEC: WB4ZML. NMs: WA4WSM WB4NPD KB4OZ K4YZU WA4AVV WA4JTE W4BEJ. Nets reporting: Net/QNI/QTC. KNTN/541/375; KTN/1432/285; KYN/356/268; D9RN/97%/243; MKPN/1093/142; KRN/446/33; KSN/240/130; D-CAN/100%/801; KRTN/97/16; CARN/232/37; BARFS/125/51; TRI ST 2 mtr./81/4; PAWN/334/38; 2STN/3/1; SEKEN/32/13; KPON/46/7; 4ARES/20/4; 5ARES/63/16; 6ARES/214/10. PSHR: K4DZM KB4OZ K4HRF WD4KDG. Silent Keys, K4KIS WA4FAG KA4AZT. 1st place in RI QSO Party, KA4ENG now KB4YH. Thanks to all clubs and ARES districts for SET participation. KF4O in new QTH in Henry Co. KRTN (RTTY) Net going good reports K4YZU NM. KA4AHF new General. Be on lookout for fat guy in red costume trying to get untangled from your lead-in/antennas or tower. A

Drake L-7 Continuous Duty 160-10* Meters 2kW Linear Amplifier

Model 1528



Temperature controlled design for "key-down" operation over a wide frequency range. Newly engineered for coverage of any new or expanded hf amateur bands within FCC amplifier rules. Also features wide frequency coverage for MARS, and other services authorized for this type of amplifier.

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

160-10* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L-7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. Tubes are included.

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

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

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

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

DRAKE L-7 SPECIFICATIONS

Frequency Coverage*: Ham bands 160 through 15 meters. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit.

Plate Power Input: 2000 Watts PEP on SSB/AM and 1000 Watts DC on CW, RTTY, and SSTV.

Drive Power Requirements: 100 Watts PEP on SSB and 75 Watts on CW, AM, RTTY, and SSTV.

Input Impedance: 50 Ohms. (Bandpass tuned input)

Output Impedance: Adjustable pi-network matches 50 Ohm line with SWR not to exceed 2:1.

Intermodulation Distortion Products: In excess of −33 dB.

Wattmeter Accuracy: 300 Watts forward and reflected, ± (5% of reading + 3 Watts). 3000 Watts forward, ± (5% of reading + 30 Watts).

Power Requirements: 240 Volts 50-60 Hertz 15 Amperes, or 120 Volts 50-60 Hertz 30 Amperes.

Tube Complement: Two of 3-500Z or 8802/3-500Z or 8163 or 3-400Z.

Dimensions: Amplifier 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75"W x 7.88"H x 11"D (17 x 20 x 28 cm).

Weight: Amplifier 27 lbs (12.25 kg), **Power Supply** 42.5 lbs (19.3 kg).

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

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CL-36: 6 el. Triband beam, qtys limited $199.95

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ATB-34: 4 el. Tribander $199.95
A32-19: 2 M. Boomer ..... $ 65.00

HUSTLER
4-BTV: 10-40M Trap Vertical ..... $ 71.50
5-BTV: 10-80M Trap Vertical ..... $ 90.50

HY-GAIN
Crankup towers and antennas — Write!

ALLIANCE
HD-73: Heavy duty rotor with 100 ft. of control cable and prepaid shipping by UPS to 48 states $119.95

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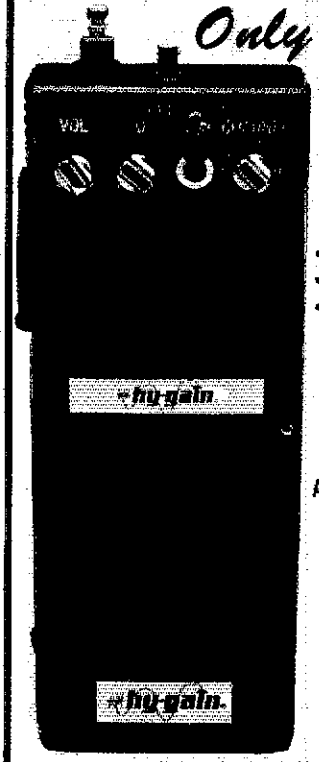

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1104 Touch tone pad **49**
1106 Wall charger **9**
1107 Cigarette lighter cord **9**
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1110 Leather carrying case **17**
1111 Carrying case **8**
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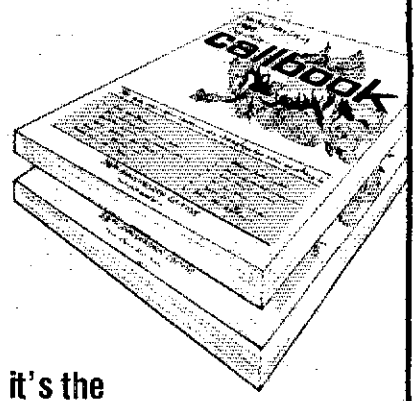

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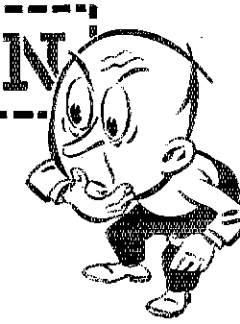
FLASH NEWS BULLETIN



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nice Holiday Season to all. Traffic: K4DZM 421, KB4OZ 334, WB4NPD 292, K4JLX 215, KA4AZT 211, K4HRF 205, WA4AGH 202, K4TXJ 200, WA4SWF 195, WA4AVV 187, WA4WSM 178, WB4ZDU 156, WA4EBN 154, WD4KDG 133, WB4ZML 126, WA4JTE 110, WB4RIT 95, WD4RNI 93, WB4AUN 57, KA4IKH 46, K4YZU 45, K4HOE 43, WA4YPO 43, W4OJN 39, K4AVX 38, AI4T 33, WD4COF 32, W4PKX 31, WD4CJQ 30, N4CCJ 29, W4CDA 29, WB4APC 25, W4BAZ 20, WA4OMH 19, WB4ILF 19, WB4ABE 18, KB4YH 17, W4HKT 14, WD4RWU 14, K4AML 10, WD4BSC 8, KA4CXW 7, WA4GAL 7, KA4ISJ 6, WA4IGD 5.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: K8LNE K8KMO WB8YDZ WA8DHB WD8BHE WD8LSV N8ABA. ECs at Large: K8RCT W8VWY.

Net	Freq.	UTC	Day	QNI	QTC	Sess.	Mgr.
QMN*	3663	2300/ 0300	Dy	1490	536	100	N8ABA
MACS*	3953	1600	Dy	860	440	31	K8LNE
MITN*	3953	0000	Dy	706	369	31	KB8AJ
GLETN	3932	0200	Dy	1126	200	31	WD8BSE
UPN*	3922	2200	Dy	743	144	35	WA8DHB
MNN*	3722	2230	Dy	443	102	31	WD8BHE
WSSBN	3935	0000	Dy	679	44	31	WB8VAI
BR	3930	2230	M-S	399	31	23	W8HIN
MIARES	3932	2230	Su	87	11	4	W8VWY
MEN	3930	1400	Su	134	3	4	W8HIN

VHF Local Nets: 12 reports 608 96 51 WD8LSV

*NTS Section nets. This October's Simulated Emergency Test was very different than ever before in MI. The simulation scenario for each EC was sent to him by the SEC rather than having the EC make up his own. This way the EC did not know what the emergency was until it took place. Participation was good and we all did learn a great deal. October also brings Halloween and with it "Spook Patrols" by radio clubs and ARES groups. The Wexford & Missaukee Counties ARES operated a Spook patrol under the leadership of EC KB8GC. The Stu Rockafellow Club of Plymouth ran a patrol for two evenings covering a total of 277 miles and a total of 82 man hours. WB8ZIY coordinated this project. Field appointment: KB7BC/8 as OTS. OBS reports from KB8BS WB8DJS AF8V. OO reports: K8JH W8QG K8RCT. New club officers for the Midland Amateur Radio Club: W8WOJ, pres.; WD8OMV, vice pres.; W8UOI, secy.; WD8OML, treas. I am sorry to report the following Silent Keys in our section: W8ELR W8VE W8SQP W8UG. Traffic: AF8V 392, W8VPW 378, WD8KZX 349, WB8MTD 278, WD8LRT 260, K8KMQ 248, W8PDP 186, WA8DHB 180, WB8YRY 174, WA8PIM 169, K8RCT 160, K8RV 147, WA8QAF 146, N8BIK 142, WB8YDZ 141, N8ABA 140, WD8NKA 128, K8DTG 122, W8MPD 107, W8CUP 99, WB8ZIY 99, WB8SYA 96, W8YIO 92, WD8IXZ 89, WD8IEB 83, WD8LSV 83, N8AJV 77, WR8AOX 72, WA8TAQ 71, K8LNE 70, WD8MJB 68, KB8GC 57, W8IHX 51, WB8POL 49, KB2JU 49, WD8JQL 48, W8NOH 48, KA8GMJ 46, K8GXV 45, WB8YIG 45, WD8EGQ 43, W8VIZ 43, KA8CPS 41, WB8ITT 39, KB8MX 38, K8UPE 38, WA8WZF 38, WB8ZNS 37, N8ACL 36, W8WOJ 35, W3GOJ/8 31, WB8UZM 30, W8HIN 27, K8OCP 20, KB8AI 16, AC8F 16, K8JED 15, WB8DJS 14, WB8VVF 14, K8DYI 12, W8UM 12, W8SOP 12, KB8EQ 11, WA8FXR 11, WA8GTG 11, W8SGW 11, W8JUP 10, W8LDS 10, W8QFO 9, K8CIP 6, WB8AFO 4, W8WVL 4, W8LOU 3, W8QG 3, KB8BS 2, W8HKL 1.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: AF8O W8TP. SEC: K8AN. NMs AF8A K8AAZ WD8KBW WB8KWD WB8OMQ WB8YGW. Net reports.

Net	QNI	QTC	Sess.	Time(Local)	Freq.
BN	523	315	66	6:45/10 P.M.	3.577
BNR	155	50	34	6 P.M.	3.605
ONN	67	28	27	6:30 P.M.	3.708
OSN	242	147	31	6:10 P.M.	3.577
OSSBN	2890	1283	88	10:30AM/4:15 & 6:45 P.M.	3.9725
06mN	353	77	31	9 P.M.	50.160

NCS - Net Control Station - should be the backbone and controlling factor of any net. It's very apparent from listening to certain nets recently that in many cases the NCS is just a figurehead; he is now CONTROLLING the net. He permits stations to talk-over other stations or permits obvious traffic handling errors to continue without making corrections. NCS should know what stations have checked into the net; having sent stations off frequently to conduct net business NCS should know where they are, or at least realize that they are not on net frequency. NCS should know the geography of the area served by the net & should know what stations can handle what traffic. A few of the things he must have on hand to assist him in performing his duties are: a map covering the area of the net's responsibility; a standard reference guide including zip codes of the area served; a roster of the net and plenty of paper and sharp pencils plus a knowledge of the National Traffic System. If you are a major section net NCS, utilize your NTS liaison stations first to pass traffic outside of the section. Be aware of what is going on and be prepared for anything at any time. Stations acting as liaison to the higher echelon nets should take ALL of the traffic they have been given to that net. Likewise, stations acting as liaison from higher nets to a lower net should take ALL of the traffic to that net. For example, if you're acting as D8RN receive on a session of DEAN, take all of the traffic received to D8RN including Ohio traffic (unless of course you can deliver it directly). Otherwise there would be no reason to send an Ohio receive station to D8RN. This is true of all NTS operations. It has come to my attention that it's not always being done. Appointments: EC: WD8AYE Carroll/Stark, WD8NUP Ashtabula, K8WQE Clark; OO WA8RUO. Local net reports:

Net	QNI	QTC	Sess.
BRTN	513	266	37
CQARES	124	40	4
HCARC	47	1	4
TSRAC	657	223	34
VWCEN	36	3	4

Traffic: K8AAZ 638, K8NCV 466, W8PMJ 286, WB8KWD 279, WA8GMT 268, WB8OMQ 234, K8AN 224, WB8WTS 212, K8FE 203, N8CW 194, WB8MEK 145, W8GGX 139, W8MOK 135, W8FU 132, WB8JGW 121, WB8SIQ 118, WD8LPP 116, K8DL 112, WD8KBW 112, WA8HGH 103, WB8UBR 95, WD8KFN 93, W8UPD 92, K8YUW 92, W8QZK 89, K8OZ 86, WA8TSX 82, WD8QAC 74, WB8TAK 72, WD8PMW 69, W8QEM 68, WB8DLP 66, K8CKY 60, W8TP 60, WB8QHU 59, WA8SSI 57, N8AUH 56, W8WEG 56, WD8OYO 55, WD8MKC 48, WD8OYK 48, WD8QZM 48, W8TH 44, N8VT 43, WB8HMI 42, W8LZE 42, WB8YTQ 40, N8AKS 39, WB8YGW 39, WB8SRC 38, AF8A 35, N8JR 32, WD8INK 30, WB8NHV 28, KA8DJZ 26, WD8JTT 26, WB8PIY 26, K3RC 25, WD8DIP 23, WB8PTX 20, WB8YTD 20, KB8KV 19, K8KWO 19, W8RG 19, N4VY 19, WD8PUH

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144-148 MHz FM Synthesized Hand-Held. Four memories plus offset, Auto Scan, Keyboard entry, 3 watts output, automatic battery saver, LED display, BNC Antenna Connector, condensor mike, and MUCH MORE!
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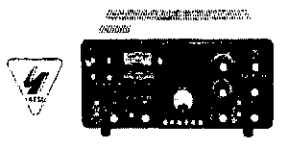

YAESU FT-101ZD High performance HF Transceiver
Covers 160 thru 10 meters plus WWV, modes LSB, USB and CW, built-in power supply, input power 180 WDC, digital and analog frequency readout, 6146 final tubes, RF speech processor, variable IF bandwidth (300 Hz to 2.4 kHz), noise blanker, VOX, sidetuner 10 db or 20 db, 100-234V operation, TX/RX freq. offset
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With 800 PLL channels, automatic scan over entire 2m band, 4 memories, toneburst, 25W HI/3W Lo, 13.8 VDC at 8A continuous. Freq. coverage: 144-146 MHz. Comes with a key-board mic that allows remote input of memory or dial freqs., up/down scanning, aux. repeater selection to 4 MHz, 2 tone input for autopatch.
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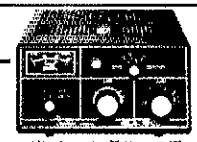
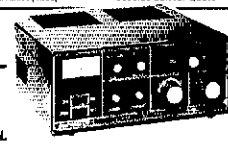


DenTron
Dentron GLA-1000 LINEAR AMPLIFIER
Freq. 80 to 15 meters, covers most Ham frequencies, RF drive max 125, power consumption 117 VAC 50/60 Hz 12.5 Amps, factory tuned at 15 Amps 234 VAC 50/60 Hz 7 Amps, DC input 1 KW CW and 1200W PEP SSB, final tubes 4 8-50A tubes (81.06)
$379.50 *Call for Quote*



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Solid State synthesized HF transceiver
Covers 160 thru 10 meters, reception from 0.5-30 continuous, 0-30 MHz with optional XTA-7, modes USB, LSB, CW, RTTY, AM, true passband tuning, RIT, built-in RF wattmeter/SWR bridge, SSB 250 watts PEP, CW 250 watts, AM 80 watts. Power supply required for AC operation. PS-7 120/240V power supply available
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TEN-TEC
Omni D
HF Transceiver
Totally solid state, 200W all bands. Covers 160 thru 10 meters, digital readout, built in VOX and PTT, adjustable squelch, 4 position CW/SSB filter, 8 pole crystal SSB filter, 2 range offset tuning, crystal calibrator, zero beat switch, SWR bridge and more. 12 VDC for mobile use, external power supply needed for fixed use
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CDE-44 Rotor $95

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FS-2 Field Strength Meter $16.50
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TH2MK3	2-Element Triband Beam	$109
TH3JR	3-Element Triband Beam	$119
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155BA	5-Element 15-mtr "Long John"	$145
105BA	5-Element 10-mtr "Long John"	$94
203BA	3-Element 20-mtr beam	$99
204BA	4-Element 20-mtr beam	$175
204MK5	204BA to 205BA kit	$79
153BA	3-Element 15-mtr beam	$64
103BA	3-Element 10-mtr beam	$54
402BA	2-Element 40-mtr beam	$175
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18V	80-10 mtr vertical	$26
18AVT/WB	80-10 mtr trap vertical	$75
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RG-213/u MIL SPEC RG-8/u replacement	$0.29 ft
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A617B	New 6-element 6-mtr Long Boom	$150
A50-5	5-element 6-mtr beam	$53
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ATB34	4-Element triband beam	$209
20-3CD	New 3-element 20-mtr beam	$135
20-4CD	New 4-element 20-mtr beam	$225
15-3CD	New 3-element 15-mtr beam	$77
15-4CD	New 4-element 15-mtr beam	$89
10-3CD	New 3-element 10-mtr beam	$55
10-4CD	New 4-element 10-mtr beam	$67
ATV4	40-10 mtr vertical	$78
ATV5	80-10 mtr vertical	$85
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A147-11	11-Element 147-148 MHz beam	$30
A147-22	22-Element 'Power-Pack'	$90
A144-10T	10-Element 2-mtr Twist	$37
A144-20T	20-Element 2-mtr Twist	$53
A220-11	11-element 220-MHz beam	$30
A432-11	11-element 432-MHz beam	$28
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1/4 TH Thimble (fits all sizes)	$0.25
3/8 EE (3/8" Eye and eye turnbuckle)	$5.50
3/8 EJ (3/8" Eye and jaw turnbuckle)	$6.00
1/2 EE (1/2" Eye and eye turnbuckle)	$7.50
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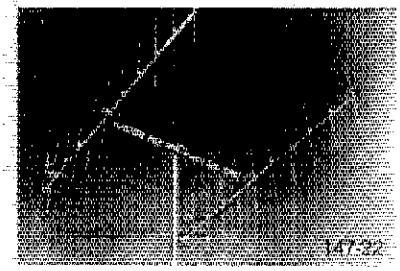

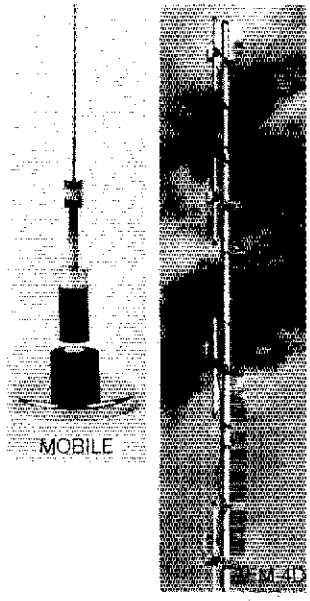

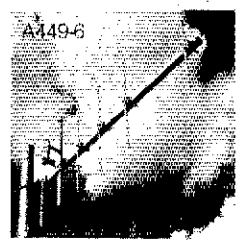

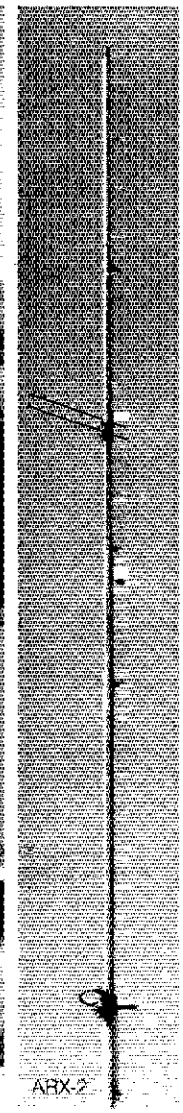

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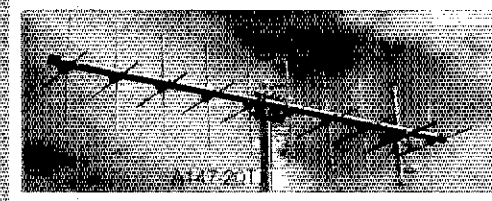

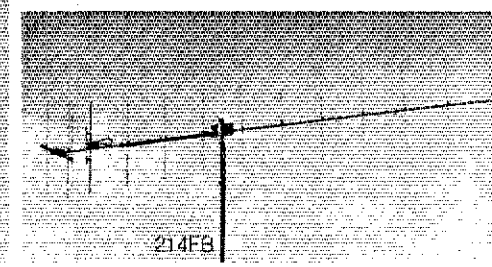

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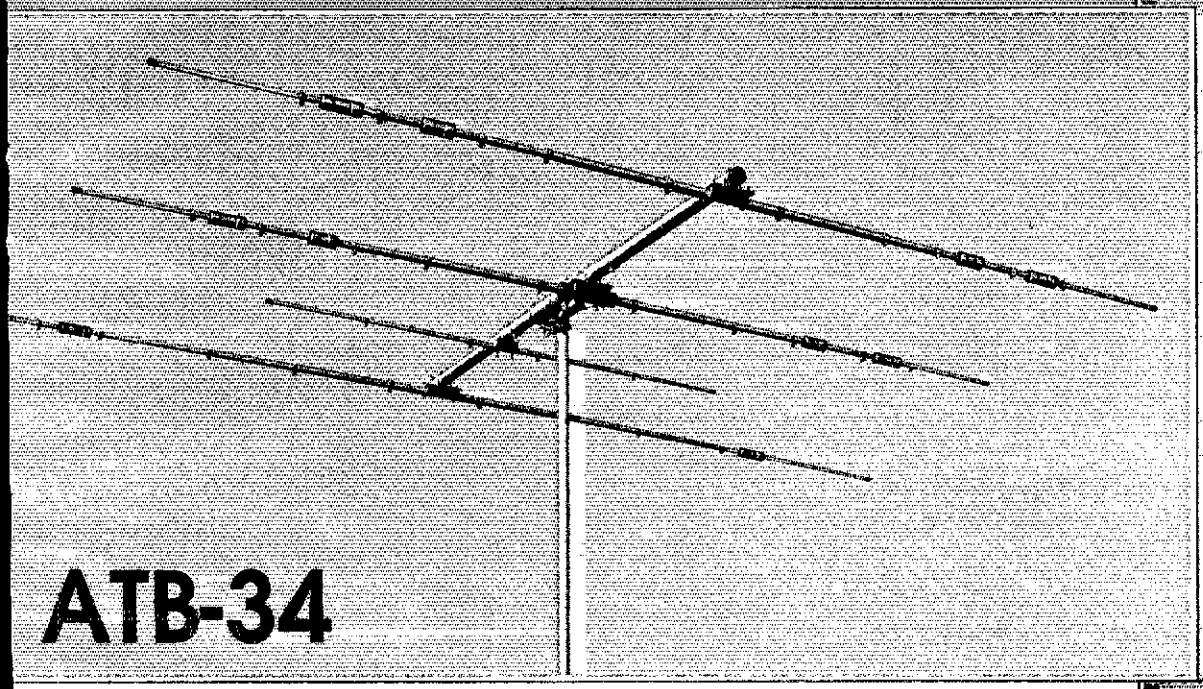

ATB-34

Punch through the pile-ups with an ATB-34, the only three band beam to give you real full size performance. We invite a full comparison and ask you to check ATB-34 element lengths, check the trap design and construction. Check the spacing and the specially developed balun. All of these features add up to the no compromise performance that you expect from Cushcraft.

SPECIFICATIONS

Gain	*
F/B Ratio Avg.	*
3dB Beam Width	62°
Nominal Impedance	50 ohms
Power Handling	2000 Watts PEP
Boom Length	18'
Longest Element	32'8"
Turning Radius	18'9"
Wind Area	5.4 Ft.^{2}
Weight	42 lbs.
Maximum Mast O.D.	2.25"

*Antenna gain specifications cannot be published in QST. For complete information on all Cushcraft antennas, see your dealer or write for a free A-9 catalog.

ATV-5

Cushcraft vertical antennas are designed to meet the exacting demands of your amateur radio station. They give top performance in easy to use packages. They can be installed at ground level or roof top.

Durability is guaranteed with double wall seamless aluminum base sections and fiberglass high Q traps. If you are interested in local contacts or long path DX communications, a Cushcraft vertical antenna is your best choice.

ATV-3	ATV-4	ATV-5
10-15-20 Meters	10-15-20-40 Meters	10-15-20-40-80 Meters
Height 13'7" (4.2m.)*	Height 19'2" (5.9m.)*	Height 24'9" (7.4m.)*

ALL MODELS
Power Handling 2000 Watts, Nominal Impedance 50 ohms, Maximum Mast Size 1¾" O.D. Termination: accepts PL-259

*Nominal height when set for phone operation.

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17, WB8CJU 16, KB8LQ 16, AB8P 15, K8GYX 14, KA8EZB 14, K8IDA 14, W8BHL 13, WB8YUS 13, WB8MZZ 11, WA8MAZ 10, WB8MRL 10, WB8VZX 10, KA8EHA 9, W8EMK 8, WB8FWF 8, W8IM 8, WB8OHV 8, WD8OMP 7, K8BNL 6, W8KN 5, WB8WNH 5, WD8OEZ 4, WD8OPO 4, WA8UET 4, WB8YJM 4, WB8NTR 3, N8BKH 2, WD8DTG 2, K8JA 2, WB8KKU 2, W8XT 2, WB8KKI 1, WD8OTO 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCM: WB2VUK WB2COY W2IT WB2KDC. NM: W2CS W2WSS KB2JG WB2OOH WB2ZCM WB2EAG. Nets: NYPON 5 P.M. 3913; ESS (slow) 6 P.M. 3590; NYSPTEN 6 P.M. 3925; NYS 7 & 10 P.M. 3677; CDN (Troy) 6:30 P.M. 34/94; HVN (Beacon) 7:30 P.M. M-F 37/97; SDN (White Plains) 9:30 P.M. S/T/T 66/06 M/W/F 615/015. Welcome to new EC, WB2CEP, for Warren, Washington and Saratoga Counties. Note W2CRS back on the air in Schenectady. SARA got an earful about international commercial radio at the Olympics. AD2X reports a college chess net held 1 P.M. EST Sundays 7205 kHz. K2ZWI, U. of Roch., is NCS. Sorry to note the discontinuance of NETN. Mgr. WB2EAG reports QNI down to zilch & unable to drum it up. Thanks for the ole college try. The first ENY Preparedness Duel is now history. Scores not ready at this writing. Some small counties made some big showings. Also some counties had clean sweeps. Amazed at number of different calls on the air, and the late nite scramble to find the missing messages. All local & section nets were used plus vars. freq. on 75, 80, 6 & 2-mtrs. Putnam cleared last msg at 2 minutes before Pumpkin. Hats off to W2IT for msgs, rules, etc, etc, etc. When do we do it again? PSHR: WB2MCO WA2SPL WB2EAG WA2EQW N2BDW W2YJR. Traffic: WA2SPL 978, WB2EAG 380, WB2MCO 144, W2CS 141, WA2EQW 124, W2BIW 81, W2YJR 73, AD2X 71, AA2Y 56, WA2CJY 36, K2HNW 35, W2IQK 20, WB2SON 18, N2EF 11.

NEW YORK — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Steve Bloom WB2IDP. NMs: WB2HIQ WB2EUF KA2CNN. STM: WB2BNY. The following are nets in and around the section. Why not join one.

Net	Time/Day	Freq.	Mgr.
NLI*	1900 Dy	3710	WB2EUF
NLI*	2200 Dy	3630	WB2EUF
NSPN*	1815 Dy	3928	WB2HIQ
BAVTN*	2030 M-F	147.315	KA2CNN
Clearinghouse	1100 Dy	3925	WB2EAG
MikeFarad	1300 M-S	3925	WA1LAD
NYSTPTEN	1800 Dy	3925	W2GLH
ESS	1800 Dy	3590	W2WSS

Nets denoted with an asterisk are NTS section nets. All times are local. BAVTN manager KA2CNN now getting active on the ht phone and cw nets. He made BPL in his first full month of operating as a General class licensee. N2BKK now serving as liaison between BAVTN and 2RN. PSHR this month to WA2MEE KA2CNN KA2DBW WB2HIQ WB2IDP and WA2UWA. Congratulations to following upgrades: KA2CEK N2ABD N2BAE to Advanced; KA2CNN and N2BKK to General. Lots of SET acitvity this year. Especially interesting was the surprise SET activity this year. Especially interesting was the surprise SET held by Brookhaven ARES. Might be something for our ECs to think about for next year. EC reports received this month from WA2SUB and WB2LOU. Crack OO N2NT observed contest propogation from a mountaintop in Puerto Rico. Congratulations on the new Novice license of KA2GXP. Congratulations to W2QUT and WB2SGA on being nominated respectively as vice president and treasurer of the Hall of Science radio club. This club had K2SJO give a talk on WARC at their October meeting and had W2TDQ give a talk on his DXpedition to Greece at their November meeting. The following participated in providing communications for the MS bikeathon at Hekscher Park: N2BHB KA2CAH WA2BGE W1TNP K2BSY WA2JYD with WA2QBB as net control. Babylon EC, WA2SUB, reports that he has completed an agreement with radio station WGLI to provide operators during snow emergencies and power shortages. Lots of traffic during the holiday season. If you have the time, why not check into one of the traffic nets listed every month at the beginning of this column. Hope everybody in the section has a happy holiday season and a prosperous New Year. Traffic: KA2CNN 369, WA2UWA 180, K2LIE 155, WB2IDP 132, W2MLC 130, KA2DBW/T 119, WB2HIQ 108, WB2DCJ 40, WA2MEE/1 33, N2BKK 32, N2BGR/T 28, WB2RVA 16.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: K2VX WA2OPY W2PSU WB2RMI W2TCA W2UEZ and WA3YGZ/2.

