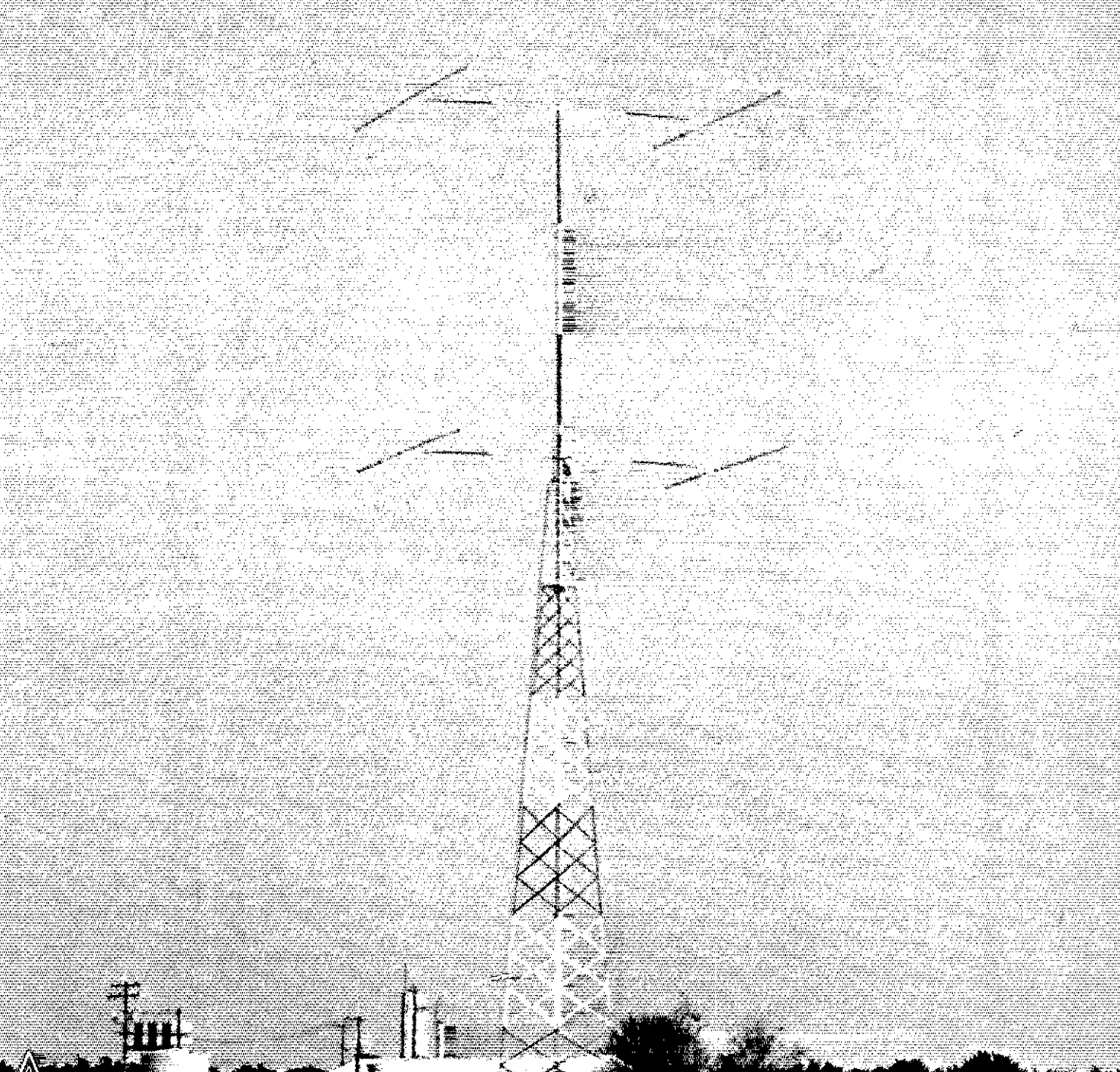


# QST

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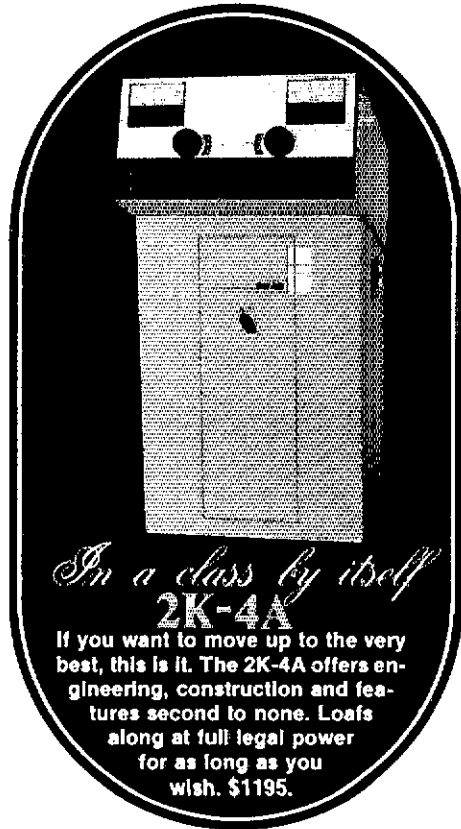
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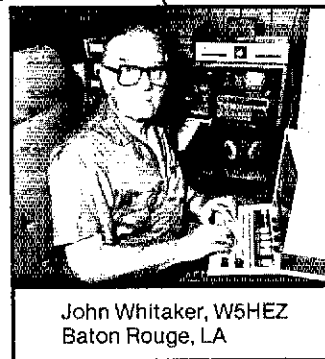
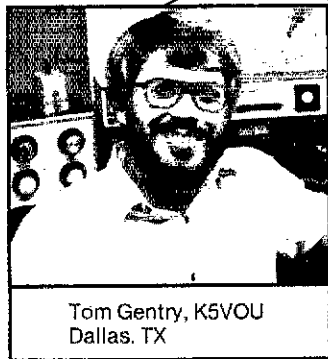
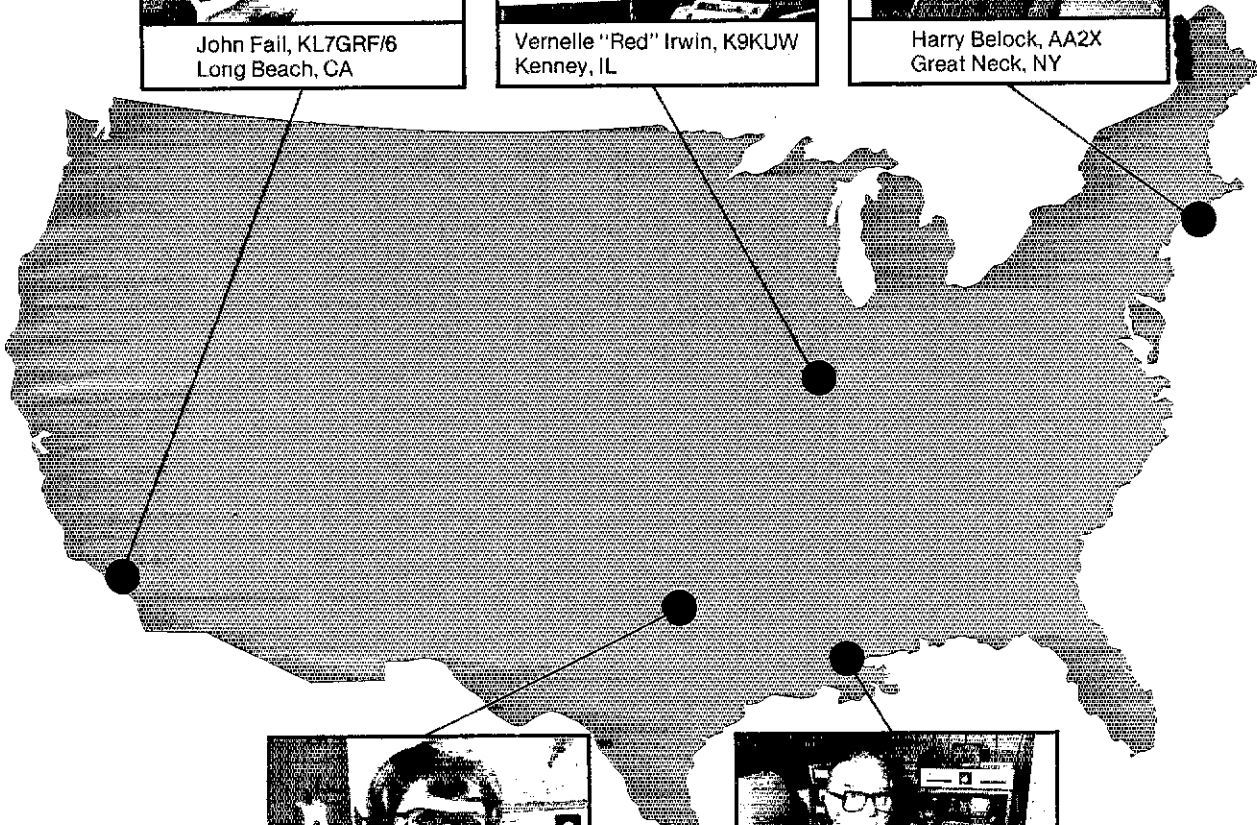
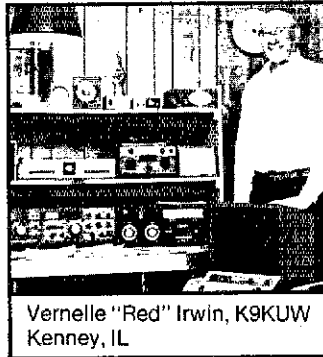


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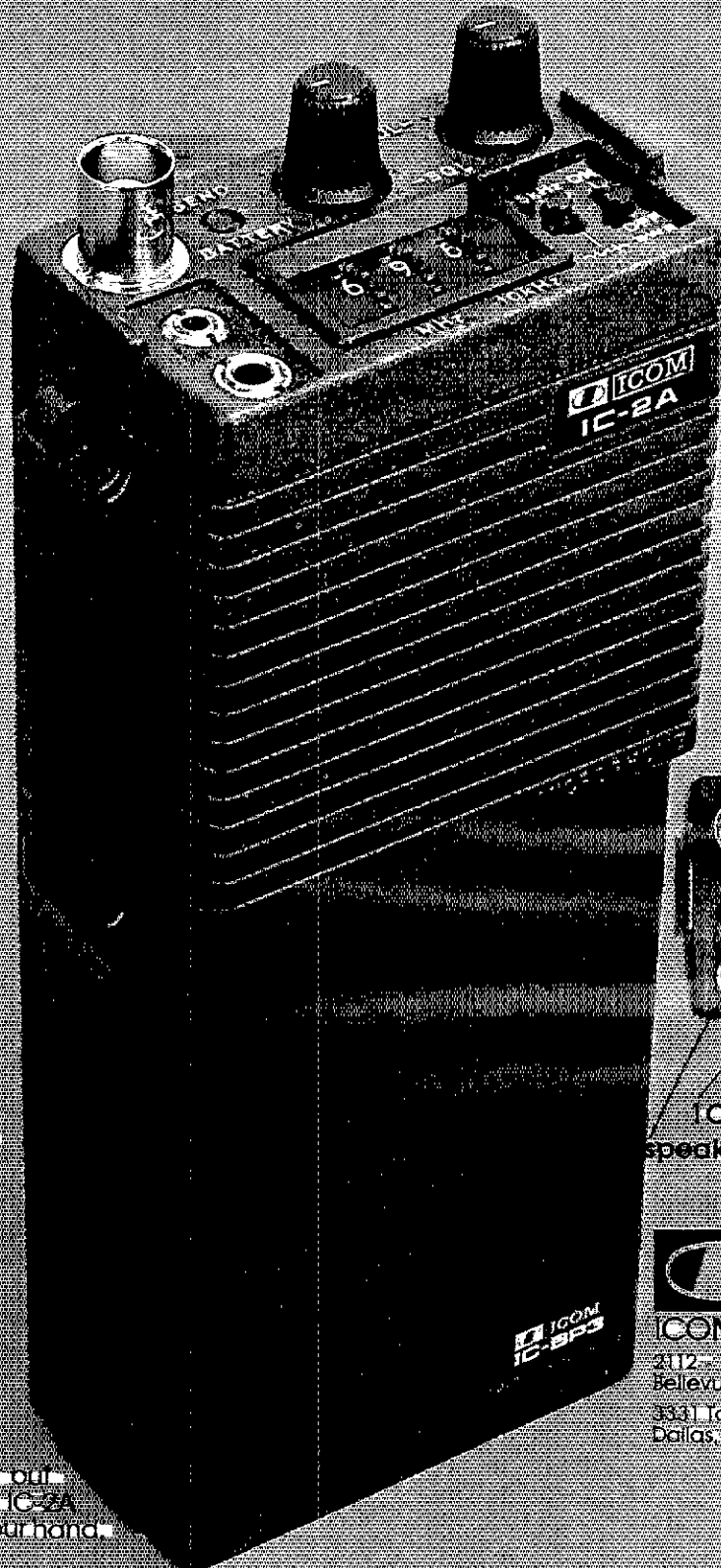
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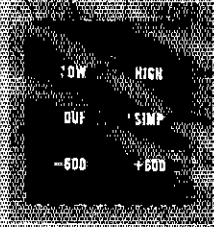
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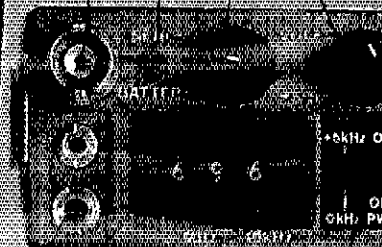
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June 1980  
Volume LXIV Number 6

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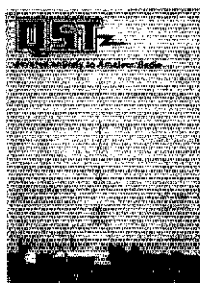
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**THE COVER**

Another in the series of state-of-the-art antennas has risen above the orchards at W6KPC. The 20-meter array will be computer controlled for the optimum combination of bays. (See page 52. *photo courtesy Fahey Photography*)



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# Introducing . . . . . the All New DTR Component Series.

*Is your operating ability superior to the equipment you're using?*

If you're a serious amateur who takes pride in his talent you should own the best, the new DTR Communication System.

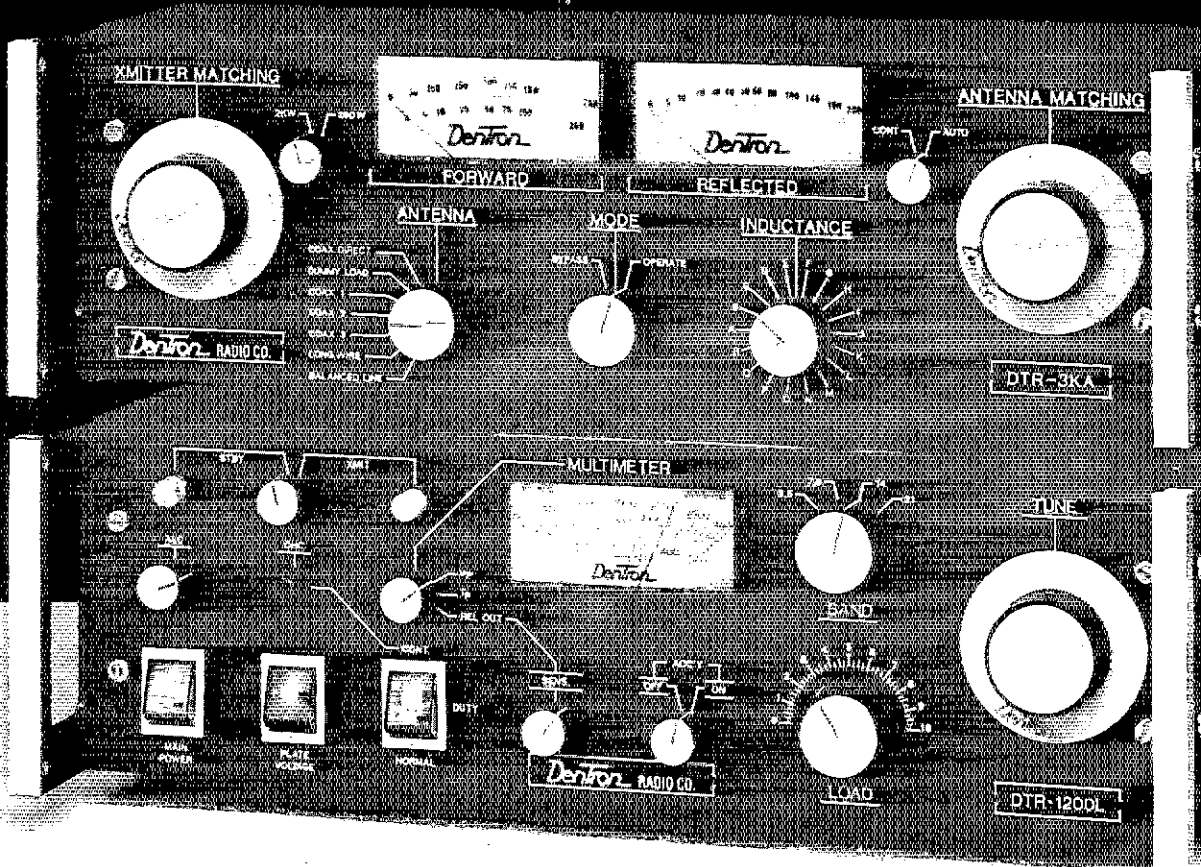
Amateur Radio has developed over the years into a sophisticated hobby. We all recognize the thrill of transmitting global signals, but to many hams it is the finesse with which those signals are transmitted that determines his pride and success as a ham.

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## \$199.95

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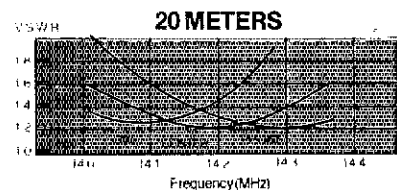
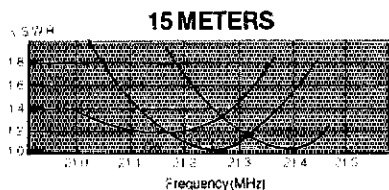
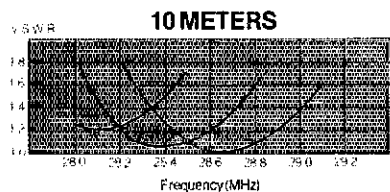
V.S.W.R.	1.2-1 Typical
Average Bandwidth	500 KHz
Power Rating	2000 w PEP
Feed Point Impedance	50 $\Omega$
Connector	Twin terminal stainless steel takes all coax.
Boom	1 7/8" - 1 1/2" x 14'
Elements/Longest	1 1/8" - 1/2" x 27'9"
Wind Stc. area	5.6 Feet <sup>2</sup>
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1 1/4" min. 2" max.
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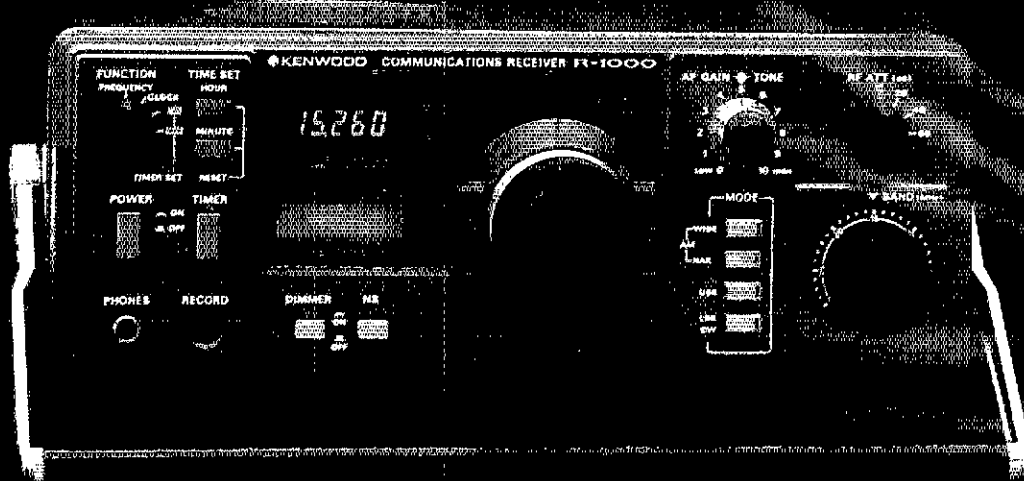


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## Easy tuning, digital display, professional quality

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The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer. Its easy-single-knob tuning and high sensitivity, selectivity, and stability make the R-1000 a favorite amongst Radio Amateurs, shortwave listeners, engineers, maritime communicators, and others who demand high quality in a general-coverage communications receiver.

#### R-1000 FEATURES:

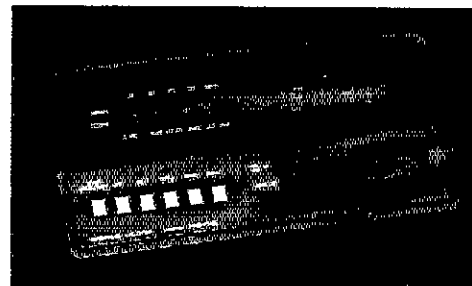
- **Continuous frequency coverage from 200 kHz to 30 MHz**  
Receives shortwave, medium-wave, and long-wave bands.
- **30 bands, each 1 MHz wide**  
Easy-to-use band switch with large knob.
- **Five-digit frequency display and analog dial**  
Accurate digital display with 1-kHz resolution and illuminated analog dial with precise gear dial mechanism.

- **Built-in quartz digital clock with timer**  
Precise 12-hour clock with AM and PM indicators. Timer turns on radio for scheduled listening, and even controls a recorder through remote terminal.
- **Up-conversion PLL, wideband RF circuits**  
Provide exceptional performance and easy operation without the need for bandspread, preselector, or antenna tuning. Excellent sensitivity, selectivity, and stability.
- **Three IF filters for optimum AM, SSB, CW**  
12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) filters for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- **Communications-type noise blanker**  
Eliminates ignition and other pulse-type noise. Superior to noise limiter.
- **Step attenuator**  
0-60 dB in 20-dB steps. Prevents overload.
- **Recording terminal**  
For external tape recorder.
- **Tone control**  
For desired audio response.
- **Built-in 4-inch speaker**  
For quality sound reproduction.
- **Dimmer switch**  
Controls S-meter and other panel lights and digital-display intensity.

- **Three antenna terminals**  
Wire terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax (ISO-239) terminal for 2 MHz to 30 MHz.
- **Selectable operating voltage**  
AC voltage selector for 100, 120, 220 and 240 VAC. Also adaptable to operate on 13.8 VDC. (With optional DCK-1 kit.)

Ask your Authorized Kenwood Dealer about the easy-to-operate R-1000 communications receiver.

**NOTE:** Price, specifications subject to change without notice and obligation.



#### HC-10 Digital World Clock

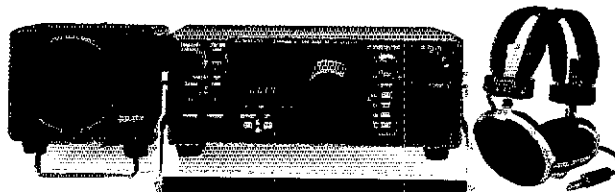
- **Two 24-hour displays with quartz time base**  
Right display: local (or UTC) hour, minute, second, day. Left display: month, date, world time in various cities, memory time (QSO starting time), and time difference (in hours from UTC)
- **Time in 10 cities around the world**  
Plus two additional programmable time zones.
- **"TOMORROW" and "YESTERDAY" indicators**
- **Memorizes present time**  
And recalls later, for logging purposes.
- **High accuracy**  
±10 seconds/month

#### MATCHING ACCESSORIES

- SP-100 external speaker
- HS-5 deluxe headphones

#### Other accessories not shown:

- HS-4 headphones
- DCK-1 easy-to-install modification kit for 12-VDC operation





# High quality...top performance!



## Maximum convenience with optimum features

### TS-180S

The TS-180S is Kenwood's top-of-the-line all solid-state HF SSB/CW/FSK transceiver. New circuit-design technology has been incorporated throughout the transceiver, resulting in optimum receiver and transmitter performance, as well as advanced operating features that every DXer, contest operator, and all Amateurs would desire for maximum efficiency and flexibility.