Net	Freq.	Time/Days	Sess.	QNI	QSP
NJN	3695	7 P.M. Dy	31	598	284
NJN	3695	10 P.M. Dy	31	367	152
NJSN	3735	6:30 P.M. Dy	31	186	44
JNPN	3950	6:00 P.M. Dy	42*	647	474
NJVN	146.49/ 147.49	32	152	99	
UCEN	146.085/ 685 Dy		44	102	102
OBTTN	147/72/12 Dy		35	225	52
NJRTTY	147.51	Dy	31		

August I reported W2IXL in error — he's still very much alive! AF2L is to be congratulated for a job well done this past year as NM of NJN. AF2L sez thanks to all the NJN'ers who made his year as Mgr-NJN so much fun! KA2BBH new General. KA2CGS new Novice was OK3CEC for 20 years. W2CVW completed 30 years as a ham on 11/11/79 and worked U0Y. BARA club reports N2ATF to Advanced and WB2PNC to General. N2AL received her DXCC. WB2KPX awarded a Fellow RAC. K2EZ was in the CARTG RTTY contest and worked a VK3 on 10 and a JA1 on 15. K2ZSI has been under the weather and hopes to be back on NJN soon. SET was light with traffic both on NJPN and NJN. Guess the WX and long weekend put a dent in the activity. It is hoped that more stations can be on emergency power in future SETs. TCRA news: KA2BBH to General. The club has a new repeater. TCRA's 45th anniversary dinner will be held December 10. Election results: W2AMS, pres.; W2EUF, vice pres.; W2NEH, secy.; WA2VMH, treas.; WB2CFB W2CHA W2IHA W2OJ WA2WDJ, dir. AA2H organized radio communication for a Camporee held at several locations and a number of NNJ/SNJ members participated. K2WM is teaching a General class course. The Morris Radio Club Worked All New Jersey (21 counties) award certificate available. For information send s.a.s.e. to P.O. Box 53, Whippany, NJ 07981. WB2YJQ has achieved DXCC. Members of Par-Troy RACES WC2AEP active during mischief night and Halloween, assisting police in township patrol. W2TCA accepted

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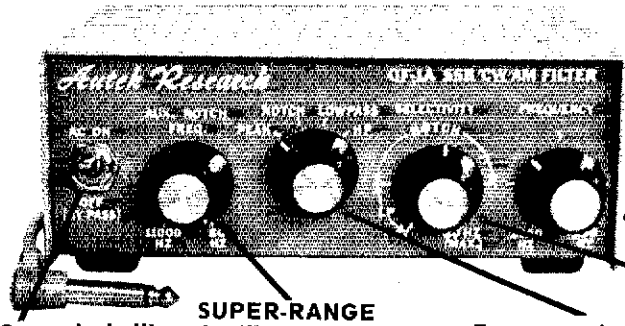

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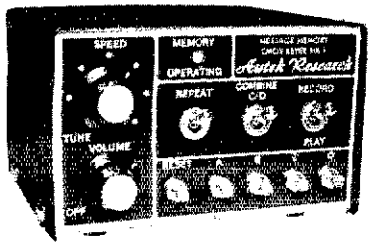

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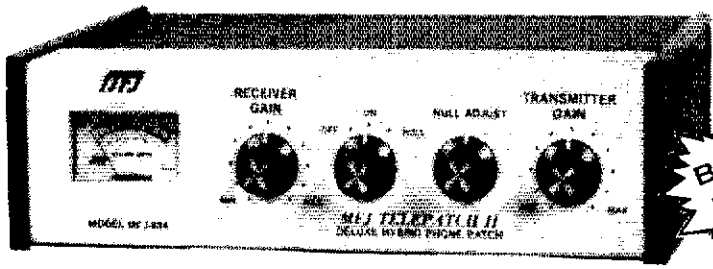

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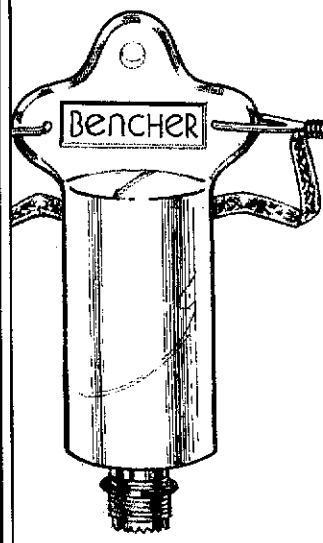

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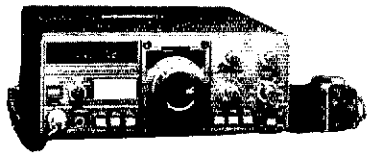

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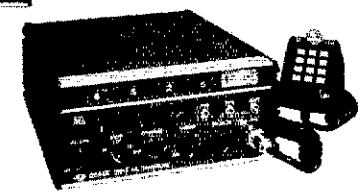

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call from WB2GJZ on WR2ANF who sought assistance in arranging a 20 meter phone patch for a badly burned Marine at the Burn Center San Antonio, TX. Quite a few 550 club members helped arrange the sked so the Marine could talk to his family in Newark. Traffic: (Oct) W2RQ 688, WB2TOM 622, W2UEZ 460, W2COB 293, K2VX 231, N2CR 202, WB2RMI 151, KB2HM 128, WA2OVE 122, WA2MVQ 111, W5DTR/2 53, WB2HSF 48, AF2L 47, WB2RMJ/T 47, W2XD 46, WB2AIU/T 44, W2ZEP 44, WB2KLF 23, W2UH 22, K2WM 22, WA7DPK 16, KA2IKX/N 11, W2CU 7, WA2DLZ 5, WA2QWR 5, W2CC 3. (Sept) W2RQ 418, W2XD 36. (July) N2NS 16.

MIDWEST DIVISION

IOWA: Max R. Otto, WØLFF — The Iowa Code Net, 3713, M-W-F, 7 P.M. CST invites check-ins. Cedar Valley Club can be very proud of their ARRL Midwest Convention. The KWM 380 won by WØDC. Eastern Iowa DX Assn. officers: KØJSY, pres.; WØWP, vice pres.; KØLUZ, secy/treas. WAØAUX gave IA 98 4% on DTRN, and WØSS WØYLS WDØGDL KØGP AEØR KØEVH WØFO WBØPYD WBØUPF and WBØSPY gave 100% on NTS-TEN. Congrats for upgrades to: KAØAAI KAØAHY Tech. KAØCAL WDØHMA KAØAMR WBØCAD KAØBED General. KAØEVW WA1MKE/ WBØJAX WDØCPD NØAQX Advanced. WBØZXU WDØGDL KØHGR Extra. KAØCHK upgraded to General and changed call to NØBHK. WØSH first to receive WØAUL "Outstanding Amateur Opr" award. Mt. Pleasant ARC new pres is WBØVHB and the repeater WØMME/R is now on 7.99/39. New Boone repeater soon on 7.90/30 and new at Des Moines on 6.61/01. WBØZKG had 6 QSs and a LU on 6m. The new Hamilton County ARC officers: WDØDNH, pres.; WAØPVC, vice pres.; WBØVLX, secy/treas. New gear dept: KAØRVT and KAØBED share new Cushcraft Tribander and tower. KØPCG IC701 and Robot 400. KØJVO TH3MK3. WØLRL GLA1000. WØSXK IC245. WBØVNK MLA-2500. Hurricane David traffic given an assist by WBØFBP WBØYUI WBØZPY and WBØOCD. NCS for SET on Tenth Region Net were WBØSND KØEVH KØSI AEØR. WØSS says traffic very light. Gypsum City Chapter of 10-10 has 127 members. Meets 0130 W-F on 28,840. WØANZ and KØPCG DXpedition to Podunk Center worked 451 stations in 49 states in 24 hours. WBØQCD has "Ab Master Scanner" Award and has 250 SSTV contacts on 10m, 30 DX countries. Happy New Year.

Net	Freq.	Time(Z) Days	QNI	QTC	Sess.
Iowa 75M	3970	1830 M-S	1145	39	27
Iowa 75M	3970	2330 M-S 0400	902	67	27
ILCN	3560	0030 Dy	356	159	27
Iowa Code	3713	0100 T-T-S	41	10	12

Traffic: (Oct) WAØAUX 685, WØSS 165, WØYLS 147, AEØR 69, WDØGDL 69, KØGP 61, WBØUPF 35, WØLFF 24, WBØNSS 15, WØBW 14, WBØHNB 12, KAØBYI 9, KØOFI 8, WBØAVW 5, WØSR 4. (Sept) WBØHNB 3.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØFT WDØESF WØOYH WAØSZG. Congratulations to WØOYH again. He received the A1-Operators Award this past month. New officers for the 1980 year for the Kansas Nebraska Amateur Radio Club, Concordia, are: WØUQD, pres.; WBØNEV, vice pres., WØDSY, secy.; WØWXY, treas., WØFDJ, program chmn.; WØUQD, hamfest chmn. Don't forget to send along your new club officers as soon as they are elected for the coming year. Net reports for October: KSBN QNI 823, QTC 12, there were 7 missing reports this month so the totals as shown are not for real. NCS please report your results to WØOYH as early as possible. QKS QNI 377, QTC 214; KPN QNI 241, QTC 22; CSTN QNI 1355, QTC 64; KWN QNI 753, QTC 387; QKS-SS QNI 143, QTC 87. ARES membership standing at 88. Are you on the list of public minded amateurs, service wise? If not see your EC or SEC. Traffic: WØOYH 277, WBØOBH 242, WØKL 233, KØBXF 172, WØFIR 189, KØEZ 156, WDØFBP 132, NØADL 97, WØFT 93, WDØACG 94, WØHI 90, WAØLBB 70, WØAM 59, WØCHJ 32, KØFPC 25, WØRT 19, WØRBO 18, WAØOWH 13, WØPB 13, WØHYC 12, KØKD 12, KØYTA 12, KØGZL 6, WØERO 4.

MISSOURI: SCM, L. G. Wilson, KØBWL — Asst. SCM: Joe Flowers, WØOTF. SEC: WBØFKY. Our deepest sympathy goes to the family and friends of WØBCD who joined the ranks of the Silent Keys.

Net	QNI	QTC	Net	QNI	QTC
NEMOE	111	12	MOSS8N	758	52

WAØYEF is now sporting a new call, AGØA, and a new 4-element yagi. WDØFZJ's new call is KAØE. The contest season is upon us once again and I'm glad to see so many stations on during CW Sweepstakes. I understand there were several stations who reported scores over 100K. Happy contesting and to everyone, best wishes for a happy holiday season. Congratulations to the following new licensees: Novice: KAØs FYI FYL FYM FYU FYY FZK FZL FZO FZY FZZ GBE GBK GBL GBN GBS GBX GBY GDC GCF GCG GCK GCR GDA. Tech: NØs BFG BFR BFT BFU BGL. KAØEXC General. WBØERO KAØGBK. Advanced: WAØVLT and WDØCFJ. Traffic: WØBMA 281, KØONK 207, WØOTF 149, KØSI 113, KAØE 52, WØHH 44, WAØKUH 11, KØRWL 5, WØVTF 5.

NEBRASKA: SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. Congratulations to the Svoboda family in Lincoln for their recent article in the Sun newspaper! The Svobodas are an all ham family: WØOFG WBØUTG KAØCCG KAØCGH and WBØUTC. The article was 2 columns and included their picture. A real boost to Amateur Radio! The Central ARC crew has been doing a lot of work on their repeater. By the time you read this it should be tuned up just fine. WØDLM hopes you will enjoy the machine this winter. Next time you hear KØODF in Chadron, ask about the pregnant repeater. It seems the WØFLO machine had been experiencing morning sickness. Twins? No, most likely weak tubes! Congrats WDØBQG in Scottsbluff, passed his Extra! To celebrate, KAØBCB bought the household a new transceiver. Nets: Morning Phone QNI 1234, QTC 39; Platte Valley 2-meter QNI 56; PM Net QNI 125, QTC 9; QCWA QNI 48; Western Nebr QNI 533, QTC 39; Nebr Storm QNI 925, QTC 27. Traffic: KØBRS 58, WØEUT 48, WØVYX 35, WØHOP 28, WØZNI 21, WAØPCC 20, WBØGWR 12, WAØDXY 9, WAØAHK 7, WØDJU 6, WØYFR 4, WAØLOY 3.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William J. Pace, W1ID — SEC: W1SY. STM: WB1AIU. NMs: WA1LOU K1EIC K1EIR WA1ELA WB1CEF.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	64	407	428
CPN	3965	1900 M-S 1000 Su	38	496	362
NUTMEG	28/88	2130 Dy	31	423	148
WESCON	78/18	2030 Dy	32	541	109

WB1FZX informs us the PVRA "New Fairfield" repeater is now in its new location in Newtown sporting a new 110 foot tower. Say a thank you to all who assisted him during WESCON participation in recent SET. W1BDN busy winterizing with wood cutting and insulation! WB1CPF has 14 elements on two! W1NJM off for Florida until April! K1WJL gave informative talk and slide show on Quads at the October CARA meeting. WB1BNU will be traveling to Arizona via Florida in their Air-Stream equipped with low band gear. WA1VOP says a hearty thank you to all the CARA members who made the erection of her new tower and beam possible. A scoop by the Tri-City feed back. Heath Co has been acquired by Zenith Radio. The November Squelch-Burst (SARA Stamford) runs an interesting item on the telephone co. language which is quite different from that which we are accustomed to. By the time this reaches print the new AREA (Amateur Radio Educational Assn) will have its newly assigned repeater frequency operating under full power. WA1ZMK faithfully keeping his early morning 7818 schedules with all the early risers! K1TGX and W1ID running neck and neck in their private DX contest with both showing about 250 countries confirmed! WB1DQP knocking them off on ten meters with his inside antenna system. N1ADE sporting a new KDK two-meter rig. WA1YKR getting antennas back into shape after Hurricane David. AF1W delighted with his new Clipperton linear. Traffic: WB1CPF 283, K1GF 225, W1HMJ 214, W1EFW 189, K1CE 161, WB2PJU/1 161, W1NJM 146, WA1UUA 129, K1XA 127, W1WP 124, W1DFT 112, KA1AWY 99, K1AQE 58, W1BDN 46, W1FCV 45, W1GVT 43, KA1BUJ 41, WB1FZX 39, WB1DQP 30, WB1EFJ 28, WA1LOU 26, K1EUW 20, W1QV 11, W1JTD 9, W1CUH 6, W1KV 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. STM: WA1IBY. QO report received from W1UI. OBS report received from WA1IFE. OVS rpt received from W1GXT. EC report received from W1XA.

Net	Freq	Time(loc)/Dy	QNI	QTC
EMRI	3.66	19/2300 Dy	503	345
EMRIPN	3.898	1730 Dy	420	339
EMRISS	3.715	1915 Dy	88	41
HHTN	04/64	2230 Dy	715	269
NEEPN	3.945	0830 Su	58	18
EM2MN	90/30	2000 MWF	119	37
EM2MN	145.8	2000 TTh		

The SET was held in Oct with many groups active and all the nets as well. Boston Red Cross was on both days on 2-meters and 75 meters. A message was sent to all Red Cross Chapters in the New England Division of ARS. Thanks to W1VSV of ARC and all those who operated from the Hq. Formal haison is being formulated. WB1EZT put Brockton Red Cross on and now they are buying ham gear. Burlington has a new EOC established largely due to EC K1FMM and c.d. Dir Whitman club member, K1BZD, directing play for a Childrens Theatre in Brockton. Quannapowitt Radio Assn members KA1DVQ, KA1DVP, KA1BBN, KA1CO and KA1BKR all have new licenses. Congrats. K1TK of Wellesley club running Novice class. Chelmsford club member, W1HH, has worked and confirmed all 351 countries. Billerica Club officers: WB1DFO, pres.; N1AAO, vice pres; WB1GEX secy., N1RR W4HMV, board mbrs. Sturdy Mem. Hosp. ARC special event station N1ACW successful during 18 hour event. Framingham club had DK9CF and SM0COP give talks on Amateur Radio in their countries. N1ACA reports that 19 amateurs helped with communications in Bedford providing help on Bedford Day. W1FJI reports the MA QSO Party results, highest number of QSOs, K1GSK 1483 and best club score from the Yankee Clipper Contest Club. W1BB, "Mr. 160", has put out a nice bulletin to kick off the DX season on 160. He reports that last year was so-so, but some DX was heard and worked, namely: A35DX JA1MUG VK9NI KH6 etc. Through the efforts of WA1VOZ, WQTV Ch 68 is showing segments on Amateur Radio on its Boston Live segment during the hours of 6 and 7 P.M. The channel is normally scrambled, but not during this hour. When your club gets a request for help from WA1VOZ please try to do your part in promoting Amateur Radio. WA1ZGK and XYL WB1ACA ran a message fair. Traffic (Oct.) WB1DXR 484, K1BA 480, WA1VAB 394, KA1CC 392, KA1BJY 246, WA1TBY 240, WA1EYT 157, K1BSO 156, W1PEX 128, KH6JNQ 119, W1FJI 116, WA1ZAZ 114, WB1ACA 99, W1ATX 90, WB1ANT 89, WB1FZT 88, WB1GEX 74, W1DMS 67, W1OMH 56, W1CE 49, WB7TPY 44, W1HL 42, WA9NEW 41, K1BZD 39, N1GW 34, WA1ZLQ 30, WA1IFE 24, WA1ZGK 24, WB1ABM 20, WA1FNM 20, KA1CGP 15, N1EF 13, K1UR 13, W1AOG 12, W1AEC 10, W1EGE 10, WB1ELU 8, K1PJ 8, W1ALP 4, W1LE 4 (Sept.) WA1EYY 245, KA1BJY 139, WB1ACA 87, WA1ZGK 54, W1EGE 29, W1CE 3, AF1Z 1.

MAINE: SCM, Ed Bristow, WA1MUX — New Appts: SEC & EC Androscoggin: WA4UJJ/1. EC Cumberland: K1MON. Other ECs/Ctv: K1ZIT/York WA1QIK/Franklin & Oxford N2KC/Washington W1HDC/Penobscot N1RP/Lincoln WB1BYR/Somerset WA1YNZ/Aroostook K1GDI/Sagadahoc K1OJN/Piscataquis W1JTH/Kennebec. Sess/QNI/QTC: SGN 27/1197/276, PTN 30/242/179; AEN 10/94/101. PSHR W1RWG WB1BYR AF1L. Communications at Farmington Olympics by W1HTG W1WYX K1YXO WA1JZP. AARC had successful Harvest Supper, WA4UJJ auctioneer. K1GXW brought quartet. K1TVT organizer. W1HYH & W1SRQ 50th ann., Best Wishes from All. Hope W1KX has his power supply fixed by now. Traffic: W1RWG 133, WA1YNZ 133, WB1BYR 118, W1HDC 115, AF1L 115, N1RP 100, W1KX 84, WA1JZP 74, WA4UJJ 68, N5YX 67, W1JTH 61, W1BJ 47, KA1BO 40, WB1GLH 36, W1BMX 35, WA1MUX 35, W1AHM 28, W1GTR 7, KA1DDJ 7.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: K1RSC. NMs: W1TN N1NH. New custodian of the Worked All New England (WANE) award is WA1WNM. KA1DQB is daughter of W1JB. Seen on the byways & byways: K1GQH W1LIM WB1FNO K1FG. The GSPN had 389 check-ins, 18b traffic. K1UOX WB1ALS & WB1FVL participated in the Boy Scout on the air Jamboree. WA1JTM back in HI as KH6IOU. It is sad to report W1AJE a Silent Key. W1MIV moved to Wakefield. The tentative date for the Nashua Clubs Amateur Radio display at the Nashua Mall will be Feb 8 & 9. N1NH sent out an excellent cw net newsletter and he is always ready for newcomers. How about you? New members of the Nashua Area Radio Club are N1ADJ N1APE WA1DEW WA1LTO. W1RCC has a new phone patch. K1OSM is handling traffic. W1HZN vacationed in Florida. Merry Christmas and Happy New Year to all. Traffic: (Oct) K1BCS 704, W1TN 269, W1GUX 265, N1NH 114, K1OSM 90, W1MHX 47, K1UOX 36, WB1DSW 34, W1CUE 17, WB1HFI 17, WA1SRU 14, WA1YAZ 10, WA1HGQ 8, WA1PEL 7, N1ALM 6. (Sept) W1TN 273.

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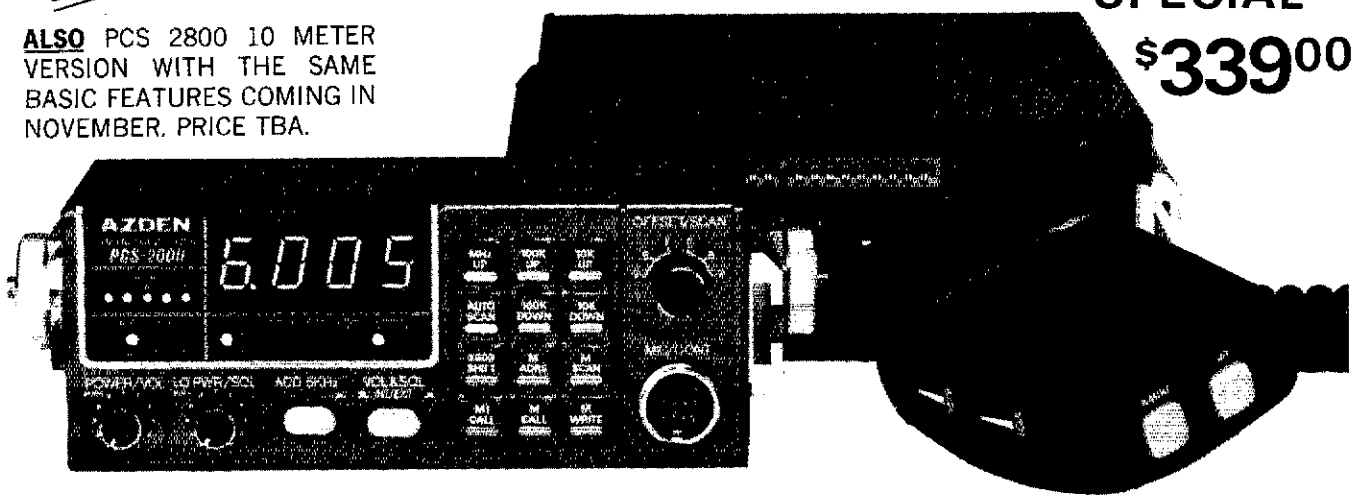

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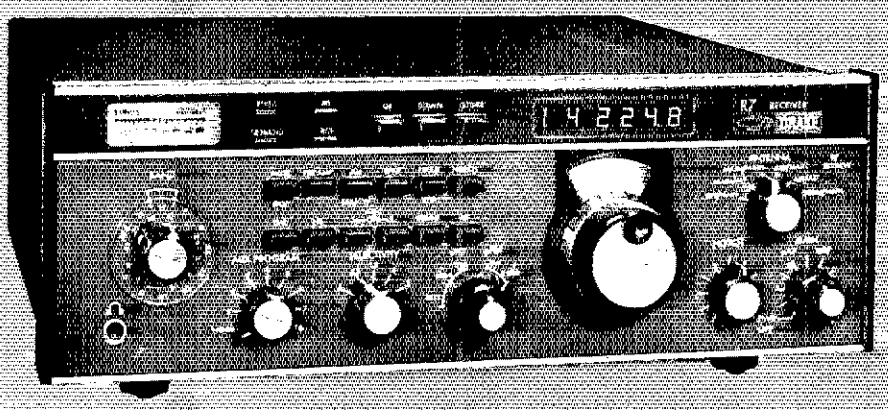

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Covers the complete range 0 to 30 MHz with no gaps in frequency coverage. Both digital and analog frequency readout.

Special front-end circuitry employing a high level double balanced mixer and 48 MHz "up-converted" 1st i-f for superior general coverage, image rejection and strong signal handling performance.

Complete front-end bandpass filters are included that operate from hf thru vlf. External vlf preselectors are not required.

10 dB pushbutton-controlled broadband preamp can be activated on all ranges above 1.5 MHz. Low noise design.

Various optional selectivity filters for cw, RTTY and a-m are switch-selected from the front panel. Ssb filter standard.

Special new low distortion "synchro-phase" a-m detector provides superior international shortwave broadcast reception. This new technique permits 3 kHz a-m sideband response with the use of a 4 kHz filter for better interference rejection.

Tunable i-f notch filter effectively reduces heterodyne interference from nearby stations.

The famous Drake full electronic passband tuning system is employed, permitting the passband position to be adjusted for any selectivity filter. This is a grea aid in interference rejection.

Three agc time constants plus "Off" are switch-selected from the front panel.

Complete transceive/separate functions when use with the Drake TR-7 transceiver are included, along with separate R-7 R.I.T. control.

Special multi-function antenna selector/50 ohm splitter is switch-selected from the front panel, and provides simultaneous dual receive with the TR-7. This makes possible the reception of two different frequencies at the same time. Main and alternate antennas and vhf/uhf converters may also be selecte with this switching network.

The digital readout of the R-7 may be used as a 150 MHz counter, and is switched from the front panel. Access thru rear panel connector.

The built-in power supply operates from 100, 120, 20 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.

The R-7 includes a built-in speaker, or an external Drake MS-7 speaker may be used.

Built-in 25 kHz calibrator for calibration of analog di

Low level audio output for tape recorder.

Up to eight crystal controlled fixed channels can be selected. (With Drake Aux-7 installed.)

Optional Drake NB-7A Noise Blanker available. Pro vides true impulse type noise blanking performance.

Optional accessories available

Model 1531 Drake MS-7 Speaker
Model 7021 Drake SL-300 Cw Filter, 300 Hz
Model 7022 Drake SL-500 Cw Filter, 500 Hz
Model 7023 Drake SL-1800 Ssb/RTTY Filter, 1800 Hz
Model 7024 Drake SL-6000 A-m Filter, 6.0 kHz
Model 7026 Drake SL-4000 A-m Filter, 4.0 kHz
Model 1532 Drake NB-7A Noise Blanker
Model 1536 Drake Aux-7 Range Program/Fixed-Frequency Board

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Frequency Coverage, continuous tuning (With Drake DR-7 Digital R/O, General Coverage Board)
0 to 30 MHz continuous (With or without Aux-7 board) (No gaps n frequency coverage)

Frequency Coverage, continuous tuning (Without DR-7 Board nstalled)

0.01 to 0.5 MHz 0.5 to 1.0 MHz 1.0 to 1.5 MHz 1.5 to 2.0 MHz 2.5 to 3.0 MHz 3.5 to 4.0 MHz	Without Aux-7 Board	5.0 to 5.5 MHz 7.0 to 7.5 MHz 14.0 to 14.5 MHz 21.0 to 21.5 MHz 28.5 to 29.0 MHz

Plus any eight additional 500 kHz segments between 0 and 30 MHz when programmed into Aux-7 Board.

Crystal Controlled Fixed Frequencies: Up to eight crystal-controlled fixed frequencies within the 0-30 MHz range with Aux-7 Accessory Board. Proper 500 kHz range for desired fixed frequency is also programmed into Aux-7.

Frequency Stability: Less than 100 Hz drift after temperature stabilization including ±10% line voltage variation.

Digital Readout Accuracy: (DR-7 installed) 15 PPM ± 100 Hz

Analog Dial Accuracy: Better than ±1 kHz when calibrated to nearest calibrator marker.

Modes of Operation: Ssb, cw, RTTY, SSTV, a-m.

Sensitivity (ssb): 1.8-30 MHz Less than .20μV for 10dB S+N/N with preamp on (typically .15μV) (Noise floor typically −134 dBm) Less than .50μV for 10 dB S+N/N without preamp (typically .30μV) (Noise floor typically −128dBm). .01-1.5MHz Less than 1.0μV for 10 dB S+N/N

Sensitivity (a-m): 1.8-30MHz Less than 1.2μV for 10dB S+N/N @ 30% modulation, preamp on. Less than 2.0μV for 10 dB S+N/N @ 30% modulation, preamp off. .01-1.5 MHz Less than 4.0μV for 10 dB S+N/N @ 30% modulation.

Selectivity (2.3 kHz filter supplied): 2.3 kHz at −6 dB, 4.2 kHz at −60 dB (1.8:1) shape factor. Optional 300 Hz, 500 Hz, 1800 Hz and 4 kHz filters are available as follows:

Ultimate Selectivity: Greater than 100 dB

Accessory Crystal Filters

SL-300 cw filter: 300 Hz @ 6 dB, 700 Hz @ 60 dB
SL-500 cw, RTTY Filter: 500 Hz @ 6 dB, 1100 Hz @ 60 dB
SL-1800 ssb/RTTY Filter: 1800 Hz @ 6 dB, 3600 Hz @ 60 dB
SL-4000 a-m Filter: 4 kHz @ 6 dB, 8 kHz @ 60 dB
SL-6000 a-m Filter: 6 kHz @ 6 dB, 12 kHz @ 60 dB

Strong Signal Handling

Two-tone dynamic range: 99 dB*	1.8-30 MHz
Third order intercept point: +20 dBm	preamp off
Two-tone dynamic range: 95 dB*	1.8-30 MHz
Third order intercept point: +10 dBm	preamp on

Blocking: >145 dB above noise floor

**(at tone spacings of 100 kHz and greater)*

I-f and Image Rejection: Greater than 80 dB (48.05 MHz 1st i-f) (5.645 MHz 2nd i-f) (50 kHz 3rd i-f)

Agc Performance; Less than 4 dB audio output variation for 100 dB input signal change above agc threshold. Agc threshold is typical .8μV with preamp off and .25μV with preamp on.

Attack time: 1 millisecond. Three selectable release times: Slow—2 seconds; Med—400 m sec; Fast—75 m sec. Also, "Off" position is provided.

Antenna Input Impedance: Nominal 50 ohms

Audio Output: 2.5 watts with less than 10% T.H.D. into nominal 4 ohm load.

Power Requirements: 100/120/200/240 V-ac ±10%, 50/60 Hz, 60 watts or 11.0 to 16.0 V-dc (13.8 V-dc nominal), 3 amps

External Counter Mode (DR-7 installed): Readout: to 100 Hz. Accuracy: 15 PPM ±100 Hz. Maximum input frequency: 150 MHz. Input level range: 50 mV to 2 V rms.

Dimensions/Weight:

Depth— 13.0 in (33.0 cm) excluding knobs and connectors.
Width— 13.6 in (34.6 cm)
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Weight— 18.4 lbs (8.34 kg)

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W1GUX 246, N1NH 107, WA1SRU 22, WB1HFI 21, WA1HOB 8.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SPC: K1DT. STM: N1RI. I am very pleased to announce two new Official Traffic Station appointments: KA1BTU and K1GOW. We need more — you can help! Welcome to A1IF (ex-WA2LIK), a new ham in our section. W1ZPG makes New Hampshire bicycle meet, must be feeling better. Officers for the new year at Fidelity ARC: WB1DFA, pres.; AA1T, vice pres.; AD1P, secy/treas. At Sub Sig ARC: AE1S, pres.; KA1BVJ, vice pres.; KA1DNQ, secy.; K1AHA, treas.; K1DFT, chief engineer. RIFM 2-mtr tfc Net: WA1CSO, mgr, sess. 25, QNI 320, tfc 86. The net ran two special sessions for the SET. New Novices in RI: KA1s DJI, DKF, DKH, DKI, DKJ, DKK, DKL, DKR, DKX, DLJ, DLL, DMV, DNA, DNB, DNO, DOB, DOI, DOP, DOO, DOY, DOZ, DQR, DRD, DRI, DRR, DUV, DUY, DVJ, DVW, DWT, DWW, DXD. Happy New Year! Traffic: W1EOF 107, N1RI 61, KA1BTU 26, WA1CSO 23, K1DT 19, AE1S 10, K1GOW 8, WA1VTZ 3.

VERMONT: SCM, Bob Scott, W1RNA — SPC: W1VSA. W1HRG suggests a calling freq. of 21.390 for those leaving the cold for warmer climates, wanting to bug the ones still in the cold. WB1CZC had high score ssb for YL in 1st District 1979 YLOM contest; also ran 4th in VT QSO Party. Other winners in VT QSO: WB2JSJ oping WB1CQR, WA1OVW, W1RNA and fifth WA1GYC. WA5OOB was 1st place out of state winner. 1980 VT QSO Party expected to be held Feb 23 & 24, more later. VE2BDM finally passed his amateur Advanced. He's in our nets more than some VTers! Carrier 27/522/38; GMN 27/514/51; VTSSB 29(?)/394/96, VTRFD 4/64/30; VTPN 4/55/5. No ham is required to accept or handle tfc. Once you accept, its your responsibility to move it with dispatch. Don't try to hatch it. Traffic: K1BQB 195, KA1FJ 48, W1RNA 10, KA1DLK 6.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB, STM: W1KK, NMs: WA1MJE, W1UD. Successful coverage of the Fitchburg/Leominster walkathon by W1BYH (NCS) KA1AGH N1AGO N1AJQ KA1COA WA1DWS WB1FCW WB1FXJ WA1GKV WA1GXN K1JHC WA1KYP K1QOG WA1QSN. SET activity in October less than in January. W1ZPB reports Northfield club again active. W1EFC now Advanced. SCM and many others enjoyed HCRA auction. Several complaints about the obnormally high parking fees at the NE Convention. W1KK putting up rhombic on 20 m. Tower and beam back up and in operation at W1WF. WA1VTA has new tower and tribander. Congrats to WB1HIH who is now Extra. Traffic (Oct): W1UD 217, W1TM 112, WB1AUV 82, WB1CGK 75, W1KK 65, K1JHC 45, WA1OPN 41, W1DWA 39, W1BVR 23, W1DOY 16, K1PUG 10, K1BE 9, W1ZPB 6. (Sept.) W1EFC 24.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — KL1IDJ visited W1-Land this month. Did not say if he visited ARRL or not. KL7AH says he is recovering in FB style. KL7SHM now in Kotzebue, reports he is back on the air. The stations there are planning on starting a club. Several stations in Nome participated in assisting FAA with flight info when regular communications failed. AKPN had 1395 ck ins with 23 sess. AKBN had 1143 ck ins with 31 sess. AKSN had 843 ck ins with 31 sess. KL7CUK toured the lower 48 this month and had eyeball QSO with many friends. With winter approaching, we should see increased activity on the bands. It is reported that the FCA plan for this section is working out very good. Traffic: KL7P 99, AL7O 80, KL7Q 35, KL7RF 31, KL7IPV 14, KL7CUK 6, KL7IYX 4.

IDAHO: SCM, Lem Allen, W7JMH — The October SET has come and gone. A sharp decline in participation and enthusiasm was noted, but in spite of this, many valuable lessons were learned about effective emergency communications in this area. Again VHF Repeaters took the brunt of the load. Kootenai Amateur Radio Society (KARS) had a booth at the fair. Nearly everyone helped. The cw station, ssb station, and teletype station helped greatly to create public interest in Ham Radio and in a forthcoming Novice class. Next big event is Xmas party Sat, Dec. 8 at the Happy Hour on Old Highway 10 to 6 P.M. Arrange with WB7WUB Rt. 1 Box 87, Rathdrum 83858 or call 772-5405. Pocatello Amateur Radio Club (PARC) hosted FCC men Jim Manson and Jerry Simons, who talked to the club and demonstrated the van and all its scopes and instruments - very interesting and informative. W7HAU and WA7JHO are new members, congrats! PARC Xmas party at Hong Kong Cuisine, 495 Yellowstone Ave, Fri, Dec. 7 at 7 P.M. Contact K7KVS, 4710 Chateau, Pocatello 83201. Net Reports:

Net	Freq	Time	Sess.	QNI	QTC
FARM	3935 ssb	7 P.M. Dy	31	1459	42
CD	3990 ssb	8:10 A.M. M-F	23	653	17
IMN	3635 cw	7:30 P.M. M-F	27	206	76
(V EMG	145.44 fm	9 P.M. Su	4	161	—

Traffic: W7GHT 346, W7JMH 94, K7JV 40, N7APC 38, W7HZL 11.

MONTANA: SCM, Robert Leo, W7LR — W7LBK checks into several nets, but most summer activity was 2-meters. W7IXD busy with traffic. Nice LYARC newsletter from Glendive/Sidney area. They are using the Glendive repeater for tfc. Usual fine newsletter "T-1" R" from Butte. Good story on Butte & Anaconda hams helping on a summer forest fire evacuation. Also story of ham help in Dillon following air crash there. And another story of their trip to Red Mountain to improve repeater. WB7UTJ, Sidney EC, held ARES mtg & has 5 asst. ECs: N7AFE & KB7AO run 2-mtr net MWF 5? 7 P.M.; MWF 16/76 7:15 P.M.; WB7UTJ 7240 kc net 10 A.M. MTTh. KA7AHA monitors Novice cw nets for QTC, got WAC. W7BQE handles 40 mtr mobile work. WB7UTJ keeps the above glued together and handles the 40 mtr net. KA1EA Bzn, new OVS. Gallatin ARC held last mtg in Livingston, with good turnout. IMN QTC 76, QNI 206, including SET activity. W7DB sends ARRL bulletins. WA7OBH sends in 00 report, intruder watch report, and reports 8 new DX countries, and only 1 zone needed for WAZ. Gt. Falls ARC newsletters info on DX by K7ABV, license plates by K7IUI, repeaters N6AGP, WB7TNH and others. Their Xmas party on Dec 21st at Bori's. New W7LR DX: 3C1, 3C0, S2, A61. N7ATT busy with TRS-80 computer for cw and RTTY. Traffic: (Oct) W7IXD 47, W7LBK 12, W7NEG 10, W7DB 4. (Sept) W7TGU 121.

OREGON: SCM, Dale T. Justice, K7WWR — Section nets.

Net	Time	Days	Freq	QNI	QTC	Sess.	Mgr.
OSARES	0115Z	Dy	3993.5	421	96	30	W7HLF
OSARES	0300Z	Dy	3993.5	265	7	30	W7HLF
BSN	0145Z	Dy	3908	599	34	30	WB7POU
OSN	0245Z	Dy	3585	137	86	31	WB7OFI

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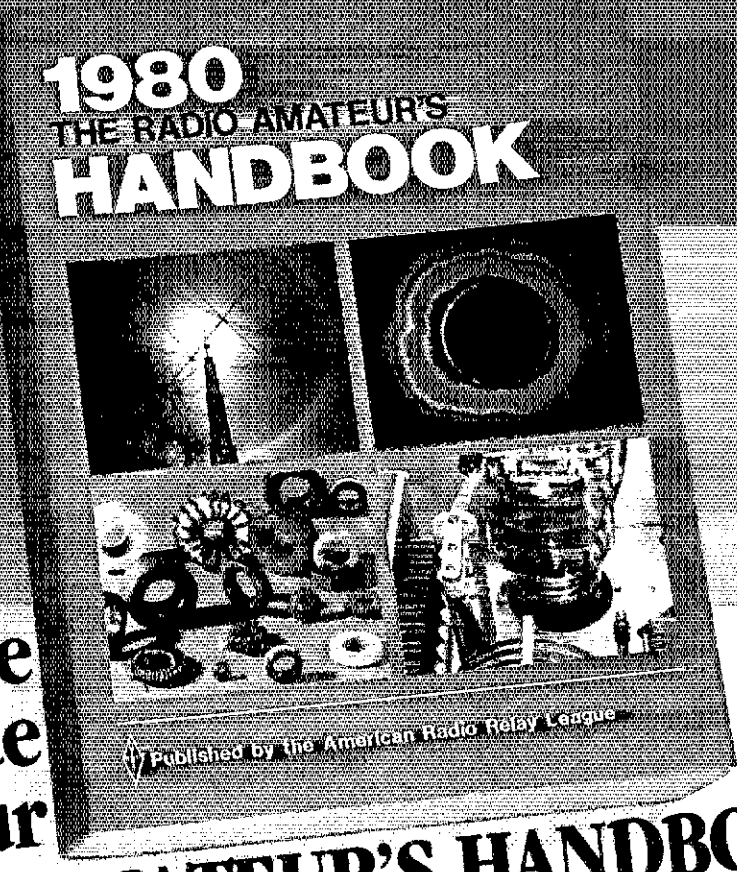

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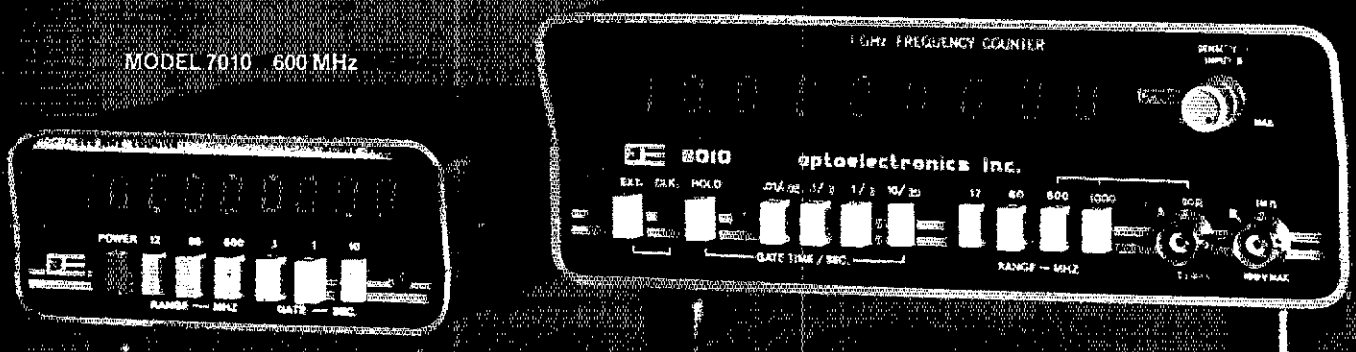

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8010 *8010.1	325.00 405.00	1 GHz	9	1-10 mV	5-20 mV	10-25 mV	1-10 mV	.01-20 SEC	.1 Hz	1 Hz	10 Hz 1 GHz	1 PPM 0.1 PPM	10 MHz	YES STD	YES OPTIO $39.

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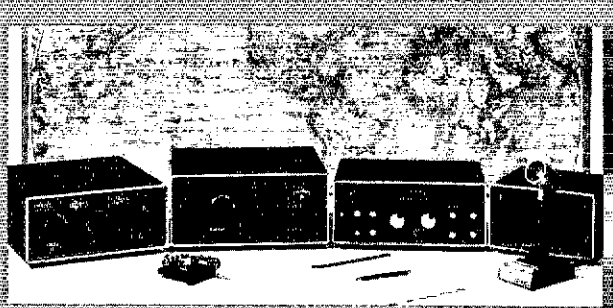

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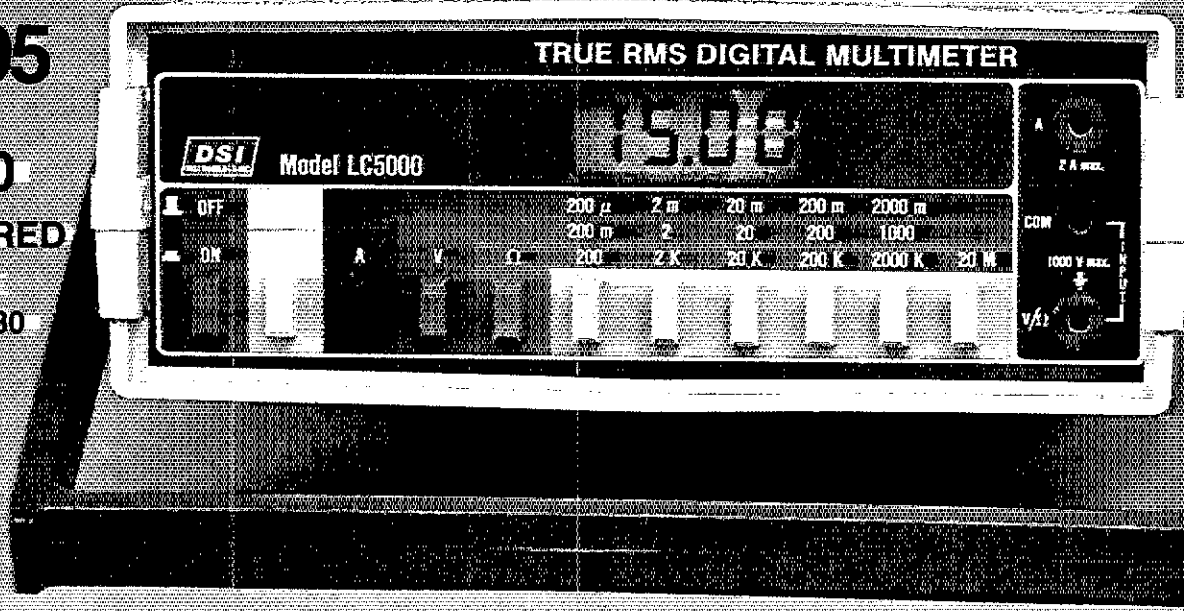

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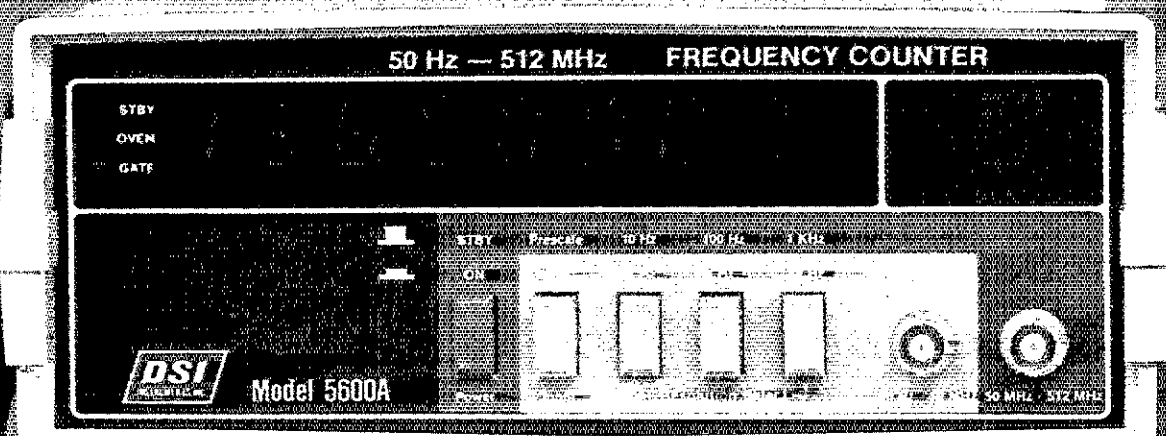

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5600A-W	$179.95								
5500 Wired	99.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	10-15MV	10-15MV	15-50MV	8	*115 VAC or 8.2-14.5 VDC	1½" x 5" x 5⅛"
500HH Wired	$149.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	25MV	20MV	75MV	8	*115 VAC or 8.2-14.5 VDC or NICAD PAK.	1" x 3½" x 5¾"

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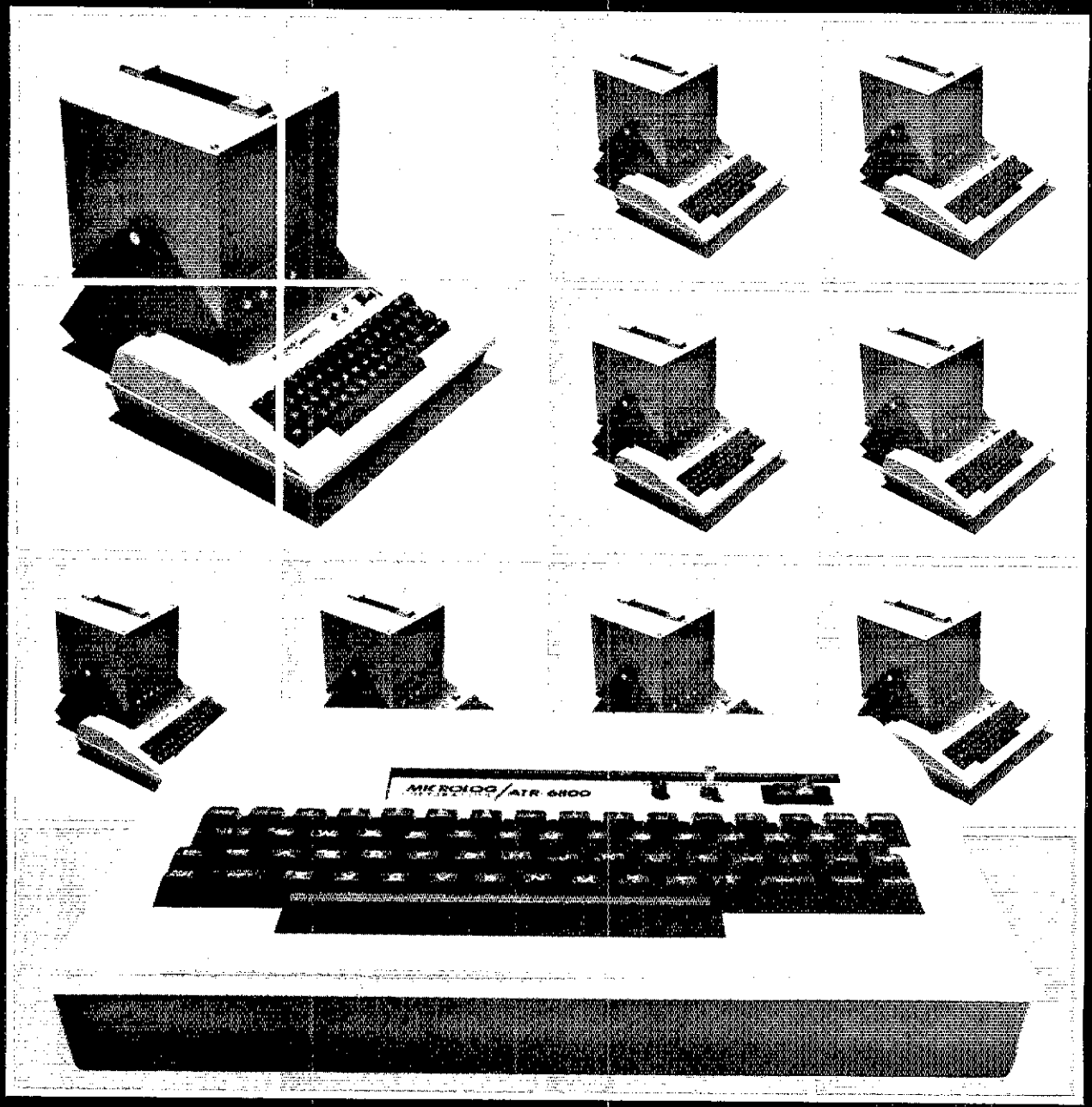

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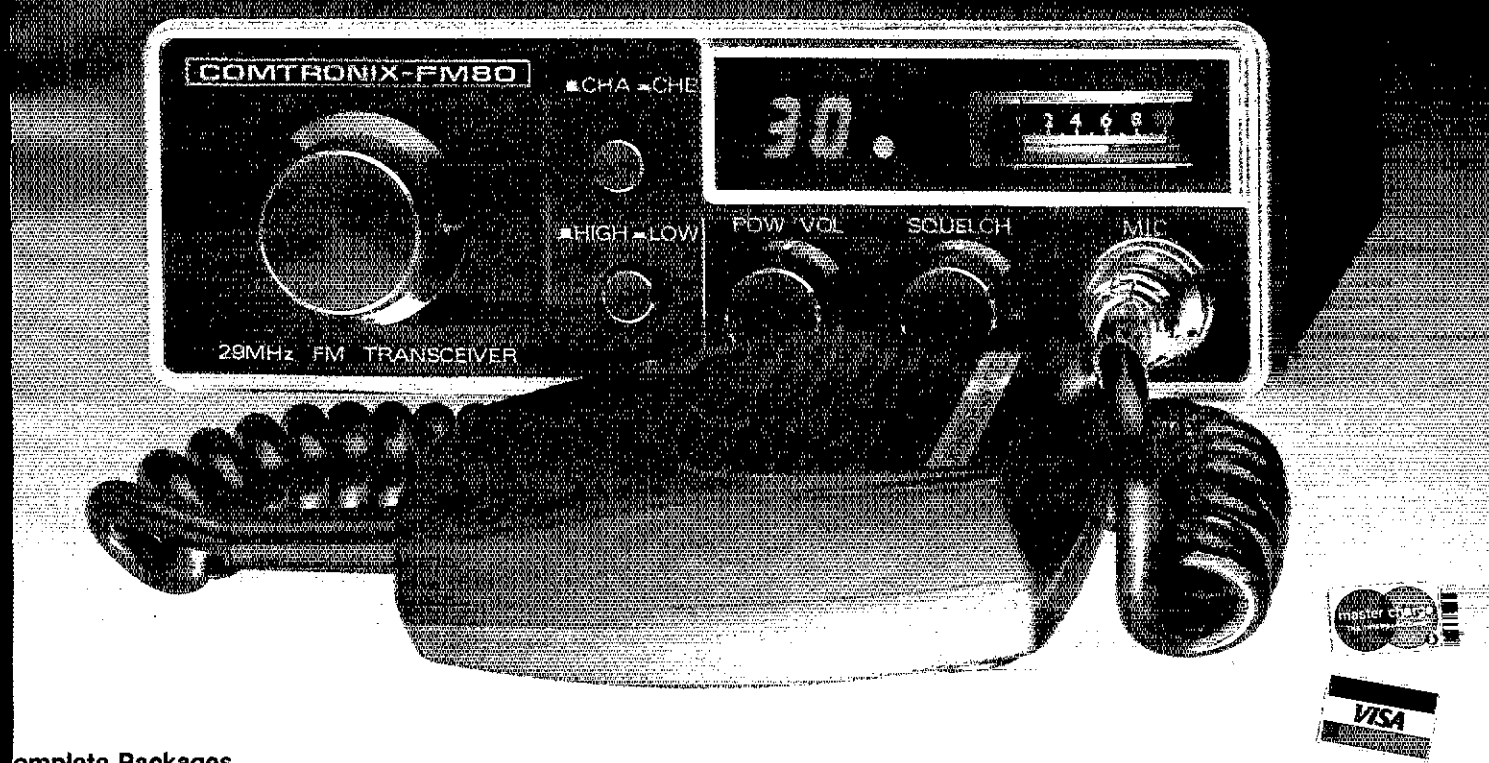

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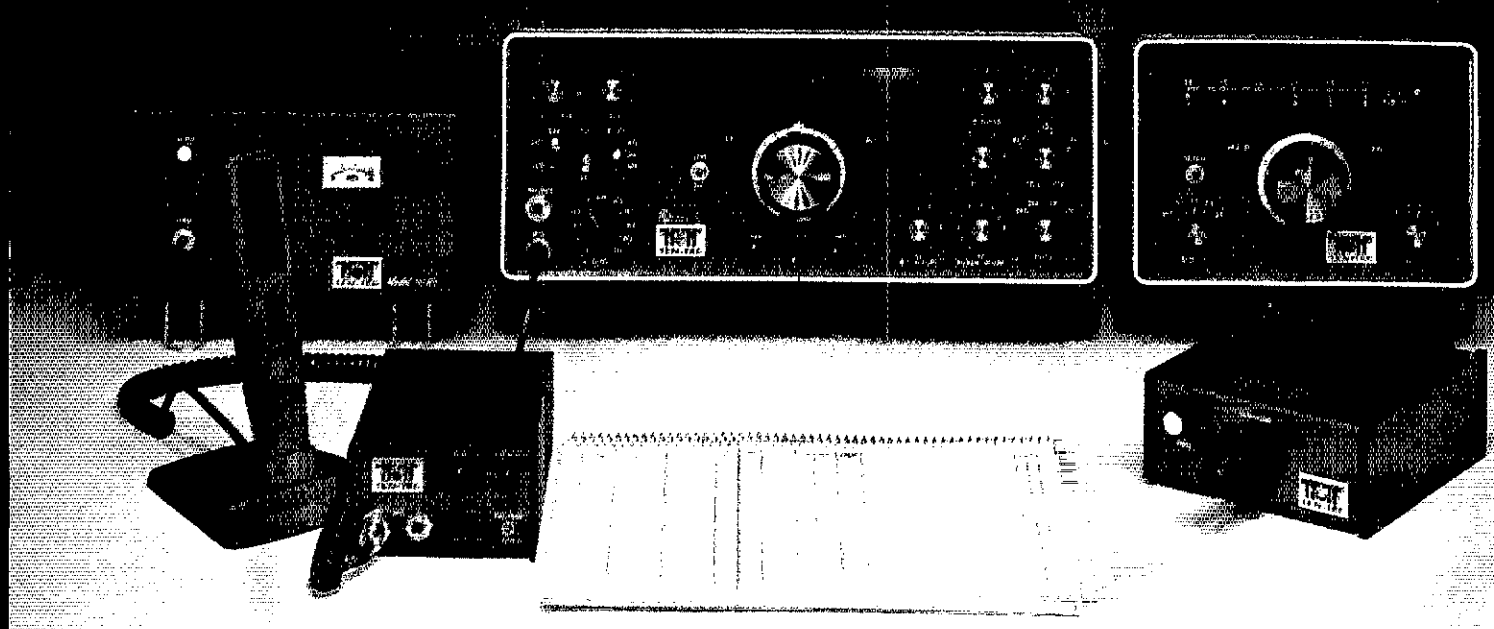

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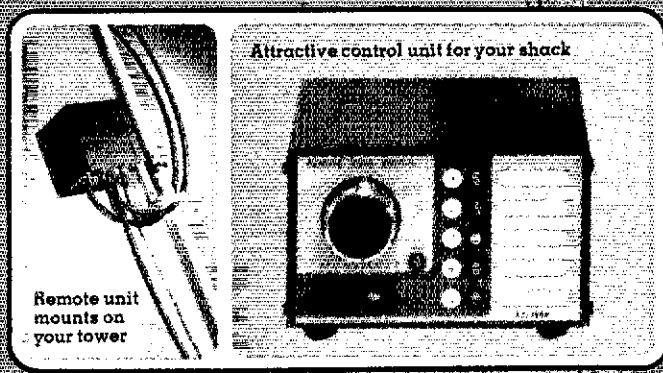

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K7DMM received a full page spread in the Cottage Grove newspaper with pix of his tower and station and a good description of Amateur Radio. The Grants Pass 04/64 repeater is now on Sexton Mt. and doing well in Southern Oregon. Jackson Co. had a SET with W7QMU NCS and many locals participating. W7IWN has a new Omni-D. W7LNE attended the QCWA dinner in Lebanon. WB7PHV spotted a small boat aground in the Columbia River and had K7GV relay info to the authorities for assistance. K7ZSK headed up communications for the annual Providence Hospital Fun-Run. Portland Amateur Radio Club will be meeting on Thursdays in the future due to changes at OMSI. WA7RWJ is new EARS pres. New 1676 net mgr. is K7LRB. New pres. of the Lane Co. ARA is N7AIB. The NW Shrine ARC sponsors the station at the Shrine Hospital in Portland. Traffic: WA7IHS 350, WB7OFI 178, W7MW 114, WB7OEX 110, K7QPW 49, K7WWR 35, W7LNE 31, W7HLF 21, W7IWN 20, W7LT 20, W7DAN 17, WB7OIJ 15.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX. SEC: WA7RWK. Nets reporting this month.