#### TS-180S FEATURES:

- Digital Frequency Control (DFC), including four memories and manual scanning. Memories are usable in transmit and/or receive modes. Memory-shift paddle switches allow any of the memory frequencies to be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. It's almost like having four remote VFOs!
- All solid-state...including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate!
- High power...200 W PEP/160 W DC input on

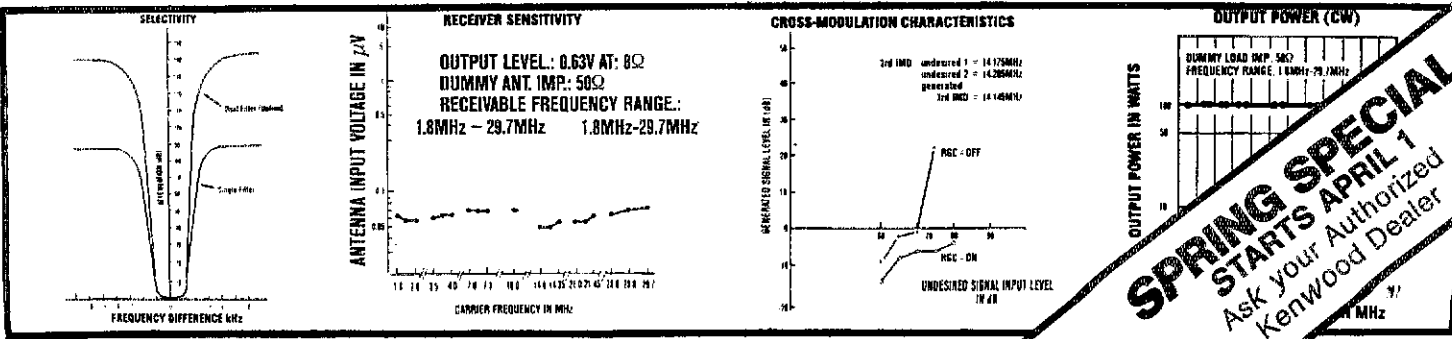
160-15 meters, and 160 W PEP/140 W DC on 10 meters (entire band provided). Also covers more than 50 kHz (100 kHz with DFC) above and below each band (MARS, etc.), and receives WWV on 10 MHz.

- Adaptable to all three new bands.
- Improved dynamic range.
- Dual SSB filter (optional), with very steep shape factor to reduce out-of-passband noise on receive and to improve operation of RF speech processor on transmit.
- Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.
- Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate "out of band" Monoscale dial, too.
- IF shift...Kenwood's famous passband tuning that reduces QRM.
- Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).
- Automatic selection of upper and lower sideband (SSB NORM/SSB REV switch).
- Tunable noise blanker (adjustable noise-sampling frequency).

- RF AGC ("RGC"), which activates automatically to prevent overload from strong, local signals.
- AGC (selectable fast/slow/off).
- Dual RIT (VFO and memory/fix).
- Three operating modes...SSB, CW, and FSK.
- Improved RF speech processor.
- 13.8 VDC operation.
- Also available is the TS-180S without DFC, which still shows VFO frequency and difference between VFO and "hold" frequencies on the digital display.
- Full line of matching accessories, including PS-30 base-station power supply, SP-180 external speaker with selectable audio filters, VFO-180 remote VFO, AT-180 antenna tuner/SWR and power meter, DF-180 digital frequency control, YK-88 CW filter, and YK-88 SSB filter.

All of these advanced features can be yours...and at an attractive price! Visit your local Authorized Kenwood Dealer and inquire about the exciting TS-180S with DFC!

**NOTE:** Price, specifications subject to change without notice and obligation.



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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 for 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.

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**Digital Licenses: Yes or No?**

In contrast to recent editorials, this one does not urge amateurs to go out and "do something." Rather it seeks your thoughts and opinions on a complex subject, one which hasn't been discussed to any extent until now.

Should the United States follow the example of Canada (page 56, November 1978 QST) and produce a new class of license — above the Novice level — for digital scientists and experimenters? An additional written examination on computer language and techniques would replace the Morse code. The license would be valid on one or more vhf, uhf or microwave bands, keeping it in conformity with the ITU Radio Regulations.

Why has the subject come up? What are some of the reasons advanced for its consideration? Why is it timely? It is clear that interest in personal computers is growing tremendously. A great many amateurs are already involved. Digital experimenters seem to have a lot in common with those radio amateurs who are on the leading edge of radio technique.

An article in September 1979 QST by Paul Rinaldo, W4RI, "Amateur Radio in the Computer Age," catalogued ways in which computers are helpful to amateurs: station control, logging, contest "dupe checks," satellite applications, and repeater "housekeeping." Other applications could include "electronic flash cards" for theory and Morse code, orbital predictions, azimuth/elevation tables, signal processing and detection, automatic error correction, antenna-design computations, automatic direction-finding techniques and message handling/logging.

Computer-to-computer conversations on the air were tremendously facilitated this spring when FCC finally authorized use of ASCII, partially in response to an ARRL petition filed in 1969 (see "Washington Mailbox," page 60.) Now there is more motivation than ever to see what computers can do in Amateur Radio.

There are also some considerations of a somewhat political nature. At Geneva a U.S. move to change Morse code skill from "required" to "recommended" was defeated. An alternative proposal which was adopted will permit governments to waive the code test for stations operating solely above 30 MHz, after the effective date of the WARC agreements, January 1, 1982. FCC Chairman Charles Ferris has requested the Private Radio Bureau to draft a Notice of Proposed Rulemaking granting

that waiver in the U.S. Codeless licenses — at least at the beginner level — have traditionally been opposed by a majority of amateurs. (There are those who feel this position by amateurs is selfish and stems from an "I've got mine!" philosophy; a fairer reason is that the present tests make each applicant demonstrate a personal commitment and invest something of himself/herself in acquiring an amateur license. The result has been a service with a far better reputation for discipline than others used by the public: in small boats, some land-mobile activities, the General Mobile Radio Service or the CB Radio Service.)

Could a new digital license be an acceptable substitute for an entry-level no-code license? Would it fulfill the Chairman's mandate without risking degradation of the Amateur Service? Certainly, the proposal will be welcome at FCC Staff level: at least three high-level officials have told the writer of their support for this type of license.

If the decision of the amateur fraternity as a whole is favorable, what would comprise the new ticket? How difficult should the test be? What would you suggest as a fair outline for a syllabus?

What frequencies should be made available? Until 1982, the lowest frequency under ITU rules would be 144 MHz; after that, 50 MHz would be permissible. But 6 meters is a tough band for newcomers because of the potential for TVI to channel 2. Popular 144 is well occupied by experimenters, OSCAR users and fimers. Newcomers with a different type of license might have difficulty being assimilated there because of the congestion. The next two bands, 220 and 420 MHz, are at least comfortably full in major metropolitan areas, but relatively open in many parts of the country. The bands above 1215 MHz pose no problem with overcrowding, but the first hardy pioneers of the new class might have trouble finding someone to talk to.

Let's hear from you about this. Discuss the digital license at your radio club meetings. Most importantly, convey your views to your ARRL director, as listed on the opposite page. The Board will be meeting in Seattle July 23-24, just before the ARRL National Convention, and it will be up to the directors collectively to support or not to support the idea of a digital license. Help them decide. — Perry F. Williams, W1UED

# League Lines...

Phase III Satellite contacts will not count for the Satellite DXCC. See DXCC Notes on page 69.

A list of countries with which the U.S. and Canada have third-party agreements appears in this issue in the "Public Service" column on page 82. We hope to have this information appear periodically in future columns.

Our editorial last month urging support for the Senate Rewrite Bills, S-611/S-622, may have done FCC's General Counsel an unintentional injustice: His view on the Novice volunteer-examiner program is not a whim but stems from Title 31, U.S. Code, the Independent Appropriations Act, which attempts to control the sprawl of bureaucracy by limiting the use of volunteers and consultants. All the more reason for amateurs to support the bill, to put the volunteer program into the Communications Act!

The April issue of Radio Club News made a pitch for the League-sponsored equipment insurance program and stated, "The policy protects against someone else's carelessness." The correct statement is, "The policy does not protect against someone else's carelessness." We regret the error.

If you haven't already done so, if you hurry it's not too late to send in your ideas on how the new 10-MHz band should be used (April "League Lines"). Send your comments directly to ARRL Vice President Max Arnold, W4WHN, 129 Page Rd., Nashville, TN 37205 by mid-June.

Visiting ARRL Headquarters this summer? ARRL administrative headquarters is open to the public Monday through Friday from 8 A.M. until 5 P.M. Regular tours of Hq. and W1AW are conducted every hour on the hour starting at 9 A.M. and ending at 5 P.M. Administrative hq. is closed on weekends, but W1AW is open to visitors from 3:30 P.M. until 1 A.M. on Saturdays and Sundays. Licensed members may operate W1AW on weekdays from 1 to 4 P.M., but don't forget to bring your original license or a photocopy. Need directions to Headquarters? Write for "Visiting Your Headquarters"; s.a.s.e. appreciated.

W1AW and League Headquarters will be closed on the following days: July 4, Independence Day; August 28, Staff Outing; September 1, Labor Day; November 27, Thanksgiving Day; and December 25 and 26, Christmas.

CQ to hams in the media: The League's Public Information Office is updating its "hams in the media" file. If you are a radio amateur working at a newspaper, radio or TV station who would be willing to help spread the word about Amateur Radio, please send your name and position to Andrew Tripp, ARRL Hq., Newington, CT 06111. All information will be treated as strictly confidential.

Please help Headquarters. If you are showing one of ARRL's films or slide shows and discover that the item is damaged or lacking in some way, please let our film librarian know. You'll be helping us provide the best service possible.

The Club and Training Department at ARRL Hq. is looking for a program manager experienced in OSCAR operation and science teaching, for its OSCAR education program, OSCAR in the Science Classroom. If interested, contact Steve Place, WB1EYI, at ARRL hq.

AMSAT is seeking Phase III-equipped amateur stations for assistance with OSCAR-Education Special Service Channel bulletins. For details, contact Steve Place, WB1EYI, via AMSAT or ARRL hq.

New Jersey still has a law that prohibits fire or police receivers in vehicles unless one has a permit from a chief of police. Some NJ hams have reportedly been misinformed by officials who thought the law, N.J.S. 2A:127-4, had been deleted.

The League's annual reports for 1979 are now available, \$1, postpaid. If you don't want the whole volume, but just the statement of income and expense, send along only an s.a.s.e.

# California Hams Assist During Mud/Flood Crisis

When the night rain of February 14 turned into a downpour, something told Joe Oliveira, WB6BJM, that the Hollywood Hills were in for serious trouble.

By Lenore Jensen, \* W6NAZ

As you may have seen on network TV, the devastation was to be enormous throughout the entire Santa Monica Mountains. Mudslides would demolish more than 100 homes (but not their mortgages) and damage at least 1500. In Southern California, 8000 persons would be displaced and, worst of all, 24 would die. The dollar cost would be in the hundreds of millions.

Joe Oliveira, WB6BJM, knew that rescue operations would need more communication than normal facilities could provide. So, as he and his repeater group had done two years earlier, Joe phoned the Tree People, a private group dedicated to conservation. For the next nine wet days, Tree People headquarters, a mountaintop former fire station located be-

tween Beverly Hills and the San Fernando Valley, would bristle with volunteer activity. From the mountaintop to the sea, deep canyons are lined with hillside homes on steep or curving roads. WB6BJM's repeater could reach most of them.

## Amateurs Respond to the Call

Yes, Amateur Radio was urgently needed! Members of the group were alerted. Bob Burns, N6ZH, Norm Friedman, W6ORD, and Mike Ramirez, W6YLZ, set up base stations at headquarters. Dispatch would be tabbed "Garage" while another was called "Control." The private line was turned off and QSTs went out on 147 MHz. "QST — we need operators with their own 2-meter hand-held or mobile rigs, plus cigarette lighter connectors and magnetic or gutter-mount antennas — on the double. And bring rain gear!"

Amateurs responded from near and far, coming over flooded freeways or mud-filled surface streets. But as wet as it was on the flatlands, it would be far worse in the hills. More than 22 inches of rain had fallen on some spots in the nine days. Recently appointed Amateur Radio Emergency System (ARES) men Dave Tucker, WB6FAK, and Mel Borses, WB6VHS, arrived promptly and worked around the clock. Assistant EC Ron Boan, AK6Y, found additional volunteers.

Broadcast stations appealed for volunteer workers willing to fill sandbags and dig mud. Four-wheel-drive vehicles (four-wheelers) and operators were needed to transport volunteer workers through debris-filled streets and torrents of water. The response to these calls was heartwarming. At the same time, emergency numbers were broadcast and

\*14867 Round Valley Dr., Sherman Oaks, CA 91403

soon pleas poured in from frantic homeowners who needed defense against the crumbling hills.

At headquarters the Tree People evaluated the needs. In the huge garage, vehicles and workers were organized into teams, each with Amateur Radio operators acting as their communicators. "Garage" and "Control" would coordinate as the teams were sent to requested addresses, some many miles through the mountains.

A multiple-control method of net operation was used, with "efficiency" and "brevity" the prevailing spirit. Happily, the more than 150 hams who participated during the 10-day period were able to understand the necessity, even though many were strangers. But all agreed later that advance planning by *all* amateurs must be accomplished before future disasters.

### The Rains Just Kept Falling

As the rains increased, so did traffic on the frequency. The Bel Air Repeater Association opened its 147.030 MHz machine, immediately becoming the spot for seeking and checking in volunteer operators; "talking them in" up the steep roads to headquarters; obtaining weather and road-closure information as well as locating specific addresses on local maps. Home-based hams took on assignments as "0-1, 0-2, 0-3" and the like; field vehicles had their own numbers.

The wet clouds had a silver lining for amateurs who had been working for years to prove their worth to city officials. There had been a long-standing lack of use of amateur services. But since Proposition 13 cut funds, government agencies in the Los Angeles area are becoming more aware of volunteer facilities.

Jeff Stern, WA6LWV, is Los Angeles County Fire Services Commissioner. As he listened to police tactical frequencies, he realized the desperate need for coordination with volunteer services. Jeff contacted the director of Civil Defense for the city, Mike Regan, and the Los Angeles Police Department (LAPD) to inform them of ham radio's value in the crisis.

A particular need existed in West Los Angeles at the base of Mandeville Canyon, which is filled with homes, many of them belonging to celebrities. Residents and property were threatened by mudslides from saturated hills, barren because of earlier brush fires.

A police incident command post (CP-8) was working in the area. Its commander made room for an amateur station with Jeff, Bob Tucker, WA6MBL, Nancy Stern, WD6FKV, and Stu Hirsh, K6EXL, among the day and night operators.

### Amateurs and Police Cooperate

Fate gave hams their opportunity when the police emergency generator failed at a critical time. Without the generator the



Hugh Harris, WD6EZZ (right) with Joe Dunning, the owner of a threatened Hollywood Hills home. Volunteers are placing plastic sheeting on the hillside to prevent further slippage onto the residence. (photo by W6VGG)

only police communications available at the site were "black-and-whites" with simplex, which was limited because of the canyon.

The police commander then requested the assistance of the amateurs. For the next four hours N6ZH's hand-held rig was used to communicate with vehicles at various trouble spots. This partnership continued for the duration of the emergency and made local history as a first for police/ham cooperation!

Volunteers spent considerable amounts of their own money on gasoline to traverse the great distances required. They faced tangled debris, huge rocks, raging waters and slipping hillsides. Control would caution: "QST — Warning! Do not walk on flooded streets. Manhole covers are being washed away and you would not realize it."

Fortunately, no serious injuries were reported, although a few rigs suffered. In the excitement an occasional power cable would be injected into an antenna jack. Some four-wheelers lacked cigarette lighter receptacles and required power cables to be clipped onto the battery.

### You Just Can't Get There From Here

Some canyons far to the west, such as Topanga, could not be reached by the 2-meter facilities available. Wayne Rankin, WA6MPG, took a portable 220-MHz repeater to the home of

WB6VHS and arranged a downlink on 147.00 MHz. Many new operators, including the Valley Good Guys, joined the mass effort.

The famed Malibu ocean-front homes were cut off by both highway slides and the pounding surf. Bill Hawley, W6ZRZ, Harold Samuelson, W6GXG, and others used the Marina repeater as the way around. Countless examples of ham ingenuity solved such problems.

Meanwhile, back at control, the days went by. Many hams slept on cots and ate food provided by the ever-faithful Salvation Army. Martee Avalier, KA6JPO, remained at her post of "paperwork executive" the entire time.

While riding the four-wheelers, operators saw the tragedies firsthand. "There's no way to describe it," said one. "You only saw the easy-to-reach spots on TV. It was too dangerous for them to go in farther."

A few hams went beyond the call of duty. Adrienne Jacoby, WA6YEO, helped clear a storm drain with her bare hands. Others pitched in and helped with sandbags when the need was urgent. A helpful volunteer provided his own four-wheeler and a medical trailer. Sharing the work at the medical trailer was emergency medical technician (EMT) Mark Oppenheim, KA6IJJ.

Although Joe's repeater has fine emergency batteries, fortunately they



Tim Sawyer, WD6AWP, helped operate the ARES communications trailer in Orange County. This unit was shared with the police department during the emergency period. (photo by WA6TLE)



Carol, K6OAO, and Ernie Hollis, W6ZGZ, operate Amateur Radio station "CP-8" in the police command center. (photo by WB6NOA)

were not needed. The 25-watt Motorola six-cavity rig of sophisticated modification performed heroically through the 10 days of operation, with 100 actual hours of "on" time.

Residents stranded beyond collapsed bridges, animals clinging to trees above the water and a wheelchair invalid are but a few examples of the myriad of problems brought by the downpour and gooey walls of heavy mud. Three thousand volunteers put 10,000,000 pounds of sand and mud into 125,000 sandbags. Communication was the key to success.

#### Meanwhile, in the Surrounding Counties

In adjacent Orange County the damage was less but the possibility was equally dangerous. Ed Ireland, WA6TLE, District Emergency Coordinator for the county, reported that 20 hams worked around-the-clock for five days to maintain communications with various agencies and Red Cross evacuation centers. Their well-equipped emergency van was loaned to appreciative police. "Mayors and police chiefs said they had never seen an operation as professional as the one our gang delivered," Ed recalled. Ralph Swanson, WB6JBI, was given special credit for his work in North Orange County.

The other adjacent county of Ventura had its own dramas as 50 ARES members were kept busy. Emergency Coordinator Ray Mote, Jr., W6RIC, was one of the four who remained at the evacuated Red Cross Chapter House during the storm to maintain communications with Red Cross personnel and the shelters. They also did the all-important damage survey.

A child was saved when Lee Woodworth, AG6A, called in on the WR6AOX repeater. He and a group of families were stranded beyond washed-out bridges and roads, but knew that a little girl was trapped in a small car they could not reach. Word was relayed to sheriffs and the child was rescued. Similarly, all throughout Southern California communities, amateurs saw the need and came through.

In San Diego County, headlines blared "Killer Floods Rage." There, nine days of rain, brought by six different storms, caused an estimated property damage of \$100 million and the loss of 10 lives. By Thursday morning, February 21, eight reservoirs were spilling over their dams and three others were expected to overflow later in the day when a seventh storm was due to arrive.

RACES and ARES operators were dispatched to three Red Cross-staffed evacuation centers. ARES activities in the city were coordinated by EC Art Smith, W6INI, and Assistant EC Mike Sullivan, WA6HJJ.

In the northern part of the County, Northern District EC Frank Ramme, WB6HFE, assisted by Herb Sullivan, N6AMF, provided ARES operators to several evacuation centers, the Red Cross Service Center in Oceanside, the Oceanside Emergency Operations Center and the Army Corps of Engineers. Palomar RC's 146.13/73 repeater and local repeater on 146.37/97 were used throughout the emergency period.

ARES communications in the eastern part of San Diego County were coordinated by EC Jim Allen, W6OGC, whose ARES operators augmented RACES at

the Red Cross evacuation centers, Red Cross Service Center and the County Emergency Operations Center.

Additionally, Amateur Radio operators assisted the San Diego County Humane Society in its animal rescue efforts throughout the county. At the Del Mar racetrack, 200 horses, worth \$5 million, were evacuated when the waters of the San Dieguito River brought three feet of water to the race track.

#### The Sun Finally Came Out to Stay

Debriefing sessions highlighted the lessons learned: Keep a handy list of emergency needs so you will get going in a hurry. Have radios and repeaters that *work*, with batteries in good condition. Have jumpers and connectors to fit all possible situations. Wear recognizable hats or other garments. Have identification to get through police lines. Bring raingear and flashlights. Display signs reading "Amateur Radio" so citizens and media will know who you are. Drill in advance; teach everyone to be brief and efficient; learn phonetics. Establish friendly cooperation between repeater groups to avoid unknowing QRM. Most of all, have a list of willing volunteers.

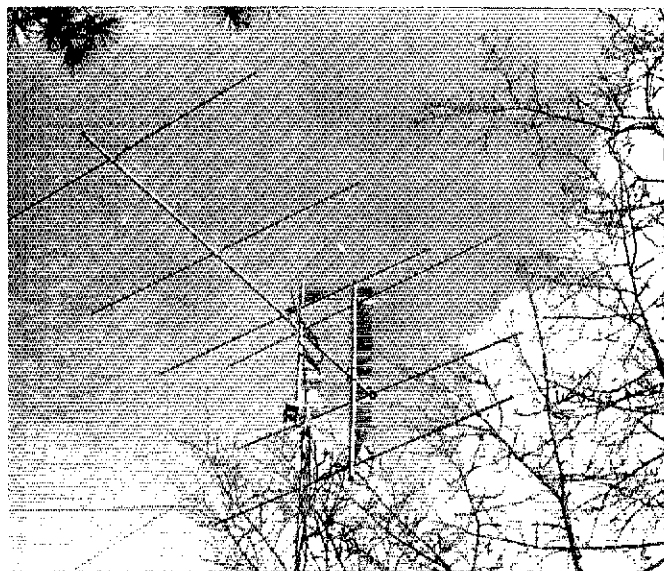
SEC Dave Tucker, WB6FAK, is hoping the emergency plan he has been discussing with the city will be accepted. The breakthrough experienced during this situation may have helped.

We wish that space permitted a list of all who gave such long, unselfish service for their fellow men and women. They made friends for the Amateur Service wherever they helped. The tradition has been carried on!

# A Tri-Yagi for 50 MHz

For long-boom performance with short-boom safety, start from scratch or convert your old standard Yagi. It's cheap, easy to make and it works!

By Vincent A. Quaresima,\* K2NE



One of the most important factors to keep in mind when designing any beam antenna is that there is usually an optimum design compromise between boom length, number of elements and wind loading. Referencing this to the question of 6-meter Yagi designs, an ideal boom length would seem to be 12 feet, particularly because of the ready availability of aluminum tubing stock in precut 12-foot lengths. Several manufacturers clearly have taken advantage of this fact, as evidenced by the number of 6-meter antennas on the market featuring boom lengths of 12 feet.

It would seem that the ideal number of elements for a 12-foot boom length at 50 MHz would be four. With optimized spacing along the boom, a Yagi configuration of this type should yield approximately 9-dBd gain. While this may be ade-

quate for most routine users, the serious vhf DXer or contest operator might want some improvement in performance over that provided by the traditional 4-element Yagi. Although many people immediately recommend one of the commercially available long-boom, wide-spaced Yagis as the best way of increasing forward gain, there is an often-overlooked possibility of accomplishing this without encountering the severe wind-loading problems attendant in the long-boom Yagi.