Net	Time(Z)	Freq.	QNI	QTC	Sess.	Mgr.
NTN	1930	3970	1470	69	31	W7PFD
WARTS	0200	3970	3087	278	31	W7EQY
NWSSBN	0230	3945	427	34	31	K7AJT
WSN	0245/0545	3590	579	350	64	K7GXZ
MPRTN	0130/0615	146.92	216	210	62	W7IEU

Many clubs will be holding elections soon, pse let me know who the new officers are. WB7FGC is working closely with Red Cross in the Spokane area. W7BCX/N7CT active on 2fm with Tempo and getting ready for a trip to California. WB7WOW is new OES/OTS. WA7EDQ has new 80 es 40 antenna. W7LUP has been reelected director of WCN. WB7QWC very busy with ARES activities and NCS on the .92 Rptr tfc net. Clallam Cty ARC has new GE Rptr to replace the tired one on the hill, a memorial fund has been set up in memory of WB7ERL who started the project before he became a SK. Other SKs are WA7NON and W7PVT. W7ERH and group of Snohomish Cty ops were all prepared to assist in road rally but north portion was cancelled due to fire danger. AI7P WB7UUT and KA7CRN have upgraded. WB7QJN sends bulletins on 147.500. KA7AWH recovering from a stay in the hospital. Clark Cty ARC provided such successful communications for Hydroplane races the committee has invited them back again next year. WA7HGB is now AJ7O and KB7BF is AJ7V, who's next? New officers for SnoKing Rptr group are: W7JPH, pres.; W7ERH, vice pres.; W7ADM, secy.; WB7UFR, treas.; W7KHO W7PGY W7RWU W7TOK K7TUQ, dir. WA7DCD received very complimentary letter from King Cty OES for use of 147.18 Everett Rptr during a recent S&R. W7GB, EC Grant Cty, and 4 of his ARES members provided communications for Mattawa 100 motorcycle race. 13 Snoco ARES and HAMS Club members again provided successful eyes and ears for Marysville PD on Halloween Punkin' Patrol. Mount Baker ARC held a successful auction at their October mtg. W7PMS has been elected secy for Whatcom Cty S&R Council and K7VNI as treas. WB7AEX is new editor of BEARS Bulletin. WA7YCM sends code practice on 146.52 at 9:30 local time. Traffic: (Oct) KL7JEB 806, W7DZX 721, WB7WOW 298, WB7OAS 289, K7GXZ 287, N7AJ 179, W7IEU 150, W7FJZ 138, WA7YCM 124, W7GB 78, W7LUP 74, WA7BDD 51, W7KZ 49, W7BUN 47, WB7CFH 40, WA7EDQ 36, WA7PHD 35, W7EBU 33, N7AFZ 22, KA7AWH 20, K7FR 18, W7LG 14, N7AFY 13, W7ZEV 13, WB7QWC 12, W7ERH 10, W7BCS 6, W7APS 5. (Sept) KA7AWH 11.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: K6UWR W6ZF VE2AQV/W6. SEC: K6UWR. PSHR: W6OA W6JXK. OOs K6ARE and N6OP finding lots of buzzing and chirping cw sigs on the air these days; when did you check your signal last? W6JXK filling in as mgr of RN6 while WA6UAZ is at sea. MDARC had Tom Vanstavern of the FCC Livermore Monitoring Station as their guest speaker and nominations for the 1980 officers took place. EBARC welcomes new members WB6MFE (ex VR3AO) and K6KQH; congrats to their member, WD6FWI, on his upgrade to Advanced Class. SBARA meeting featured a talk on Radio Direction Finding and Emergency Radio Locators by WD8ALX. Their new members are: KB6KU and WØVEZ. Not much in the way of reports being received from the vast army of section appointees, all of whom will have their current appointments expire 31 December 1979. As of now, very few will be renewed. Traffic: W6JXK 412, W6OA 245, WB6UZX 25.

NEVADA: SCM, Ralph E. Covington, W7SK. New EC for Northwest Nevada is WA7KCD, who takes over from K7WLY. WB7EIX recuperating from surgery at home. New officers for NARA for 1980 are: K7AZ, pres.; W7SRM vice pres.; WB7UJR, secy., K7QOP treas., W7XZ, trustee, K7OX W7SK W7DIK, directors. KA7AJJ has new tower and transceiver. K7QOP has new tempo S1. Nevada Sagebrush Net meets nightly at 0300Z (winter schedule) at 3893 kHz. SAROC in Las Vegas this month. Members please sent station activity reports. Traffic: N7AKX 231, W7BS 103.

PACIFIC: SCM, Pat Corrigan, KH6DD — STM: WØKON. SEC: KH6CKJ. Pac tfc net mgr, KH7ST. Congrats to all on a fine SET in Oct, especially to KH6JIC and his members in Guam and Marianas. Ex-SCM N7HR/KA2HR heard on Pac Inter-Island Net for those who would like QSO. FCC still making strange interpretations of rules and hampering amateur comm support for public events. Result is curtailing of Kauai ARC plans and KH6ILR's plan to lend amateur support to marathon, race and parade events. Strange they block ARS public service role. Great to have AH6AC back for visit from Long Beach. JA1KSO in for honeymoon visit and visited KH6GMP. Visitors from OE and ZS also. Haouli Makahiki Hou to all and best in 80.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: W6NJU. The Sacramento AREC with EC WA6LWP operated from the emergency station that has been set up at the Carmichael Elks Lodge. KA6AWX is the new EC for Yuba Co. WB6GFJ and N6CCS are now on the Board of Dirs. for the Yuba City Red Cross. GFJ is also the Disaster Committee Chairman. The Yuba-Sutter ARC is installing a low level repeater in the Sutter Co. Courthouse using 146.085/.685. Their new secy/treas. is KA6BIP. The El Dorado Co. ARC participated in the Sam's Town Marathon and the Nevada Co. ARC provided com-

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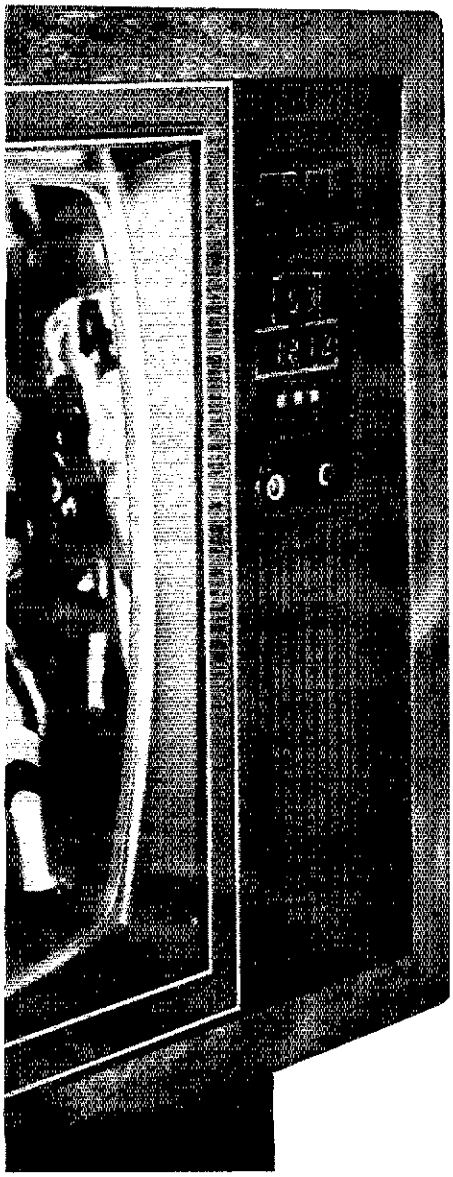

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munications for the "Ride for Life" cyclethon. The section was represented at the Division Directors meeting in Concord by W6GO K6HHD WB6CQF WB6PHR WB6PWT and N6JV. If your county has no EC, or you don't know who he is, contact the SEC. Traffic: W6SX 25, W6DEF 15, WB6GFJ 9, W6RSP 6.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. Thanks to N6KM for past services as SEC and good luck to new SEC, WB6ZRK. WB6TSA is new OO. FWRA active in March of Dimes bike-a-thon and Avenue of the Giants Marathon. MARC participated in SET and Marin County disaster drill. SFRC active in Greenpeace skate-a-thon, SET, Bridge-to-Bridge run and hidden transmitter hunt (won by WA6UHA). K6LRN and WB6TKD headed up communications for Golden Gate Cup Marathon. KA6IAR new Novice. Congrats to W6BIP for first place in NCDXC cw marathon. Bip now has new TS-180S, which was used in CQ WW DX phone contest, with assist from WA6DJI and WA6PYN. AA6GM reports clean sweep in cw Sweepstakes. N6SF operated WA7NIN in CQ WW DX phone contest. New SFRC officers: WA6DQP, pres.; WB6ZRK, vice pres.; W6BOW, secv.; WA6ODB, treas. Traffic: WA6OXV 2.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. New officers of the Stockton ARC: N6ZU, pres.; N6OZ, vice pres.; WA6OMC, secv.; K6RLG, treas. New officers of the Central Valley ARC: N6HB, pres.; W6UBA, 1st v.p.; KA6CZS, 2nd v.p.; W6BYH, secv/treas. The northern SJV 10-X group (Modesto) provided communications for the Turkey Tech Grand Prix. The Sierra ARC has a net Sun at 2000 local on 1.8150 MHz. N6BZW and KA6BTV made General. N6RZW has an IC 280. K6PBT N6OZ KA6GCA WB6NZI and WA6URV have TR 7625s. WB6ZCJ and WB6LCM have TR 7600s. N6BBO has new tower and beams. WA6OEC and W6MND have DXCC. W6ILH K6YK WA6CPP made WAZ. WA6MGG is KE6F. Many SJV stations working DX on 6 meters. NCN for October: NCN I QNI 280, QTC 268; NCN/VHF QNI 1158, QTC 297. The Fresno International DX Convention April 19-20 at the Airport Holiday Inn. The Fresno Hamfest May 9-11 at the Sheraton Inn. See you there. Traffic: N6AWH 267, W6DPD 32, N6AMA 28, WB6THY 27, WA6YAB 27, WA6JDB 5, WB6WYA 2.

SANTA CLARA VALLEY: SCM, Jettie Hil, W6RFF — SEC: WB6IZF, NM: W6RFF. I want to wish every one happy holidays and hope your new year will see great operating accomplishments, whatever your mode or band is. Thanks to all who have sent into during the past year! New members of the NPS ARC are WA6YEY W6FTW N6LW KA6HVO. DXCC was earned by WB6CAM WD6COR; WAS by WD6AZK, all of NPSARC. RFF discussed NTS traffic handling and emergency communications at the Memorex ARC and the San Mateo ARC, and attended Pac. Div. Directors meeting. Memorex ARC had a meeting for family members and others interested in ham radio. New officers for SPARK W6OZE, pres.; WA6SUW, vice pres.; W6THI, secv.; WA6LOU, treas. NCN Honor Roll includes W6BFH KA6ETB KA6FAZ W6GJZ WA6KRA W6KZJ WB6LT WA6NMQ K6OFP W6RFF W6YBV N6YE K6YKG. NCN preparing for the holiday traffic rush. Northern CA Net meets daily on 3630 kHz at 1900 & 2030 local time and 144.81/145.41 MHz at 1930. PAARA lists the following new members: W6UVP K6URO WA6YSO WB6WBK WA6SLF GI3OFN. WD6BGV upgraded to General. K6FS organizing communications for "Vetathon" as well as his EC duties. W6ASH was the subject of pictures and an article in the San Jose Mercury. LERA ARC new members are KA6CLC and N6CBW, also W6TWO WA6RRU WB6WLL KB6IH provided communications for the Pulgas Water Temple Run for sponsor Interplast. FARS Mount Tamalpais expedition was a great success, with operation on both phone and cw during the CA QSO Party. WB6JNN spoke on Linear Repeaters to SCCARC -they meet last Fri of the month. San Mateo RC meets third Fri of month. For that New Years resolution - attend the Pacific Division Convention in Santa Clara on August 29 to 31. To volunteer your help call WA6RXB. W6MMG and WB6HBL both chasing DX from same QTH. W6BJH has new 6 el on 20 mtr. WB6IZF has office in new QTH but not living there yet. W6YBV W6ZRJ and W6KZJ busy with traffic on NCN. W6AUC increasing traffic totals each month on 5 nets. (Traffic: (Oct) W6YBV 216, W6AUC 121, WB6IZF 100, W6RFF 87, W6ASH 61, W6KZJ 22, W6ZRJ 19. (Sept) WB6IZF 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — ASM: N4UE. SEC: K4CJZ. Good reports from both Asheville and Eastern NC Hamfests in October; thanks for clubs which sponsored the events. We welcome KF4R to NC, now active in CN. Will miss W4HVE who is moving to CA. Congrats to K4DHX for upgrading to Advanced, and to W4CH who is celebrating 50 yrs on the air and his 70th Birghday. Cabarrus ARS provided communications for 10,000 Meter Marathon in Concord. WA4LWO is new pres. of WCARS (Asheville) while WB4PLA is vp and WD4IJV is new Editor. WD4JJK is new OTS-II appointee and is a NCS on the Carolinas Novice Net (CNN) which meets daily on 3720 kHz at 6:15 P.M. local time. ECs are reminded to send in annual reports to Hq, and thanks to all who participated in SET. WA4GXD reports good participation in Rockingham Co. during SET as they practiced their notification plan. Likewise, KB4IZ reports active group in Guilford Co. during SET. WA0TPD/4 is now set up and active in CN. Want to get your code speed up? Well check into CN each evening on 3573 at 10 P.M. local time. This is a slow speed net and looks forward to all newcomers. Carolinas Morning Net (CMN) now operating at 8 A.M. on 3930 kHz. See you in the morning. Thanks to Alamance Co. ARC for sponsoring the NC QSO Party, and to all who participated. Traffic: (Oct) WD4CNO 282, WB4WII 184, AB4S 169, K4VHT 166, WD4EPO 166, WB4ZIQ 129, WB4MXG 126, W4EAT 114, KB4IZ 90, K4FTB 84, KF4R 83, WA4SRD 79, K4MC 73, N4ZH 73, W4FMN 63, WB4VVL 62, W4RVE 50, KK4M 48, W4PGN 45, WA4CUD 44, K4DHX 44, N4UE 37, WA4FSC 30, WD4JJK 27, WB4CES 26, W4ACY 25, WA4UYS 23, W4HKB 22, WA4IHG 21, WB4CYN 16, WD4CNR 15, WD4NAO 12, WB4TOP 9, WA0TPD/4 9, K4AI 4. (Sept) W4RVE 25, WA4OJU 8.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. SEC: WD4HBX. DECs: Zones 1 & 2 WB4TNS, Zone 3 WD4DOM, Zone 4 K4VIA, Zone 5 WD4EDM, Zone 6 K4EAR, Zone 7 WA4JYR, Zone 8 N4BCD. Congrats to all known upgrades KA4JMY WD4HGL. I wish to thank all hams for their splendid cooperation in all their efforts to make my job as SCM more pleasant. In the coming year, I ask for your cooperation as you have given me in the past. Check-

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ins/traffic: SCSSBN 1531/238; Anderson 2-m Net 477/22; CMN 384/132; CNN 272/76; Lancester County 2-m Net 224/16; CNe Sept./104, Oct./153; Western SC Emergency Net 126/5. Dillon County Emergency Net Sept. 24/0, Oct. 16/0. Traffic: K4ZN 330, WD4AWN 240, W4FMZ 164, W4NTO 137, W4ANK 123, W4DAW 112, W4OCX 57, KA4BGX 56, W4NQL 54, W4MTK 45, WB4UDK 45, WB4DRT 42, K4FRX 42, W4FVV 32, KA4AUR 31, WA4SJS 29, N4EE 22, KA4ASJ 21, N4BCD 17, WD4RUM 11, AF4E 11, WB4FEU 10, WB4JNE 10, WA4JWS 10, WD4EDM 9, K4VIA 8, WA4ABZ 7, WB8TCT/4 7, N4BXD 6, WA4VYS 3, W4DRF 2, WB4NBK 2, WD4DOL 1, W4LS 1.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. SEC: N4NK. STM: W4SOQ. Chief OO: W4HU. Chief OVS: WA4PGL.

Net	kHz	Time (PM)	Sess	QTC	QNI	Mgr.
VNTN	3907	Noon	31	286/269	335	N4LE
VSBN	3947	6/10-15	62	801/726	1399	W4JK
VSN	3680	6:30	30	128/112	271	WA4YIU
VN	3680	7/10	61	487/429	655	WB4FLT

It is with great sorrow that I report the death of W4ZM, on Nov. 1st. He was a great Ham and a great person who was loved and respected by all who knew him. WB4DBK is enjoying UVa. WA4LJI's Rockbridge ARES is working closely with local govt. officials. N4RF visited his home state of PA. Bravo to K4AXF who pulled his first 4RN stint. N4FM is teaching radio at the Shenandoah Valley ARC. KB4OF participated in a local walkathon. The Virginia Public Service Communications Foundation, Inc. is off and running in our fight against the NRAO Quiet-Zone. Many thanks to those who have already made a tax-exempt contribution to the Foundation and for those who haven't yet, N4NK is the secy-treas. The Lynchburg ARC participated in their 20th "Operation Halloween." WA4ISA and W4LXB are having rig trouble. KI4W and WA4UYD are off the air with downed ants. WB4ODZ's Hampton ARES group has a new net, the SPARK City of Hampton ARES/RACES net. WD4RDF participated in several marathons with his Norfolk ARES group. WB4LCK passed Advanced. N4DW received 5BDXCC, serial nr. 759. Following your unanimous vote, I am submitting news of individuals, but to see it in print, ya gotta send it. We have several new OBSs: WB4FJT, WB4FMD and WB4NER. If your repeater doesn't have the ARRL bulletins, please submit an OBS candidate to me (address is on pg. 8). Traffic: (Oct) W4JK 705, WB4PNY 694, KB4N 688, N4NK 521, WA4CCK 399, W3BBN 340, K4KNP 332, WB4FLT 321, WA4LJI 277, W4SOQ 261, K4BKX 246, WA4STO 214, N4IF 130, K4JM 130, N4AZI 120, N4LE 118, WD4NEI 111, K4EJ 108, AA4CK 100, W3BBO 97, KR4OG 91, W4UVA 91, W4OKN 74, WB4FDT 73, WB4ZNB 73, N4RF 72, WB4NEE 70, WB4FNW 62, W4SHJ 60, WA4YIU 59, K4ITV 53, KB4OB 53, W4UO 52, K4AXF 50, W4CEU 38, WA4YVG 37, W4NWM 35, WD4POZ 35, N4FM 34, N9ASX 32, KB4OF 31, N4YQ 27, WB4SHK 26, N4BJX 24, KA4CHX 23, WB4KIT 20, W4WWO 20, WA4PBG 19, WD4RDF 18, WB4ZWT 17, KA4GIO 16, WB4DQZ 15, WB4MAF 15, KA4ETG 14, WB4LAB 14, WB4UHC 13, N4UY 13, WA4ISA 12, W4KXE 11, WA4YJF 11, W4CFV 10, WA4UYD 10, KI4I 9, WB4RWY 9, N4SD 9, WD4DUU 8, WD4FTK 8, KM4X 8, N4BFI 7, WA4EGW 7, WA4FDV 7, KI4W 7, N4BHI 6, WB4FMD 6, WA4ONR 6, W4SUS 6, K4VWK 6, WD4CNG 5, WD4EUV 4, W4JUJ 4, WD4KUK 4, K4MLC 4, N3RC 4, WA4JUO 3, W4LXB 3, WB4ODZ 3, WD4HZB 2, W4TZC 2, W4DM 1, N4DW 1, N4OT 1. (Sept) WA4NTP 64, WD4RDF 32, N4ATT 15, W4CFV 12, W4TZC 7, WB4LCK 4, N4DW 2.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8DEW. NMs: K8MHR, WD8JYM, WB8AKQ. STM: WA8WPW. Emergency net was operational on Oct. 10 due to power outages in several WV counties. EOC station in capitol was active as K8BS. New ECs are WB8BMX, Marion Co; WD8MJE, Brooke Co; WD8SEN, Putnam Co; AE8Q, Wood Co; WD8PQE, Marshall Co; K8TEV, Ohio Co. Parkersburg ARC has been formed and is ARRL affiliated. First officers are: AE8Q, pres.; WA8HPD, vice pres., K8UC, vice pres.; WA8CRW, vice pres.; KB8MH, sec/treas. Nightly 2-m net has been formed on 146.13/73 (Fort Gay area) with WD8RNR net control. New officers for WV State Amateur Radio Council are: WB8GDY, pres.; WA8GYU, vice pres.; K8YL, secy., K8SR, treas.

Net	Freq	Time (Z)	Ck-In	Tfc	Sess.
Hillbilly	14290	1700 Su	133	64	4
Novice	3730	2215 Dy	--	--	--
Phone(MD)	3990	1700 Dy	323	54	29
Phone	3990	2300 Dy	907	168	31
CW	3567	0000 Dy	183	59	29

Traffic: WA8WPW 504, WB8AKQ 171, N8AJC 97, WD8EAV 55, W8CAL 49, K8MHR 42, KA8ETV 36, W8HZA 34, WD8POG 33, WD8JYM 32, WD8LDY 22, K8KT 20, W8YP 20, W8JWX 19, KA8Q 19, W8CKX 17, K8OEW 12, WD8JYN 10, K8ZDY 8, WA8LZE 7, WB8UDY 7, K8KXE 6.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Pointer, KØDJ — SEC: WØGOW. STM: WBØMCL. NM: ADØA KØCNV WØHE WØHXB WBØZQG WDØAIT. Northern Colo ARC is starting classes for perspective new amateurs. Eleven states were represented on Hi-Noon net in October. RTTY with a TRS-80 computer, M80 interface and TU170 terminal providing plenty of excitement at NØACW. WØBWJ, formerly our Division Director and past vice president of ARRL, serving as an observer at IARU conference in Geneva. That trancontinental balloon trip which brought the adventurers over Colo. ended abruptly do to bad weather but those of you who worked KØLIS/balloon mobile may QSL via P. O. Box 6761, Bellevue, WA 98007. SASEs are required. Several amateurs in traffic nets and ARES took part in the special SET in October. Net traffic: Columbine: 31 sess, ONI 1038, QTC 125, informals 172, QNF 1192; Hi-Noon, 30 sess, ONI 1171, QTC 106, informals 181, QNF 1231. Traffic: (Oct) WAØHJZ 1359, WBØZOY 224, WØLAE 151, ADØA 131, KØDJ 101, NØACW 95, WØEJD 82, WØGO 79, NØAGW 72, WØNFW 52, WBØYKH 48, WØLQ 23, KØTER 19 (Sept) WAØYNP 148, WØLQ 14. (Aug) WØLQ 31.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NM: WD5AHH K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 1930 local time and handled212 msgs with 170 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 170 msgs with 1254 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local. WR5ACX, the new solar powered 220 repeater on Pajarito Mt. (Los Alamos) Elev. 10,441 ft. is working nicely on 223.34/224.94. Reported range has been up to 120 miles. SAR activity has been at a peak with Balloon Race disaster and up to five SAR missions in one evening was almost too much. Yucca two-mtr net handled 12 msgs with 396 ck'ins. Traffic:

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  W9XYZ HERB DE RON N6FE
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UTAH: SCM, Royce Hennigson, K7QEO — STM: W7OCX. SEC: WB7FCB. K7JH/Rpt 146.16/76 on the air 20 miles west of Cedar City with auto patch. WB7FCB the new SEC for the state of Utah, has gotten off to a good start on his job by starting a net for ECs, Sun at 2000Z on 7272 kHz. Traffic: K7HLR 244, WA7MEL 100, W0AHA 60, W7OCK 22, W7VTM 10.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — Asst SCM: K7LYA. SEC: WB7EIN. NMs: WB7NHR WA7WFC W7LYA. We regret to report W7ABO a Silent Key. W7IRL has been a licensed radio amateur for 47 years. Shy-Wy ARC of Cheyenne reports that 56 and possibly more helped with disaster communications during and after the hurricane that hit part of Cheyenne. W7KMF is using his mobile rig to provide communications between the National Guard search and rescue team and the National Guard and Civil Defense in Cheyenne during their attempt to locate a missing woman in western Wyoming. WB7NHR reports Wyo. Cowboy net held 23 sess. with 646 QNI, 20 QTC. WA0PFJ reports Jackalope net held 27 sess. with 621 QNI, 3 QTC. Traffic: W7LYA 330, W7SQT 165, WA7GYO 100, K7KSA 49, K7TFW 17, WA7SGG 14.

SOUTHEASTERN DIVISION

ALABAMA: SCM, William E. Scates, WA4JYU — SEC: W4IBU. STM: WA4JDH. New appointments: EC Marshall Co. K4IMQ; EC Montgomery Co. WA4YCM; EC Talladega Co. WA4OSB. SEC: W4IBU. The Muscle Shoals Club ran communications for a charity Bikeathon. On hand to do a fine job were WB4LQX WB4ZUH N4AJZ W4SAJ WA4JPK K4OXU WD4HCM. If your club runs short of activities for the up coming winter months, I suggest that you might consider working up some programs on Amateur Radio, and visit the schools and civic club circuit next spring. I for one, thing it is about time that we quit griping about no publicity, and do something about it. By the time this is in print, this SCM will be a lame duck, and we will have a new one. Let me take this opportunity to express my thanks for the fine support given me by the amateurs of this section. Thanks for a job well done. Traffic: WA4JDH 1533, N4MD 709, N4CCT 579, WA4VKD 513, W4CKS 112, K4AOZ 80, K4HJX 66, KA4EWD 56, WN4KKN 53, WA4YCM 46, WA4JYU 26, KA4IVO 25, KB4VI 19, W4IBU 15, WB4TVY 6, WB4EKJ 5, W4JPK 3.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — Asst SCM: K4VHC. SEC: K4SWJ. Asst SEC: WB4HXE. STM: WA3NAZ/4. NMs: WD4ADV (ARES) K4DMK (GCN) W4GH (GA TFC NETS) W4HON (VHF) K4VHC (RTTY) W4WXA (GSN) WB4ZOJ (GTN) WB4ZVX (GSSBN)

Net	Freq.	Times
GCN	3995	0700 M/S 0800 Sun EST
GTN	3718	1815 Dy EST
GSN	3595	1900 & 2200 Dy EST
GSSBN	3975	1930 Dy EST
GA TFC	7243	1200 Dy EST
GA TFC	3955	1830 Dy EST
ARES	3975	1700 Sun EST

Listed above are all of the major nets in the section. Those of you who work different hours now have an opportunity to help handle traffic. Tnx to all for your fine cooperation. Colquitt County Ham Radio Society "Sunbelt Expo" again a success. Folkston planning repeater on 146.19/79. Savannah's Hamfest successful, looking forward to next year. W4KGP honored on his 75th birthday with special citation. Father & son, WB4GKO & WA4YOP, helped save burn victim in Ecuador. Recent hurricanes proved that emergency power is an essential part of your station's equipment. W4RA gave interesting talk on WARC & spectrum use at Savannah. WD4IPA now KO4N and WD4RGO now General. WD4LYV now VHF OBS in SE GA area. K4CZR back on air after many years. K4INN now in Tampa & active. Tnx to all who are conducting nets on their local repeaters. They are very essential during local emergencies. By now all appointees should have received endorsements or certificates. Please let me know if you desire an appointment. HAPPY NEW YEAR. Traffic: W4PIM 401, WA3NAZ/4 292, WA4PUP 280, WD4ADV 251, WB4ZOJ 236, W4GH 229, WD4LYV 135, K4EV 88, W4ELO 83, K4VHC 74, W4CMX 56, N4UZ 52, W4FIZ 48, W4BIA 35, K4JNL 32, W4HON 25, K4WC 22, K4PIK 14, AK4T 17, K4HBI 12, WB4ZVX 12, N4BGN 8, WA4PGY 5, W4AAY 4.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA. NM: WD4HXS WD4LUG WD4PDK. W4IRA acting as NM of AFPN while WA4NBE repairs hurricane damage. WD4PJS, Crystal River, appointed EC of Citrus County. WD4HIF new OBS for daytime NTS phone nets. Pensacola hams got front page publicity in local paper for work during Hurricane Frederic. The WA4KSTIR 220 MHz repeater now covers a 50 mile radius. There is a new open repeater in Fort Walton Beach: W4MFD/R on 28/88. New Panama City ARC officers; KM4O, pres.; KE4N, vice pres.; N4CDY, secy.; KL7JGI, treas. They were installed at the annual dinner; W4OMC did a fine job as MC. KO4Z was formerly KB4KS. K4OHR visiting in Tallahassee for the winter. KA4ELI reports reactivation of the radio club at N. FL Christian School. AA4US and WA4ROE held 200 wpm cw QSO, using TRS-80 computers. NOFARS station, W4IZ, handled over 1600 messages from Jax Fair. W4JL N4UF WA4EYU and others helped relay them. KB4B had charge of the ham booth. WB4RIS won NOFARS message contest. WD4BII appointed Asst. EC/liaison with emergency services. New officers of Jax RANGE: WB4GDJ, pres.; N4BFX, vice pres.; WD4PVC, secy.; WB4YTJ, treas. KJ4N is new Editor of "Squelch Tale." WD4ETG wrapped up 5 Band WAS. W4UJ became a Silent Key last month. W4MGO named to ARRL PR Advisory Committee. Hernando County ARA has a new local net — 145.5 MHz Weds. at 7 P.M. NCS is WB4EXA. Traffic: (Oct) W4IZ 3303, WD4HIF 760, W4JL 593, N4UF 408, AA4FG 343, WB4TZR 316, N4WA 315, N4BZH 254, WA4EYU 237, WD4HXS 214, WD4IIO 195, W4FZX 185, N4PL 158, WA4GRI 124, W4KIX 123, WD4DNC 105, WD4PDK 105, K4BZS 92, N4EC 82, WB4WOO 67, W4MGO 58, KF4U 57, WB4DTS 55, WB4ADL 52, WB4FJY 35, W4MVG 30, K4RNS 29, WD4LUG 27, W4RH 26. (Sept) N4EC 82.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCM: W4KGJ. SEC: AA4WJ. No new appointments but lots of endorsements as follows: AA4BN EC Hendry County, K4RCP EC Hardee, W4ESH EC Collier, W4IYT EC Dade and OBS, WA4RLU EC Eastern Palm Beach County, K4SCL EC Pinellas, K4SJA EC Western Palm Beach, K4URX EC Monroe, W4DL OBS, WA4ZLW OBS and OVS. The Simulated Emergen-

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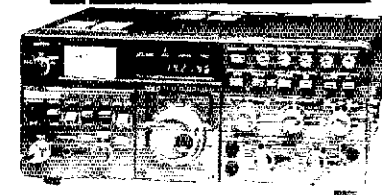

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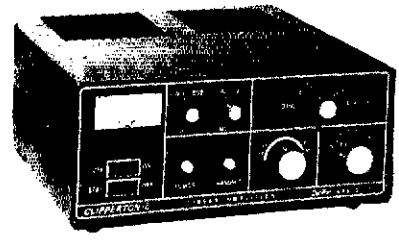

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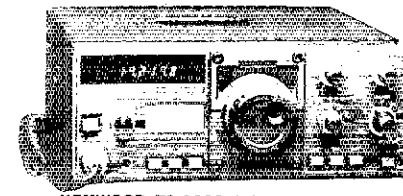

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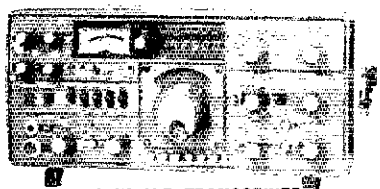

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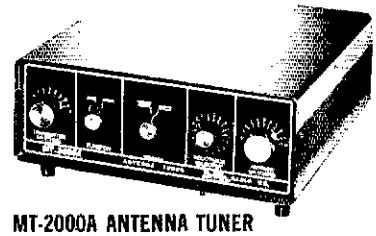

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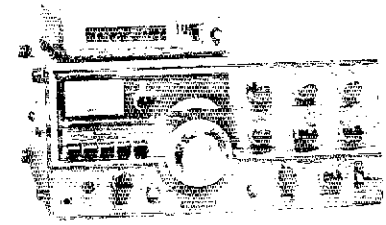

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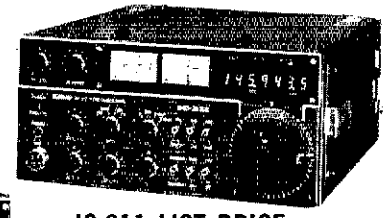

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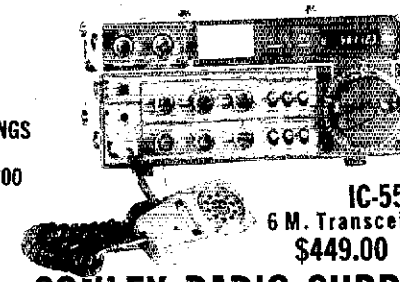

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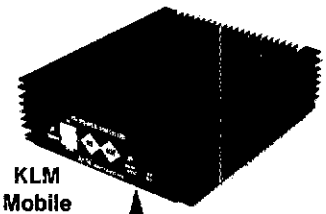

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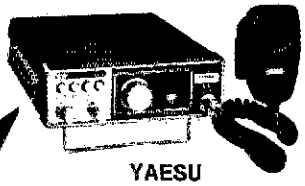

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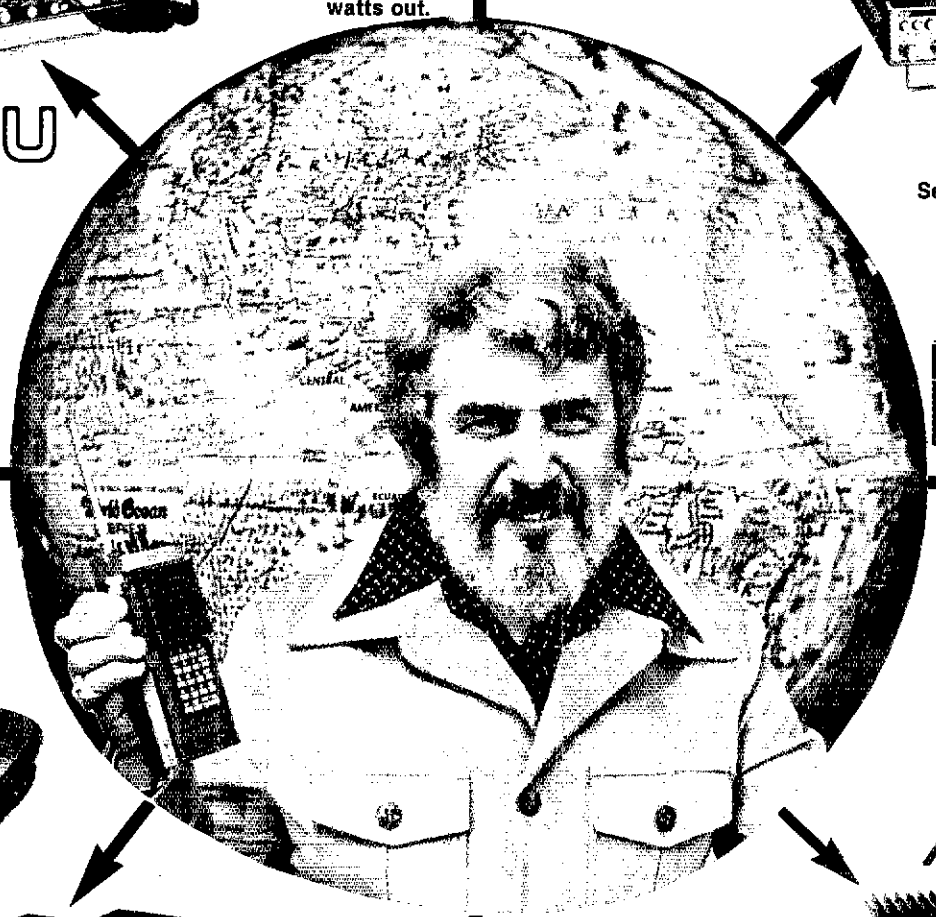

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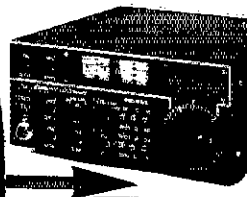

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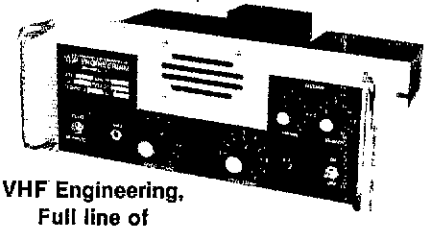

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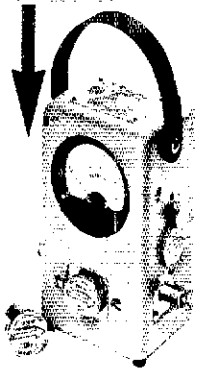
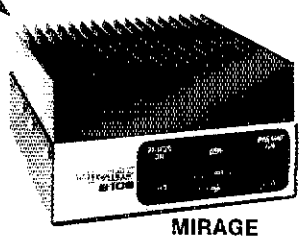


BIRD ELECTRONICS, Full line of elements in stock.

MIRAGE



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KLM/N&G MA-25B
Power Amplifier
SPECIFICATIONS

Freq. of Operation: 144-148 MHz
Power in: 3 watts
Power out: 25 watts
Preamp: 2.5 dB N.F., 11 dB gain
Mode: FM
Amps @ 13.5 VDC: 5
Audio/PA amp: 5 watts
@ 8 ohms

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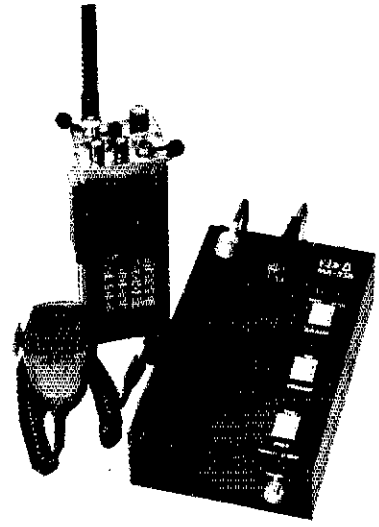

Preferred by the professionals: Gordon Lane, N4BUO Eastern Airlines Pilot

cy Test, Oct. 6-7, seemed anticlimactic to us, coming on the heels of real Hurricanes David and Frederic. Most of us felt already saturated with emergency communications. However, the section-evel NTS phone nets did a rather outstanding job. And a few of the county ECs conducted excellent drills. W4IYT and Dade County are especially commended for pioneering cooperation of ARES RACES and REACT during SET. The CB operators in REACT were handling messages in ARRL form, "just like Radio Amateurs!" REACT operates an excellent 450 MHz repeater covering Dade County. ARES under W4IYT accomplished another notable first, we believe, in executing an agreement with U.S. Coast Guard, 7th District, to provide emergency communications assistance. Not new, you think? Well, now it is formalized, on paper. The Duty Officer will know whom to call and what to expect out of Amateur Radio assistance. This may be the seed of a mutual cooperation agreement which could grow to a nationwide scope. On the repeater scene, it is noted that WR call-signs are rapidly disappearing, being replaced by "regular" call-signs followed by "/R" or "/RPT." N8GG reports sporting a new Drake TR7 line. Congrats. The St. Pete club has a new 220 MHz rig, Midland 13-513, at the Club Station in Red Cross. Traffic: W3CUL/4 2989, W4MEE 1336, K4TH 715, W3VR/4 631, K4SCL 414, WA4PFK 400, W4NFK 361, WB4FVV 277, WD4KPG 215, K4EUK 199, KE4O 177, W4GPI 158, W4IRA 157, WB4WYG 157, WB4SNX 134, KB4OW 128, W4LX 100, WA4HXU 90, KA4FZI 87, WA4EIC 84, W4WYR 76, W4DVO 71, N8GG/4 60, KM4G 50, W4IYT 49, WB4NJU 48, KRPXM/4 43, W4SMK 29, WD4CHO 26, WB4GSV 24, KA4GDV 23, N4AUO 21, KA4BBA 20, W4TJM 12, WA4BYT 8, W4GKJ 7, W4MNZ 6, WB4ZVD 6, WA4HKP 5, W4MML 4, WB4DWU 1

SOUTHWESTERN DIVISION

ARIZONA: SCM, Willard L. Haskell, AC7D — W7WGW rpts that the Mingus Mt. repeater is operational an 447.150 IP/442.1500P. A new tower (100 ft.) has been put up for the 6000 Rpt MMRG rpt 87/27 ant. is now located on top of the Koll Financial Ctr., Pnx. The TRA in Tucson and the ARA in Pnx, provided communications for the Camp Wildcat Bike-a-thon that is held yearly. Route covered, was from the U. of A. Tucson to Daley Pk Pnx. Twenty-five amateurs participated. There were about 175 bicycles and 1 unicycle involved in the cross country. Cyclists had sponsors pledge money for every mile they rode ($9000.00 was raised). TRA also provided communications for the JC's Annual Mardi-Gras Halloween Party at nine parks throughout Tucson. Congrats to WB7NUY and WB7NUZ who had a baby boy; same to WB7QMN and WB7EHQ, a baby girl. The mothers are sisters, Hi! W7GMR, one of the founders of the TRA, is being transferred to Denver. He sparked the engineering sect. and will be missed by all. The AZ Section wishes him good fortune in his new position. K7PQI was injured in an industrial accident, "Speedy recovery." Flagstaff Jr. High School ARC, WB7OWW, is now on the air with the assistance of WB7QAD WB7PNZ and WB7PLX. Nine students are receiving code and theory instruction from W7YS and WB7QAD. Congrats to WB6FVV, upgraded to Adv; KA7ETA to Tech. Oct 20-21 Kingman celebrated Andy Devine Day (WB6RER) who resided in that city. Members of the Hualapai ARC operated a station under the club call of WA7LAE using some of Andy's original radio equipment. New SWN mgr. is KL7HSF/5. WA7FDN rpts the Kachina ARC has their repeater WA7GWG/R in operation on Porter Mt, 9200 ft. on 04/64. A-10 Net: QNI 930, QTC 205; SWN: QNI 170, QTC 212; Cactus Net: QNI 1019, QTC 110. Traffic: W7EP 178, K7MC 169, W7LVB 133, K7NTG 46, WA7KQE 44, K7UXB 39, WA7WEB 30, K7NMQ 28, AC7D 27, K7JKM 17, WB7NJY 13, WA7NXL 12, N7EH 10, WB7VON 10.

LOS ANGELES: SCM, Perry Masterson, KD6C — W6INH now has all his antennas up and reports everything working well. N6VI had several foreign hams stop by tovisit when they saw the antennas from the freeway. He will soon hae some VHF amps and a 6 ft. dish for 1296 MHz. Ron Wetton has been appointed RN6/D manager. W6BWG now has 271 countries confirmed and 281 worked. With a QSL average like that, he should tell the rest of us how he does it. W6NKE still QRL. WB5EKU reports SCN/RTTY participation on the increase, but new check-ins are still needed and welcome. K6CL has been out of town. N6NQ is ending a long QRT, he hopes to be active again. The convention for Southwest Division was held this month (October) and a good time was had by all who attended. Many fine prizes were won. However, not by me nor W6RIQ. Maybe we can have better luck next time. I understand next year's convention will be sometime in September and in LA. K5DY/6 has resigned as a section net manager, due to personal problems. Due to the press of business matters, I have been out of town quite a bit this past month. I have not been able to contact to many section members for more news. Traffic: W6INH 170, WB5EKU 152, WB6OT 150, WA6LVO 129, WB6YID 116, KB6FC 106, K6OWA 105, N6PZ 90, W6BRO 42, W6BWG 27, WA6OCM 25, K6CL 8, W6NKE 6.

ORANGE: SCM, Roy Zukerman, AC6H — Well, the Southwestern Division Convention is now history, and a good one it was. W6RE's committees and helpers can rest in the knowledge that more than 2,500 registered hams and their families had a great time. The tech sessions were all well attended and got good reviews. 850+ enjoyed the final banquet, with WD6FBU - entertainer Stu Gilliam - headlining. 88 FCC exams were given, no official report on results but quite a few "interim Long Beach" calls showed up on the bands afterwards. Congrats to new ECs WB6OSP WB6JBI W6HAG W6GQB WD6DGI WA6QMW W6ZZZ and especially WU8Q who adds the duties of Asst. SEC to his already busy schedule of RACES activities. At the same time a hearty "well done" goes to W6SQE, stepping down at his own request as Coachella Valley EC. He has promised to stay active in ARES. Most of the clubs are nominating and voting on new officers, but the Orange County Council has elected WA6WZO (SEC) as its 1980 pres.; WB6DCB secy.; WA6WZO is also charter pres. of SCAR Computer Club, with KB6DM, vice pres.; K6KNC, secy.; WD6DIY, treas.; WA6WZN, bulletin editor; of the new ham/computer group. Congrats to WA6TEY, Ham of the Year of the Anaheim ARC. Really enjoyed meeting the Beach Cities Wireless gang and presenting their ARRL affiliate charter. Traffic: W6DXL 650, WB6EIG 430, WB6QBZ 323, KA6A 157, WA6QCA 30, K6XI 29, W6CPB 17, WB6ULU 12, WA6PTU 11.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Asst SEC: N6RD. the Imperial Valley earthquake found amateurs ready to respond to needs. Noteworthy are the organizational efforts of WA6LAW and W6AIL's expert handling of phone patches for

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

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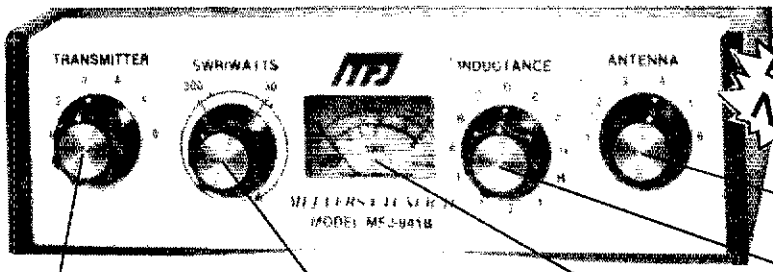

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Transmitter matching capacitor. 208 pf. 1000 volt spacing.

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Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

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Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.

ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

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This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

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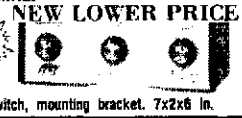

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Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

MFJ-16010 RANDOM WIRE TUNER FOR LONG WIRES. NEW LOWER PRICE

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1.8 thru 30 MHz. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz. Does not tune coax lines.

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emergency requests. Most used was SANDRA's Laguna repeater (W6PDA on 147.75/15.) TV coverage included interview with WA6AIL and scenes from San Diego County Emergency Operations Center. Also used was the S. D. County RACES repeater, WB6AOT (147.795/195). Four solar-powered transceivers featured the SET with San Diego County ARES teamed up with Red Cross. W6THR engineered the solar-powered headquarters station which was featured in a TV newscast. Learn traffic handling by checking into the North County Traffic Net, nightly, 2000 local, on WR6AII (146.13.73). Convair ARC meets at 1930 on first Thurs. at Convair Clubhouse, 8115 Clairemont Mesa Blvd. ARES members and friends are invited to breakfast and/or meeting on second Saturday at Normal Heights United Methodist Church, 4650 Mansfield. Breakfast 0800, meeting 0900. Traffic: (Oct) WB6PVH 504, N6GW 303, WA6AMK 290, WA6UAZ 140, K6HAP 110, N6AWC 98, WB6MLB 87, N6AT 86, W6HUJ 77, WA6UFY 51, WB6FTY 43, WA6HGA 12, WA6COE 2. (Sept) W6HUJ 39.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — N6NB spoke at the Satellite ARC and showed slides of his contesting on the East coast. W6PA and W6ENR spoke at the Central Coast ARC meeting. Santa Barbara ARC saw the new movie "World of Amateur Radio." K6HPT graduated nine new Novices from the Conejo Valley Club class and has eight in the current class. AE6B is moving to MN and WA6LBO is moving to AZ. Their activity will be missed. The Central Coast ARC and the Lompoc ARC honored them, respectively. We regret to note the passing of K6GVN, Ventura County ARC. K6MEP was active from Pine Mountain in the CQ WW DX test as was W6MB from Lompoc. Santa Barbara Section net certificates have been earned by K6MXO W6POU K6UB and AJ6Y. Mgr. K6DZT now has liaison to RN6D and SCN. Catch W6ZRR bulletins on RTTY on 146.70 Thurs. at 1800 local. WB6TRP has been active on ARES, MARS and traffic nets. My term as SCM has been extended until June since no nominating petitions were filed by the deadline. QST will resolicit for nominees. How about your club getting behind your candidate. PSHR: K6YD 82 N6YH 49 K6DZT 16 N6TR 3 N6MA 18. Traffic (Oct.) N6YH 82, K6YD 78, WB6TRP 49, K6DZT 35, K6SZS 25, N6MA 24, N6TR 3. (Sept.) K6SZS 12, K6DZT 1.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. STM: W5VMP. SEC: N5WB. NMs: AE5I AA5J. McKinney ARC meets 2nd Tue of each mo. 1930L @ Red Cross Bldg. The club rptr, WR5AQI, is on 146.745/145. WB5FPI and WA5WDB overhauled KC Club stn. The KC CLub also furnished communications for the Annual Fall Classic Foot Race, led by WB5FLQ (talking, not running!). The Grayson Co. ARES group busy with two public service events this month plus SET. Dallas Co. ARES pressed into service to help the Dallas PD in search for a kidnapped girl. Texoma Hamarama a huge success again this year, with excellent forums on tfc handling on vhf rptrs and emergency preparedness. Attention all N.TX Emergency Coordinators: your annual EC report is due by March 15th. If you have lost yours, contact K5PC or N5WB for a form. This is a mandatory report! It is the only accurate way to keep records on both the national and section level on ARES activity. Garland ARC has built a new portable rptr as a club project for emergency use. Contact W5TGY or any Garland RACES member if needed in your area in an emergency. DFW Metro Net rpt: QNI 478, QTC 415/395, QTR 1107 min. in 31 sess. BPL: W5TI. PSHR: WD5EUE W5HMR WD5IVD AA5J WD5JYI WD4SIH AJ5F WD5HHK W5VMP WA5OFD WB5LAT. Traffic: W5TI 565 AA5J 354, WD5HHK 322, WD5EUE 271, WB5OXE 164, N5BT 149, WD5IVD 140, W5RYA 133, K5PC 125, W5HMR 98, W5CMP 71, N5AWG 65, WA5QFD 63, WB5BKM 56, W5CTZ 52, WA5INJ 50, WD4SIH 48, WB5LAT 46, AE5I 44, WD5JYI 42, W5YK 32, WA5EZT 26, W5TAH 25, WB5YYK 25, W5IAR 22, KB5DR 14, K5SOR 14, WA5ZNZ 14, WD5JDA 6.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Ass't SCM: W5REC. SEC: WA5MLT. NMs and Nets: K5CAY STN: WB5KKT OFON, WA5MLT OPEN, WB5NKD OAN, W4RB OLZ. Texoma 79 is history. Another FB Hamfest. Next on the agenda is Oklahoma Repeater Society in Jan. All 2-m operators need to get behind this organization and give it your full support. Winter is here. Did you get ready for it? Some did with new towers, (heard of one 125 ft'r) some with new beams. W5HXL improving rapidly, FB. Tornado in Ardmore area Oct. 30 gave that group a workout helping c.d. and Red Cross. Many FB net reports this month. 2-meter nets, have you thought about daily instead of weekly operation? Muskogee likes it. Helped QNI average. With a liaison to hf nets, good traffic outlet and training, Night Owl Net averages 20 QNI. Several 2-m nets using Simplex. How about a regular 2-m ssb net? The capabilities are unlimited. KB5EK new NCS on OTWN, WA5AFO new NCS on OLZ. WB5MVR working on Extra. Many upgraded at Texoma. Election time in most clubs. Secretaries, get your reports to Hq promptly. HF nets listed at top of column can use your help. Accurately handled traffic is good training for emergencies and real good PR. Tnx to W5REC for the FB report last month. Traffic: K5OWK 504, K5JGZ 433, WB5NKC 397, WB5NKD 346, W5REC 318, W5RB 171, W5UYH 66, WA5OUV 50, W5SUG 43, K5CAY 33, W5BYC 32, WA5FSN 31, WB5AOH 30, W5VOH 26, WD5IFB 20, K5MGD 18, W5VXU 16, WD5GLO 14, WB5ELG 13, W5FKL 10, WD5ETB 8, WA5UTO 8, W5VEJ 8, KB5EK 7, W5HGH 6, KA5DRD 4, WB5OVT 2.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — Asst SCM: N5TC. SEC: AK5N NMs at large: N5TC phone; WA5RKU cw. OOs reporting K5DL WB5CIT. OVS, WD5JJS, reports new Brenham ARC repeater on 147.855/.255. Also acted as NCS for Washington County emer. drill. EC, K5DG, reports good activity in Cameron County. SET. Communications were supplied for '79 Confederate Air Force Show. WB5EFJ says Twin Counties Amateur Radio Society (Harris/Montgomery Counties) having good programs such as SSTV and amateur radio activities in Brazil. Congratulations to WB5YDD on appointment as OTS, Houston/Harris County SKYWARN Net activated Oct. 30 due to severe thunderstorms. WB5PBL acted as NCS from Weather Service office in Alvin. The West Gulf Convention held in Houston was a great success. Hats off to the organizers for a job well done. W5APX reports the Port Arthur 34/94 machine down for upgrading to all solid state. Weekly emer. drill on this machine averaging 60 QNI. N5FN has new TS120S and has made DXCC. Remember our section nets: TTN (phone) OO UTC 3.961 MHz daily; TEX (cw) 0100 & 0300 UTC 3.710 MHz daily. WD5HSN upgraded to Advanced and having good time working 10 Mtr am with

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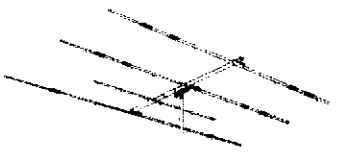

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converted CB rig and 4 watts. EC. WA5RVT, presented a program on traffic handling to the Alvin Community College RC. Traffic: (Oct) W5RLV 575, WB5YDD 517, N5TC 201, K5HZR 177, WD5BIP 108, WA5RKU 100, WB5MMI 75, KB5NX 67, AK5N 63, K5QEW 58, WA5RVT 48, WB5CIT 46, KA5CDX 42, AE5X 33, W5BGE 24, WD5GKH 21, WD5HSN 21, KD5D 21, W5KR 16, KAØGDD 15, WD5AAH 10, N5FN 9, W5ERT 8, AK5M 6. (Sept) W5BGE 38, WB5MMI 35, K5DG 17, WD5GKH 10, WD5IQN 7.