## A Compromise for Stacking Yagis

Stacking Yagis at 50 MHz presents several physical problems, both from the construction aspect and from the standpoint of wind loading. However, the advantages of obtaining additional gain by H-plane pattern compression are too

great to be summarily dismissed. An ideal compromise would be to compress the H-plane pattern of the antenna system without having to worry about stacking frameworks, manifold-feed systems and whether or not the darn thing will stay up once installed on the tower!

\*Department of Mathematics, John K. Ossi Vo-Tech High School, Medford, NJ 08055

<sup>1</sup>E-plane pattern refers to the electric field. H-plane pattern refers to the magnetic field. See Kraus, *Antennas*, 1st edition, McGraw-Hill Book Co., 1950.

## Test Measurements

For the purpose of gain measurement, test transmissions were made over an 8-mile path from K2NE to KA2BOP. Observations of the signal level with the Yagi were made first and then compared with the signal-level observations made next with the dipole. The procedure was to increase the power level transmitted through the dipole until the monitored signal

had the same strength as obtained via the Yagi. The results given in the article were obtained by using the figures for the original power output (through the trigonal Yagi) and the figures for the adjusted power output (through the dipole). These were applied to the formula,  $\text{gain (dB)} = 10 \log (p/p_T)$ , where  $p$  = power to the dipole and  $p_T$  = power to the test antenna.

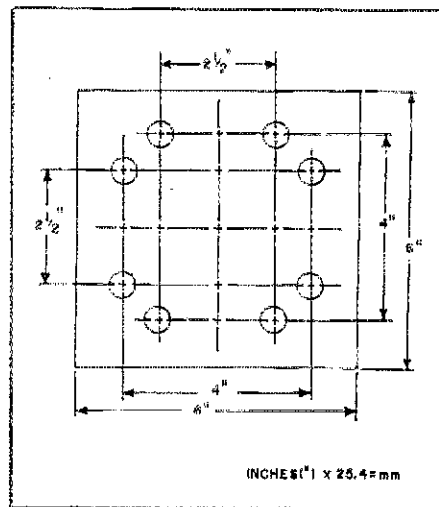


Fig. 1 — Template for the boom-to-boom bracket. The plate is constructed from 1/4-inch (6.4-mm) steel. All holes are 17/32-inch (13.5-mm) dia to accommodate 2-inch (51-mm) U clamps.



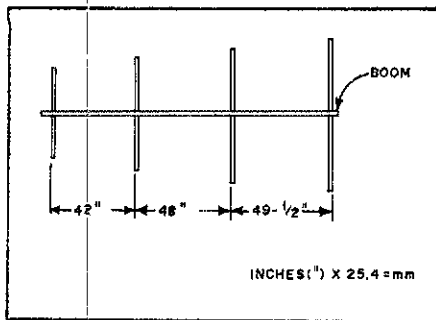


Fig. 2 — Planar element configuration of the K2NE 6-meter antenna. Element lengths are as supplied by manufacturer. Do not use the shortest director. Element lengths are not drawn to scale.

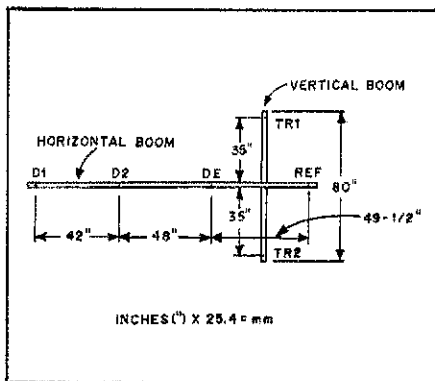


Fig. 3 — A side elevation of the beam with trigonal configuration.

Fortunately, there is such a compromise. On the average, replacing the standard Yagi reflector with a corner-type reflecting screen will improve the forward gain of the antenna by about 4 dB. At 50 MHz, however, a corner-reflector screen would dangerously increase the wind-loading of the antenna, particularly in icing conditions, as well as being impractically large for most users.

While not as efficient as a full screen-reflector, a trigonal reflector configuration still represents a way of improving gain of a Yagi over the "stock" Yagi configuration. In the case of the Cushcraft 5-element Yagi, this conversion is easy to do and inexpensive, and results in an antenna that will perform favorably when compared against the 6-element "standard" Yagis on booms of length varying between 21 and 26 feet. Note again that we are talking about 6-element, "wide-spaced" performance on *half* the boom-length and with significantly less wind loading.

### The Conversion

To make the conversion, you will have to acquire aluminum tubing (two 12-foot or 3.66-m lengths) having 3/8-inch (10-mm) outer diameter, and an 8-foot (2.44-m) length of 2-inch (51-mm) OD tubing. You will also need six 2-inch (51-mm) U clamps. A diagram of one possible bracket for securing the trigonal support mast to the main boom is given in Fig. 1. Construct two elements, each identical to the reflector that is supplied by the manufacturer, being sure to drill holes in each element for the U clamp which is used to attach them to the reflector support mast.

Simply reposition the four remaining "planar" elements in accordance with the spacing information that is outlined in Fig. 2. Then mount the trigonal assembly as indicated in Fig. 3. Feeding and matching the antenna is done according to the manufacturer's instructions. It is not a bad idea to aim the antenna straight up while matching adjustments are made.


This will minimize the interference caused by immediate obstructions and make the job of matching the beam quicker, easier and more accurate.

### Simplicity of Matching the Antenna

In practice, matching the antenna to the feed system is a simple matter accomplished by varying the position of the shorting bar along the gamma match until the point of the lowest SWR is located. An SWR of less than 1.2:1 is quite easily attained. The antenna is fed with RG-8/U coaxial cable, although any low-loss 50-ohm unbalanced feed line would work. The end result, shown in the accompanying photograph, is mounted with an Alliance U-100 rotator atop a 30-foot (9.1-m) collapsible mast. The wind-load factor for this antenna is significantly less than that of a wide-spaced 6-element antenna on a boom in excess of 20 feet (6.1 m). Forward gain is in the neighborhood of 11 dBd, according to tests run with another amateur located 8 miles away. The comparison antenna for the gain test was a half-wave center-fed dipole mounted on the same mast, prior to the actual mounting of the "Tri-Yagi." The 11-dBd gain is obtained by H-plane pattern compression. Thus the normally wide, half-power beamwidth of the 4-element Yagi is not compromised in the E plane at all. This is important to consider when using the antenna for weak-signal work. It won't help much in reducing interference off the front of the beam during a contest, but the improvement is impressive!

### Scatter Experiment

An interesting experiment would be to try establishing ionospheric scatter circuits. Mounting this antenna at 35 to 40 feet above ground and tilting the boom axis upward on an angle from 35 to 40 degrees might produce significant improvement in scatter results.

I wish to thank James Esposito for the original drafting and James Cramer and Paul Clark for the photography. 

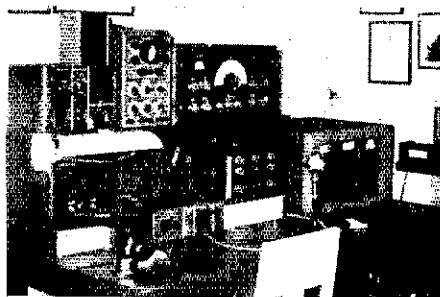
## Strays

### THE FRONT PANELS DON'T MATCH, BUT . . .

□ "You don't have to be continually buying and investing in ham gear to fully enjoy the hobby," says Tom Fielder, W4EPL, of Columbia, South Carolina. Tom has come to believe in homemade and surplus gear — and his station shows it.

The top shelf of his uncommon station setup includes af and rf test oscillators, modified scope for monitoring and the ssb exciter from June 1958 *QST*. The bottom shelf holds a modified BC-348 (with product detector from February 1966 *QST*), converters for 10, 15 and 20 meters (February 1956 *QST*) and a 1-kW linear amplifier that contains 4CX250Bs. The control panel includes a phone patch, sidetone monitor and the Monimatch SWR indicator from February 1957 *QST*.

Tom wrote the receiver modification article that appeared in February 1966 *QST*. He sums things up by saying, "While the station may be antiquated in today's environment, the net result is a clean signal, good audio and a receiving capability that is not often surpassed." If anyone thinks that older gear is ugly looking, it may be worth quoting noted *QST* author W7ZOI: "Ugly-looking gear does not denote inferior performance!" — Doug DeMaw, W1FB



W4EPL says that this station, featuring homemade and surplus gear, has been in operation for 18 years, essentially unchanged.

### QST Congratulates . . .

□ Richard I. Vaughn, N5AA, who has been named FCC Regional Director, San Francisco.

### ATTENTION AFFILIATED CLUBS

□ Have you mailed in *your* annual report forms yet? We would like to keep your club on our mailing list, but cannot if we don't hear from you. — Sally O'Dell, AE8P, Club and Training Department

# A Telephone-Line Repeater-Control Device

Each repeater licensee must control his repeater. A handful of parts will net a circuit to fill that need.

By John Nery,\* WA1ESO

A method for direct on/off repeater control is extremely desirable, both to assure compliance with FCC regulations and for the licensee's peace of mind. The project described here has unique advantages: It is easy to build and very simple to use. The repeater can be "dumped" with just a telephone call — dial the repeater, let it ring *only once* and hang up. The repeater will shut down after eight seconds. Since no special control equipment is needed, any member of a repeater group may be assigned control-operator duty. All that is required is a telephone line to the repeater site.

Even this expense can be spared if a

\*3 Springer Ave., Tiverton, RI 02878

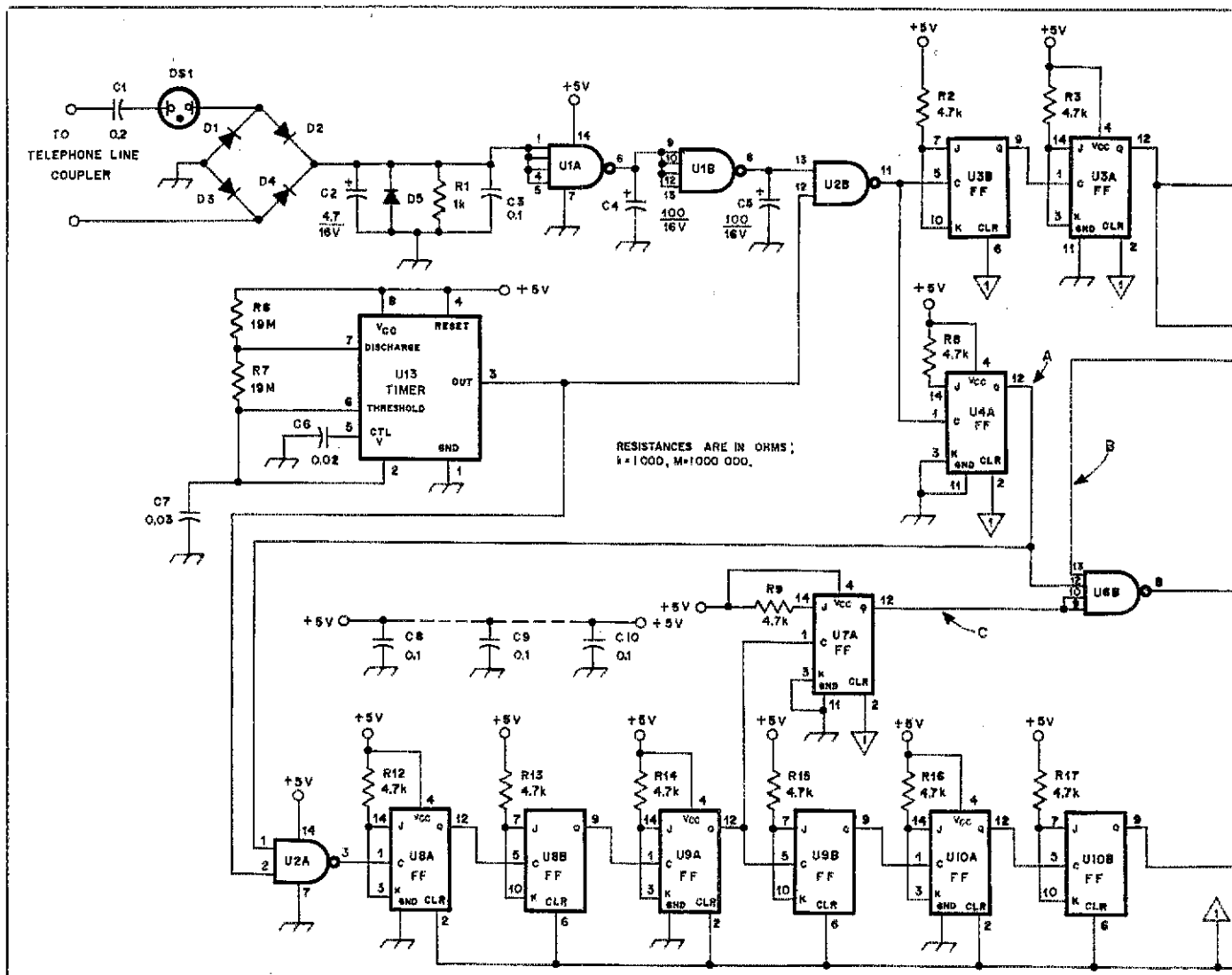


Fig. 1 — The WA1ESO repeater-control circuit. Resistors are 1/4 watt; k = 1000, M = 1,000,000. Capacitors are in  $\mu\text{F}$  and are disc ceramic except those with polarity indicated, which are electrolytic.

D1-D4 incl., D6 — Silicon rectifier diode, 1N4002 or equiv.  
 D5 — Zener, 6-V, 1-watt.  
 DS1 — Neon lamp, NE-3.

K1 — Reed relay, see text.  
 U1 — TTL dual 4-input NAND Schmitt trigger IC, 7413.  
 U2 — TTL quad 2-input NAND gate IC, 7400.  
 U3, U4, U5, U7, U8, U9, U10, U11 — TTL dual

J-K flip-flop IC, 7473.  
 U6 — TTL dual 4-input NAND buffer IC, 7440.  
 U12 — TTL one shot IC, 74121.  
 U13 — IC timer, 555.

repeater club member has a telephone that receives few or no incoming calls. A radio or hard-wire link can be set up between the member's phone and the repeater. This idea is also useful if the repeater is in too remote a location to have a telephone line installed at the site. Of course the repeater should be monitored at that phone and manual control used when the phone is in use. [If the repeater already has a telephone line for an autopatch, this line cannot also be used as the sole control line. When the autopatch is in use, the control operator will get a busy signal! — Ed.]

The circuit is designed to toggle the repeater off or on when it receives one "ring" pulse from the telephone line. More than one ring will have no effect. Thus if the control line receives a "wrong

number," the repeater will not be shut down, because the caller would normally let the phone ring several times. The control circuit is unresponsive for about two minutes after it receives a valid command. Then the repeater can be toggled back on with one ring in the same manner.

### Circuit Details

The circuit, shown in Fig. 1, consists entirely of 7400-series TTL integrated circuits. When the circuit has reset itself, two minutes after a command, points A and C are in the "low" state while point B is "high." Each ring is detected by diodes D1 through D4, limited by D5 and filtered by U1A, U1B, C4 and C5. When one ring is detected, J-K flip-flop U4A will toggle, causing point A to go high. The high at A enables U2A, passing pulses from the 2-Hz oscillator, U13, to the binary counter consisting of U8A and B, U9A and U7A. After about eight seconds, point C goes high. This, together with the high at A and B, enables U6B which toggles flip-flop U7B, causing the reed relay to change state.

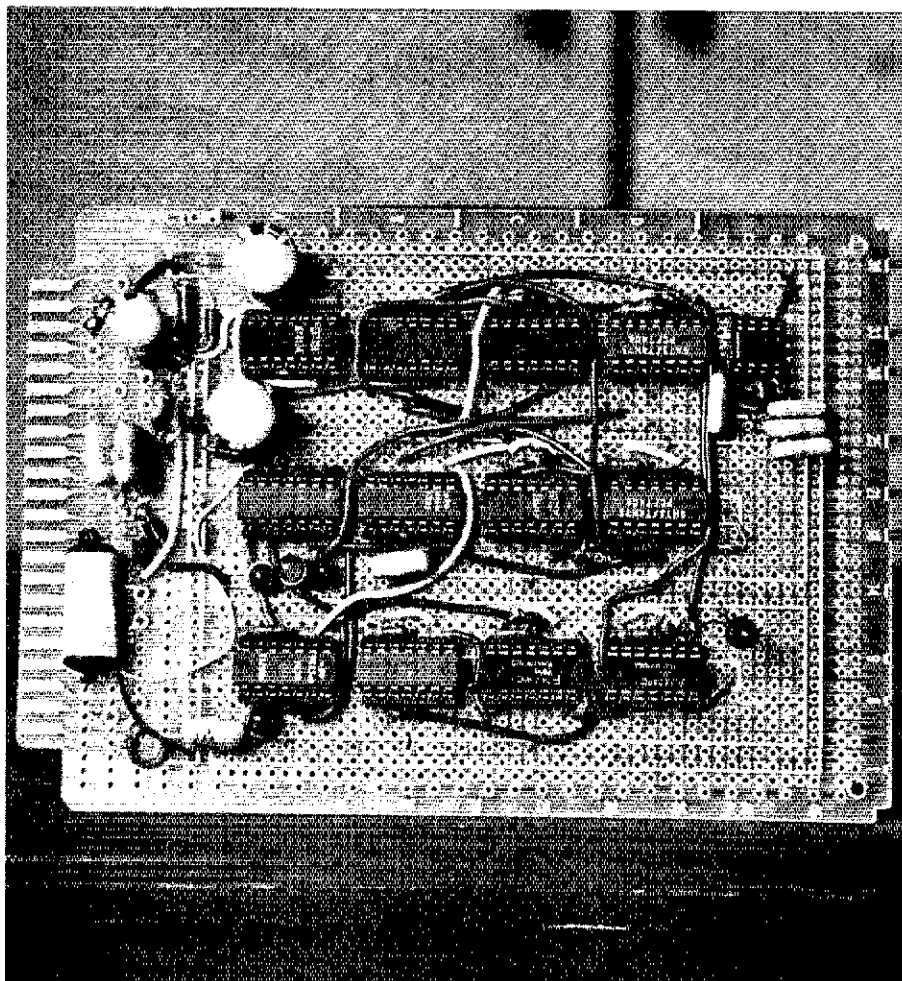
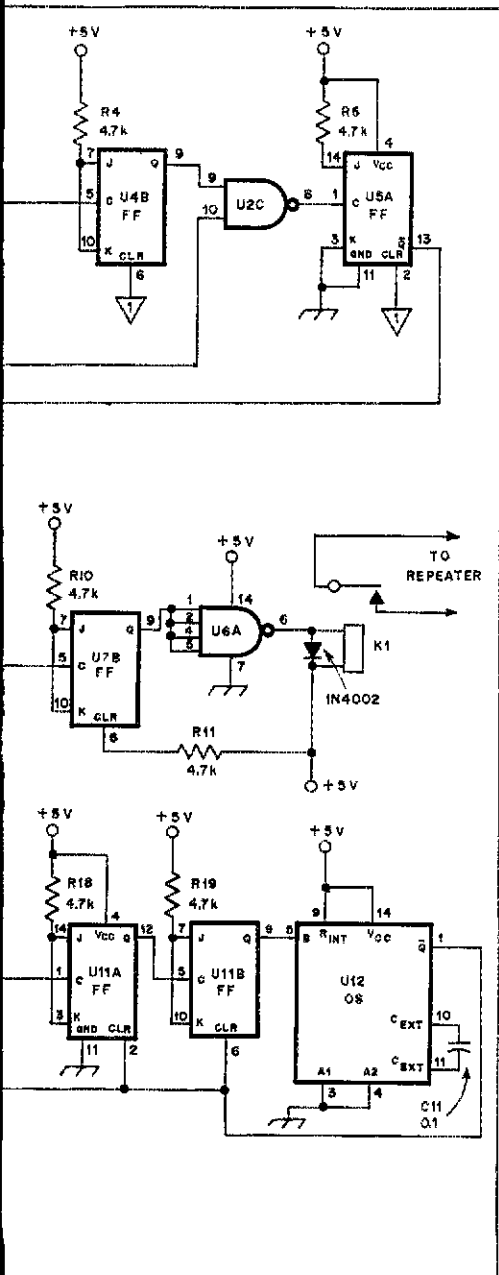
When several rings occur rather than one ring, U2C is enabled by the binary

counter consisting of flip-flops U3B, U3A and U4B. Gate U2C toggles flip-flop U5A, disabling U6B. Thus flip-flop U7B cannot be toggled.

The two-minute reset pulse is generated by U12, which is triggered by U11B, the last flip-flop in the counter chain. U12 holds all flip-flop clear inputs (except U7B) low long enough to ensure that all are reset.

The repeater control circuit is built on a Vector Plugboard, no. 3677-2<sup>1</sup> (see photo). Any reed relay that draws less than 40 mA at 5 volts can be used. To power the circuit, a 5-volt supply is needed. The current requirement of the circuit is about 200 mA. It is good practice to install 0.1- $\mu$ F capacitors from Vcc to ground at several points on the board to prevent noise problems. Since the board will be used in a strong rf field, it should be built in a shielded box with all external wiring bypassed to ground. The circuit works well connected directly to the phone line, but an FCC-registered coupler should be used.

<sup>1</sup>Vector Electronic Co., Inc., 12460 Gladstone Ave., Sylmar, CA 91342.



The repeater control unit, built on a Vectorbord. The author used 0.1- $\mu$ F ceramic capacitors to bypass the Vcc line to ground in three places.

# The Electronic Voice-Saver

Ever operate a 24-hour contest with a 6-hour voice? Here's the perfect prescription for that one-too-many-contacts throat.

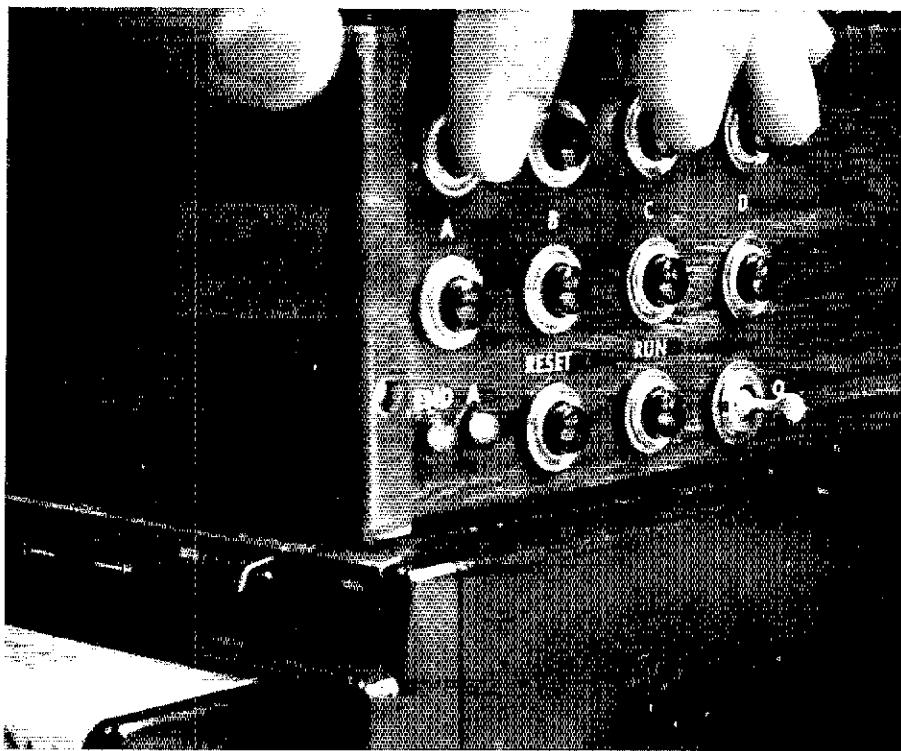
By A. Douglas Brede,\* W3AS

Six hours into the contest and I was tiring from the shouting battle. "I've waited long enough," I thought, sliding my "secret weapon" across the operating table. The push of a button sent the watt-meter needle dancing as my voice poured from the monitoring headphones: "CQ contest, CQ contest . . ." Muttering the call of the W9 who answered the call, I pushed another button and he received, "you're 5 by 9 in western Pennsylvania." Scribbling down his exchange, with a push of a third button, "73 and QRZ" was the reply. All this time I was sitting back, a throat lozenge slowly dissolving in my mouth.

Ever dream of a contest machine that would do for the phone operator what the memory keyer did for the cw contester? The Electronic Voice-Saver features a push-button-controlled digital logic circuit that selects any one of eight prerecorded messages from a standard 8-track tape player to provide the phone equivalent of a memory keyer. What's more, with one additional 20-cent IC, it can double as a cw memory keyer.<sup>1</sup> The Electronic Voice-Saver uses all the existing hardware in the player. Metallic sensing tape (Radio Shack 44-1155) is used to "doctor" the playback tape to provide three 10-second segments.

All of the IC's used in the circuit (including the two voltage regulators) cost approximately four dollars. The 2N3055s are available at Radio Shack (276-1634) and are priced at two dollars for a package

\*16E Graduate Circle, University Park, PA 16802  
Kilpatrick, "Keying a Transmitter With a Tape Recorder," Hints and Kinks, QST, January 1974.



The Electronic Voice-Saver is shown perched atop the modified 8-track tape player. The cabinet is covered with adhesive-backed, wood-grain, vinyl paper. Side-mounted push buttons permit squeezing the buttons instead of pushing them because a 1-second depression is required to complete mechanical track changing.

of six. Practically any general-purpose npn transistor can be substituted for the 2N2222s used here.

## Theory of Operation

The circuit diagram is shown in Fig. 1. When any one of the eight push buttons is

depressed, the tape player drive motor is activated through U6, U7 and U8. The motor remains running until the tape-sensor contacts (ordinarily used for track changing) close. U7 and U8 also decode the button selection and switch a relay (via Q3) from one stereo channel to another.

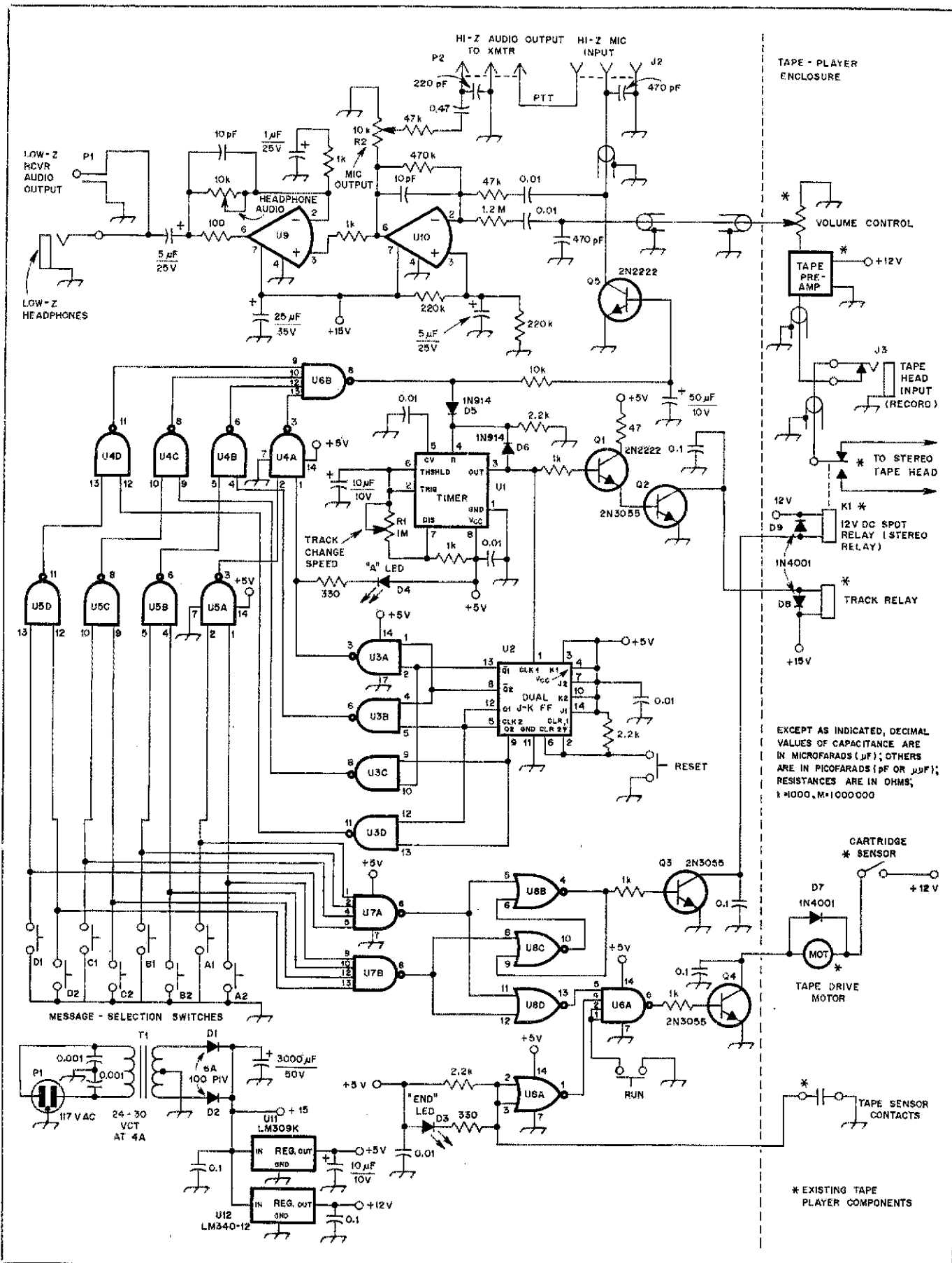


Fig. 1 — The diagram of the Electronic Voice-Saver. With the exception of the diodes, relay and J3, the components to the right of the dashed line are indigenous to the 8-track tape player. The message-selection switches (A1 through D2) are normally open push-button types.

U1 — 555 timer.

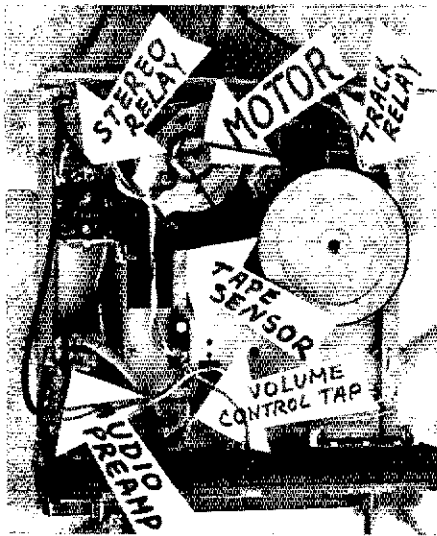
U3-U5, incl. — 7400 quad NAND gate.

U8 — 7402 quad NOR gate.

U2 — 7473 dual J-K flip-flop.

U6, U7 — 7420 dual NAND gate.

U9, U10 — 741 op amp.

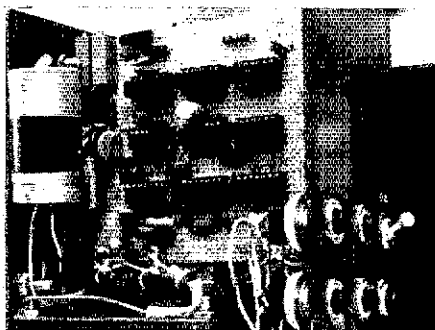


Any standard 12-V dc (negative ground) 8-track tape player can be adapted. Important components are identified in this unit, which was purchased for two dollars. The tape-sensor contacts are not visible in the photograph, but are near the indicating arrow and the more readily visible cartridge-sensing contacts.

Since most inexpensive tape players have no track indicators, a dual flip-flop (U2) "remembers" the track to which the mechanical selector is set. U4 compares the push button selected with the information stored in memory. If it is different, U6 gates the timer (U1) to advance the track relay and memory until the correct track is located. While the relay is being energized, the microphone input is muted to prevent the noise from tripping the transmitter VOX. U10 mixes the mic and tape player audio for delivery to the transmitter audio stages. U9 provides sufficient gain to drive a low-impedance headset which may be used for monitoring.

### Construction and Adjustment

Flea markets and audio repair/dealers abound with used 8-track tape players with "blown finals." These players are perfectly suited for adaptation since only one channel of the preamp is required; audio is derived from the arm of the volume control.



The electronics are assembled on perf board using point-to-point wiring. Though compact, there is no crowding of components.



Tightly wound tape will bind and overly loose tape may catch on the splices. Minimal tape tension is important and easy to obtain. The tape loop winds in a clockwise direction.

After identifying the existing components in the tape player (see the accompanying photo), test the leads of the drive motor to see if either one is shorted to the chassis. My unit had such a ground and required the installation of small nylon washers and screws. The 1N4001 diodes shown in Fig. 1 should be mounted at the relay and motor terminals.

Adjustment of R1 should produce a 3-Hz pulse rate or the maximum speed at which your track changer can reliably operate. I substituted a 68-kΩ resistor for R1. The mic output potentiometer (R2) should be adjusted for unity gain. Audio from the tape player preamp is balanced with the mic using the player volume control. Headphone audio should be set at a low level so that tape noise does not interfere with reception of weak received signals after the recorded message has ended. Even at high volume levels, acoustical feedback has not been a problem.

### Preparing the Tape

The 8-track tape cartridge can be opened at the center seam with a knife. Remove all of the tape, saving a 115-inch (3-m) piece for recording. This tape length will provide three 10-second segments; if you desire longer or shorter messages, adjust the length proportionally. Using three messages per loop allows you to vary your recording style to prevent your transmissions from sounding recorded. Before winding the tape, erase it; an ordinary permanent magnet run along its length a few times will do the job. Next, place a 1-inch (25-mm) piece of metallic sensing tape on the front side of the tape at the 37- and 75-inch (940- and 1900-mm) locations. (The front side of the tape is less

glossy than the back side.) Wind the tape on the cartridge spool, rotating clockwise, using no tension. Trim off any excess tape at an angle and splice the tape with a 1-inch (25-mm) piece of sensing tape. Rotate the spool in the cartridge to check for correct tape tension, as shown in the photograph.

Recordings can be made with any tape recorder if an 8-track recorder is unavailable. I installed a jack (J3) on the rear panel of my player to enable a shielded-cable connection to be made to the tape head of a cassette recorder. This places both tape-deck heads in parallel. Simply record the tape as if you were recording on the cassette after pressing the desired track button on the Electronic Voice-Saver.

When recording, allow a brief pause (less than a second) at the beginning of each message to allow for a track-change interval. Since VOX operation usually truncates the first syllable, begin the recording with an unimportant word, e.g., "You're 5/9," as opposed to simply "5/9." I chose to record a CQ in A1, contest exchange in B1, QRZ? in C1, and my call in D1. A longer version of each (for heavy QRM conditions) is selected by the second row of buttons. The "call sign" track, since it is brief, can double as an "oops! I pushed when I didn't mean to" button. The memory-reset feature permits shifting the position of the messages.

### Operating Tips

For important contests, keep a duplicate tape handy. With correct tape tension, a single tape will flawlessly outlast many a 48-hour extravaganza.

As with a memory keyer, there is always the tendency to rely too heavily on the machine and not on operating skill. During high activity periods, abandon the taped messages entirely since exchanges are short.

The Electronic Voice-Saver puts fun back into the radio marathon. After all, isn't that what contests are all about? QST



The Electronic Voice-Saver in action. Field testing at the North Hills (Pennsylvania) ARC Field Day outing raised more eyebrows than the home-built cw memory keyer sitting atop the rig.

# A Computer-Operated Rotator-Control Interface

Are you still operating the rotator while your computer is just calculating the beam heading? Here's how to make the computer do *all* the work.

By George Blakeslee,\* N1GB

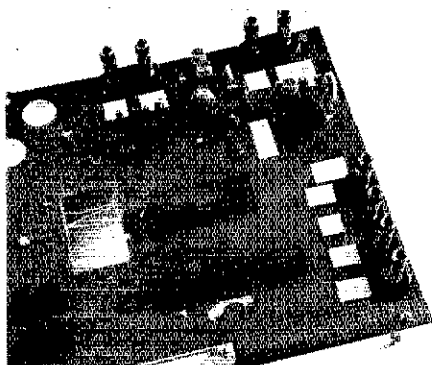
While marking time as I rotated the beam antenna for the umpteenth time during a recent IARU Radiosport contest, it occurred to me that there had to be a better way. The TRS-80 was doing an admirable job of logging and dupe checking, but I was acting as the interface between computer-calculated beam directions and rotator control-box switches. This was a task the *computer* should be performing while I was establishing the next QSO. A trip to a local electronics store produced two excellent books on the subject of microcomputer interfacing<sup>1,2</sup> that supported my project motivation with useful know-how. The motivation and information resulted in the circuit described here. Next contest, the computer is going to do *all* the work!

## Circuit Description

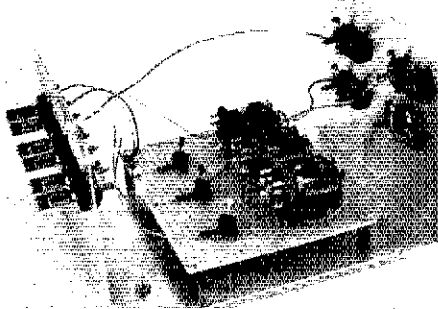
The computer-to-beam rotator interface consists of three I/O ports, a D/A converter, a voltage comparator and a set of control relays. The I/O ports establish communication between the microcomputer and the interface. The D/A converter and voltage comparator combine to determine the beam heading, and the relays are used to control the rotator brake and motor.

Setting up the programmable peripheral interface (PPI) is the first task for TRS-80 owners and anyone else whose microcomputer does not already have available ports. As shown in Fig. 1, I used a 3-port 8255 PPI IC. I found it necessary to use tri-state buffers (U1-U3) on the data bus. Prior to buffering, stray signals on the bus

\*P. O. Box 15, Sudbury, MA 01776  
<sup>1</sup>References appear on page 24.



Buffers U1 through U3 are shown at the foreground center with the inverter, U4, and decoder, U5, to the left. The power supply connections are at the right of the board. U6, the 8255 PPI, is at the board center and the D/A converter-voltage comparator (U7 through U9) are at the background center. Active filter U10 is to the right with the optical isolators on either side.



Driver transistors Q1 through Q3 are to the left in this photograph, with the switching relays (K1 through K3) on the right. The 1N4007 diodes (D1-D3) are mounted across the coil lugs of each relay (second row from the bottom).

were causing the CPU to get "lost" during initial power up. Inverter U4 is needed to provide compatible RESET signals for the 8255. Decoder U5 is optional; it was included to provide for later expansion. Enabling the 8255 is accomplished by providing pin 6 with a signal from the address bus. This is done by using a 3-to-8 decoder on bus lines A2-A7, but any of the address lines would work if connected directly. The two address lines connected to pins 8 and 9 are used to determine which of the four 8255 locations is being addressed. If the circuit is wired as presented in Fig. 1, U6 will be selected whenever the address lines A0 to A7 contain the program values 80H to 83H.

Enabling the 8255 is not sufficient to initiate operation. An additional signal is required to determine whether U6 is to READ data onto the data bus from an I/O port or WRITE data off the bus into one of the internal buffers. TRS-80 owners have two options: U6 may be addressed as three I/O ports with U6 READ and WRITE pins connected to TRS-80 IN and OUT pins respectively, or the ports may be addressed as memory locations and U6 READ and WRITE pins connected to the TRS-80 READ and WRITE pins respectively. If the latter method is chosen, be sure to choose address locations that are not currently assigned to existing memory.

Once the I/O ports are set up, it becomes possible to monitor and control the rotation of an antenna. It is required that the computer be able to determine the beam heading from the control-box indicator voltage and be able to activate switches that control the antenna rotation. Determining the current heading of

the beam involves the use of a D/A converter and a voltage comparator. I/O port A is used to pass a digital value from 0 and 255 to the MC1408L8 D/A converter which generates a corresponding current. U8 converts this current into a voltage. Voltage comparator U9 determines whether the voltage is larger than the analog voltage coming from the rotator. Comparator output is passed back to the computer via I/O port C. The computer decides whether rotation is required and if so, in which direction. Active filter U10 is necessary to eliminate 60-Hz interference from the analog indicator signal.

The digital values passed to the D/A converter are created by a process known as "successive approximation." Basically,

the computer "guesses" that the 8-bit value which corresponds to the analog value is 1000 0000 in Binary, or 128. The comparator value is then examined to see if the digital value is larger than the analog. If so, the most significant bit is reset and the next significant bit is set (i.e., 0100 0000); if not, the MSB is left and the next bit is set (i.e., 1100 0000). In this manner, the computer finds the matching digital value for the analog value in 8 "guesses." As there are 256 different possible values, the 8-trial successive approximation method is quite fast and makes possible accurate monitoring of a rotator that is either stationary or in motion.

The computer makes its decisions based

on the value of the determined analog voltage and initiates rotation via I/O port B, using three of the eight output pins to operate switching relays. One of the relays is used to control the rotator brake and the others are used to control clockwise and counter clockwise rotation of the antenna. The outputs of I/O port B are latched and while the rotator is in motion, the rotator analog voltage is monitored and compared to the desired beam heading value. When the values are equal, the port B outputs are turned off, stopping the rotator and reapplying the brake. The port B control circuitry is protected from the ac voltage that is being controlled by 4N27 opto-isolators (U11-U13). Diodes placed across the relay coils

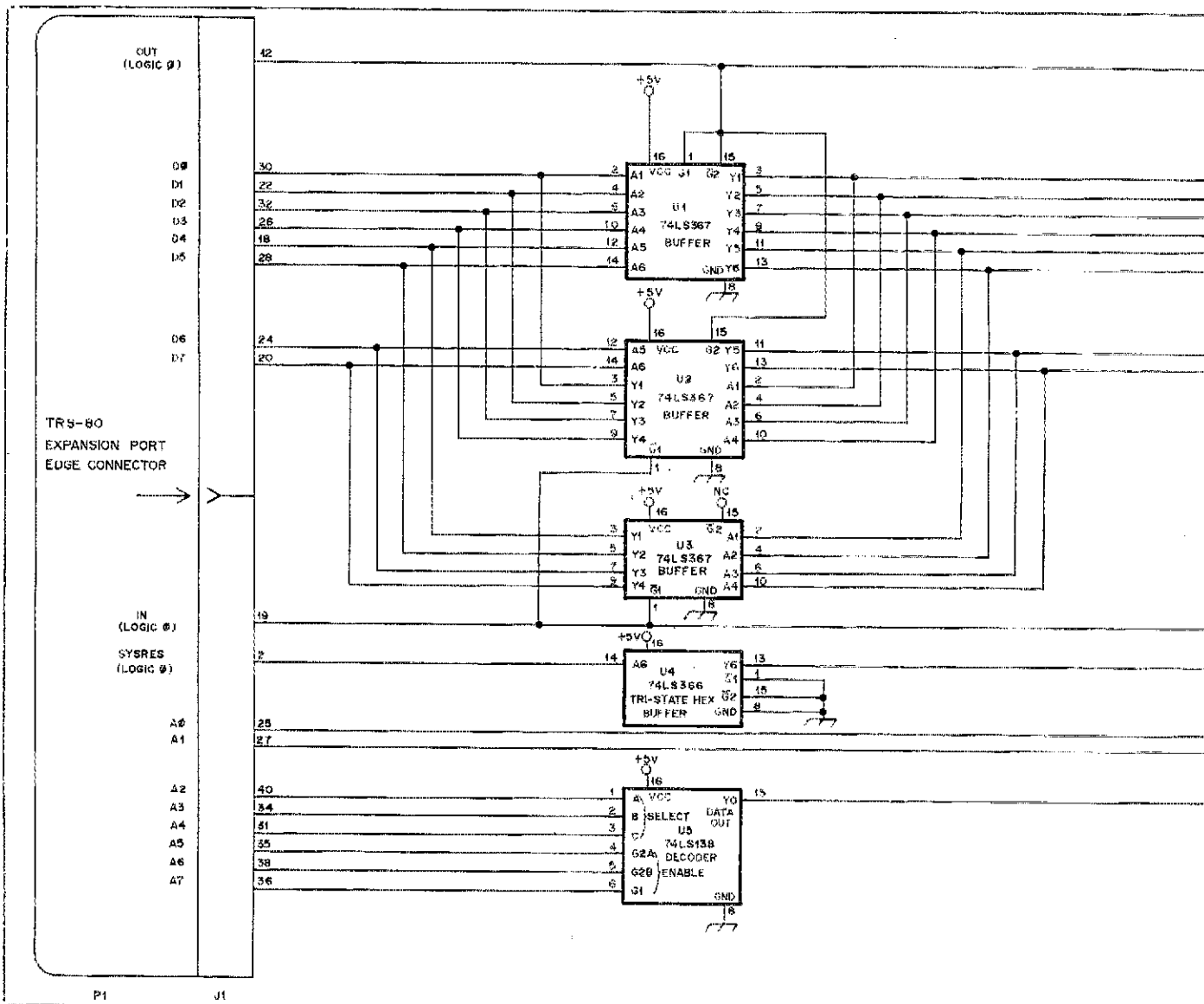


Fig. 1 — The computer-rotator interface diagram. All resistors shown are 1/4-watt. The TRS-80 expansion-port edge connector will mate with an Amphenol 88103-1 edge card connector, or a surplus connector may be used (see text). The components listed below may be obtained from the following sources: Active Electronics, 12 Mercer Rd., Natick MA (U1 through U10 inclusive); You-Do-It Electronics, 40 Franklin St., Needham, MA (re-

maining components).  
 D1-D3, incl. — 1N4007 silicon diodes.  
 J1 — Amphenol 88103-1 edge card connector or other (see text).

J2 — Part of CDE control box.  
 K1-K3, incl. — CDE No. 302 D-10 relays, spst. NO 10-A contacts, 12-V dc/110-ohm coil.

P1 — TRS-80 expansion-port edge connector  
 Q1-Q3, incl. — 2N3904 npn silicon transistors or equiv.



prevent damage to the driver transistors Q1-Q3. In this application, the relay contacts are wired in parallel with the CDE Ham II control box switches where they are used to control the 120- and 30-V ac brake and motor leads.

### Construction

As shown in the photographs, the interface is assembled on two pieces of perf board. One board contains the active filter and opto-isolator circuitry. The other board holds the switching relays and associated components; it is housed in a protective chassis-box. Wire-wrap construction was used throughout the project. Component layout is not critical except that the data bus lines from U6 to the

computer should be as short and direct as possible. Ribbon cable with 40 conductors was used to interconnect the interface to the computer. I found that a cable length of 18 in. (460 mm) was the most the computer would tolerate without problems developing. Edge connectors for the TRS-80 expansion port can be hard to locate. I had to use a 60-pin surplus connector that had the correct contact spacing and cut it to size.