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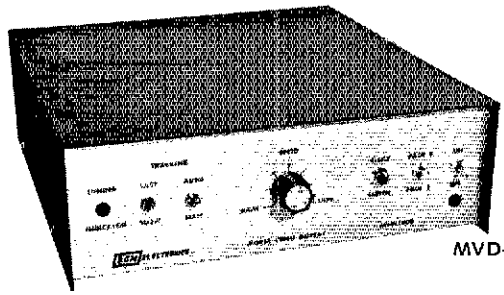

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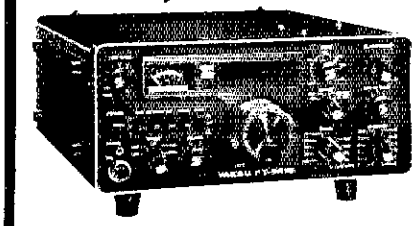

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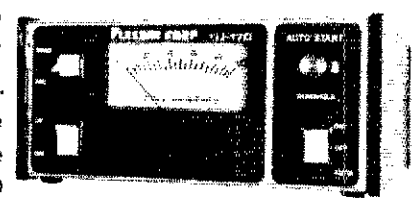

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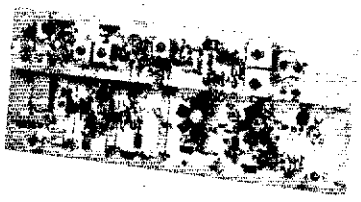

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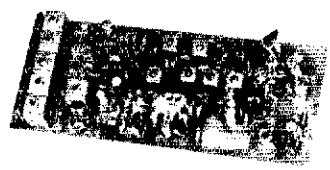

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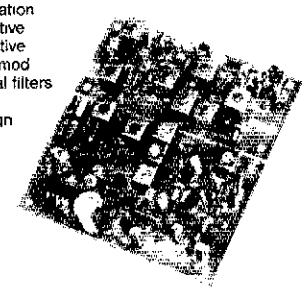

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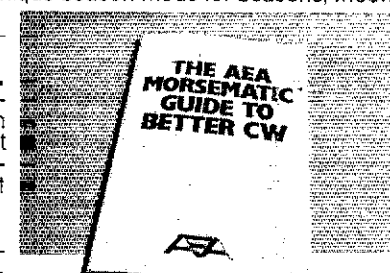

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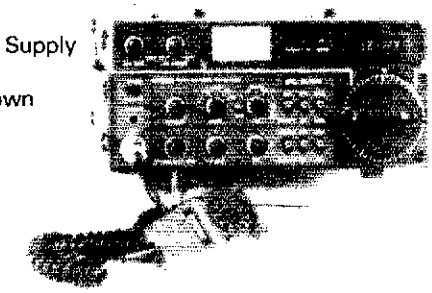

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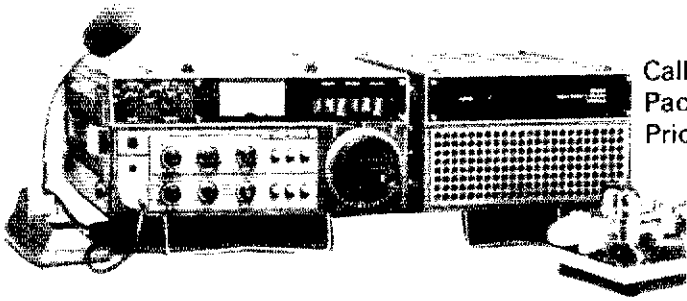

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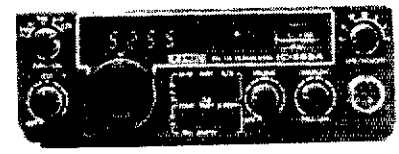

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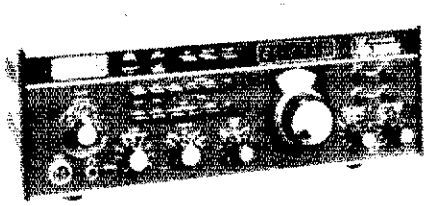

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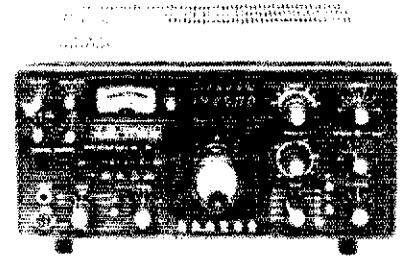

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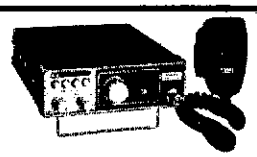

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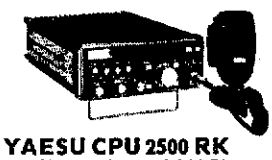

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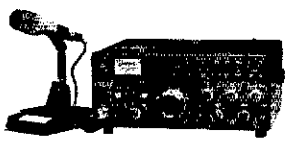

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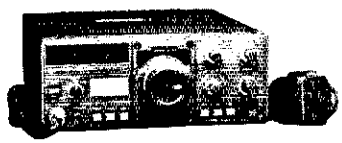

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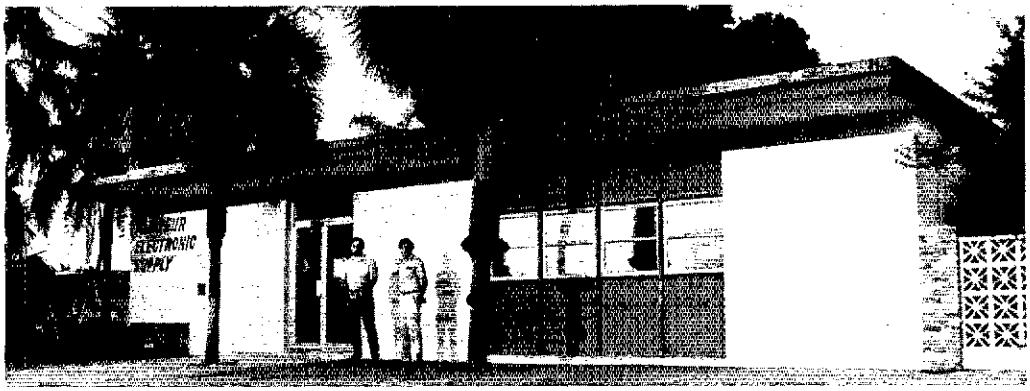

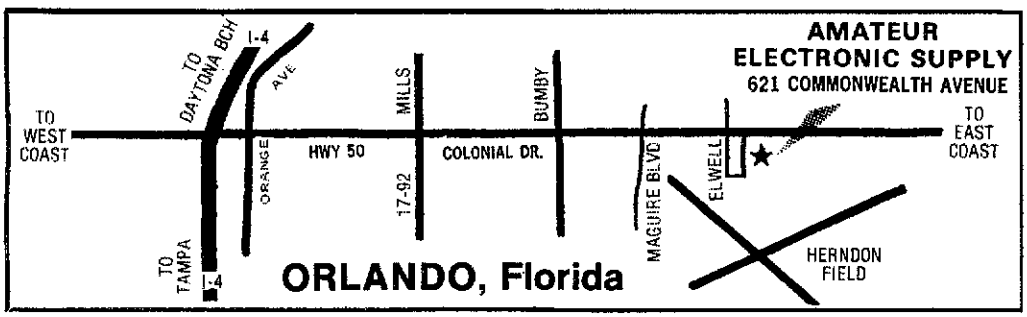

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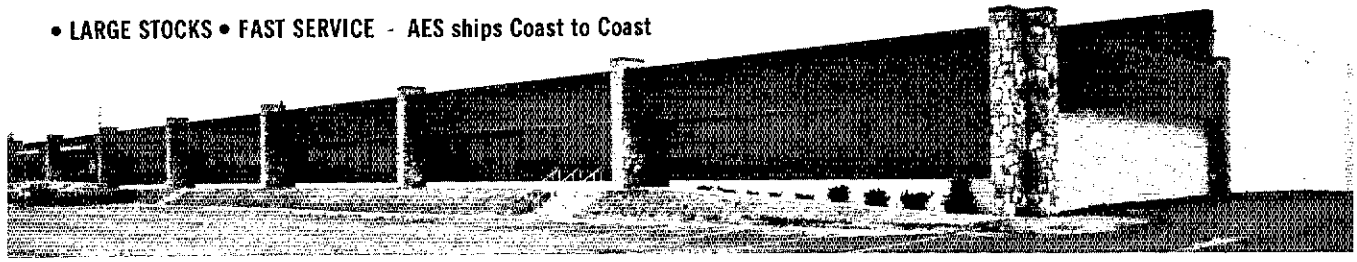

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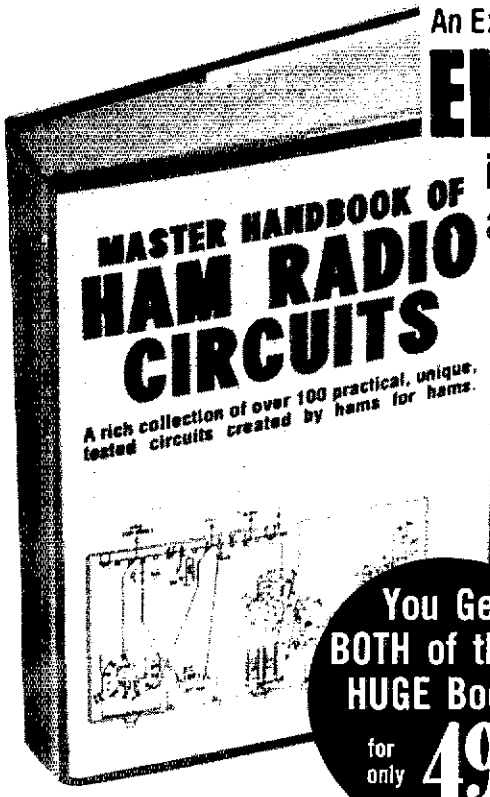

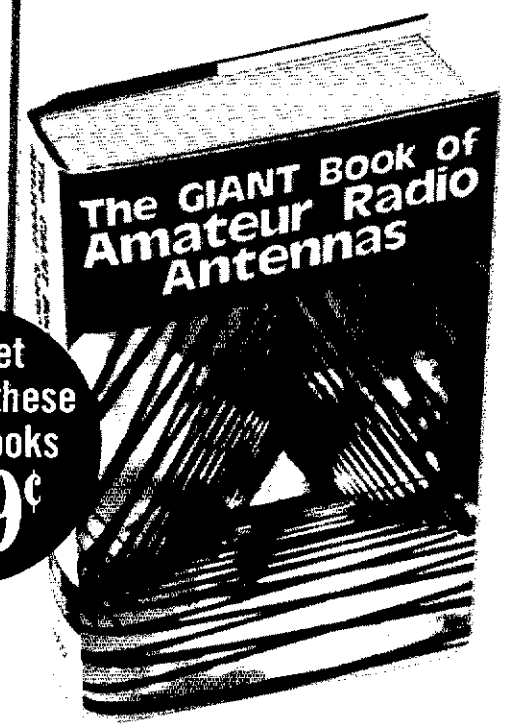

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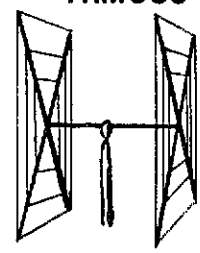

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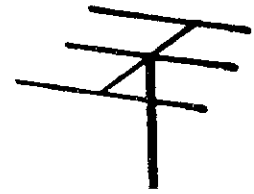

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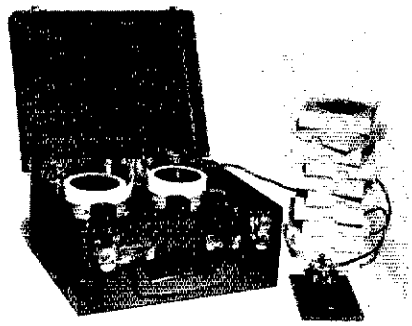

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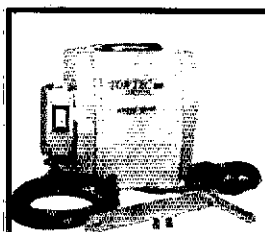

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4-HOBBY OPTO COUPLERS, 1500 VOLT ISOLATION, U-test, (#2629A)	1.29	8 for 1.30
8-TAPE RECORDER EARPHONE, for radios, recorders, 8 ohms, (#2946)	1.29	16 for 1.30
5-MICRO-MINI JACKS, in a block, for 2mm sub-mini plugs, (#1437)	1.29	10 for 1.30
5-PL-55 PHONE JACKS, standard bushing, for hams, communications, (#5868)	1.29	10 for 1.30
40-RED DEVIL CAPACITORS, handy assort. of pop. values, axial leads, (#3823)	1.29	80 for 1.30
50-MICAS asst. sizes-n-shapes, incl. "silvers" too! (#373)	1.29	100 for 1.30
10-TRANSISTOR SOCKETS, for npn and pnp types, (#5944)	1.29	20 for 1.30
12-LED DRIVER IC's, similar to 75491, (#5890)	1.29	24 for 1.30
10-MODULAR SWITCHES, Centralab "push-on" type, up to 8PDT, (#3150)	1.29	20 for 1.30
5-"MOTORS MOTORS", small, high speed, asst'd sizes, 3-6VDC, (#2551)	1.29	10 for 1.30
2-HEAVY DUTY LINE CORDS, 8 ft., 2 cond., 18 gauge, black insulation, (#5803)	1.29	4 for 1.30
10-LED SOCKETS, "snap-in" minis, for LEDS, and transistors, too! (#5745)	1.29	20 for 1.30
10-MV-54 MICRO-MINI LEDS, flat top style, diffused red lens, (#1789)	1.29	20 for 1.30
30-WIRE NUTS, twist-on's, for #20-24 gauge wire, (#3724)	1.29	60 for 1.30
2-ALUM. HEAT SINKS, 2¾"x3", for power tabs, innumerable uses. (#5338)	1.29	4 for 1.30
1-"MICRO MINI" METER, ½" dia. 0-1 basic movement (#5858)	1.29	2 for 1.30
2-DOUBLE-SIDED PC BOARDS, 3"x12" high quality G-10 glass, (#5694)	1.29	4 for 1.30
60-TUBULAR CAPACITORS, asst'd 100mmf to .1mf to 600 WVDC, (#35A219)	1.29	120 for 1.30
6-MICRO MINI REED SWITCHES, 1" long, for alarms, relays, etc., (#1258)	1.29	12 for 1.30
10-TANTELUM ELECTROS, asst'd mini, axial, hermetically sealed, (#5840)	1.29	20 for 1.30
50-DISC TYPE CAPS, incl; NPO, hi-Q, mylar, ceramics, asst'd values, (#437)	1.29	100 for 1.30
60-COILS & CHOKES, asst'd RF, OSC, IF, parasitic types, (#35A297)	1.29	120 for 1.30
6-SWITCHCRAFT PHONO JACKS, hi-Q, chasis mount, teflon base, (#5119)	1.29	12 for 1.30
1-TO-3 HEAT SINK, heavy duty aluminum, prepunched for TO-3, (#4083)	1.29	2 for 1.30
65-MOLEX SOCKETS, "on-a-strip", for multiple pin dips, (#1609)	1.29	130 for 1.30
6-PAIRS 9V BATTERY CLIPS, w/red & black color-coded leads, (#2852)	1.29	12 for 1.30
1-UHF TUNER, 3 gang, uhf TV unit, 300 ohm, pos. direct drive, (#2927)	1.29	2 for 1.30
15-HUMBUCKER CONTROLS, assorted values, manufacturers dump, (#3807)	1.29	30 for 1.30
30-SUBMINI IF TRANSFORMERS, slug tuned, shielded, (#35A9)	1.29	60 for 1.30
15-"POP" OPTICAL LENSES, plano-convex, 1" dia., plastic, (#5043)	1.29	30 for 1.30
40-ADJUSTABLE FERRITE CORES, center cut for hex adjust, (#5701)	1.29	80 for 1.30
3-1.5V MINI LAMPS, only 3/32" dia., draws 15mA, w/1" wire leads, (#5693)	1.29	6 for 1.30
30-FT. WIRE-WRAP WIRE, 30 gauge, insulated, continuous length, (#3803)	1.29	60 for 1.30
4-MONO TAPE HEADS, may incl; cassette, 8-track, reel to reel too! (#5789)	1.29	8 for 1.30
5-DUAL DIGIT "BUBBLE" READOUTS, HP5082 style, red, dip type (#5748)	1.29	10 for 1.30
40-METAL & PLASTIC TRANSISTORS, asst'd sizes (#1965)	1.29	80 for 1.30
2-HI PWR. TRANSISTORS, Motorola type, MJ3201, NPN 15W, TO-66, (#2797)	1.29	4 for 1.30
60-GERM. GLASS DIODES, similar to 1N34, axial leads, untested, (#642)	1.29	120 for 1.30
40-1N914 SWITCHING DIODES, silicon, 4nS, glass, untested, (#143)	1.29	80 for 1.30
4-AM/FM VARIABLE COND., 2 bands, "poly-con" ½" square, (#2924)	1.29	8 for 1.30
3-MICRO SWITCHES, SPST, NO contacts, plunger style, solder tabs, (#5705)	1.29	6 for 1.30
10-MULTI-GANG POTS, audio 2 gangs and up, asst'd types and values, (#5326)	1.29	20 for 1.30
10-MAN-3's, 7 segment, w/bubble magnifier, 100% material, (#3842)	1.29	20 for 1.30
3-PL-259 COAX PLUG, mates to SO-239, Amphenol, (#5221)	1.29	6 for 1.30
1-LITE SENSITIVE UNIJUNCTION TRANSISTOR, programmable, (#5719)	1.29	2 for 1.30

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☐	200	2.85	2.86
☐	400	3.50	3.51

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2378	1N4002	100	10 for .75	20 for .86
2379	1N4003	200	10 for .85	20 for .96
2380	1N4004	400	10 for 1.19	20 for 1.20
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Type 63 SINGLE TURN FLAT				
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50	500	2.5K	20K	100K 1 Meg

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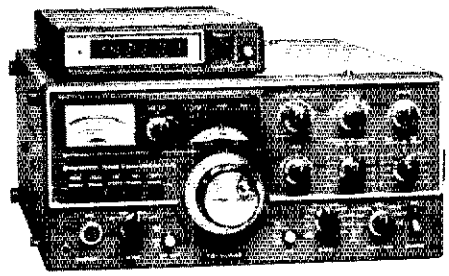

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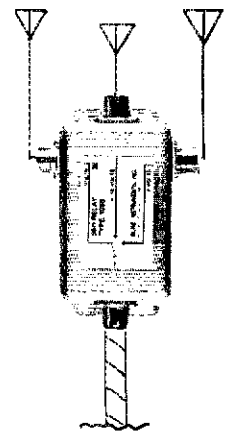

INLINE'S exclusive coaxial coupler at the radio energizes a weatherproof relay/s mounted on the tower, pole, tree, or wherever the antennas are via any length coaxial cable. Using more than one antenna lets you reach out further because you can instantly compensate for changes in propagation or signal path conditions. You can also change bands, or polarization, or phase arrays. You can eliminate a rat's nest of wires. Ideal for apartment dwellers.

INLINE relays are in constant use worldwide, in more than 100 countries, in any conceivable climate, by Amateurs, International News Services, Embassies, Cable TV, Government Agencies, Airlines, Etc. where reliable communications is a must.

Two position relays

Type 101*	DC to 550 MHz	2000 W PEP	$31.45
Type 103	20 to 550 MHz	1000 W PEP	48.45
Type 105	1.5 to 180 MHz	2000 W PEP	53.45

Three position relays

Type 1013*	DC to 550 MHz	2000 W PEP	48.45
Type 1033	20 to 550 MHz	1000 W PEP	65.45
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*(not "wireless" controlled — use 1 wire + Gnd.)

Literature and application data on request.

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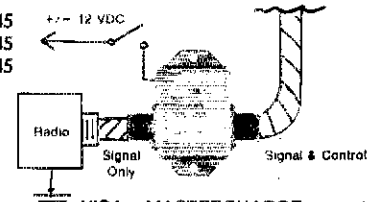

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Florida in-state WATS: 1-800-432-9424

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Mon, Tues, Wed & Thurs 9-5:30; Fri 9-8; Sat 9-3

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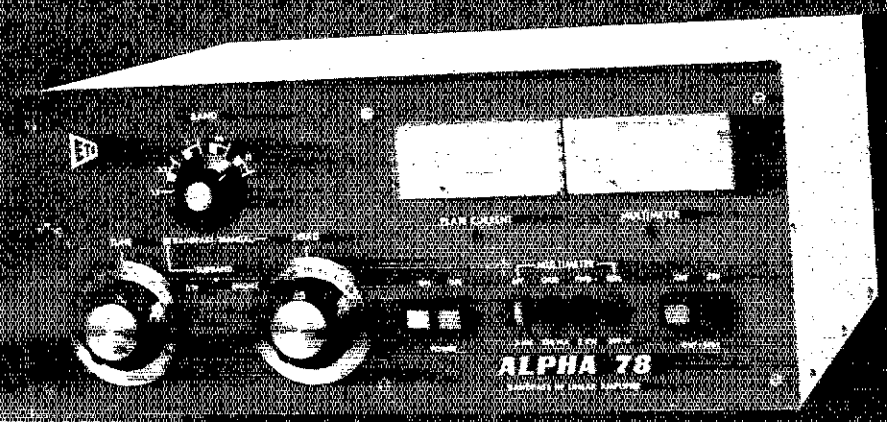

IS SOMETHING ELSE "JUST AS GOOD?"

New *ALPHA* owners often tell us, "I wish I'd saved my time and money and bought an *ALPHA* in the first place." Why not benefit from their experience? Compare first!

TRY TO GET ANY OTHER MANUFACTURER TO TELL YOU - IN WRITING - THAT IT'S SAFE TO OPERATE HIS DESK TOP LINEAR AT A FULL D-C KILOWATT . . . SAY FOR 24 HOURS KEY-DOWN. OR, ASK HIM FOR A FULL YEAR WRITTEN WARRANTY. GOOD LUCK!

YOUR NEW *ALPHA* WILL HAPPILY AND COOLY RUN THAT KILOWATT KEY-DOWN . . . FOR 24 DAYS IF YOU WISH. AND YOU'LL BE PROTECTED BY ETO'S UNMATCHED WARRANTY FOR TWO YEARS. WE PUT IT IN WRITING ALL THE TIME. IT'S THE WAY WE BUILD AND WARRANT EVERY *ALPHA*!

The new ***ALPHA s*** are the best we've ever built. Nothing else even approaches an ***ALPHA's*** combination of power, convenience, quality, and owner protection. The ETO/ ***ALPHA*** two year limited warranty offers you eight times as much protection as the industry standard 90 day warranty.

The new ***ALPHA 78*** combines major capabilities that you can't get in any other linear amplifier plus all the traditional ***ALPHA*** qualities. You can hop instantly from one HF band to another with NO TUNE UP . . . with truly conservative maximum legal power in all modes including SSTV and RTTY . . and with NO TIME LIMIT on key-down time at full power!

You can work full CW break-in with the ***ALPHA 78*** (provided your exciter/transceiver's up to it!), using the same vacuum relay high speed QSK system made famous by the "Ultimate Linear" ***ALPHA 77Dx.*** And if new amateur bands are granted, you can manually tune your ***ALPHA*** to work them, too.

The standard of high power convenience established back in 1974 by the original ***ALPHA 374*** has gone unchallenged ever since. In 1980, ***ALPHA 374A*** and ***ALPHA 78*** are *still* the only linears that offer you *both* maximum legal power *and* no-tune-up convenience. Not to mention sleek "one cubic foot" desk-top packaging. And these newest ***ALPHA's*** are even huskier than their famed predecessors: bigger transformers, quieter and more efficient cooling systems, more robust RF components. ***ALPHA's*** exclusive two year limited warranty is no accident - it tells you a lot about how an ***ALPHA's*** built.

Before you get serious about any other brand of linear, compare its convenience and quality, its transformer heft, its cooling system efficiency and noise level and its warranty - with the ***ALPHA's.*** Be sure to ask around about its reputation.

Call or write for detailed literature and thoroughly check out all the great new ***ALPHA's*** . . . so you don't make a mistake.

ETO

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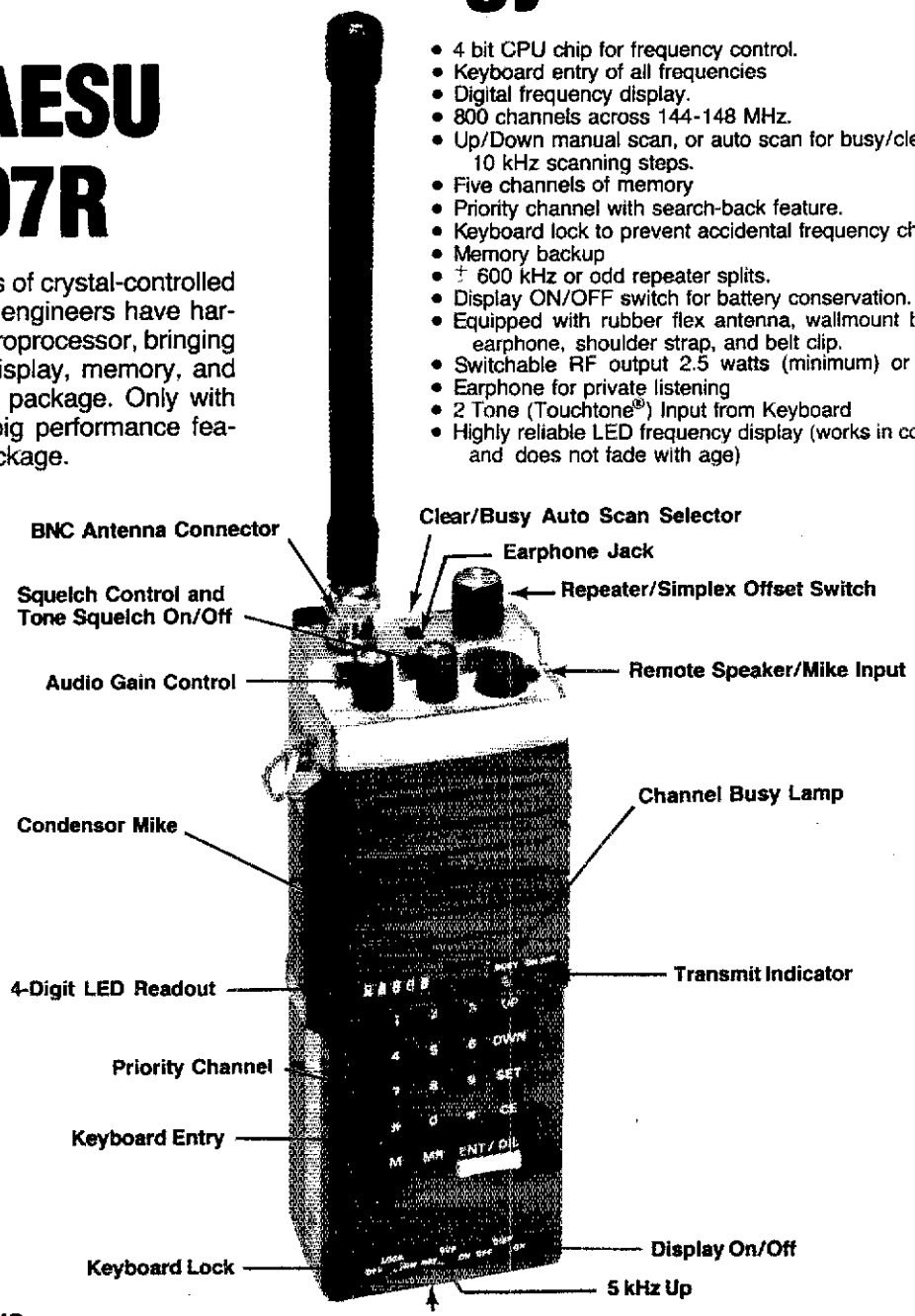
THE YAESU FT-207R

The "horse-and-buggy" days of crystal-controlled handies are gone! Yaesu's engineers have harnessed the power of the microprocessor, bringing you 800 channels, digital display, memory, and scanning from a hand-held package. Only with Yaesu can you get these big performance features in such a compact package.

- 4 bit CPU chip for frequency control.
- Keyboard entry of all frequencies
- Digital frequency display.
- 800 channels across 144-148 MHz.
- Up/Down manual scan, or auto scan for busy/clear channels. 10 kHz scanning steps.
- Five channels of memory
- Priority channel with search-back feature.
- Keyboard lock to prevent accidental frequency change.
- Memory backup
- ± 600 kHz or odd repeater splits.
- Display ON/OFF switch for battery conservation.
- Equipped with rubber flex antenna, wallmount battery charger, earphone, shoulder strap, and belt clip.
- Switchable RF output 2.5 watts (minimum) or 200 mW
- Earphone for private listening
- 2 Tone (Touchtone®) Input from Keyboard
- Highly reliable LED frequency display (works in cold temperatures and does not fade with age)



SPECIFICATIONS:

GENERAL

Frequency coverage: 144-148 MHz
Number of channels: 800
Emission type: F3
Batteries: NiCd battery pack
Voltage requirement: 10.8 VDC ± 10%, maximum
Current consumption:
Receive: 35 mA squelched (150 mA unsquelched with maximum audio)
Transmit: 800 mA (full power)
Case dimensions: 68 x 181 x 54 mm (HWD)
Weight (with batteries): 680 grams

RECEIVER

Circuit type: Double conversion superherterodyne
Intermediate frequencies.
1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 uV for 20 dB quieting
Selectivity: ± 7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

TRANSMITTER

Power Output: 2.5 watts minimum /200mW
Deviation: ± 5 kHz
Spurious radiation: -60 dB or better
Microphone: Condenser type (2000 ohms)

OPTIONS

LC-C7 Leather Carrying Case
YM-24 Remote Speaker/Microphone
Tone Squelch Unit
NB-P9 Battery Pack
NC-2 Quick Charger

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The radio.

180

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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

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Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

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CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6LS, 2814 Empire, Burbank, CA 91504.

INDIANA: South Bend Swap & Shop January 6, 1980 at new Century Center downtown on U.S. 31 Oneway North across from St. Joseph Bank Building. Half acre in one large room at ground level. Food, museum and Art Center in same building. Four lane highways to door from all directions. Talk-in: 52-52 & area Repeaters.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin TX 78766.

$2.70 per 100 (1000 order). 30 original two-color styles. 125 cards minimum. We ship 2-weeks after your check clears or you may have your money back! Satisfaction guaranteed. Send 30c stamps for catalog. VP5QED Press; Box 1523-Boca Raton, FL 33432.

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QSLs, Catalog 45c N & S Print, P. O. Box 11184 Phoenix AZ 85061.

QSLs with class! Unbeatable quality, reasonable price. Samples, 50c refundable. QSLs Unlimited, P. O. Box 27553, Atlanta, Georgia 30327

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

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QSLs — The KØAAB collection plus many new custom designs. Send No. 10, 28c, s.a.s.e. for free samples and prices. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

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fact: the sound of the professionals belongs in amateur radio

Experienced operators recognize that the audio quality of the transmitter is limited by the quality of the input from the microphone. On the air, there's no mistaking the crisp, intelligible messages from Shure microphones.

Shure microphones have been the overwhelming choice of professional communications users all over the world for over 30 years. And, many of the milestone improvements developed for the demanding professionals are found on Shure microphones for amateur radio. Described below are just some of the Shure-developed advances that have eliminated many field maintenance costs common to amateur radio microphones.

ARMO-DUR® Case: Lightweight, immune to oil, grease, fumes, salt spray, sun, rust, and corrosion. Prevents RF burn!

"Million Cycle" leaf switch: Just one of the crucial wear points Shure-tested to insure reliability and extraordinary durability.

TRIPLE-FLEX® Cable: Provides three or four times longer flex life than previously available cords on hand-held microphones.

CONTROLLED MAGNETIC® or Dynamic Transducer: The exclusive Shure-designed super-rugged transducers that give excellent voice intelligiblity and super reliability.

To improve your on-air intelligibility we suggest the following Shure Microphones for amateur radio applications:

	Mobile Application	Fixed Station Application
SSB	414A* 407A* 577A**	444* 526T Series II
FM	414B* 507B* 577B**	450 526T Series II

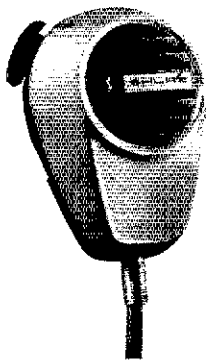
*General recommendation: Consult equipment instruction manual for correct microphone impedance.
**Noise-canceling.

SHURE Fixed Station Mics.