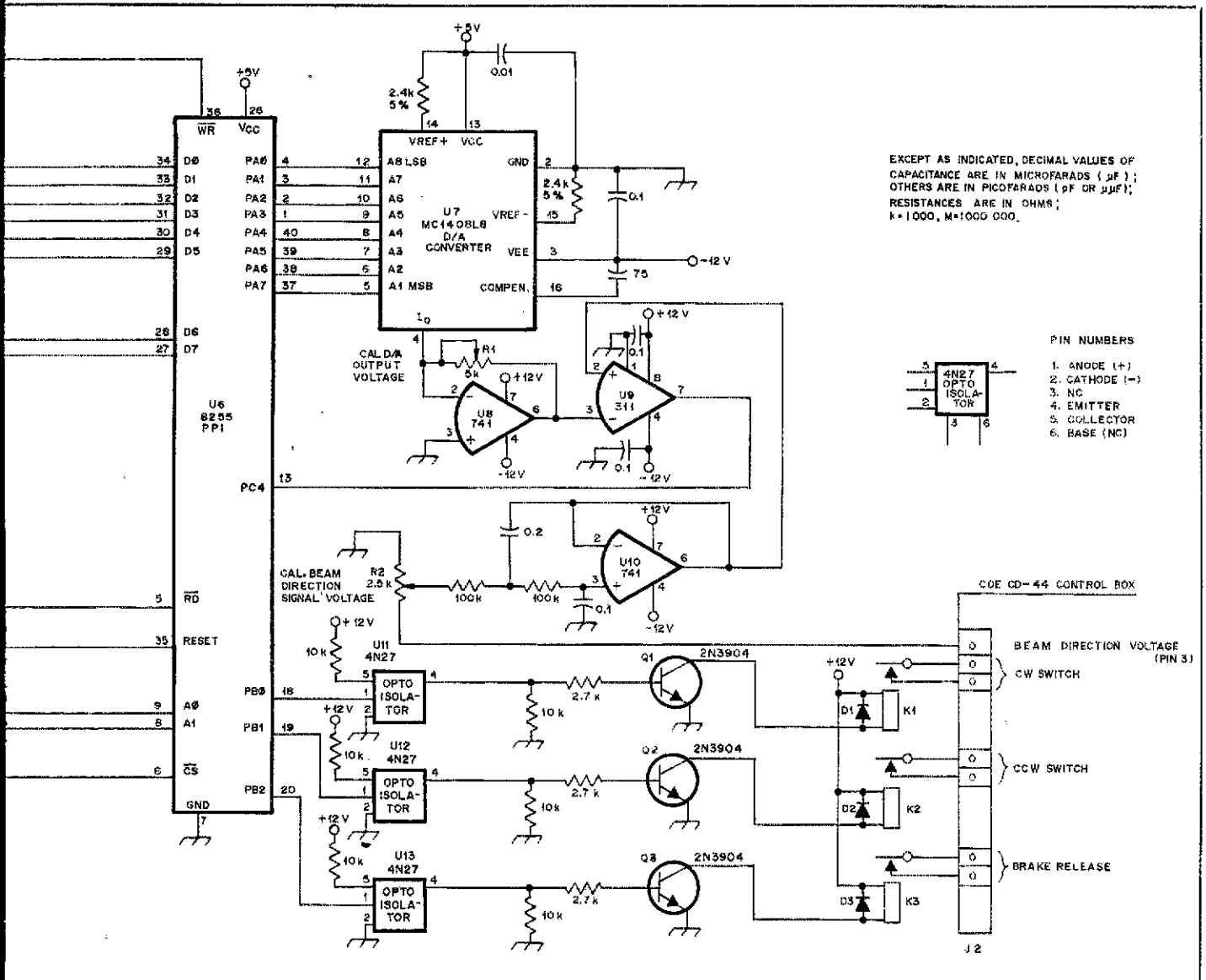
Connections to the rotator control box are simply made; the CDE box has plenty of room inside. To get to the switch contact lugs, the bottom portion of the housing must be removed. I used 6-conductor cable to make the connections, routing the cable through a 3/8-in. (10-mm) hole in

the chassis rear lip. The relay box and interface board may be interconnected by any convenient means. I used 10 ft (3 m) of 6-conductor cable for flexibility in physical interface placement.

### Calibration

To calibrate the interface, +5 V and  $\pm 12$  V dc are applied to the proper points and the digital output value 255 supplied to port A. Adjust R1 for the desired maximum D/A converter voltage. This will be in the range of 0 to 10 volts. The books I consulted recommend setting the voltage to 2.55 volts.<sup>3,3</sup> As the D/A range is 0 to 255, this setting results in a 0.01-V resolution.

Manually rotate the antenna to the



U1-U3, incl. — 74LS367 hex tri-state buffers.  
 U4 — 74LS366 hex inverters.  
 U5 — 74LS138 3-to-8 line decoder.

U6 — 8255 programmable peripheral interface.  
 U7 — MC1408L8 digital-to-analog converter.  
 U8, U10 — 741 op amp.

U9 — 311 voltage comparator.  
 U11-U13, incl. — 4N27 opto-isolators.



# A Beginner's Look at Op Amps

**Part 2:** What goes on inside the black box; or a journey from fantasyland to the real world.†

By George H. Woodward,\* W1RN

The introduction to closed-loop amplifier theory in Part 1 was intended to dispel any latent fear and loathing you may harbor for those convex triangular symbols. But just as a quick briefing on the facts of life doesn't prepare a person for marriage, our first peek at op amps won't allow us to use them in circuits without some awkward fumbling. This concluding part gives you information on some real circuits.

## A "Quasi-Real" Operational Amplifier

You could build the circuit in Fig. 7 to demonstrate the principles I discussed in Part 1. If you're a bit uncertain about Kirchhoff's laws, voltage nodes and black boxes, analyzing Fig. 7 at the component level may help clear the haze. Look first at the input stage, composed of Q1, Q2 and Q3. This arrangement is known as a differential amplifier. Our colorful British friends call it a "long-tailed pair." Old-timers may feel more comfortable thinking of the input circuit as a cathode follower driving a grounded-grid stage, and if you ground one base and excite the other, that's the vacuum tube equivalent of what we have. Q3 is a *constant current source*. The voltage at its base (with respect to the negative power bus or rail) is fixed at 1.2 volts by means of D1 and D2. Since the base-emitter junction of Q3 has one diode drop, the voltage developed across R3 is 0.6 volt. Ohm's law tells us that the current through R3 is 2 mA. The

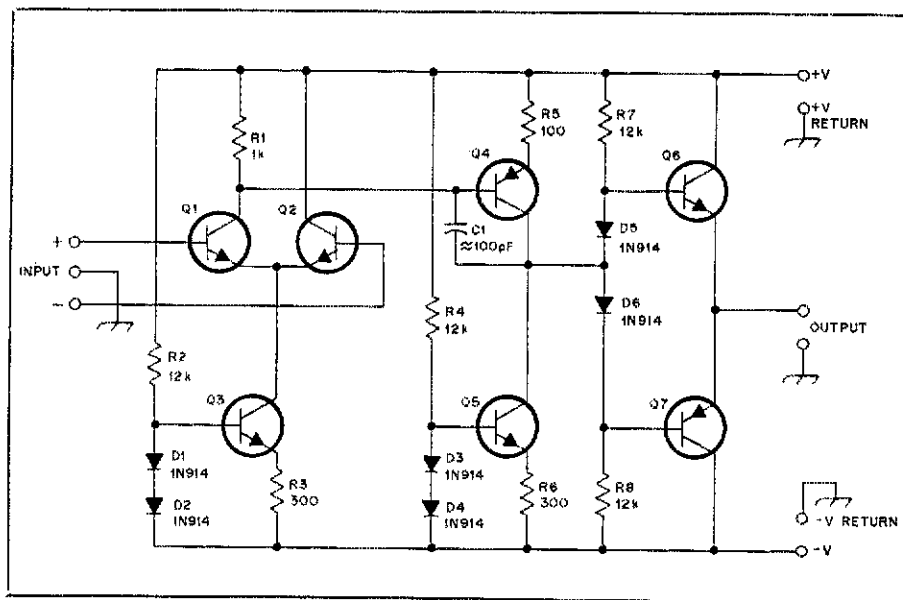


Fig. 7 — An operational amplifier assembled from discrete components. Npn transistors are 2N3904 or similar, and pnp transistors are 2N3906 or similar. Supply voltages from  $\pm 6$  V to  $\pm 20$  V may be used.

beta (current gain) of the transistor is very high, so its collector current is also 2 mA, provided the collector to emitter potential is at least a couple of volts. Constant current (independent of voltage) means infinite resistance. A constant-current source provides the tightest possible coupling between the emitters of Q1 and Q2 while ensuring the proper bias current.

If we ground both inputs of our op amp, Q1 and Q2 will each conduct 1 mA. An op amp isn't too useful with both inputs grounded, so let's tie the noninverting terminal (the one marked +,

remember?) to ground and apply a positive voltage to the inverting terminal. Notice that Q2 has no collector load resistor, so it behaves as an emitter follower. The Q2 emitter follows its base voltage, but since the base of Q1 is grounded and its emitter is connected to that of Q2, Q1 starts to turn off. As Q1 draws less current, its collector voltage rises toward the positive power bus. Q4 is a pnp transistor, and its base is connected to the collector of Q1, so it tends to turn off with Q1.

The circuitry around Q5 looks

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†Part 1 of this article appeared in April 1980 QST.

suspiciously like that of Q3, and if you call it a current source, you're right. Q5 forms the load resistance for the collector of Q4. The voltage gain of a bipolar transistor circuit is approximately the ratio of the collector load resistance to the emitter resistance. Since our constant-current load has "infinite" resistance, the stage gain is substantial.

Q6 and Q7 form an output stage called a *complementary-symmetry* circuit. Emitter followers of opposite polarity allow active pull-up (away from ground) for both positive- and negative-going signals.

Would anybody really build an op amp from discrete components? The answer is yes — take a look at the diagram for your high-fidelity music amplifier. It likely bears a striking resemblance to Fig. 7.

We still haven't talked about every component. And do we really *need* all those parts? First things first. The diodes between the bases of the output transistors hold each base one diode drop above its respective emitter. This gives the transistors a slight forward bias, causing them to conduct a small current under static (no signal) conditions. We could eliminate D5, D6, R7 and R8, and simply connect the bases of Q6 and Q7 to the collector of Q4. However, doing this would create a 1.2-volt "dead zone" around our zero-signal output level. The result would be crossover distortion of the output waveform. We'll deal with C1 a little later.

Fig. 8 illustrates the simplest possible operational-amplifier circuit. The constant-current sources have been replaced by high-value resistors, and the output is taken directly from the Q3 collector. In the early '60s (when a 709 op amp cost \$75), such circuits abounded in electronic instruments. They work fine in dedicated applications, but their flexibility is limited.

### Common-Mode Rejection

The circuit in Fig. 9 shows an op amp sensing a signal that is riding on another signal. An audio amplifier in a direct-conversion receiver is an example of this situation. The 60-Hz generator represents hum picked up by the receiver wiring, and the 1000-Hz generator represents the desired signal. If we assume the 1000-Hz signal source to have zero internal resistance, the hum will appear with equal (common) amplitude and phase on both amplifier input terminals. With only a resistor feeding the emitters of the input transistors, as in Fig. 8, the transistors will respond equally to the common-mode 60-Hz signal. This signal will be developed across the Q1 load resistor, and its amplitude depends on the balance between Q1 and Q2 and the value of the emitter resistor. Increasing the emitter resistance will improve the common-mode rejection at the expense of noise figure and/or dynamic range. If the amplifier of

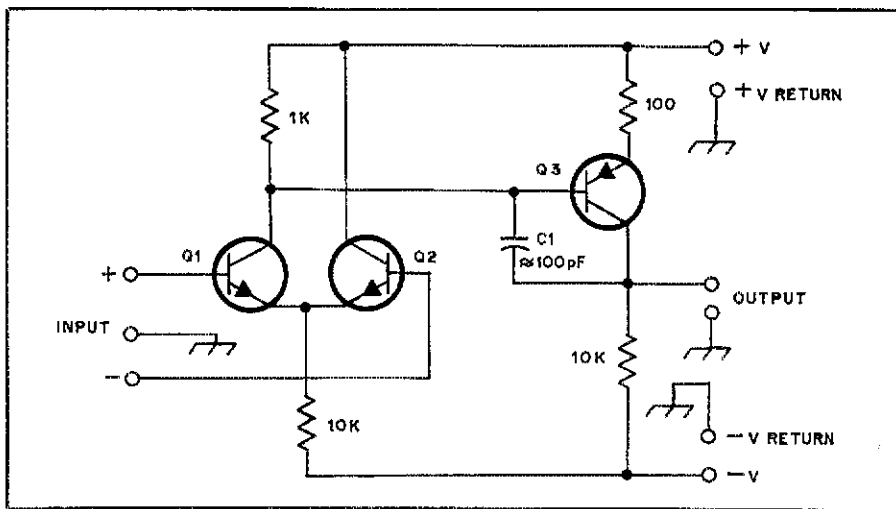


Fig. 8 — Simplified discrete op amp. This circuit was in common use before the advent of inexpensive IC technology.

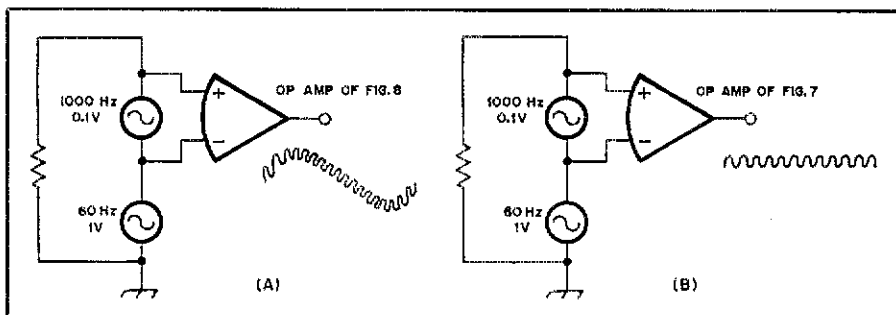


Fig. 9 — Illustration of common-mode noise. The unsophisticated circuitry of the op amp in A is unable to reject a signal common to both inputs. In B, the more elaborate op-amp circuit suppresses the undesired 60-Hz noise. Noise from the power supply is rejected by the same mechanism. See text for an explanation of this phenomenon.

Fig. 7 is used, no signal will appear at the collector of Q1 because of the infinite emitter resistance presented by the constant-current source. The total current in the differential pair can't vary with the input signal. Only the *ratio* of currents in Q1 and Q2 varies, and since the inputs are essentially shorted for the 60-Hz signal, the ratio is unity. When a constant-current source biases the differential pair, the only factor that can degrade the common-mode rejection is unbalance between the input transistors. A constant-current source also greatly enhances the op amp's rejection of power-supply noise.

### Offset

Another parameter that depends on the transistor balance is voltage offset. Ideally, shorting the input terminals together would produce zero output voltage. In reality it doesn't happen. A small differential voltage must be applied to the inputs to zero the output. This voltage is called *offset*. IC manufacturers specify this offset with respect to the *input*. To determine the effect of offset voltage on the *output*, simply multiply the input offset by the circuit gain. Most inexpensive

general-purpose op amps have offsets of a few millivolts. Some of the newer high-performance units feature offsets of only microvolts. Terminals for trimming the offset voltage to zero are available on many ICs. If the circuit resistances are low, the offset voltage can be measured directly by means of a digital multimeter connected across the input terminals.

A small current flows in the input terminals of real op amps, usually on the order of nanoamperes or picoamperes. If this current flows through a large resistance, a voltage will be developed. To nullify this error voltage, we can make the resistance to ground the same for both inputs. The error voltage will then be the same on both inputs, and the op amp will reject it as a common-mode signal. Fig. 10 illustrates this technique. Offset voltage can be ignored in most amateur applications, but it's a good thing to understand.

### Loop Gain

The voltage gain of the circuit in Fig. 10 is simply  $R_f/R_i$ . We derived this formula in Part I of this article, but it's based on the assumption that the amplifying device has infinite gain. We can't have infinite

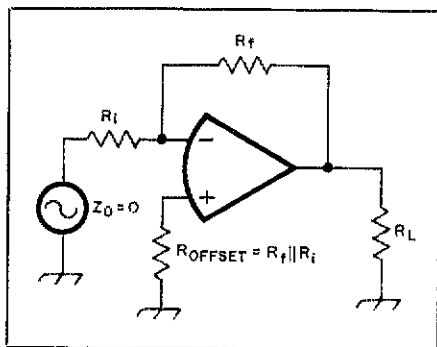


Fig. 10 — Equalizing the resistance to ground in each input leg cancels offset voltage caused by input current.

gain with real components, but our formula will be reasonably accurate if the amplifying device has at least 10 times the gain we expect from our circuit. The gain of the amplifying device alone is called the open-loop gain. With the feedback network connected, the circuit gain is called, appropriately enough, the closed-loop gain. The numerical open-loop gain divided by the numerical closed-loop gain is known as the *loop gain*. If all quantities are expressed in decibels, loop gain is the difference between the open-loop gain and the closed-loop gain. When expressed this way, loop gain is sometimes called *gain margin*, and is a measurement of the amount of feedback in the circuit. Loop gain is an important parameter in op-amp circuits because it profoundly influences such characteristics as accuracy, distortion and stability.

### Phase Shift and Stability

Drawn in Fig. 11 is an inverting amplifier circuit, along with a plot of its frequency response. The closed-loop gain is 10, or 20 dB, as set by the input and feedback resistors, up to about 50 kHz, where the op amp runs out of gas. If we set the closed-loop gain to 100, we could only go out to about 5 kHz before the frequency response drops off. Connecting the op amp as a voltage follower would allow us to approach 1 MHz of bandwidth. The open-loop gain of the device rolls off at 6 dB per octave (20 dB per decade), and the 3 dB corner frequency is about 3 Hz. Three hertz?! But semiconductors are faster than that, aren't they? Yes, they are — much faster. The sloping response comes about as a result of C1 in Figs. 7 and 8. If we omitted C1, the amplifier's frequency response would be determined by the time constants of the semiconductor junction capacitances and resistances. Each parasitic R-C product introduces an attenuation of 6 dB per octave above a corner frequency dictated by

$$\frac{1}{2\pi RC}$$

As each successive corner frequency is

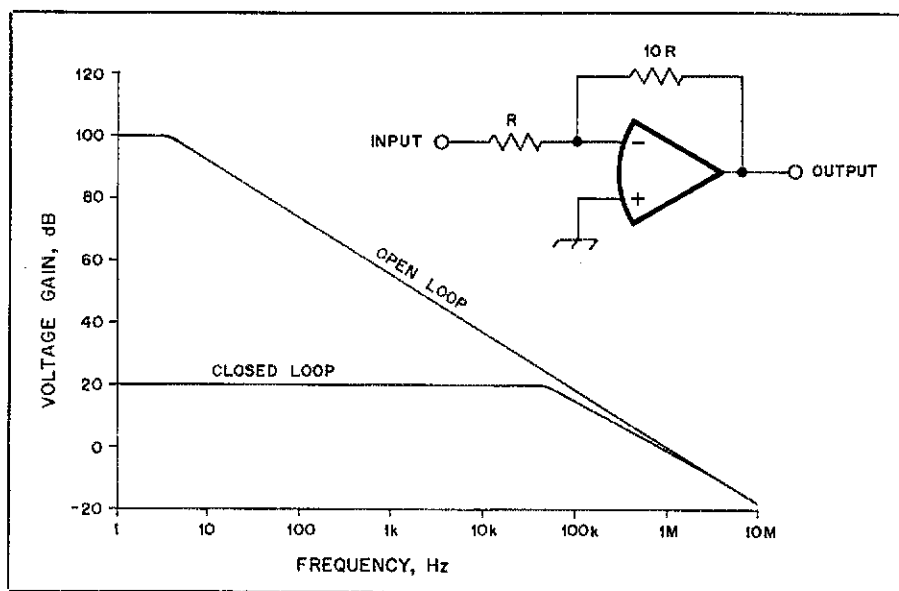


Fig. 11 — Open-loop gain and closed-loop gain as a function of frequency. The vertical distance between the curves is the feedback or gain margin.

reached, the attenuation slope increases by 6 dB per octave, becoming 12 dB per octave, then 18 dB, and so on. The problem with allowing the parasitic R-C networks to determine the op amp's open-loop frequency response is that each such network introduces some phase shift. At the corner frequency, an R-C network exhibits 45 degrees of phase shift, and this value increases beyond the corner frequency. After passing through three parasitic R-C networks, an input signal above the highest corner frequency has been shifted at least 135 degrees.

In other words, above a certain frequency, an inverting amplifier circuit doesn't invert at all! In fact, if the device still has gain above the third corner frequency, connecting a resistor from the output to the inverting input terminal will cause the circuit to oscillate, because the feedback is really positive. To prevent oscillation, we ensure that the gain drops to unity before the phase shift reaches 135 degrees. A capacitor between collector and base of the main voltage gain transistor is the easiest way to accomplish this. The capacitor doesn't need to be very large because its capacitance is multiplied by the *Miller effect*. Basically, the Miller effect works this way: As the base voltage of the transistor goes positive, the collector voltage goes negative. The voltage across the capacitor, then, is the sum of the base and collector voltages, with the result that the base current must be larger than to charge a like-value component connected to ground.

Tailoring an op amp's response to prevent oscillation is called phase compensation or frequency compensation. In some devices, the compensation is internal. The curve in Fig. 11 is for a 741 — a popular

internally compensated op amp. In some other op amps, such as the 709 and 301, the frequency compensation must be connected externally. The 6-dB-per-octave compensation is the most stable, but it severely limits the bandwidth over which a large closed-loop gain can be realized. Application notes published for externally compensated types of amplifiers show specialized types of compensating circuits such as two-pole and feed-forward networks. These have the advantages of wider bandwidth and improved transient response, but at the expense of increased load sensitivity. Op amps particularly dislike capacitive loads.

### Bandwidth

The small-signal bandwidth of an operational amplifier depends mostly on the phase-compensation scheme. As shown in Fig. 11, lower closed-loop gain (greater feedback) allows wider bandwidth. For large signals (output swing approaching the supply voltage) the bandwidth is smaller, being limited by the amplifier's *slew rate*. Slew rate is a measurement of the amount of voltage change a device can produce in a given time. Energy stored in junction capacitances is the major factor limiting the speed with which transistors can respond to changes. Typical slew rates range from about 0.8 volt per microsecond for the 741 to about 13 volts per microsecond for the high-performance LF356. Devices having small-signal bandwidths of 10 MHz or better typically have power bandwidths on the order of 200 kHz.

### Input and Output Considerations

Real op amps have input impedances ranging from megohms to gighms. Ordinary general-purpose devices having

bipolar input transistors usually fall into the megohm category. In order for these op amps to approach "ideal" performance, the input source impedance should be kept below 10 kilohms. Low source impedances generally promote low noise and low offset and drift errors. FET input op amps can sometimes be operated successfully from source impedances greater than 1 megohm.

Although the internal circuit configurations combined with heavy external feedback encourage low dynamic output impedances, most IC op amps aren't happy with load impedances lower than about 2 kilohms. The reason for this is that the chips have built-in current limiting which helps protect them from damage caused by pin-to-pin short circuits. Beyond 10 or 20 milliamperes of load current (source or sink) the output goes into a constant current (meaning high impedance, remember?) mode. For high output currents or low impedance loads, we can add a discrete emitter follower within the feedback loop. As mentioned in the discussion of stability, most op amps tend to oscillate when subjected to capacitive loads. Often a small resistor in series with the output will remedy this condition.

### The Norton Amplifier

An unusual type of op amp I didn't discuss in Part I is the *Norton*, named for the network theorem on which its operation is based. Fig. 12A shows a simplified diagram of the input stage of a Norton amplifier. The noninverting input makes use of D1 and Q1 in a *current mirror* configuration. When input current is applied to Q1, it steals base drive from Q2, the inverting input. Obviously, this amplifier must have input current to operate, hence it is *not* a high-impedance device. In the inverting-amplifier configuration the numerical voltage gain is  $R_f/R_i$ , but the noninverting input terminal must be returned to the *positive supply* through a resistance of  $2R_f$  to equalize the input currents. Any attempt to use this type of IC as a voltage follower is doomed to failure — the input stage will be destroyed by excessive current. The chief usefulness of Norton amplifiers is in single-supply applications where the dc level of the signal is very near ground. The ssb chapter of the *Handbook* features a VOX circuit using the LM3900 Norton op amp.

### Some Op-Amp Applications

We haven't learned *everything* about operational amplifiers yet, but with the information presented so far, you should be able to put together a few op amp circuits without getting into too much trouble. April 1980 *QST* featured a microphone amplifier. As well as being a handy gadget and an excellent "first project," that unit is useful for demonstrating basic op amp principles. Other applications for op amps

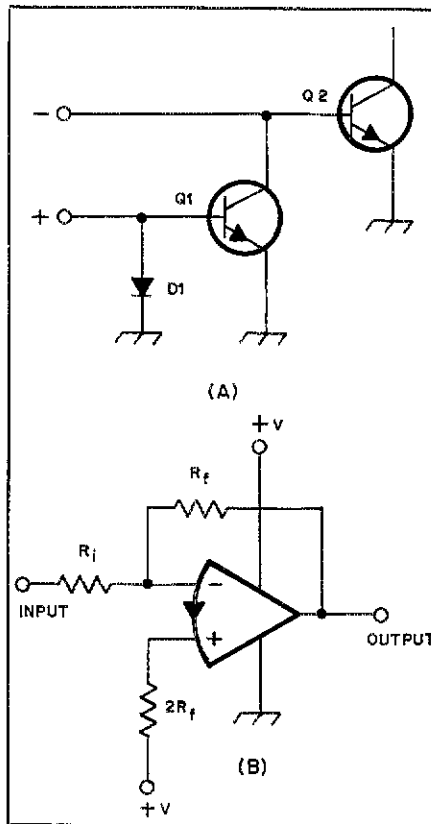


Fig. 12 — (A) Input circuit of a Norton operational amplifier. (B) Norton op amp connected as an inverting amplifier. Note the special symbol used to denote a Norton IC.

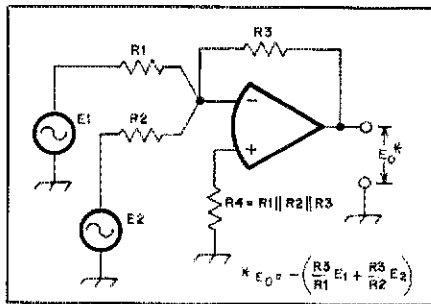


Fig. 13 — A summing amplifier and its transfer function.  $E_1$ ,  $E_2$  and  $E_0$  are *instantaneous* voltages. Don't forget to assign the proper polarities to the input voltages. Any number of signals can be summed this way.

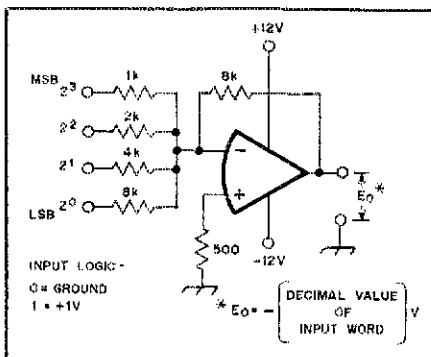


Fig. 14 — Digital-to-analog converter. One application might be an analog (meter) readout for a frequency counter. The circuit is also useful as a coarse steering-voltage generator for a VCO in a frequency synthesizer.

in either inverting or noninverting circuits include receiver audio sections, alc, agc and S-meter amplifiers, and even 50-kHz i-f stages.

All of the circuits we've looked at so far have had only one signal source. An inverting op-amp circuit has the ability to amplify signals from two sources without mutual interference. See Fig. 13. The current in the feedback resistor,  $R_3$ , is equal to the *algebraic sum* of the currents in the input resistors,  $R_1$  and  $R_2$ . Now you can see why the common connection of  $R_1$ ,  $R_2$ ,  $R_3$  and the inverting input terminal was called the *summing junction* in Part I. Since the summing junction is a virtual ground, the two generators have no mutual current, so they are completely isolated. When audio engineers work with summing amplifiers, they call them *audio mixers*. In most communications work, a mixer is a nonlinear device that generates the sum and difference and other products of two input frequencies. A summing amplifier used as an audio mixer is linear, and only the input frequencies appear at the output. You should be aware of this distinction when speaking of mixers. *Combiner* is a better word than mixer for an audio summing amplifier.

If your interest in electronics is mostly digital, you are about to be rewarded. To interface from bits and bytes to the land between one and zero, we need a D/A (digital to analog) converter. A summing amplifier can serve this purpose. A four-bit D/A converter is drawn in Fig. 14. For simplicity, assume the digital word generator has zero output impedance for both logic levels. If the data input is 0000, the op amp's output is zero, because all of the inputs are grounded. Incrementing the word generator to 0001 applies a positive 1-volt level to the least significant bit (LSB) of the converter. The gain for this input is  $8k/8k$  or unity, so our output is negative 1 volt. An input of 1001 is BCD (binary-coded decimal) nine. One volt applied to the most significant bit (MSB) will cause an output of negative 8 volts, because that input channel has a gain of eight. The LSB input resistor also has a current, and the current in the feedback resistor is the sum of the two input currents. The LSB input caused an output of negative one volt, so the op amp's output will be negative 9 volts. The gain of the MSB channel is eight times that of the LSB channel because the MSB has eight times the numerical weight of the LSB. If the input word were 1111 (hexadecimal F or decimal 15) you'd get an output of negative 15 volts, right? Wrong! Look at the diagram again — the negative power supply is only 12 volts. Most op amps can't generate output voltages closer than about 2 volts from either supply, so we'll have to be content with a BCD converter. Naturally, if we want the output to go *positive* with increasing input numbers, we'd use an inverting op amp after the

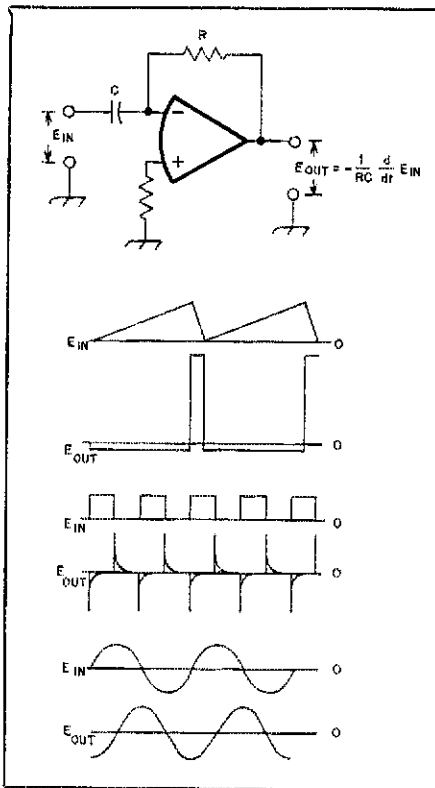


Fig. 15 — A differentiator circuit with its transfer equation. The  $d/dt$  notation is from the calculus, where the derivative of a function can be expressed as the ratio of two differentials (increments, or small changes). Typical input and output waveforms are also given. Transposing the resistor and capacitor transforms the circuit into an integrator (see text).

converter.

Early in Part I I promised to talk about differentiators and integrators. Differentiation and integration are the fundamental operations of the calculus. When a voltage varies with time, we say that the voltage is a *function* of time. How fast the voltage changes with time is called the *slope* or *rate of change* of the function. When we discussed slew rate, we were really talking about the slope of the output function. An expression defining the instantaneous slope of a function for any given point is called a *derivative*. The process of finding a derivative is called *differentiation*. An electrical differentiator, then, is a circuit whose output voltage is proportional to the instantaneous rate of change of the input voltage.

If the input resistor of an inverting amplifier is replaced by a capacitor, as in Fig. 15, a differentiator results. Several input and output waveforms are sketched in the figure. The first input signal is a linear ramp. As the name implies, the voltage increases with time at a constant rate. While the input voltage is rising, the output voltage is constant. When the input voltage peaks and starts to decline, the output voltage reverses polarity and

assumes a constant voltage proportional to the new (steeper) slope.

A square-wave input produces an output that looks very different. The rising edges of the input signal have a near-infinite slope, so the op amp puts out its largest possible voltage. The flat portion of the square wave does not vary with time; its slope is zero. During this period the differentiator's output decays quickly to zero.

When the input signal is a sine wave, the output is also a sine wave, but displaced in phase (time). The derivative of the sine function is the cosine. Since our differentiator is an inverting circuit, the output function is minus cosine, which is the same as a sine wave advanced 270 degrees or retarded 90 degrees. Without a mathematical derivation, you can rationalize the transfer function by analyzing the curves at a few critical points. The input slope is steepest where the curve crosses zero, and it is at this point that the output curve has the greatest amplitude. When the input sine wave peaks and begins to decline, its slope is zero, as dutifully indicated by the differentiated output.

A differentiator has one other characteristic — it's a high-pass filter. It's easy to see why this is so. As the input frequency increases, the reactance (ac resistance) of the capacitor decreases. If you think of the capacitor as the input resistor of an inverting amplifier, you can see that the circuit gain will double every time the input frequency doubles. For this reason, differentiators are sometimes jokingly called "wide-band noise generators."

Analog computers use differentiators to solve mathematical and physical problems involving the calculus. In most electronic applications, the op-amp differentiator serves simply as an edge detector for the generation of timing, triggering and synchronizing pulses.

The inverse of differentiation is *integration*. If we interchange R and C in Fig. 15, our circuit becomes an integrator. The output is the *antiderivative* of the input. If the input signal is a derivative, the integrator tells us what function the input is a derivative of. The mathematical expression for the integrator's transfer function is

$$E_{out} = \frac{-1}{RC} \int_{t_1}^{t_2} E_{in} dt.$$

In words, we say the output voltage is proportional to the definite integral of the input voltage as a function of time, evaluated over the time interval  $t_1$  to  $t_2$ , divided by the RC product. To see how the input and output waveforms are related, just swap the input and output labels on the waveforms in Fig. 15.

As you might suspect, an integrator is a first-order low-pass filter, having an attenuation slope of 6 dB per octave. Aside from its obvious mathematical application, the integrator finds use in ramp generators, frequency-to-voltage converters, duty-cycle detectors, and so forth. Although integrators and differentiators are active filters, other op-amp circuits can provide much more impressive attenuation slopes. Active filters will be treated in a future *QST* article.

### Nonlinear Feedback

Our op-amp circuits thus far have had only linear elements (resistors and capacitors) in the feedback loop. A wide variety of transfer functions is possible if we insert nonlinear devices in the feedback path. What's a nonlinear device? One that doesn't strictly obey Ohm's law. The most common nonlinear device is the junction diode. Junction diodes are useful as rectifiers, but at low signal levels the conduction threshold causes severe distortion and loss. We can "linearize" a diode by inserting it in the feedback path of an op amp. The "perfect rectifier" circuit shown in Fig. 16A is an example of this technique. When the input voltage is zero, the output voltage is also zero, give or take some offset. If the input signal goes slightly negative, the output will swing sharply positive. The op amp runs open loop until the IC output voltage reaches the conduction threshold of D2 (about 0.6 volt). From this point on, the circuit's output voltage (at the D2 cathode) is a linear function of the input voltage. The closed-loop condition forces the current in D2 and  $R_f$  to equal that in  $R_i$ . Since the output voltage is taken between  $R_f$  and ground (equivalent to the voltage across  $R_f$ ), the output waveform will be a faithful reproduction of half the input cycle. Of course the current in D2 is still a nonlinear function of the voltage across it (and its temperature), and this characteristic can be seen at the IC output terminal. Positive excursions of the input voltage cause the op amp to output a negative voltage, which biases D2 out of conduction. D1 conducts when the input is positive, closing the feedback loop. A closed loop keeps the summing junction at virtual ground, providing a constant load for the input signal.

Several circuits exist to produce linear full-wave rectification. These are sometimes called *absolute value generators*. The absolute value of a number is the difference between that number and zero. For example, the absolute value of two is two, and the absolute value of negative two is also two. The simplest absolute value generator I've seen is illustrated in Fig. 16B. It isn't "perfect" because the output can go slightly negative. That condition could be rectified (no pun intended) by means of a small bias voltage on the diode's anode —

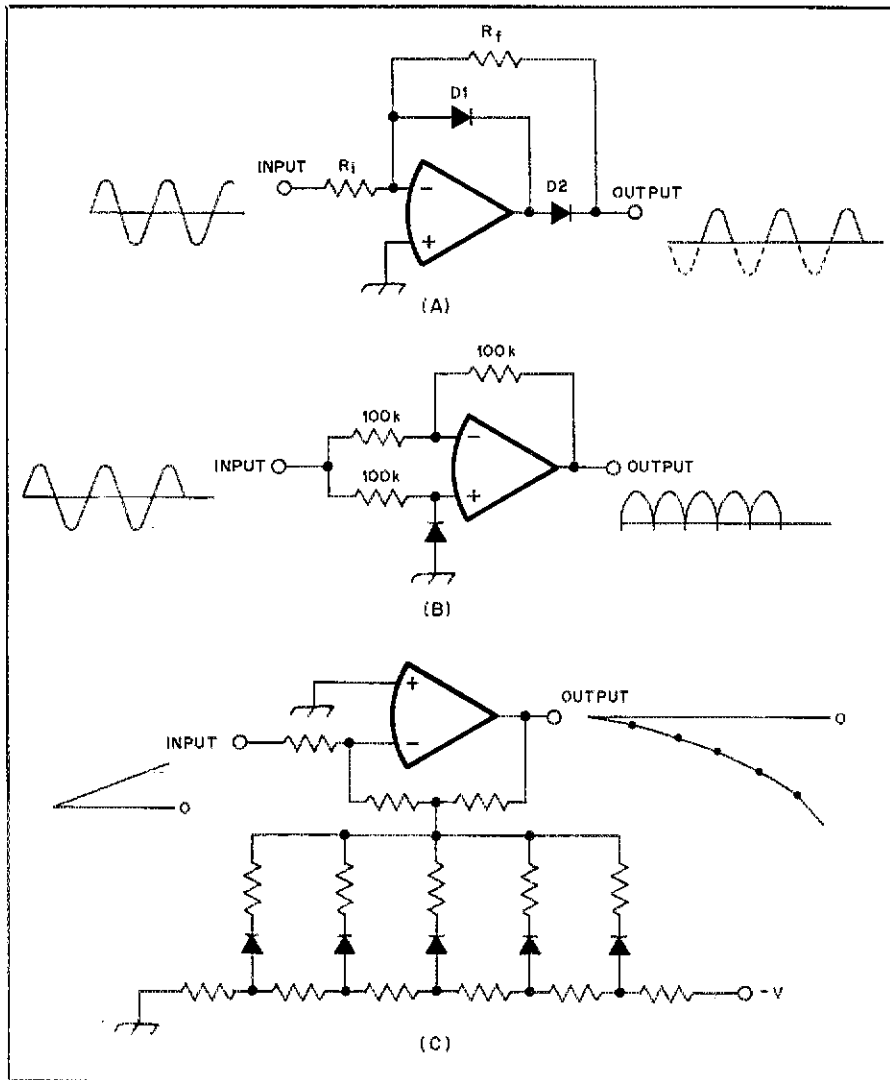


Fig. 16 — (A) Op amp used as a half-wave rectifier or "perfect diode." (B) Simple electronic full-wave rectifier or absolute-value generator. (C) Piece-wise linear approximation of a nonlinear function by means of a shaping network. The break points are set by the voltage divider taps, and the slope between break points is determined by the resistor values in series with the diodes.

it's the old trade-off between simplicity and performance. I leave the exact analysis of this circuit as an exercise for the reader.

Fig. 16C shows a method for synthesizing a nonlinear output function from a linear ramp. The feedback resistance is split into two parts. Notice that the anodes of the diodes are tapped along a voltage divider string. The resistance of the divider should be low compared to the feedback resistors. A positive input ramp causes the op amp's output to go negative. As soon as the output voltage forward biases one of the diodes, part of the feedback current gets shunted to ground. In order to satisfy Kirchhoff's current law (equal currents in and out of the summing junction), the output voltage must increase. This means the gain, and therefore the slope, of the output function must increase. If we continue to increase the input voltage, more diodes will be forward biased, raising the gain still higher. Shap-

ing a curve this way is known as *piece-wise linear approximation*. One application for this circuit is in a microwave sweep generator using a varactor-tuned oscillator. As you tune such an oscillator higher in frequency, it takes more and more voltage to obtain a constant frequency increase. A shaping network like that of Fig. 16C allows the oscillator frequency to be calibrated on a linear scale. There are more examples of nonlinear feedback circuits, but it's time to move on.

#### Op Amps as Switches

Op amps aren't always used with negative feedback. An open-loop implementation is given in Fig. 17A. This circuit is a *comparator*. One input terminal is connected to a fixed reference voltage. When the signal applied to the other terminal crosses the reference voltage, the op amp output swings very quickly to its maximum value, usually

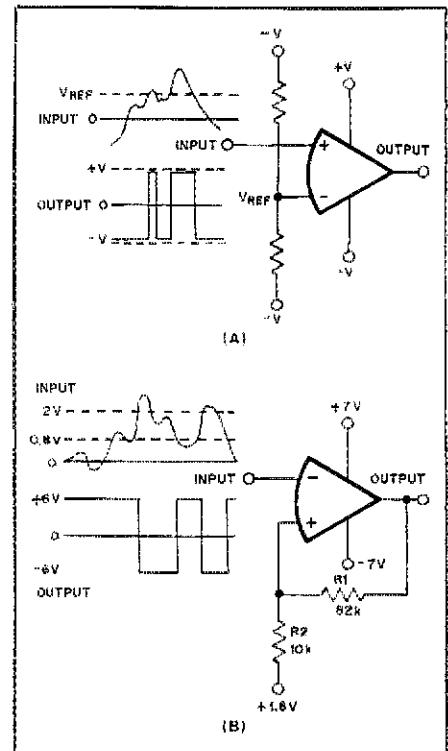


Fig. 17 — (A) Differential voltage comparator. Either inverting or noninverting circuits may be used. (B) Schmitt trigger. The constants shown here are suitable for connecting +5-V TTL to  $\pm 7$ -V CMOS logic.

near the power supply voltages. The circuit in Fig. 17A is a noninverting configuration. If the signal voltage is more positive than the reference voltage, the output voltage will rest near the positive supply. If the signal becomes negative with respect to the reference, the output will hover near the negative supply. Grounding the reference terminal transforms the circuit into a zero-crossing detector. The existence of essentially two output states immediately suggests digital applications. An array of comparators having different thresholds combined with appropriate logic can form one type of A/D (analog-to-digital) converter. I should point out that digital logic systems can be implemented with standard negative-feedback op-amp circuits, but there is usually little point in doing this.

Introducing *positive* feedback to a comparator helps to speed up the output transition from one state to another, giving the circuit real "snap" action. The circuit of Fig. 17B is a useful application of this principle. To understand its operation, assume the inverting input is driven to zero volts. This is clearly below the threshold voltage, so the op amp output voltage rests near the positive rail — let's say the output is 6 volts. Since the op amp input impedance is very high compared to R1 and R2, we can compute the voltage at the noninverting terminal from the divider ratio. With the 6-volt output potential at



one end of the R1-R2 divider and the 1.6-volt reference at the other, the junction potential is just about 2 volts. This means the input signal must exceed 2 volts to flip the output to the low state. Once the output is low, say minus 6 volts, the noninverting input terminal will see about 0.8 volt. *Pulling the input level down to the previous 2-volt threshold won't make the op amp revert to the high state* — we have to provide an input more negative than 0.8 volt to cause a transition.


This inertia effect is called *hysteresis*. You may encounter that term when you study electromagnetism — the meaning is similar. A comparator with hysteresis is a *Schmitt trigger*. The noise immunity provided by a Schmitt trigger gives it great utility as a *line receiver* — a circuit used to restore digital pulses which have been degraded by a long transmission line. The

0.8- and 2-volt trigger levels in our example provide maximum noise immunity for TTL (transistor-transistor logic) inputs. These voltages are the maximum low and minimum high output levels guaranteed for TTL gates. The output states in our example are ideal for driving CMOS (complementary-symmetry metal-oxide semiconductor) logic systems using plus and minus 7-volt power supplies. It is a simple matter to clamp the output voltages to any desired levels by means of diodes.

### Wrapping Up

There's much more to the op-amp story than we have space for in this article. Semiconductor technology is advancing rapidly, and new applications will emerge as improved devices become available. In this article I haven't surveyed the op amps

on today's market. Each semiconductor manufacturer publishes a "selector guide" in his catalog of linear integrated circuits, and every serious builder or experimenter should make the effort to obtain these books.

Once you understand the principles outlined in this article, you will probably invent your own applications for op amps. When you determine your device requirements, choose an op amp from what's available at your local hobby electronics store or from mail order firms. Operational amplifiers can't replace discrete transistors (or tubes!) in every application, but in many cases the "black box" approach with its "cookbook" methods for gain selection and impedance matching can make your electronics hobby simpler, less frustrating and more fun. 

## Strays



### HAM HOOKUP — TEXAS TO NICARAGUA

□ Living in Bonanza, Nicaragua, a small mining town in the northeastern part of the country, and being licensed as YN4KLB, I thought that Amateur Radio was a wonderful way to talk to my daughter. We have no telephone service in Bonanza and mail from the U.S. takes about two weeks. I was delighted to get in touch with a willing ham, Glen Hallmark, W5AUT, in College Station, Texas, where my daughter, Kathryn, was attending a university. Certainly neither Glen nor I could have imagined that our weekly contacts would become daily contacts, and that they would be our only means of communication for over three months.

Because of our isolation, we felt quite safe from the disturbances that were taking place elsewhere in Nicaragua. We scoffed at rumors that guerrillas were camped in the jungle nearby. Surely they would not bother our insignificant little village. All that changed last spring! Our little village was attacked by Sandinista guerrillas and a battle raged right at our doorstep. The *Comandancia* (headquarters for the Guardia Nacional) was burned and the Guardia took to the hills. That night the Sandinistas buried their dead and left. The next day a contingent of Guardia was flown in and the red and black flag of the Sandinistas was taken down and the Nicaraguan flag went up

again. In the days that followed, those flags went up and down so many times that we lost count. One day we would be under Sandinista control, the next day the Guardia would be back. As foreigners working for an American company, we tried to maintain a neutral position. We cooperated with whoever was in control — or, you might say, with whoever had the guns.

After the raid here and the one in the neighboring town of Rosita made international news, our first concern was to let the families of the foreign staff know that we were alright. Our first thought was of W5AUT. After we contacted him, he notified our families in the U.S. and Canada, and offered to keep in daily contact with us for anything we might need. As it turned out, our need became acute. During one of the guerrilla raids the radiotelegraph facilities at the local airport were destroyed and regular mail and supply flights were stopped. This left the ham radio arrangement with W5AUT as our only means of communication. We had no food and no way of getting any. A few ordinary circumstances became important — a pregnant woman needed a cesarean section and a diabetic needed insulin. We unloaded all our problems on W5AUT. Soon our families realized that there was no other way to learn news of us, and they began keeping in touch with Glen by phone from various places in the U.S. and Canada. He gave news and

reassurance and was able to tell them that he was in daily contact with us. Meanwhile in Nicaragua, we were having a series of very tense situations and emergencies. It got to the point that the highlight of each day was the radio contact between YN4KLB and W5AUT. This usually brought news of our families and a few words of hope and encouragement for us. Through W5AUT we were able to get medical supplies for our expectant mother, insulin for the diabetic, and a sick woman was able to get out by private plane. Each of the situations that Glen handled for us is a story in itself.

The war is over — the Sandinistas are in control — both flags are flying these days. The reconstruction period is difficult, but the danger is past. We have rather erratic mail service but still have no radiotelegraph facilities or air service, and the future is uncertain.

We certainly hope that our friend, W5AUT, hasn't developed an ulcer from all the problems that we have dumped on him. He assures us that it's "all in a day's work" and that he has done no more than would be done by another ham under similar circumstances.

Once again, I am back to a weekly chat with my daughter, but now with a renewed respect for the dedicated men and women who devote so much of their time to helping others. My thanks to all of you, and please keep up the good work. — Kathryn L. Byrd, YN4KLB

# A Two-Band Half-Sloper Antenna

When an off-the-wall empirical design like this works well, suspicion and skepticism are warranted. Maybe you'll agree that this sloper idea is an exception!