Controlled Magnetic® Fixed Station Microphone (Models 444, 450)
Our most popular fixed station microphones. Unmatched performance characteristics. Adjustable stand raises microphone for most comfortable talking position.

New Transistorized Fixed Station Microphone (Model 526T Series II)
A new design for maximum versatility in fixed station operation. Modulation level (volume) control for high undistorted output with high- or low-impedance inputs.

SHURE Hand-Held Mobile Mics



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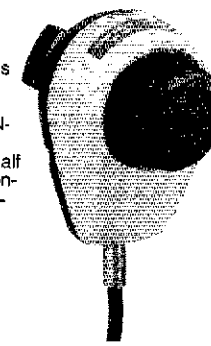

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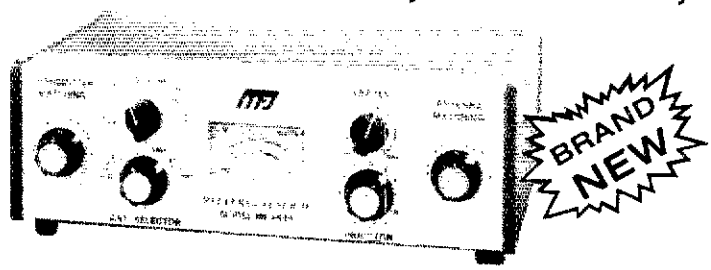

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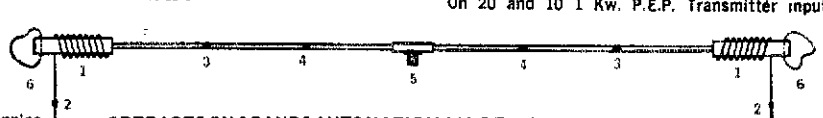

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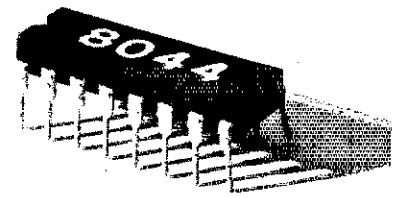

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WILL trade 75 x 125 ft. building lot in northern FL. Can use a Kenwood TS820 or equal. Will sell Viking 2 & VFO. K. Albert, Hubbard, OR, 503-981-4142.

VFO wanted: WRL VFO 775 to match Globe Chief 90A. Phil Harpine P.O.B. 335 Lexington, SC 29072.

KENWOOD TS-520 with cw filter, VFO-520S, Swan 1200-X Shure 444, Heath HM-102 Cantenna, Viking phone patch, Drake TV-3300-LP, B&W coax switch 376, Mosley TA-33 jr., 40 foot crank up tower, CDE rotor, Hustler 4BTV with RMS-75 $1600 or best. KB9AQ 317-842-3368 4430 Cranbrook Dr. Indianapolis, IN 46250.

SELL: National NC77X Receiver, $50. Elco 723 transmitter, crystals, $35. Simpson 55 transceiver, 160- 40 meters, $50. Wanted HW-18. All top condition. KA2BCS, 35 Chamber Lane, Englishtown, NJ 07726.

432 YAGIS by RIW — "Best antenna ever purchased . . . no broken or missing parts like others. Works very well." Bob Drake, W0RAP. "Workmanship on the 432-19 is just beautiful." John Radigan, N8KK. Get your 432-19, the highest-gain, highest-quality 432 Yagi available from: Maury's VHF-UHF, 253 Providence Square, Greenville, SC 29615. 803-288-4671.

HEY! Wilson Mark IV with touchtone, nicads, charger, speaker/mike, leather holster and xtals for 52 direct, 19/79, 28/88, 34/94, 75/15, 78/18, 81/21. Rubber duck antenna and adaptor for PL-259. First money order for $325. Gerli, AC1Y, 35 Brookmoor Road, Avon, CT 06001. Tel. 1-203-667-2494 days Mon-Thurs.

COMPLETE station. Heath SB-104A, all acc, $700. SB-614, $100. SB-644, $100. HW-101, acc, $325. Matching Ant tuner, $75. 2021 2m Handi talkie, $75. Cantenna, $10. GR-78 Gen cov rcvr, $125. Drake 2-NT, $50. AKR keyer, $10. Hy-gain 15 mtr 3 el., $40. (408)-279-1425 days, 259-9648 eves. Jeff WB6EDN.

REALISTIC DX-160 5-band rcvr and spkr. Used little, $80. Jim Brotz, Box 370, Livingston Mnr, NY, 12758.

SELL: Swan slim trap vertical ant. Year old. 28 thru 7 MHz — $25.00 Cant ship. W2EZM, 431 Oakland, Maple Shade, NJ 08052. 609-663-8137.

HEATH SB-303 receiver, cw, am, ssb filters, SBA-104, noise blanker, extra 100 kHz on 80, SB-600, speaker. Marauder HX-10 transmitter. Both mint. Make offer either or both. W3PZ 4971 Parkvue, Pittsburgh, PA 15236.

FT-901 DM, used twice, $1200 or offer; Webster 160 mobile antenna $40. Tatar, 1625 North Park, Cleveland Heights, OH 44106.

DRAKE T4XB transmitter, AC-4 MS-4, mint condition, reasonable offer. Dr. Jonathan Zins, 301 E. 79 St., NY, NY 10021. 212-734-0559.

432 YAGIS by RIW — Two RIW 432-19's break 70 cm terrestial record, July 18, 1979 — KH6HME, Hawaii to WB6NMT, San Diego. Send for info on the highest-gain 432 MHz Yagi available. RIW Products, Box 191, Babylon NY 11702.

BARGAINS: excellent Drake TR-4, AC-4 $420; mint Kenwood TS-520S $545; excellent Hallicrafters SX-122 $195, very good SX-96 $80. With manuals. Returning for advanced schooling. Box 253. Cedargrove, NJ 07009.

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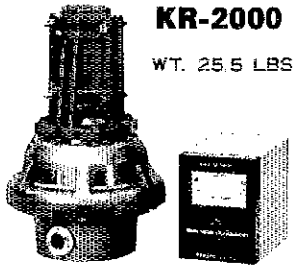
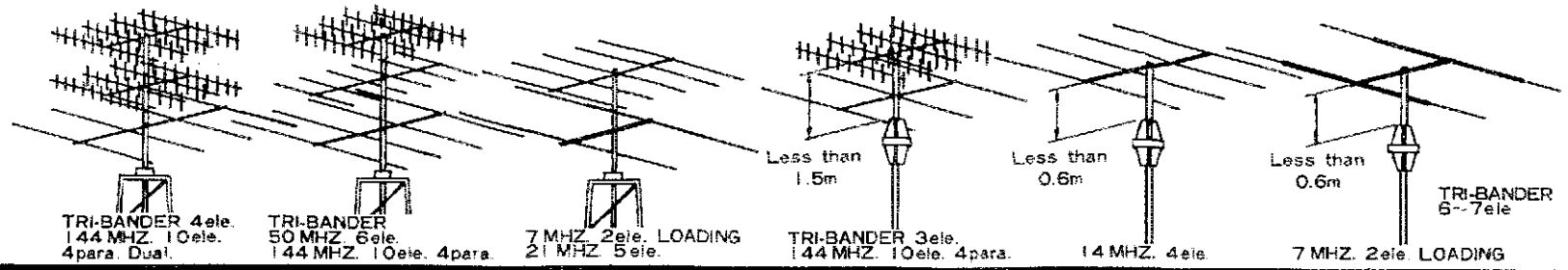


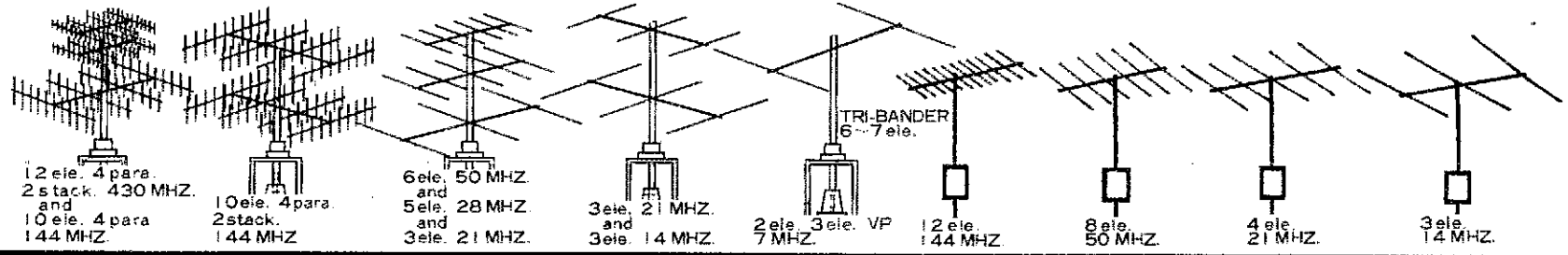
KR-2000

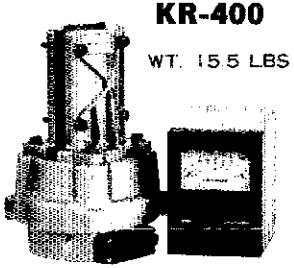
WT. 25.5 LBS



KR-600

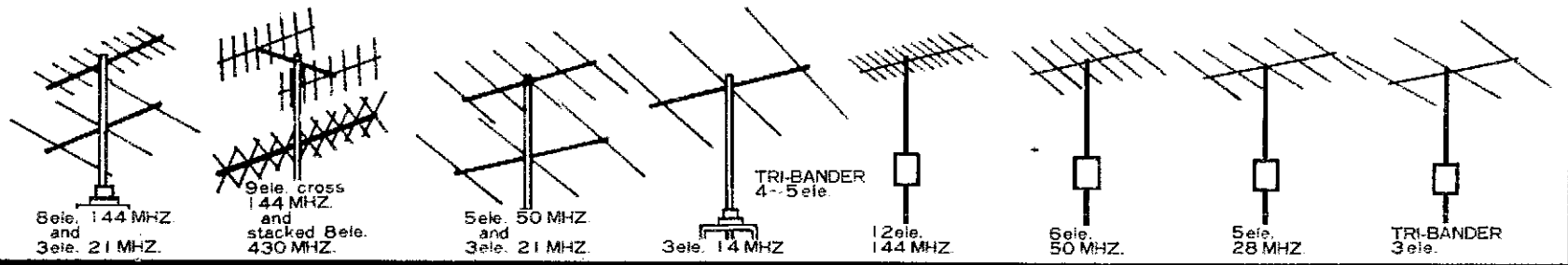
WT. 15.5 LBS

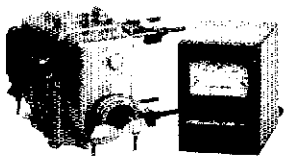




KR-400

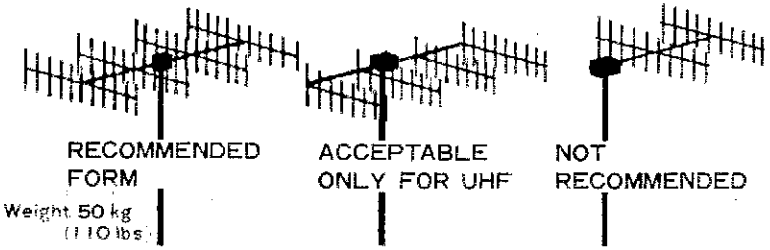
WT. 15.5 LBS

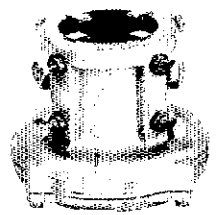




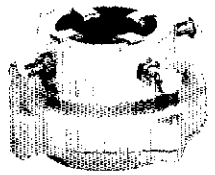
KR-500

WT. 11.0 LBS





KS-065



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FOR Sale. Drake R-4C, T-4X, HB. AC. PS. $750. Net. K7IJF. 843-3547.

NEW, Kenwood TS520S, TR7500, MFJ941, Swan 1040V, extras. Complete $600. Wiener, 96 Claridge Lane, East Islip, N.Y., 11730. 516-277-2461.

FOR sale — SB200 amp. $300., Johnson kW Matchbox, widirectional coupler, $150., Johnson Viking I, w/4D32 final, 807 mod., $75. CQ, 73, QST, most any year or month. $1.50 ea. Tubes; make offer, 6146's, 811A, 813, 4X250, etc. UPS extra W3FGU, Jack Lane, 1701 East Del Rio Drive, Tempe, AZ 85282.

ONLY my friend's recent physical disability makes this top grade equipment available. Purchased new, still in as-new condition, complete with manuals/cables: Collins 51S1F $2050; 55G1 $325; 30L-1 $995; 32S3-A/516F-2 $1775; 312B-4 $425. All round emblem, immaculate. Two Hy-Gain HT-18 10-80 mtr. vertical antennas $195 each (harness for phasing available); two Murch Ultimate Transmatches (UT-2000A) $125 each; Dentron antenna tuner MT-3000A $230; KLM Multi-2700 144MHz transceiver $575; KLM pa 10-140BL linear amplifier $175; VISTA 120VAV 13.8Vdc power supply for above $136. Excellent condition w/manuals. Thomas, W2UK, 201-938-5623.

WANTED: cw keyboard, cw only. Memory not needed. Paul Wise, Route 6, Rogers, AR 72756.

GOV'T Surplus signal generator AN/USM 27B. Sell best offer. sase: D. Testa, P. O. Box 9064-qst, Newark, N.J. 07104.

SELLING out Swan350; Johnson Navigator, Challenger; Hallicrafters SX100; Globe90; DX40, DX60-HG10; Aerotron DX100. K4FCR, Box 5595 Savannah, GA, 31404.

CLEANING house . . . Drake C line mint, 3 filters, NB. $1100. Drake C line $950. Drake SSR1 gen cov. receiver $250. Microlog AVR1, AKB-1, 12" monitor 60-100 wpm RTTY cw & ASCII $550. 7400A $340. Icom 215 $190. Icom 30A $300. New C4console $485. Mint TR7, DR7, PS7, RV7, MS7, WH7. 7077, ser. manual, 2 filters and AUX 7. $1800. New TH2MK3 120. K3UKW - 215-271-8898 - Tony.

CODE practice cassettes — Computer generated, perfect code. High quality, full 90-minute cassettes. QSO tapes very much like FCC code exam. Printed text included. 25 QSOs at 15 wpm order no.C7 — 25 QSOs at 22.5 wpm order no.C8. Other types and speeds available. All cassettes $5.95 each ppd. S.a.s.e. for catalog. MC and Visa welcome. Fast service! K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037. 408-683-0287.

K5YY and OH2BH are coming to the International DX Convention at the Fresno, California Holiday Inn on April 19 and 20, 1980. Are you?

NOVICES: Improve you skill and relax with all-important operating aids on one 11" x 17" sheet; cw abbreviations, Q-signals, punctuation, RTS, UTC & more. $2. postpaid Ralph Foster, WD5KFN, Albany, TX 76430.

ANYONE having a difficult time learning code and operating cw? This like-new visual decoder and electronic typewriter keyboard will help: Pickering 230-D Morse Decoder $1500; Pickering KB-1 Electronic Keyboard Keyer $140; Atronics CR-101 Code Reader $65. Manuals/instructions. Thomas, W2UK, 201-938-5623.

1923 ARBORFONE battery 5-tube table radio $65 W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

SAVE even more: KWM380 Collins; call! TS120S Kenwood $594. TS180S w/o DFC $836. TS180S w/DFC $975. PS30 $125. TR2400 $345. TR7600 $299 TR7625 $339. ICOM 701 w/AC mic $1195, IC-551 $498. IC-211 $649. FT-901DM Yaesu $1169 FT207R $349, FT227RB $349. Alpha Amplifiers 76A $1225. 76PA $1475. 76CA $1636. 374A $1550, 78F special price $1995, Clipperton Amplifiers L $499, GLA 1000 $319 Ten Tec OMNI D $928 TELREX Antennas in stock TB5EM, TB6EM, 6 ELE 20 plus others call for prices Mike WB5USV, The Key Works 1604 Crabb River Rd, Richmond, TX 77469 ph713-343-0487 6:30-10:00 CDT.

AS-NEW QSTs, 11/45 thru 12/75 plus 37 older copies, $135 & COs, 10/54 thru 10/71 plus 10 older copies, $50 & Several older Handbooks and Callbooks $2 each. New Eimac 4E27A/5-125B, $20. W4BBL.

YAESU FT-101B with FV101B VFO xtals & filter $570. Regency HRT-2 Talkie, 5 channels, 2 batteries, charger and case $125. Wanted Heath SB 620 Scan analyzer. WB4RGQ Tom Smith 904-252-2906 after 6 pm.

FT101E, accessories, perfect, prepaid, $585. K5ED, 10529 Springwood El Paso TX 19925. 915-592-6058.

DEFOREST spherical Audion (one loop intact), $125. RCA WD12 (broken tip), $10. WA2KER, 26 Periwinkle Road, Levittown, NY 11756, 516-731-1792.

URGENTLY needed — 1 mode switch for Hallicrafter SR150 - Part #S5-060-002441 VE3-EVP — 1478 Spring Road, Mississauga, Ontario, Canada L5J 1M9.

TEST instruments — Hewlett Packard — HP200AB Audio Oscillator $60, HP711A hvps $50; RCA WR36A Dot-Bar generator $20, WR41B UHF Sweep generator $50; Fairchild 704A Oscilloscope equal to HP130C $175; Precision E200C RF generator $20; Motorola Handi-Talkies H-23-10 and H-23-1 $15 each. WA2EGT 125 No. 9th St. Lindenhurst, NY 11757 516-226-1407.

SALE — New never aired Swan 100 MX, original warranty, $585., N. C. Scott K4HWP, Clifton Forge, VA 24422, phone day 703-862-4264.

HEATHKIT SB401, ST-303 with cw filter. Excellent condition, $400 WAØNLK 319-886-6800.

WANTED: Allied "Ocean Hopper" plug-in coils. WØOGJ, 38 Lawrence Pl., Freehold, N.J. 07728.

TRADE Heathkit HI-Z Touchtone mike for similar LO-Z type, K6HBW.

COMPLETE set transformers for DX-100 new $35 i package, you ship WA5YXS Box 392, Los Fresnos, TX, 78566.

ACCU-KEYER Vibroplex red knob paddle per latest handbooks. Has Heathkit 1416 practice oscillator, all incorporated. Shielded lunch box cabinet, manuals complete $75 paddle cost $45 parts $127. Electrovoice desk microphone 619TR. P-T-T switch. Tiny meter 2 controls in base, compression, gain 9V nicad $35. Cost $89 Cope, 5011 F St, Little Rock AR 501-666-7504.

WANTED — Coils or coil forms any condition for National SW-3 or SW-5. W4EIZ, Box 3927, Gastonia, NC 28052.

SELL, Vibroplex Champion Bug, $30. John Christy, Box 2566, Oxnard, CA 93030.

NEED the room. Will sell DX-60B, VF-1 VFO, HR-10B, manuals, speaker, antenna relay, package $150. WD8PTX 419-634-4404. You ship.

TUBES — 357A, JAN-CDR-808, CRP-715B, RK-715, Jan-cw-715C, Jan-cw-5D21, VT-154, Jan-Cep-838, Make offer. WA2EGT 125 NO. 9th St., Lindenhurst, N.Y. 11575, 516-226-1407

QST's 1921-1978 incomplete. $1 each. E. Moser, Caltech Library, Pasadena, CA 91125. 213-795-6811 x2415.

HEATH SB101, HP23B acps, SB600 spkr. Excellent $300. W4UKU, Jerry, 803-827-1629.

SALE HM-15 Heathkit Reflected Power Meter $11. W7EOO.

SALE — Heathkit receiver HR-10B $80, DX-60 cw/am transmitter $80, both good condition, nice novice station, buy both for $140, Call 7-9 pm EST 704-633-9183 Jim KA4EBW Salisbury, NC

TEN-TEC Triton I xcvr, 80-10 mtrs, 100 wts solid state, absolutely perfect with model 261 matching power supply (with built-in VOX); full QSK, 2 cw filters, etc. $425. Hallicrafters HA-6 50 MHz transverter, 28 MHz input, perfect condx with matching P-26 power supply and built-in Drake low-pass filter (xmtr) and Janel model 50PB MOSFET preamp (rcvr); 180 wts PEP. $175. Also some commercial test gear, sase for list. WB2WIK, 24 Louis Dr., Budd Lake, NJ 07828 201-964-9305 days, 201-691-0557 eves.

40 Foot E-Z Way Crank up/tiltover tower $400 and HT-33B Hallicrafters kilowatt amplifier $500. Both exclt. condx guaranteed, located near Chicago call: 213-820-8113 CA.

SELL Heathkit SB401, SB303 excellent condition $450. WB4YTZ, 2255 Glen Dr., Safety Harbor FL 33572, 813-726-8375.

ICOM-245, fm, cw & ssb, new in carton with warranty & manual, use mobile or base. $495. Ken, K2YKE, 243 Crosby Blvd. Buffalo, NY 14226, 716-834-4083.

HRO-5 coil sets Type B 7-14Mc (2 each), Type C 3.5-7.3Mc, Type D 1.7-4.0Mc. Entire set of 4 with wooden case in gud condx - $40. HRO-M coil sets with bandspread, 9-2.05Mc, 1.7-4.0Mc, 7-14Mc, 14-30Mc, without bandspread, 3.5-7.3Mc, 7-14Mc, $10 each. ART-13 in good condition - $40. BC-221N with ac like new - $60. You pay shipping. W7IFZ, 73 Candlelight Lane, Dover, OH 44622, 216-343-8168.

WANTED — Heathkit Spectrum Analyzer (SB-620) mint only WA5HRC Geo. Bailey, 600 W. Krehl, N.L.R. AR 72116.

KENWOOD TS820 & Digital & cw filter & 12 volt p.s. & MC-50 mike, mint $900 VFO-820 $90 SP820 $40 AT-200 $100 WA2TFT, 914-834-4295.

SELL or trade for R390A or similar general coverage receiver: NLS LM 3.5A digital meter $100, CP-1 crystal pack $160, Skipjack keyboard $150, Simpson 260 VOM with mirrored scale and transistor checker $85. Two 4-100s and assorted linear amplifier parts, sase. N1FB, 4 Roberts Rd., Enfield, CT 06082.

H.Q.-170 triple conversion receiver plus speaker. Good condition. U-ship $150. James Stafford, 2125 Chandler Ave., Fort Myers, FL 33907.

ICOM-701 International Users' Club. Details sase N8RT, Pohorence, 9600 Kickapoo Pass Streetsboro, OH. 44240.

FOR sale: Collins 30L-1 excellent condition with 572B tubes. Bob, AA6RF, 1-213-789-0809.

RADIO Shack DX-150B allband receiver, mint condition, $45, plus postage. K2RG, 10 Rose Court, Dover, NJ 07801.

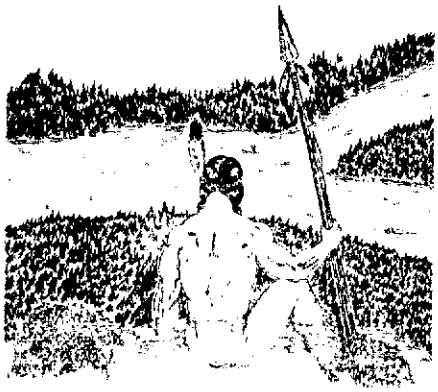
SELL: Robot 400, New $600 DGM MVD-1000, new 350 (with RTTY option) Sanyo CCTV monitor new $150 WA1WED.

YAESU FT-DX-400 transceiver -$300, Yaesu FT-7 mobile transceiver - $375, Hy-Gain 18AVT vertical - $45. All excellent condition. W6GZG, 18450 Ogilvie Dr., Castro Valley, CA 94546, 415-537-2839.

SWAN 500CX, 117XC supply, 508 VFO, MFJ CWF-2 cw filter, all exc condx w/manuals. $550 package. Call 215-929-8847, John, WA3LFY, 706 Alton Ave, Reading, PA, 19605.

WANTED: Hallicrafters FPM 300, Mark II "Safari." W6OWD, 415-728-7136.

MORSE video display, DGM electronics MVD-1000, works with any ordinary TV, 3 months old, cost $365, sell $265, firm. Sony 8 1/2 in. TV, AC-DC, works well with the MVD-1000, 3 months old, cost $150, sell $100, firm. Ask for Lou. 518-372-5108.



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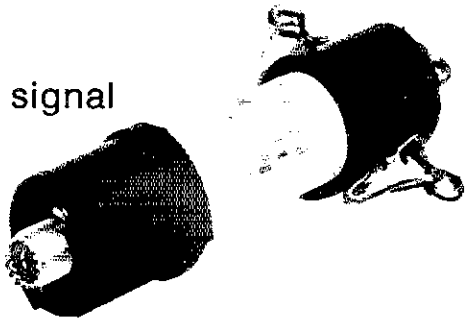

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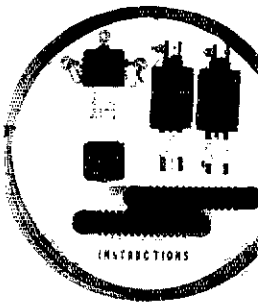

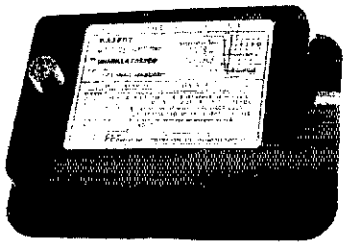

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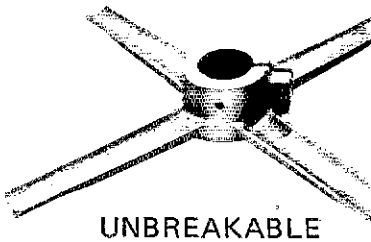

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YAESU FT101B with G3LLL processor $475 K2VV, 518-843-3897.

FOR sale — best offer: Heath DX-60, 90W, cw-am; Knight T-150, 150W, cw-am, VFO; Hammarlund HQ-110C, ham bands, clock. All manuals. Excel cond. WD9HZK, Varna, IL 61375. 309-463-2318.

FOR sale: Yaesu FT-101B with FV-101B VFO, ac/dc, fan, filter, xtals, $600.00 Heath HR-1680. First $100.00. Manuals included, will split shipping. Steve, WB4OMM, 904-767-4833 days.

SELL: S-F Enterprises Custon Radio Desk, teak finish with glass top, $65. Eico Model 717 electronic keyer, $20. Atronics Code Reader, $75. Set of Hustler mobile resonators with mast, 80-10 mtrs, $35. Homebrew 1kW amp (4-400 A's), make offer. WB6WQA, 213-379-5151, evenings.

FOR sale: Yaesu FT401B ssb transceiver 80-10 meters with matching external speaker and desk microphone. All excellent condition. $550. Call Judy, WB2QXY, 516-585-4951.

HW-101 with HP-23 and HP-13 mike and speaker. Factory aligned. Vertical and mobile antennas. Used mobile less than 8 hours. First certified check for $450 takes. Offers welcome. Will ship U.P.S. Also two BC-611F (WWII walkie-talkie) one works one doesn't - make offer. Ron Van Noord, WA6LVO, 2377 Bluebell Dr. Livermore, CA 94550 415-443-7644.

YAESU FT-221 fm/ssb/am/cw xcvr, tunes 144-148 MHz, 12/110V. operation $375/offer N6OE, 213-794-7323.

TELETYPE ASR-35 excellent-no modifications - $650 -K2BUF - call 518-463-7229 evenings.

HEATH: SB610 scope $95, HD-15 p. patch, $15, HM-15 SWR, $15, Cantenna & oil, $15 cabinets for SB102 $10, SB600 $5 Murch UT200A x-match $100 Drake TV-1000 LP filter $5 John - WA2TFT 914-834-4295.

YAESU, mint, FT 101E w/fan cw filter, FV101B VFO, $675 W2KAI 201-697-3225.

20M ssb CLASSIC: Heath HW-32A, HP-23C, mike, Fan, spares, calib, mint; $140. MFJ speech processor, TenTec case; $49. Custon ARC-5. 200W matchbox; $39. RME DB-23, 6 tubes, $25. All: $222. 80m ARC-5 conv. rcvr./ps., $25. Hank, WA2OVG, 212-490-2160 day 796-8617 eve

OZARKS retirement? Ham's hilltop home for sale. Easy care, two bedroom. Fireplace. Garage. Custom radio room, shop and den in basement. On State Road, overlooking Table Rock Lake. HAAT 310 Ft. Great DX on HF and VHF! Realtor Ernestine Brewster, WBØQBH, Shepherd of the Hills Realty, Kimberling City, Missouri 65686. 417-739-4333.

FOR sale: Years of experimenting stock. RF power transistors, broadband xformers, toroids, pin diodes, ceramic capacitors, loads, transmitter components, ceramic tubes. J. Enber, Box 964 Newbury Park CA 91320. Sase for list.

HW101 and HP23A. Finest kind, cw and ssb filters, both manuals. Check out by professional - me $340. W1JE 6 Locust Grove Road, Harwich, MA 02645.

KENWOOD TR7400A 2m-fm $275 Heath HM2102 VHF wattmeter $25 John - WA2TFT - 914-834-4295.

WANTED — Heathkit HR-10B receiver, DX60 transmitter. Call Ron, N5GP, 1-713-539-3808, 1510 Oddfellow, Apt. 10 Conroe, TX 77301.