By Gary E. Myers,\* K9CZB

The popularity of the half-sloper antenna seems to be increasing, as evidenced by recent articles in *QST*.<sup>1,2,3</sup> This type of antenna has some worthwhile advantages, particularly for the lower frequency operator — low-angle radiation for antennas of modest height, compactness and simplicity of construction. On the minus side, narrow bandwidths and difficulties in resonating the system have been reported.<sup>3</sup>

The antenna system to be described here evolved from a simple-minded attempt to design a two-band half sloper for 80- and 40-meter operation. A trap-type of antenna was selected as the design basis because of previous experience with trap antennas and because the inductive loading of the trap on the lower-frequency band allows a somewhat shorter overall length. The same inductive loading, however, was also expected to increase the antenna Q and thereby further decrease the bandwidth. For this reason I was prepared to experiment.

It is well that I was so prepared because the final form of the antenna bears little resemblance to the initial concept. But most interesting — and exciting — is the impressive bandwidth on 80 meters.

## The Design

A diagram of the two-band half-sloper antenna system is shown in Fig. 1. It can

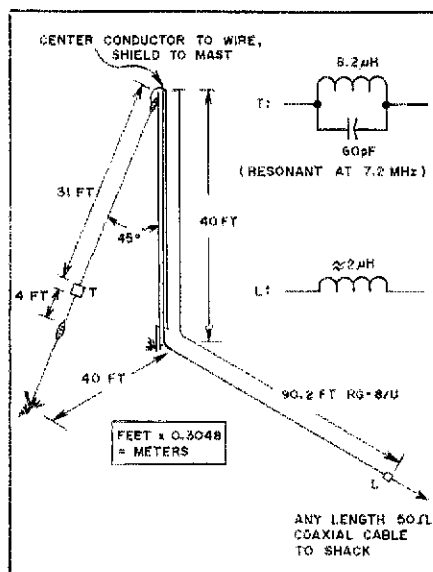


Fig. 1 — The two-band half sloper. To shield the transmission line from the antenna field, the line is routed up the inside of the support mast, which is grounded. Inductor L is needed to resonate the system.

be seen that there is no obvious quarter-wave dimension in the entire system. In fact, the radiator itself is a nonresonant device.

Initial attempts to prune the wires to resonance resulted only in a mound of wire clippings and one frustrated amateur. After many hours of cut-and-try experimentation, accompanied by a grow-

ing, gut-level appreciation for what apparently was happening, the magic combination of wire lengths and trap component values was found. Impedances of  $40 - j80$  ohms at 7.2 MHz and  $60 - j40$  ohms at 3.6 MHz were measured with a noise bridge. It was then a simple matter to cancel out these capacitive reactances with an inductor.

For convenience, the inductor was placed in the transmission line, rather than at the feed point — final "tweaking" of the system is more easily performed on the ground than at 40 feet (12.2 m) in the air. A Smith Chart exercise shows that the SWR on the transmission line between the feed point and inductor L is 5:1 at 7.2 MHz and 2:1 at 3.6 MHz. When RG-8/U is used, the additional loss incurred because of these SWRs is less than 0.5 dB at 7.2 MHz and is almost nonexistent at 3.6 MHz.

## Performance

This antenna performs very well. Operation at K9CZB is primarily 80-meter cw, with some 40-meter ssb. Power output is nominally 100 watts. Signal reports on 80 have been uniformly good, with comments such as U R LOUDEST 9 ON BAND and VY FB SIG, VY STRONG. Voice operation on 40 has also resulted in good signal reports, although the praise has not been so lavish. This is my only 80/40-meter antenna, so direct comparisons were not possible. However, it appears to greatly outperform two previous antennas, a

\*28-W-135 Hillview Dr., Naperville, IL 60540  
 \*Notes appear on page 35.

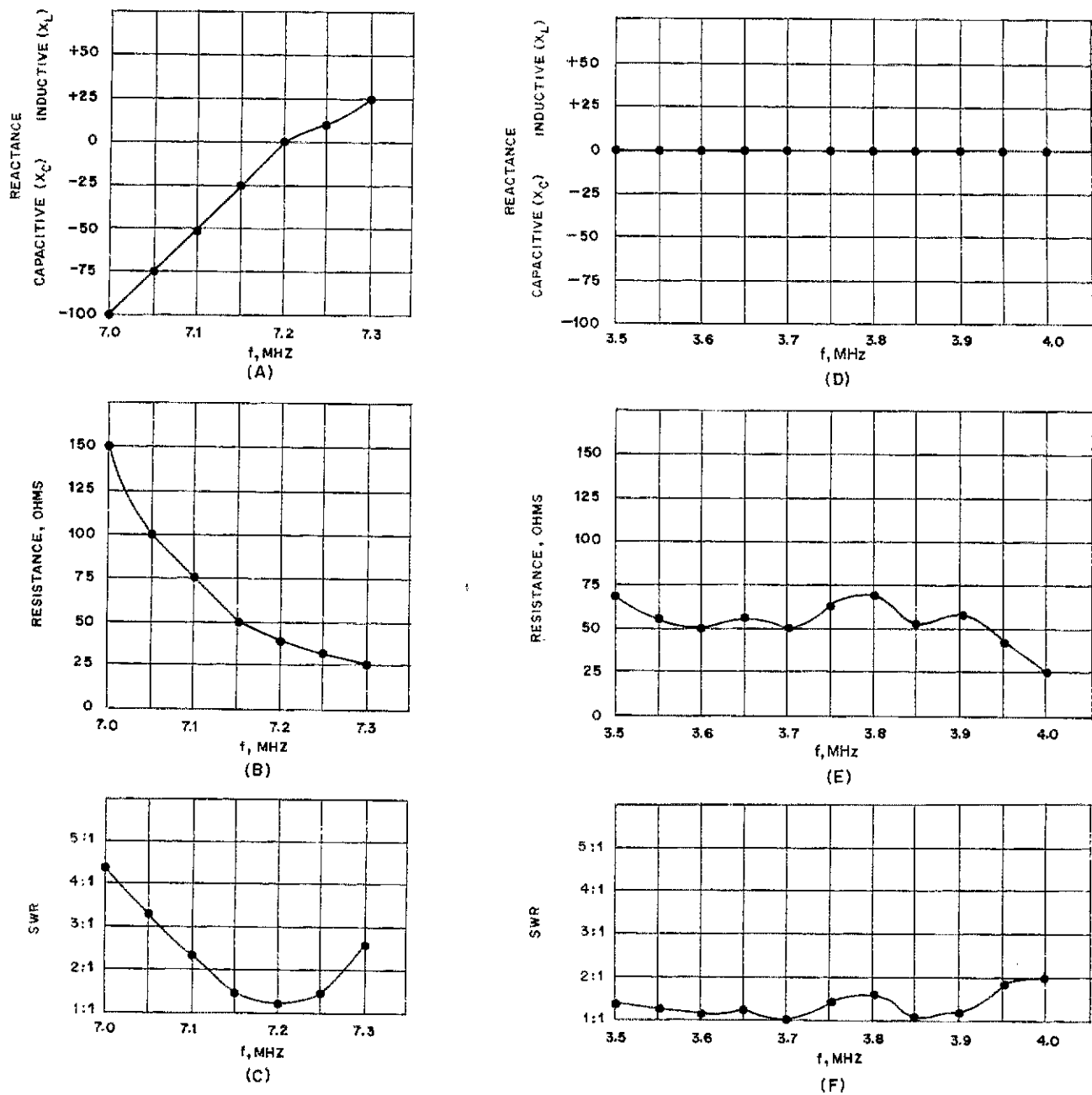


Fig. 2 — Loading characteristics of the antenna. The SWR curves were determined from a Smith Chart. Impedance values were measured with a noise bridge.

160-foot (48.8 m) end-fed wire and a trap dipole, both strung 30 feet (9.1 m) above ground. All in all, it is about what I expected from a half sloper.

This kind of performance is nice, but nothing to write an article about, since that has already been done. The real performance story about this antenna can be summed up in one word: bandwidth. A glance at the SWR curves in Fig. 2 will open the eyes of any 80-meter operator. As far as I know, this is unheard-of bandwidth for such a simple and compact antenna. It is a real treat to QSY 400 kHz and see the SWR meter needle barely

move. This isn't a low-Q antenna — it's a *no-Q* antenna! The bandwidth on 40 is far less impressive and is, in fact, similar to what has been reported previously for half slopers.

#### Construction

During experiments with prototypes of this antenna, I noticed some sensitivity to feed-line placement and length. Therefore, in later versions I ran the feed line up the *inside* of the support mast to shield it from the antenna field. This precaution seems to be effective, for no such sensitivity has been observed since. (I can't

help but wonder if this might improve the behavior of any cantankerous half sloper.) If a nonmetallic support is used, or if there is no possibility of placing the feed line inside the support, double-shielded coaxial cable should serve equally well, provided the outer braid is connected to the inner braid at the top of the tower and a ground is connected to the outer braid at the bottom of the tower.

I used standard 10-foot (3.05-m) TV mast sections for my support, simply because they were on hand. This results in a very flimsy and flexible mast in a 40-foot length, though. The first 20 feet must be

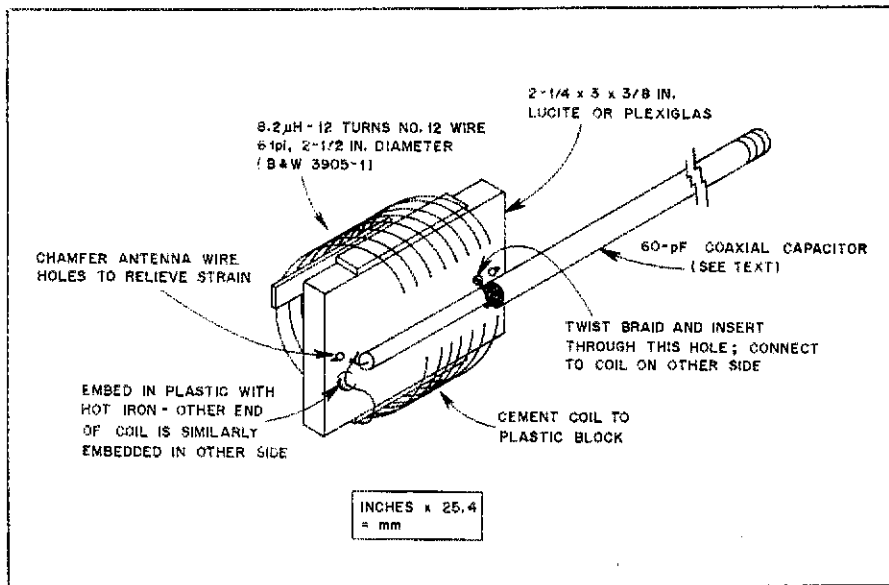


Fig. 3 — A simple, sturdy trap. The coaxial capacitor should be taped to the antenna wire after installation. It is not necessary to enclose the trap.

doubled up with long U-bolts if the mast is to be walked up. The price of six sections of TV mast is about the same as a 36-foot (11-m) telescoping push-up mast, but the latter is much sturdier and far easier to erect. If support materials are not already on hand, the telescoping mast is the better choice. I should mention that I took the trouble to bond all sections of mast together electrically to ensure good conductivity and to guard against TVI from rectification at joints after inevitable corrosion sets in. The base of the mast should be grounded. Effects from the guy wires can largely be avoided by breaking them into nonresonant lengths with strain insulators placed at the mast and every 19 feet thereafter.

The inductance and capacitance values shown in Fig. 1 must be used for the trap. Construction techniques for the trap are covered in *The ARRL Antenna Book*.<sup>4</sup> A novel and inexpensive method of trap construction has been described by WB9OQM.<sup>5</sup> I built my trap using the method shown in Fig. 3. Traps made in this fashion are much stronger than they appear. I've never had one break, even in high winds that caused property damage. In this antenna, however, the radiator also serves as one of the top guys. For that reason the trap was reinforced. Two 3/16-inch (4.8-mm) thick pieces of plastic were used with three layers of glass cloth and epoxy sandwiched between them. A rotary wire brush serves well to rough up the inner surfaces of the plastic to ensure good adhesion. However, one may use coarse sandpaper for that purpose. Glass cloth and epoxy are sold as a repair kit in many hardware stores.

Before the antenna wires are connected, the trap must be tuned to resonance. A dip meter or noise bridge can be used to

measure the resonant frequency. Start with about 30 inches (762 mm) of RG-8/U for the coaxial capacitor. After connecting it to the coil, as shown, 26 or 27 inches (660 or 686 mm) of braid will remain. At this point, the resonant frequency should be below 7.0 MHz. Trim the braid at the far end, a little at a time, snipping off the center conductor as you go. Recheck the resonant frequency each time. As 7.2 MHz is approached, continue trimming the braid, but stop cutting the center conductor. To increase the leakage path, the polyethylene dielectric should extend beyond the braid 1/8 to 3/16 inch (3.2 to 4.8 mm) when the trap is resonated at 7.2 MHz. Very close to 24 inches (610 mm) of braid should remain at completion. Tightly tape this end with several layers of plastic electrical tape.

The component values for this trap are exactly the same as those used in the W3DZZ trap dipole,<sup>4</sup> so there are several commercially made traps that may be suitable for this antenna. Traps made for a five-band, two-trap dipole, 108 feet (32.9 m) long should have the proper values of capacitance and inductance.

In any antenna system, the radiator feed point impedance repeats itself every half wavelength along the transmission line. Inductor L must be inserted in the transmission line at a half-wave point in order to exactly cancel the capacitive reactance of this antenna system. It is, of course, advantageous to place L as close to the feed point as possible in order to minimize losses. A half wavelength at the lower frequency is as close as you can get without going to the feed point itself. The 90.2-foot (28-m) length of RG-8/U shown in Fig. 1 is an electrical half wavelength at 3.6 MHz for solid polyethylene dielectric coaxial cable *only*. If cable having a

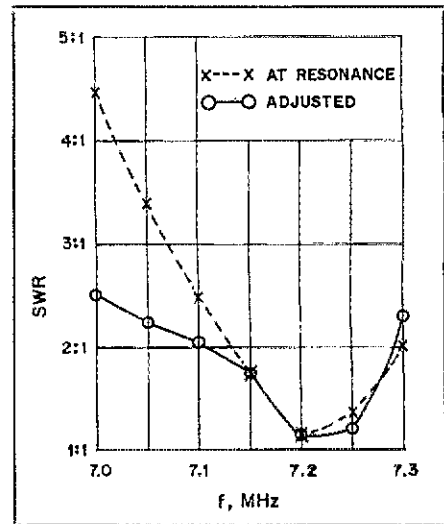


Fig. 4 — SWR curve for 40 meters, showing the effect of tapping L and adjusting feed-line length between L and the transmitter to obtain the best SWR curve. Such adjustments have little effect on 80-meter characteristics.

velocity factor other than 0.66 (e.g., foam-dielectric coaxial cable) is used, this length will have to be recalculated from the equation

$$l = 492 V / 3.6 \text{ feet} \\ (\text{Feet} \times 0.305 = \text{m})$$

In this equation, V is the velocity factor of the cable to be used. Only RG-8/U or a similar type such as RG-213/U should be employed for this section of the transmission line in order to keep the losses low. If you don't mind a dB or so of loss on 40 meters, RG-58/U is acceptable. The loss on 80 meters will be negligible in any case.

The value of inductor L should be 1.75  $\mu\text{H}$ , but I recommend that a coil having about 3- $\mu\text{H}$  inductance be used to allow some latitude for final tune-up of the system. I mounted 12 turns of a no. 3018 Miniductor (1-1/4 inch or 32 mm in diameter, 8 turns per inch or every 25 mm) in a small Minibox with SO-239 coaxial connectors placed at each end. After tapping the coil for the best SWR curve on 40 meters, the entire assembly was sealed and waterproofed with bathtub caulk.

#### Tune-up

As seems to be characteristic of half slopers, this antenna can be very touchy to tune up. If the length of transmission line between the radiator and L is not an exact integral multiple of a half wavelength at 3.6 MHz, tune-up can be a real "can of worms." Since the oft-quoted value of 0.66 for the velocity factor of standard RG-8/U is only a nominal value and can vary appreciably from brand to brand (in cheap cable from lot to lot), this length should be determined with a noise bridge.

If a noise bridge is not available, the following procedure may be tried. Cut this section of cable about 6 feet (1.8 m)

shorter than the calculated length. Prepare a section of RG-58/U, 12 feet long, with solderless connectors on each end. Connect it to both the shortened feed line, using a PL-258 double female connector, and to L. Tap L to obtain the best combination of SWRs at 3.6 and 7.2 MHz. Record the SWR figures and tap position.

Now shorten the RG-58/U by 6 inches and repeat — and repeat — until you are certain you have passed through the point where the SWR values simultaneously bottom out at both frequencies. Prepare a length of RG-58/U (from the same lot) exactly as long as the best experimental length, using permanent coaxial connectors. Seal and waterproof all connections. RG-58/U is recommended for relative ease of pruning. If you don't mind unsoldering a PL-259 each time, RG-8 could be used. However, the additional loss from such a short section of RG-58/U will be infinitesimal at these frequencies.

This procedure is obviously tedious, but it is necessary to obtain good performance on 40 if a noise bridge is not available.<sup>6</sup> In fact, some adjustment of this section of transmission line may be necessary even if a noise bridge is used to measure the electrical length to obtain optimum two-band performance. The exact half wavelength should always be used as a starting point, in any case.

Strangely enough, the above procedures are necessary only to optimize 40-meter performance. My experience has been that merely cutting the half-wavelength section of transmission line to the calculated length, then tapping L to obtain the best SWR at 3.6 MHz, is sufficient to obtain a ratio of 2:1 or less over the entire 80/75-meter band. So tune for 40, and 80 should take care of itself.

Once the antenna system has been resonated, it may pay to experiment with the value of L and the length of transmission line between L and the transmitter. Changing these values will change the shape of the 40-meter SWR curve somewhat. By so experimenting, you may be able to tailor the shape of the 40-meter SWR curve to your operating preference. Don't expect miracles, though, for the range of adjustment seems to be small. Fig. 4 illustrates the results of such an effort. These adjustments will have very little effect on 80-meter bandwidth within the range of acceptable SWR on 40 meters.

### Further Thoughts

The first prototype was constructed close to my house, and I was therefore concerned that the performance might not be reproducible. The next prototype was erected in a far corner of my yard, over 100 feet from the house and even farther from any other structures or conductors. The final version was similarly located. Except for final tune-up parameters, all

three behaved almost identically, even though a number of physical changes was made each time. As a final test of the soundness of the design, I built scaled versions for 40/20 and 20/10 meters. They exhibited very similar characteristics, although all parameters of the system seem to become very critical as the design frequency is increased.

The first two 80/40-meter systems were built using a 30-foot (9.1-m) mast, yet their behavior was not markedly different from the final version with a 40-foot (12.1-m) mast. Since the mast is an electrical part of the system, and since proximity to ground must play some role in the performance of the antenna, other heights, and supports that have beams attached, may yield different results.


The reactance of the trap at 3.6 MHz is 245 ohms. Therefore, there is a possibility of constructing an 80-meter-only version of this antenna by using a 10.8- $\mu$ H inductor in place of the trap. This has not been tried, however.

Scaling up to 160/80 meters is an attractive possibility. Conceivably, a mast height as low as 50 feet (15.2 m) could be used. A starting point would be the doubling of all wire lengths, and using a 16.4- $\mu$ H coil with a 120-pF capacitor for the trap to preserve the 245-ohms reactance at 1.8 MHz.

There also seems to be a possibility that a slight increase in trap capacitor value, to resonate the tap at 7.1 or 7.15 MHz, might allow better coverage of 40 cw, but probably at the expense of the phone portion of the band. Such a change might have little effect on 80-meter bandwidth, but another round of cut-and-try could prove necessary.

### Conclusions

At this point, this is still an experimental design. Further development may eventually allow a cut-to-formula type of construction, but until that happens, be prepared to experiment. The dimensions given in Fig. 1 will put you in the ball park and should yield immediate results on 80.

The convenience of Transmatchless operation over all of 80/75, plus a reasonable portion of 40, coupled with an excellent radiated signal, is ample repayment even for many hours of cutting and trying. Once tuned up, this antenna is very well behaved and enjoyable to use. I would like to hear from others who construct antennas based on this design. 

### Notes

<sup>1</sup>Hopps, "A 75-Meter DX Antenna," *QST*, March 1979, p. 44.

<sup>2</sup>Atchley, "Putting the Quarter-Wave Sloper to Work on 160," *QST*, July 1979, p. 19.

<sup>3</sup>DeMaw, "Additional Notes on the Half Sloper," *QST*, July 1979, p. 20.

<sup>4</sup>*The ARRL Antenna Book*, 13th edition, 1974.

<sup>5</sup>Mathison, "Inexpensive Traps for Wire Antennas," *QST*, February 1977.

<sup>6</sup>[Editor's Note: A third alternative is to use a dip meter to determine an exact half wavelength of line. See Downs, "Measuring Transmission-Line Velocity Factor," *QST*, June 1979.]

## Strays

I would like to get in touch with . . .

amateurs with 2-meter gear to assist with the 1980 New York Special Olympics, to be held Friday, Saturday and Sunday, June 13-15, at Elmira, NY. Many amateurs are needed at the site. About 10,000 visitors from all over the U.S. are expected for the weekend. Contact Hal Mandel, WB2FSX, c/o NY State Special Olympics, 307 East Church St., Elmira, NY 14901, tel. 607-733-7359, evenings.

### SISTER CITIES — INTERNATIONAL FRIENDSHIP THROUGH AMATEUR RADIO

What do Fukaya City, Japan, and Fremont, California, have in common? Both cities were organized from five smaller cities; have dynamic growth-oriented, youthful leadership; have a Route 17 nearby; are semi-agricultural communities specializing in commercially grown flowers; and have residents that are interested in Amateur Radio.

Bob McGihon, WB6DMB, of Fremont, has had regular contacts with Tak, JK1OFI, and Akko Ohata, JK1OFH, of Fukaya City. Recently, Tak, speaking for his city's mayor, asked McGihon if Fremont would like to become Fukaya City's sister city. Several members of Fremont's South Bay Amateur Radio Association (SBARA) worked with the Sister City Committee of Fremont to make the necessary arrangements.

The result? Mr. Ohata was the guest of honor at the January Grand Ball, held at the Castlewood Country Club, in Pleasanton, California, to celebrate the union of the two cities. Nightly 0200 UTC contacts keep hams from the sister cities in touch with each other. — submitted by Jane D. Bell, WD6GKN



Dr. Walter Hashimoto (left) carried official "sister city" papers from Fremont, California to the sister city, Fukaya City, Japan. Bob McGihon, WB6DMB, helps friends in the sister cities keep in touch with each other through Amateur Radio. (photo by Dino Vournas)

# The Checkerboard Checker

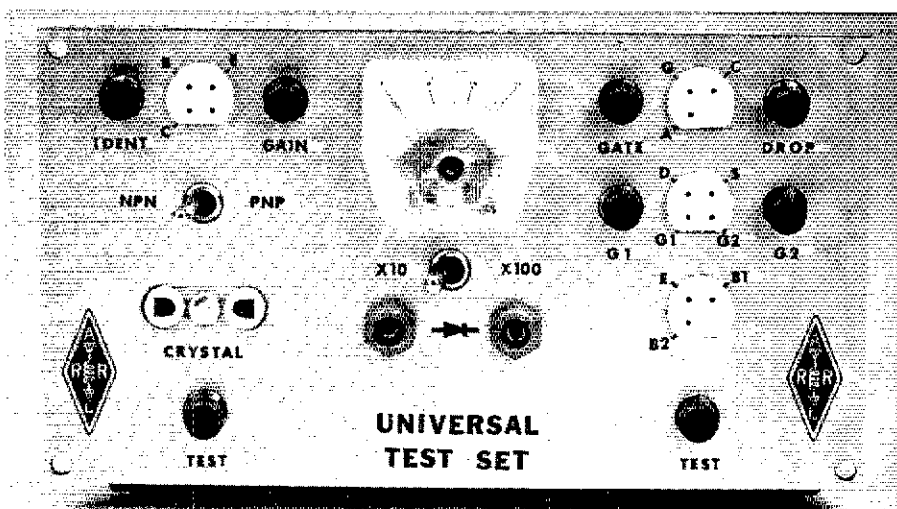
Have you ever looked at a transistor and wondered if it was good? Have you puzzled for hours over the polarity of a diode? Here is a simple, inexpensive project that will help you answer these questions and more!