QST in QST binders — 1935 thru 1939, $25/yr, 1941 thru 1952 $15/yr, and CQ 1947 thru 1952 $10/yr. Add $2/yr UPS. Want old model engines. CJ Hoyt 598 S. Edgewood Ave. Jax, FL 32205.

HT-220 — Motorola 450 MHz 6 Freq 1 watt, PL good condition $500 or trade. K6YS 7829 Robinette Rd. Sacramento CA 95828 916-426-2881.

FOR sale: Mint Drake TR4-C with ac supply - $595 money order to Lee Nelson, Box 53952, Lafayette, LA 70505

FOR sale: Ten-Tec Triton IV 80-10M xcvr. 18A powersupply w/VOX, noise blanker, 150Hz cw filter, digital display, microphone, key. Originally $1,130. asking $900 or b/o. Joseph Boykin 1897 N. Fourth st., Apt. A. Columbus, OH 43201, 614-291-7391.

MURCH transmatch for sale. Built-in meter. Like new, $120 W2DPP evenings 212-288-7714.

YAESU FT-901DM/FV-901 with latest modifications, cw filter, 50 operating hrs. $1400 WA1BFO 207-873-4663 or 207-289-2275.

FOR sale: Mint Wilson MkII with batt. pak and BC-2 charger unit - $245 money order to Lee Nelson, Box 53952, Lafayette, LA 70505.

WANTED pocket pager. High or low band, low if possible. Steve Siske, Box 551, Hazelwood, NC 28738.

SONY portable TV 4" screen b/w ac/dc rechargeable batt., excellent cond. $80. FRED, 213-664-2388.

FOR sale: Hallicrafters SR-2000; complete, best offer over $495. W5LR, 2203 Sweetpea Lane, Arlington, TX 76011.

WILSON 1405-SM, seven channels, touchtone, case, charger, extra nicads. $225. Armand Bakalian, 8746 Little Neck Parkway, Floral Park, NY 11001. 212-343-7565. Business - 212-383-2430.

WANTED: Operating instructions for Hallicrafter SX-99. Glen Larsen 34911 Buena Mesa Dr. Calimesa, CA 92320.

KENWOOD TS 820s/cw filter, mint, 2 yrs old. $800, or best offer. WD9BHK or WD9GGY 312-799-6135 you pay shipping.

COLLINS wanted: S-line, KWM2A, 30L1, 30S1, any condition. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

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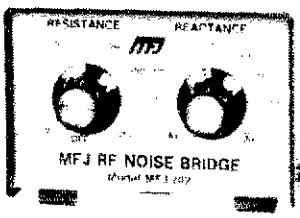

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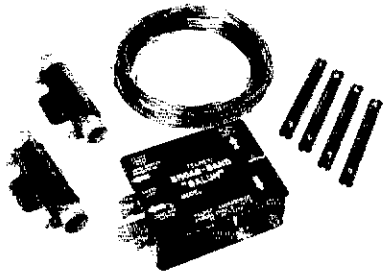

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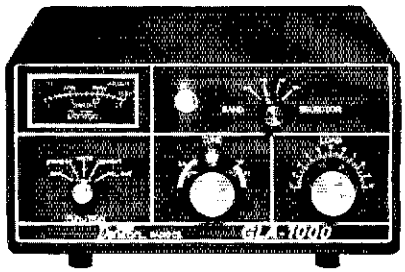

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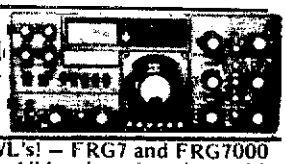

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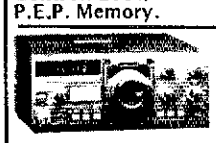

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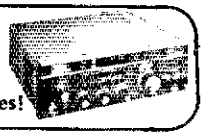

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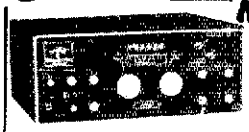

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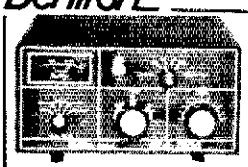

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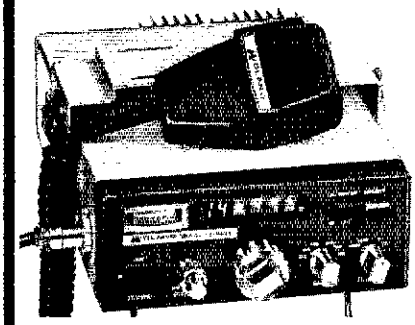

MIDLAND 13-510A 2m FM Xcvr. 12vdc, 25/1w, 143 - 149 MHz. PLL synth. for 600 freq. in 10 KHz steps + 5 Khz shift-up for 600 more. 4 offsets, + or - 600 KHz and 2 opt. FET front w/ high-Q resonator filter and ceramic IF filters. LED readout. Polarity/ VSWR protected. Jacks for tone burst, discrim. meter & ext. speaker. S/RFO meter. Covers MARS & C.A.P. adjacent to the 2m band.

Regular Price $399.95 . . . . **CLOSEOUT $329**

MIDLAND ANTENNAS	reg.	NOW
18-940 2m 5/8 trunk/roof mt . . .	$ 31.95	15.00
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18-951 220 5/8 magnet mt	37.95	19.00

Quantity Limited. Order Direct from this ad. Send Check, Money Order or call TOLL FREE and use your Mastercharge or VISA. Allow $6 for UPS shipping and handling in thee 48 states.

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ORLANDO, FL 32803; 621 Commonwealth Ave.
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Florida in-state WATS: 1-800-432-9424

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ERICKSON COMMUNICATIONS, INC.
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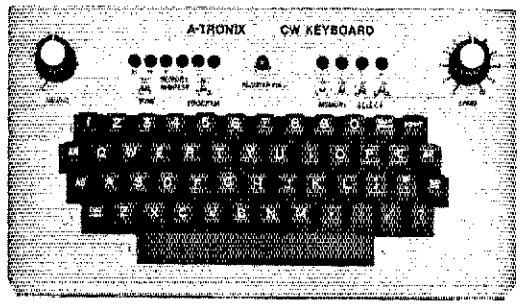
NEW — 64 CHARACTER BUFFER
CW KEYBOARD

32 CHARACTER PROM $15.00



256 CHARACTER ERASABLE MEMORY $95.00

- Perfectly timed code automatically
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- Easy as typing a letter

Call or write to order or request specifications. $249.00 plus handling. Mastercharge or Visa accepted. 23151 Alcalde, Unit C-6, Laguna Hills, CA 92653.
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Unique
WIRE TUNERS

IMPROVED
Random Wire Antenna Tuners

Continuous frequency coverage with long or short wires. Excellent for MARS operation. Choice of configuration for wide range impedance matching capability, plus harmonic suppression. Turns counting dial on rotary inductor for **perfect** match and exact resetability. Runs cold at 1500 watts **output power.** Nine years of proven performance.

- **CONTINUOUS COVERAGE**
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- **IDEAL FOR MARINE OR PORTABLE**
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SOLD FACTORY DIRECT ONLY TO GIVE YOU FULL VALUE.
Prices F.O.B. factory.
Standard: 3.0-30.0 MHz **$119.00**
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W6's add state sales tax. Send check or money order ($15.00 deposit on C.O.D.'s) to:

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AUTOMATIC CW COPIER

Now you can copy the fast CW stations. The NEW professionally designed DE-150 plugs into a transceiver's earphone jack & automatically displays Morse code as it is being received. New characters are entered from the right and shift left giving a continuous easy to read display of the latest code received. $425.
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SALE: Dentron Super Tuner Plus, new, $125. + ship. *Plane*. 20 Pennsylvania Ave., Niantic, CT 06357.

ESTATE of KB3AK, Brand new SB104A, SBA-104-1 SB604, PS1144. Equipment was aligned by Heath and never used. $700. W2GRN 516-354-5550.

SELL: Kenwood TR-7200A with 20 pair xtals - $175. St-6/XTK-100 $225. Motorola HT-220 with portable clinic synthesizer and 16 button TT pad other extras $525. Richard Duntley, K1EVU, Westbrook, ME 04092. 207-865-6558.

CENTURY 21, crystal calibrator - mint $300. KA4IAW, 2502 Mahan Dr., Waycross, GA 31501 - 912-285-3327.

NEW and unique computer generated up to the minute DXCC listing. Incorporates on each page: worked and confirmed checks. No coloring, confusing squares, just a very simple and unique way of determining 5 Band worked and confirmed. Each listing includes your call, name, station location, and your geographical beam heading. Satisfaction guaranteed. $5. payable to "DXCC LIST" c/o The Lake County Amateur Radio Club, P.O. Box 1909, Gary, Indiana 46409. Please allow 3 weeks for delivery.

KWM-2 (winged) with built-in Waters rejection notch, 516F2, and 399C-1 remote VFO. $700 or make offer. K2HNW, 1366 McClellan St., Schenectady, NY 12309, 518-393-8825.

SELL Heath SB-104A with nb, cw filter, power supply & speaker. Excellent condition. $525. You ship. W6OWD, 415-728-7136.

SB101, cw filter updated to 102, ac supply, HP13 dc supply, SB640 remote VFO. Excellent condition.

WANTED — Heath, AT-1 transmitter, AC-1 antenna tuner, and VF-1 VFO, or any one of the above. Give price and condition. William White, KB6SI, 1412 Eltham, Fullerton, CA 92633.

SB-650 frequency display $140. 4-chan 60W Progline $45. Both negotiable. W4NEZ/4 703-360-7357.

SELL: Kenwood TL-922A. Never used $1000 cash. You pick up. George Diament, 15 Rugby Lane, Bridgeton, NJ 08302. 609-455-4912.

WANTED — 2 geared knobs, plate and tuning, for KWS-1 transmitter. Call collect - 1-305-287-2960 Ralph Hough, K4VNL, Box 595, Port Salerno FL 33492.

WANTED: Old Vibroplex and Speed-X keys for parts. KA5Y 417 Ten Mile, Desoto. TX 75115.

TUBES. Selected and matched driver/finals sets for: FT101, Tempo, Drake, Swan $21. FT901, FT101ZD, Kenwood, Heath, Collins $19. Dentron GLA $33. We carry complete replacement tube sets for most rigs. Power tubes: 4cx250B, 572B $33. 3-500Z $86. 8874 $137. 8877 $275. All tubes ppd. January equipment specials: Yaesu FT101ZD $750. Icom 211 $725. KLM Echo 70 $340. SST, Ltd. 423 Cornelia Street, Boonton, NJ 07005. 201-334-1723 weekdays.

HW-202, HW-12, matching power supplies, mikes, speakers. Mint codition - $125. each. R. Luedke, 4525 Cove Circle, #304, St. Petersburg, FL 33708.

I will assemble and test your Heathkit. Please write for details or quotations. Paul Preidecker, WA5WBF, 4123 Durness, Houston, TX, 77025.

FOR sale: Kenwood TS-520 with ac/dc capabilities. Mint condition in original carton. Very little usage $500. 901-743-0951, WB4MNW, 1555 Galveston St., Memphis, TN. 38114.

WANTED: Penwood "Tymeter," working. W6BE.

VIBROPLEX "Original" bug 25., Drake 2NT 75., Realistic DX-160 75., Hallicrafter SX-110 75., plus shipping. K4JCX, 121 Maple, Oak Ridge, Tenn. 37830.

FOR sale Yaesu FT-101, excellent condition - like new, $475. Ronald P. Davis, 1006 N. Division, Creston, IA 50801 515-782-5274.

WANTED — Swan 2-meter transverter. 220MHz beam new $25. WD4NCF - 502-465-8763.

NEW: IC245/ssb $479. TS820-S, PS-30 $1069. VFO-120 $125. MB-100/SP-120 $25. AT-100 $89. AT-200 $119. FRG-7000 $299. FR-101 $399. Dentron 160-10-AT $95. 351D-1 $35. 351D-2 $59. 516E-1 $50. 4-PR1000 $100. 4-CX1000-A $150. 4CX250-B/4CX300A/4CX350A $25. Xtals: Icom/Kenwood $2.50. 4 Used: 312B4 $275. 312B5 $575. 30L2 $575. 399C1 $265. ITT-MacKay 3010-C (0.7-30 MHz) $675. TEK-535 $210. NCX-3, acps, $200. HT37 $115. IC22A, IC3PA $150. IC230 $229. KWM2-A, 516F-2 (4 yrs old) $1500. James W. Craig, Jr., Box 615, Portsmouth, NH 03801, 207-439-0474; 603-436-2884.

FOR sale: Complete Drake B-line, $500 or offer. Collins 75A-4 receiver, serial number above 4,000, $325. Johnson Viking Ranger Xmtr, $75. Heathkit SB-200 linear amp, $250. Vintage Pre-1940 Hammarlund receiver, make offer. Contact Tim Martinec. 551 N 200 E, Provo, UT 84601, 801-377-0255.

SB-104A with n.b. 400 Hz cw filter matching speaker and power supply few hours running time, mint - $700. O.F. Craggs, Baird Ave, R. D. #7, Meadville, PA 16335 — 814-724-2497.

B. & H. T.V. course, $47.50. Inquire K7ZAB, Box 245, Ashfork, Arizona 86320.

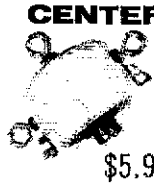
ANTIQUES! Weston tube, set tester Model 566, UX/UY sockets, two meters, $50. Magnetic modulator, RCA/GE, $20. Variometer, "SE-AR-DE," $20. Grid leaks $1. Fixed capacitors, Faradon, Dubilier, Micamold, Aerovox, Sangamo, $1 each. Antenna insulators $1 up. Modern minicomputer Motorola MEK6800D2, book, cw programming, $100. Heath HW-32A 20M ssb, HP-13A, hump mount, mike, $150. SBE-34 80-15M, ac/dc, mike, $200.

HI-Q BALUN

- For dipoles, yagis, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz.
- Small, lightweight and weatherproof
- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector

$10.95

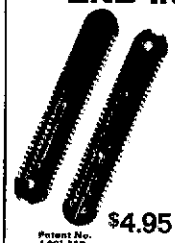
HI-Q ANTENNA CENTER INSULATOR



Small, rugged, lightweight, weatherproof.
Replaces center insulator
Handles full legal power and more

$5.95 With SO 239 connector

HI-Q ANTENNA END INSULATORS



Rugged, lightweight, injection molded of top quality material with high dielectric qualities and excellent weatherability. End insulators are constructed in a spiral unwinding fashion to permit winding of loading coils or partial windings for tuned traps.

May be used for
- Guy wire strain insulators
- End or center insulators for antennas

$4.95
- Construction of antenna loading coils or multiband traps

Patent No. 4 091 350

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80/75	130	$28.95	$24.95
D-40	40/15	66	25.95	21.95
D-20	20	33	24.95	20.95
D-15	15	22	23.95	19.95
D-10	10	16	22.95	18.95
Shortened dipoles				
SD-80	80/75	90	31.95	27.95
SD-40	40	45	29.95	24.95
Parallel dipoles				
PD-8010	80,40,20,10/15	130	39.95	35.95
PD-4010	40,20,10/15	66	33.95	29.95
PD-8040	80,40/15	130	35.95	31.95
PD-4020	40,20/15	66	29.95	25.95

Dipole shorteners - only, same as included in SD models

S-80	80/75	$11.95/pr
S-40	40	$10.95/pr

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center Insulator, No. 14 antenna wire, ceramic insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

Antenna accessories—available with antenna orders

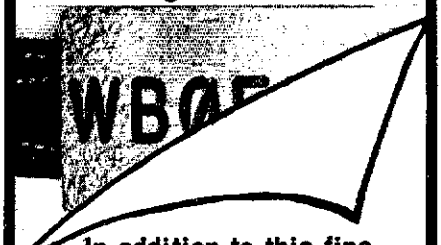
Nylon guy rope, 450# test, 100 feet	$3.49
Ceramic (Dogbone Type) antenna insulators	.70/pr
SO-239 coax connectors	.75

All prices are postpaid USA 48
Available at your favorite dealer or order direct from

Van Gorden Engineering
BOX 21305, S. EUCLID, OHIO 44121

Dealer inquiries invited

Thinking about GIFTS?



In addition to this fine buckle, we now have NEW smaller size buckles, tie clips, belts, etc., PLUS.... several items for the ladies.

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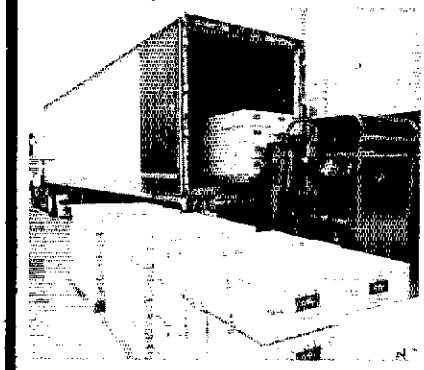
"Old Price" Sale



When we heard that DenTron was raising prices on the Clipperton and MLA-2500B linears, we sent our Semi to the factory to pick up a TRUCK LOAD full.

We bought at the OLD PRICE so we can give you the OLD PRICE plus a good DISCOUNT too. Check the Savings!

MLA-2500B 2 Kw Linear

*Reg. $999.50 - **Sale $799***

Clipperton-L 2 Kw Linear

*Reg. $699.50 - **Sale $539***

Quantity Limited. Order Direct from this ad. Send Check, Money Order or CALL TOLL FREE and use your Mastercharge or VISA. Allow $20 for UPS shipping & handling in the 48 States.

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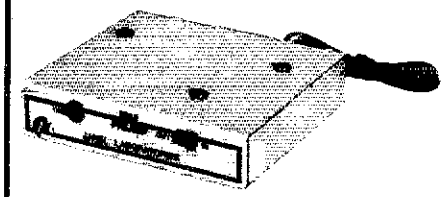
ENJOY VHF/UHF WITH JANEL ACCESSORIES 2 METER PREAMPS



QSA5	With auto-switching for Transceivers	$41.95
PM-1	Miniature module	16.95
144PB	Classic Preamp	21.95

Other Preamps

Outstanding JANEL quality—the result of careful assembly and thorough testing of each unit.

30PB	28-30 MHz	$21.95
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53PB	52-54 MHz	21.95
220PB	220-225 MHz	21.95
432PA	420-450 MHz	33.00
432PC	432 MHz, 2 dB NF	54.95
432PE	432 MHz, 1 dB NF—Write for details on this super preamp	90.00

CONVERTERS

Receiving Converters for serious VHF/UHF operation. Ideal for all modes including OSCAR. High out of band rejection and overload resistant.

144CF	Deluxe 2 meter receiving converter, 2 dB NF	$ 79.95
432CF	Deluxe 432 receiving converter, 2.8 dB NF	79.95

Accessories

01-A	10 MHz Precision Oscillator .2 ppm	$ 79.95
432FA	6½" tuneable High Q Cavity Filter .5 dB loss	105.00
432FA.2	Cavity Filter as above but .2 dB max. loss. Can be used ahead of 432PE preamp	115.00
ISOLINE	2 Meter Antenna Isolator for vertical beams	14.95

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Please add $1.40 shipping and handling on all orders. Prices shown are for USA only. Write or call for FREE CATALOG showing our full line of Preamps, Converters, and Precision Oscillators. Export inquiries (except Canada) should be sent to Extech Ltd., 5319 S.W. Westgate Dr., Portland, OR 97221

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Hickok 410B rf vtvm, $50. Rockwell-Collins mechanical filters F455FA21, $50. Heath HW-2036A, ttp, $200. Gene Hubbell, W7DI/W9ERU, 6633 E. Palo Verde Lane, Scottsdale, AZ, 85253, 602-948-7413.

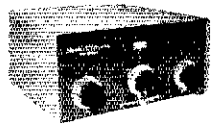
TRANSCO-Y UHF ant relay (432Mc) kw, low SWR/isolation $65. Preamps: Janel 432PC, 25-30dB s/n 1.5-2.0 $45.; 30PB (10M) $16. W6RQZ, 1330 Curtis, Berkeley CA 94702.

YAESU FRG-7 gen cov synthesized rcvr (List $370.) $295 (W6RQZ 1330 Curtis Berkeley, CA 94702.

HEATH SB-220 $495. Kenwood TV-502 transverter $160. Kenwood TS-900, VFO-900, PS-900, filter $650. Dentron 160-10AT tuner $130. Icom IC-230, $200. W7ND, 303-776-2366.

NEW FROM MURCH ELECTRONICS

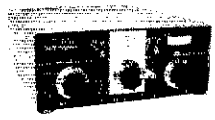
MODEL UT-2000A
ULTIMATE TRANSMATCH



Similar to the one in Lew McCoy's article July 1970 QST

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers.
- 80-10 continuous, including MARS.
- Rotary inductor with turns counter for precise and rapid tuning.
- Full legal power, 4,000 volt capacitors.
- Use with any SWR/wattmeter.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $139.95 + shipping.

NEW — MODEL UT-2000B

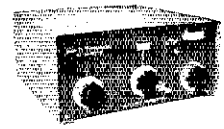


- Continuous coverage 160-10 meters.
- Rotary inductor with turns counter.
- Three core balun, 4,000 volt capacitors, full legal power.
- Built-in line sampler for precise tuning.
- No external meter required.
- Use with any antenna.
- Function switch — in, out, dummy load (not supplied), ground.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt. $218.50 + shipping.

MODEL 68A
MULTIBAND ANTENNA 10-80M

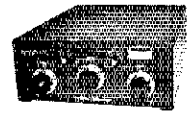
- Field proven 4 years.
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead.
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch.
- 2000w P.E.P. $44.50p.p.

NEW — MODEL UT2000A-LS
ULTIMATE TRANSMATCH



- With all the features of the popular UT-2000A.
- Plus built-in LINE SAMPLER for precise tuning.
- No external meter required.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $168.50 + shipping.

NEW — MODEL UT-160M
& UT-160MB



- 160-10 meters.
- CERAMIC inductor tapped every turn each band, no burn out.
- Heavy duty switch.
- Built-in line sampler for precise tuning, no external meter required.
- Function switch — in, out, dummy load (not supplied), ground.
- Full legal power.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt.
  UT-160M (less balun) $164.50 + shipping
  UT-160MB (with balun) $179.50 + shipping

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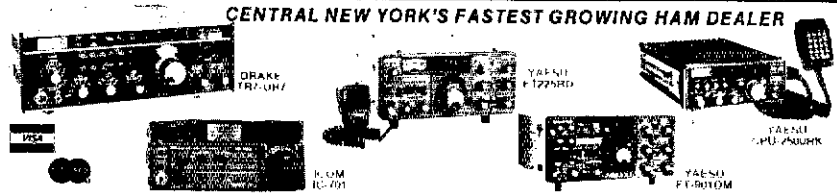

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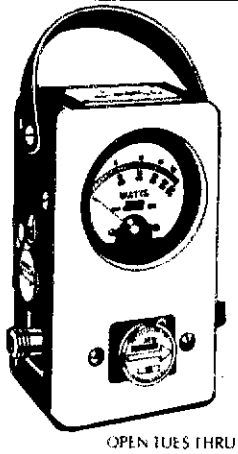

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pressor $35; Heath HM-102 $30; all ppd; W8FDN, 371 Claymore, Cleveland OH 44143.

GONSET 2 meter Sidewinder CW-ssb 10 watts with a.c. p.s. $150 KLM 10-35 420-450 MHz amplifier $125. W2HG 114 Atlee, Rochester, NY 14626 716-225-6754.

CRYSTALS: Novice-General. All frequencies, FT-243, 7000 - 8700 kilocycles $1.50, minimum five $1.25 each. 3500 - 4000 $2.95, five $.250. Airmail-FC 20c per crystal. "Crystals Since 1933". W9LPS Stamp for 160M-2M Listing-circuits. C-W Crystals, Marshfield, MO. 65706.

COLLINS filter F455J-40 $100, F455J-05 $125. Marvin Partin, K4FPV, Rt. 8 Fayetteville, TN 37334, 615-433-3791.

GENERAL coverage Yaesu FRG-7 mint condx used 4 hrs., orig. carton, manual $275 W1CJ/4 408 Woodberry Dr. Chesapeake, VA 23320 804-547-4048.

COLLINS 52S1-F 2-30 MHz receive - (round emblem #7390) with matching 55G1 VLF/speaker. Complete that S-line with this mint receiver $1200. Bob, WA6ERB 451-1 Via Casitas, Greenbrae Ca 94904 415-461-3209.

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FOR sale: Kenwood R599D receiver and speaker S599 $295 TenTec Century 21 CW transceiver $220. New Morgain assembled dipole for 40 and 20 meters $35. Shipping paid George Konnick, Apt. C-5, 1750 West Main Street, Riverhead NY 11901.

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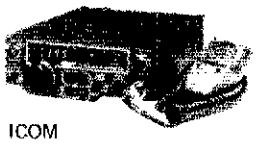

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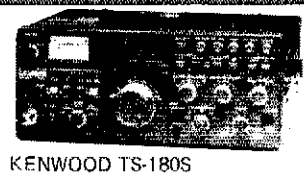

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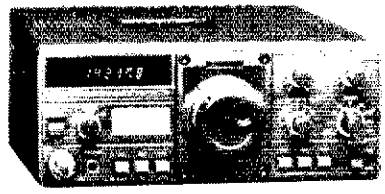

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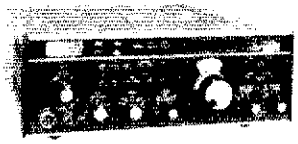

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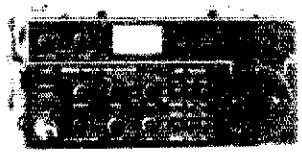

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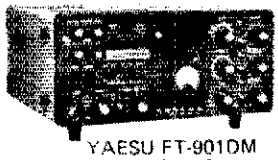

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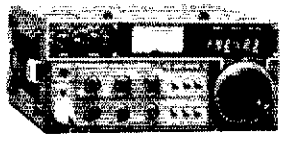

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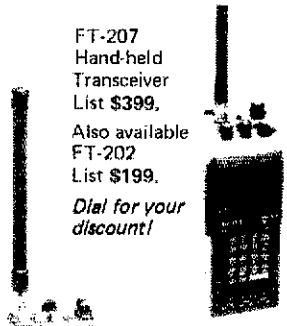

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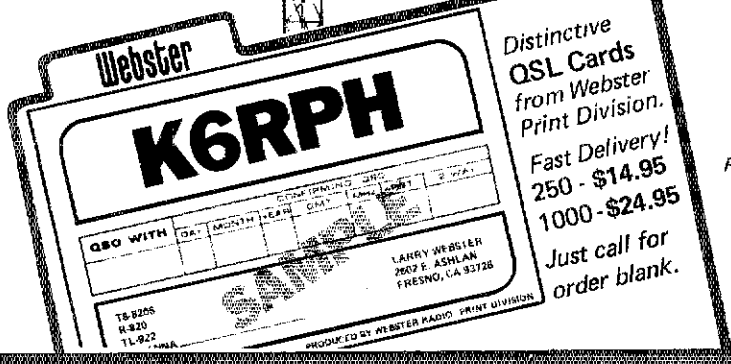

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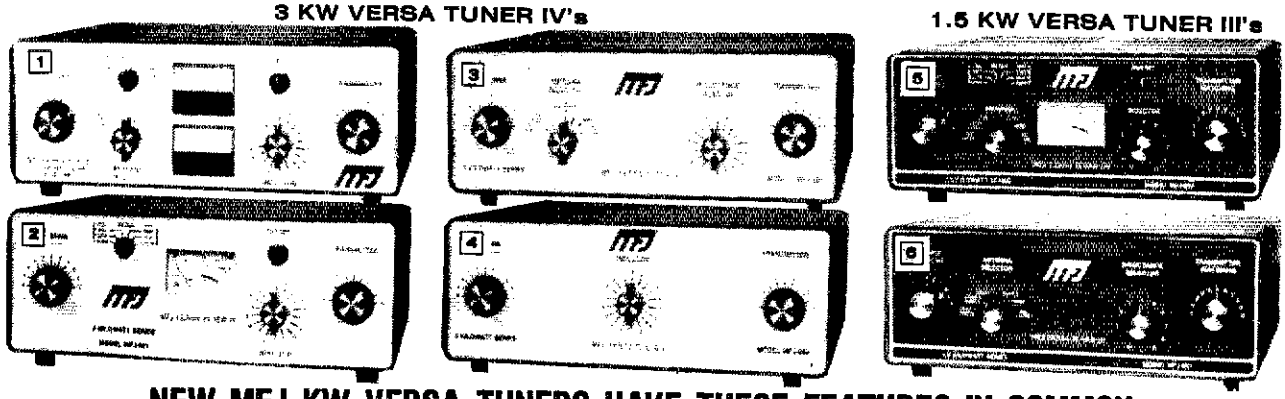

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Efficient, encapsulated 4:1 ferrite balun. 250 pf, 6000 volt capacitors. 18 position dual inductor, 17 amp, 3000 V ceramic rotary switch (3 KW version). 12 position inductor, ceramic rotary switch (1.5 KW version). 2% meters. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. One year limited warranty. Made in U.S.A.

3 KW VERSA TUNER IV's

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This is MFJ's best 3 KW Versa Tuner IV. The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

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The MFJ-981 3 KW Versa Tuner IV is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

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Black front panel has reverse lettering.

6 MFJ-961 1.5 KW Versa Tuner III

$149.95 ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

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- Bright Digital Readout
- Fixed crystal position
- 2 auxiliary bands for future expansion
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FT-707 with Optional FV-707DM & Scanning Microphone

- Choice of 2 rates of scan
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