By Peter O'Dell,\* AE8Q and Robert D. Shriner,\*\* WA0UZO

**A**fter coauthor O'Dell had been working in a two-way shop for about a month, the manager walked over to him, took a \$2000 mobile radio unit out of his hand and hurled it about 12 feet through the air to the test bench. When the new, expensive radio hit, it bounced about 6 inches in the air and finally came to rest atop a roll of solder. Astonished, O'Dell looked at his boss with disbelief. The manager said, "The worst that can happen is that it will break. Big deal; then we'd have to fix it. That's what we do here. You hams are too gentle with your equipment."

What do you do when your equipment breaks? Do you troubleshoot and fix it yourself? Or do you let someone else do it for you, or throw away the equipment and buy new? If you answered yes to the last question, then we have another question for you: why? Being psychic, we know that most of you said the reason that you don't troubleshoot and repair it yourself is that you don't know how to test a component to tell if it is good or bad. Those few of you who said that you don't repair your own equipment because you've got too much money and don't know what to do with it, please contact us for details on obtaining your very own, personal bridge connecting two of New York City's finest boroughs.

In the olden days of tubes, a backyard technician could look at a tube to see if the filament was glowing. If not, the tube was definitely bad. If the filament was glowing, but the tube was still suspect, he



The absence of mounting nuts gives the front of the test set a "clean" look.

could run down to the corner drug store and plug the tube into a "tube tester." With these simple machines he could determine if a tube was definitely bad or probably good. The final test was to substitute a known good tube for the suspect. We have yet to find a drug store that has a "transistor checker" installed, and you can't look at the filament of a transistor to see if it is glowing because the transistor doesn't have one. (If you've got a transistor that is so warm that it is glowing, chances are that it is defective.)

## Return With Us to Yesteryear, Almost

Those of you who yearn for the simpler days take note. This month's project is a

simple "checker" that you can use to test most discrete solid-state devices. We dubbed it the "Checkerboard Checker," because it is built on the Universal Breadboard with its checkerboard pattern. Since all the tests, except that for crystals, are done at dc levels, an occasional device that tests "good" may, in fact, be "bad" for the circuit that you want to use it in. In our experience, this should happen in no more than 2 percent of the cases.

The schematic diagram for the test set is given in Fig. 1. If you look closely at the diagram, you will note that it really is six different circuits wired in parallel to the meter and BT1. The simplest of these circuits is J2 (A and B), which is used to test

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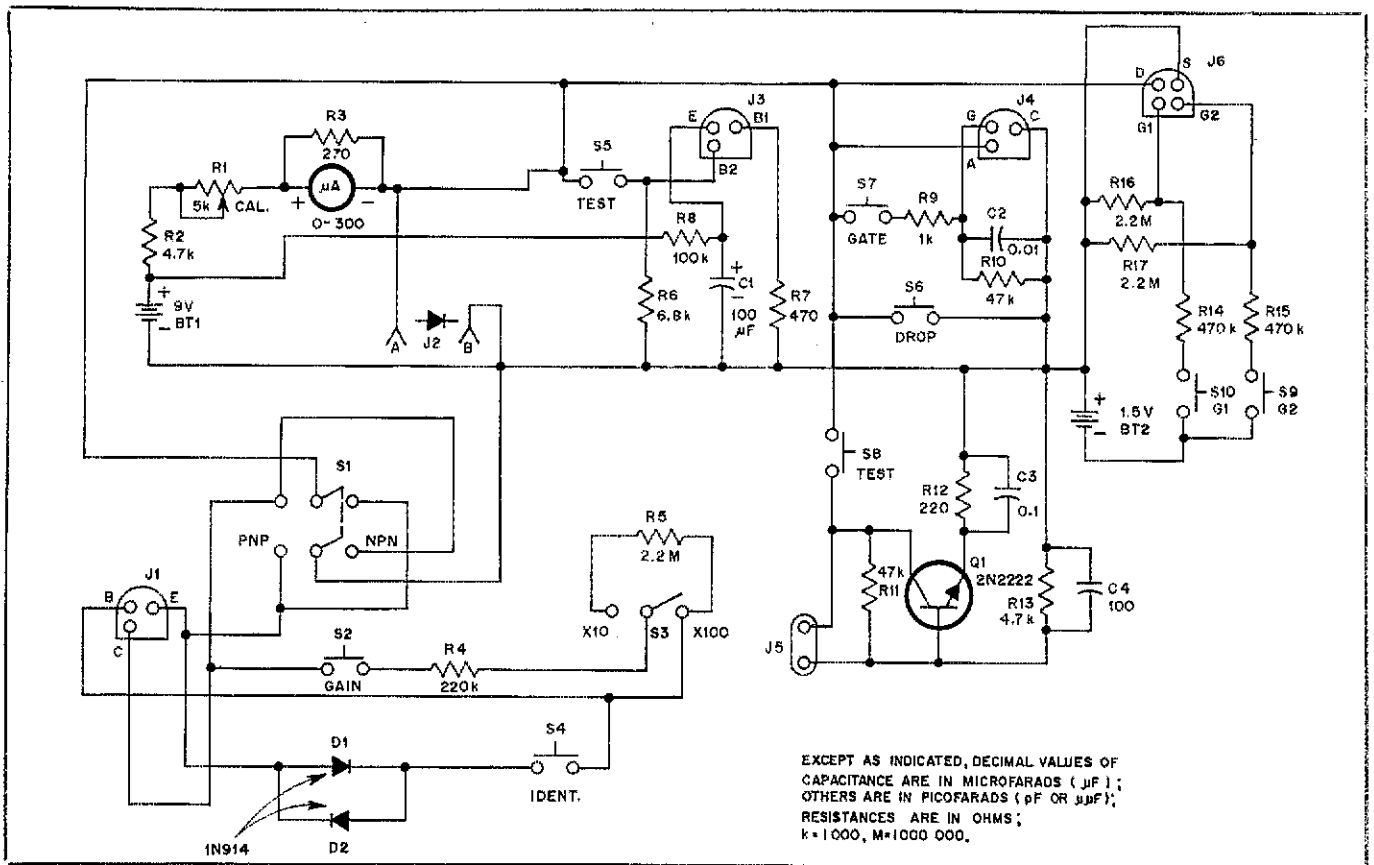


Fig. 1 — Schematic of test set. All capacitors are disc ceramic, except those with marked polarity. Fixed-value resistors are carbon composition, 1/2-watt or less. Sockets are depicted as viewed from the front of the panel. Part numbers inside parentheses are Radio Shack parts suitable for use in this circuit.

C1 — 100  $\mu$ F, 10V tantalum.  
 C2-C4 — Numbered for text discussion and parts-placement purposes.  
 D1, D2 — 1N914 or equiv.  
 J1, J3, J4, J6 — transistor socket (Radio Shack 276-548 or other transistor sockets are suitable, but may require innovative mounting techniques).  
 J2 — 2 phone tip jacks (one each for A and B).  
 J5 — Crystal socket.  
 M1 — 300  $\mu$ A.  
 R1 — 5-k $\Omega$ , thumbwheel pot (271-217).  
 R2-R17, incl. — Numbered for text discussion and parts-placement purposes.

S1 — Dpdt, (275-614).  
 S2, S4-S10, incl. — spst, momentary contact (275-1547).  
 S3 — Spdt (275-613).  
 Miscellaneous — hardware, solder, 1.5-V AA penlight cell, 9-V transistor-radio battery, battery holders.

diodes; with an auxiliary set of test probes, it can be used to test for continuity.

The components near J1 are used to check bipolar transistors. S1 is used to reverse the polarity on J1, thereby enabling the user to check both pnp and npn transistors. D1 and D2 are used to fix bias on the base at 0.7 V which permits the user to differentiate between silicon and germanium transistors. The components near J3 permit you to check the performance of a unijunction transistor in an oscillator circuit.

J5 and its associated components provide a convenient method of testing crystals. It is similar to the oscillator circuit that was used in the Universal Transmitter.<sup>1</sup> Notice that BT2 is used only with the circuit at J6. BT2 is wired in such a way that it provides cutoff bias for the gates of FETs.

The user is able to test small SCRs with the circuit near J4. By small, we mean those rated at 1 ampere or less. We tried checking the more common, larger (6- to

8-ampere) variety on the tester, but the results were not satisfactory. While the GATE switch, S7, was being held closed, the SCR fired; however, when the GATE switch was opened the SCR ceased to conduct, even though there still existed a voltage potential across the anode and cathode. We assume that the low current level, limited by the value of the resistors and the potential of the supply, is below the threshold of the SCRs. If you need a circuit for checking larger SCRs, you could devise one along these lines, (but with a higher voltage supply, larger wattage and, perhaps, different-value resistors).

Construction is straightforward.<sup>2</sup> In Fig. 2 we show the Universal Breadboard<sup>3</sup> and the rear view of the front panel. These boards are depicted side-by-side, even though they are mounted perpendicular to each other. Some new ideas were used in the construction of the prototype unit shown in the photographs. Notice that no mounting nuts are visible in the front view of the unit.

After making sure that each switch will fit through the hole provided for it,

remove the nut from the first switch to be mounted. Place the nut over the appropriate hole *on the back side of the panel*. From the front side, insert an ordinary wooden pencil (sharpened) into the hole and screw it into the nut until it is tight. This should hold the nut in place while it is soldered to the backside of the panel. In some cases, it may be necessary to use an abrasive to "rough up" the surface of the nut to get it to take solder. Once the board is cool to touch, the switch may be screwed into the nut from the rear of the panel. When the switch is properly positioned, apply fast-setting epoxy cement to the shaft and nut, taking care to avoid getting any cement where it will interfere with the workings of the switch. Repeat this process for the other switches.

This style of construction will provide a front panel that is free of mounting nuts, resulting in a "cleaner" look. Like most of the other construction practices used in this series, there is nothing sacred about these procedures. If the builder is in a hurry or doesn't like the looks of this style, mounting the switches in the normal

<sup>1</sup>Notes appear on page 39.

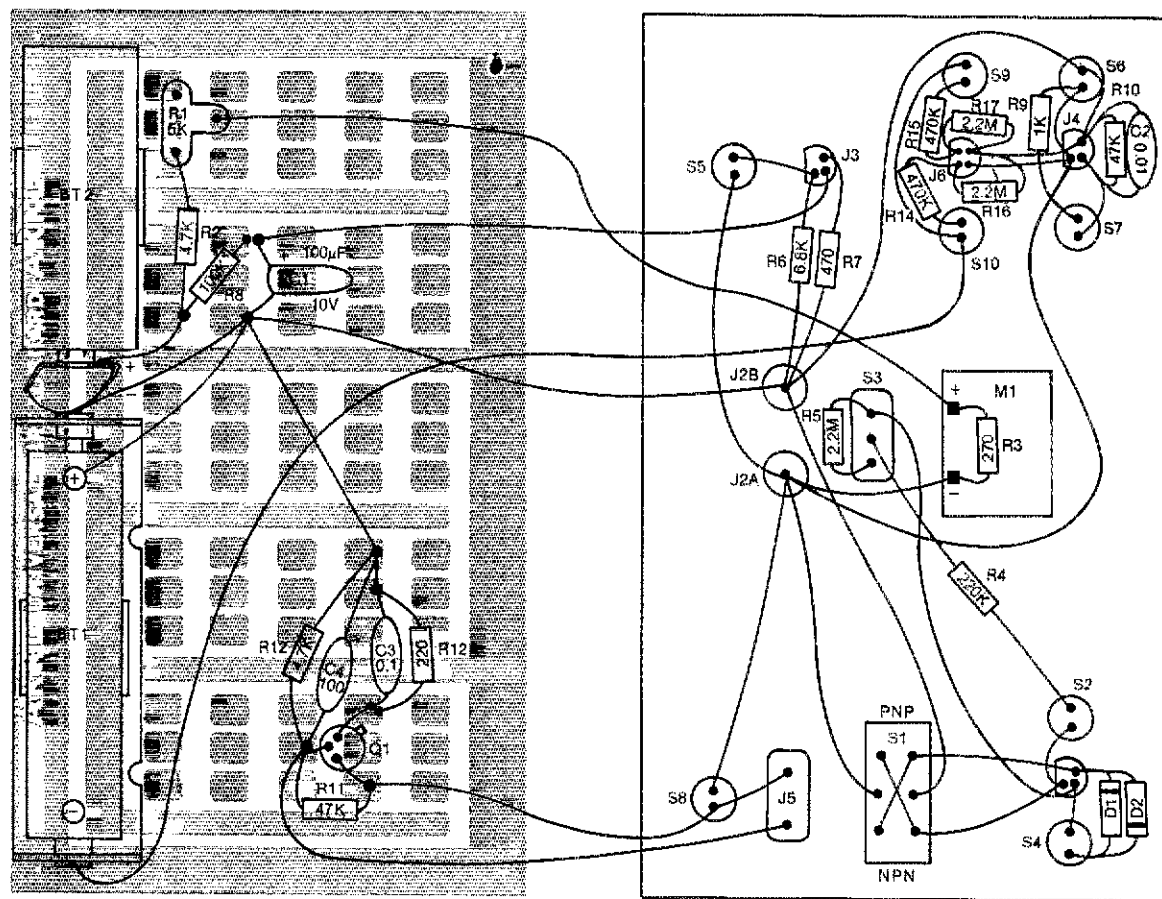


Fig. 2 — Parts-placement guide for test set. Parts are placed on the top side of the breadboard and the back side of the panel. Unmarked lines indicate insulated wire jumpers. Resistances are in ohms; k = 1000 and M = 1,000,000. Capacitors with whole-number values are in picofarads except those with polarity shown. Capacitors with decimal-value numbers are in microfarads. Sockets are depicted as viewed from the rear of the panel.

## Test Instructions

To calibrate, press DROP switch (S6) and adjust R1 for full-scale reading. (If device to be tested will not fit in sockets, use test leads described in text). If the device you wish to test is completely unknown, try it in various sockets until you get a correct indication. No damage will result from placing a device in any of these sockets.

### Bipolar Transistors

Insert the device into J1, and operate S1. A reading of zero indicates proper bias (i.e., npn or pnp), any small reading indicates leakage. Press S2 (GAIN). If reading is off scale, switch S3 to its x100 position. Hold GAIN switch down and press IDENT (S4); a small drop in the meter indication signifies germanium, while a drop to zero indicates silicon.

### SCRs (up to 1 ampere)

Insert the device in J4. The meter should still read zero. Press and release GATE switch (S7); the meter should now read near full scale.

Press and release DROP switch (S6); the meter reading should drop to zero. Repeat several times to verify that the device is good.

### FETs

Either single-gate or dual-gate FETs can be tested. If you are testing a single-gate FET, you may use either gate socket. When you insert the device in J6, the meter should swing upscale to near full scale. Press the appropriate gate switch and watch for the meter to drop. If you are checking a dual-gate device, check the second gate after checking the first one. In a dual-gate device, the drop should be the same for both gates.

### Unijunction Transistors

Insert the device in J3. Depress and hold S5 (TEST). The meter should read about 10. While keeping the TEST switch depressed, watch for the meter to "pulse" up scale. The first pulse should come around two seconds after the switch is depressed; after this, the rate should be about one per second.

### Diodes

Insert diode in J2 and watch for an upward deflection of the meter. Reverse the leads and watch again. The meter should deflect with the diode in one direction only (when it does polarity will be indicated by the etching on the front panel). No reading either way means that the diode is open. A reading in both directions means that it is shorted.

### Crystals

Press TEST switch (S8) and look for a reading in the range of 5. Insert crystal in J5 and depress S8 again. A meter reading above 10 indicates a good crystal.

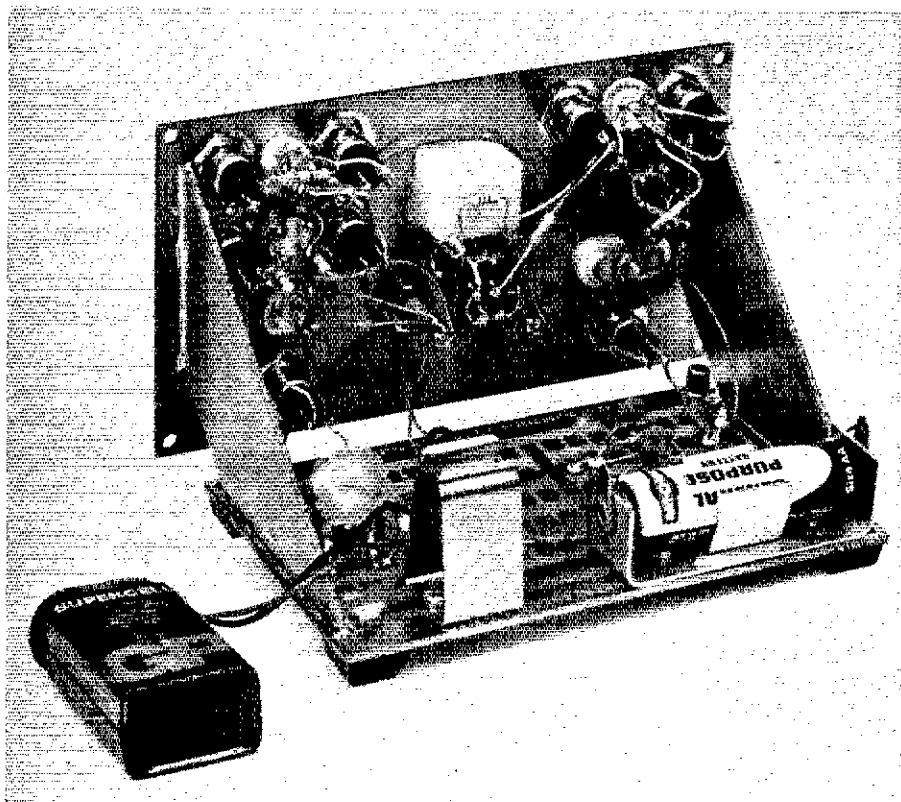
### Continuity

Plug a set of test leads in the diode sockets (J2) and use as a continuity tester.

### When All Else Fails

If you have a component that checks good in the tester, but does not work in the circuit, replace it with one that is known to be good.





When viewed from this angle the wiring of the test set looks a bit like a can of worms. A close examination of Figs. 1 and 2 reveals that it is quite simple and straightforward. Note the mounting nuts soldered to the back side of the panel.

way will not affect the operation of the circuit. If you are positive that you will never need to check one or two of the listed devices, you may omit the appropriate jack and its circuitry without harm to the other test circuits.

The battery holders are fastened to the Universal Breadboard with no. 4 hardware. The meter and the transistor sockets are held in place with fast-setting epoxy. A set of probes can be constructed for testing devices that will not fit into the sockets. Cut off one end of a small alligator clip jumper (e.g. Radio Shack 278-1156) and strip the insulation from one-half inch of the wire. Solder the wire to a short piece of stiff wire, such as the lead from a 1/4-watt resistor. The stiff wire is plugged into the transistor socket, and the alligator clip is attached to the appropriate terminal of the device to be tested. Make four of these jumpers of different colors and you will be able to test any discrete device regardless of package format.

### The Beginning

Now that you have your own semiconductor test set, you are in a position to begin troubleshooting and repairing your own equipment. Additionally, you can take advantage of unmarked "specials" at the next hamfest with the knowledge

that you will be able to figure out just what they are without benefit of package markings.

Some of you are wondering just how long it took O'Dell to troubleshoot and repair the mobile unit that his former boss threw across the room. There wasn't a thing wrong with it when it was checked out! You may be saying, "So what? Everybody knows that commercial equipment is built tough." A few years back we toured the plant of an American manufacturer of amateur equipment. The final test on each unit before it was shipped was to strap it to a vibrating platform like those used for mixing paint. After a minute of shaking loose anything that could be shaken, it was again tested to see if it still met factory specifications. If so, it was boxed and shipped. If not, it went back for more work. Most amateur equipment is built tough, too. We aren't advocating that you abuse your equipment, but don't be afraid to touch it either. You hams are too gentle with your equipment. QST

### Notes

<sup>1</sup>Shriner and DeMaw, "Transmitter Fundamentals," December 1979 *QST*, p. 11.

<sup>2</sup>Circuit boards, negatives and complete parts kits for this project are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

<sup>3</sup>Etching pattern for the Universal Breadboard appears on page 47 of September 1979 *QST*.

## Strays

### DANGER, HIGH VOLTAGE

□ Joe Johnston told fellow members of the WR3ACU net that he had experienced a sudden rash of burned out electric light bulbs in his home. He had checked the line voltage and was surprised to find that it registered 132 volts. The electric company made necessary adjustments when notified. "Don't," Joe warned, "think that second bulb burning out is just a coincidence. Check it out." — *Jane Johnson, K3RIH, Upper Darby, Pennsylvania*

### EXAMS — WHAT TO STUDY?

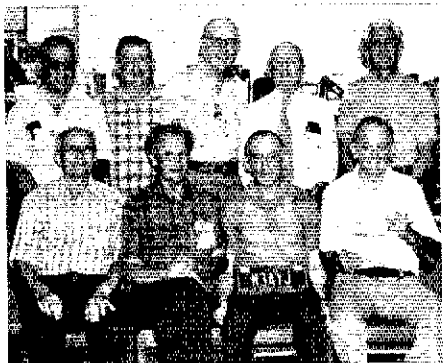
□ We've received many letters and phone calls at Headquarters asking about comparisons between the new and the old FCC Study Guides and how they will affect Amateur Radio examinations.

General language and organization of required information is easier to work with in the new Study Guides. Topics have been shifted between different classes of licenses, and new items of study have been introduced.

If you haven't noticed, the "In Training" column in May 1980 *QST* (page 64) contains important information concerning the new tests and Study Guides. The Guides themselves, as released by the FCC, are in March *QST*, pages 55-58. Instructors and anyone planning to take an exam should check this information. — *Bill Grim, W0MHK*

### I would like to get in touch with . . .

□ hams interested in spreading the next Friendship Earthalite message, to be transmitted on June 22, 1980, the longest day of the year. Contact George H. Byer, 35099 W. Florida D-8, Hemet, CA 92343.



A group of Bayonne's old-timers recently met in the Civil Defense and Disaster Control Center at the 16th Street firehouse in Bayonne, New Jersey. Some of the old-timers had not seen each other in about 45 years. Those gathered were, front row, left to right: W2CBY, W2ESB, W3AYJ and K3RFL. Standing: W2FQF, SWL Aaron, W2AZR, W2GNM and W2DYH. (photo by K3RFL)

# Transmitter Keying Circuits for CW

Do you have a tube-type transmitter and a solid-state transmitter? Would you like the convenience and economy of safely keying both with one key — without having to move the plug?

By D. Howard Phillips,\* W6FOO

**H**ow do we connect one key to a grid-block keyed, tube-type transmitter and a solid-state transmitter at the same time?

As with most things in life, there is at least one wrong way and at least one right way to accomplish this objective. Wiring

the two transmitters in parallel with the key (Fig. 1) can create a dangerous situation. Damage may result if the two keying lines are connected without regard to the voltage sensitivity of the semiconductor devices used in the keying circuit of the solid-state transmitter. Should a short develop in the solid-state transmitter, the tube transmitter could become lock keyed, resulting in the destruction

of the final amplifiers.

## The Right Way is the Safe Way

The circuit shown in Fig. 2 allows effective and safe keying of the two transmitters. This is accomplished by using only two diodes in a diode-clamp circuit.

Transmitter 1 is keyed by passing current through D1 when the key is closed. During the key-down condition, the key is

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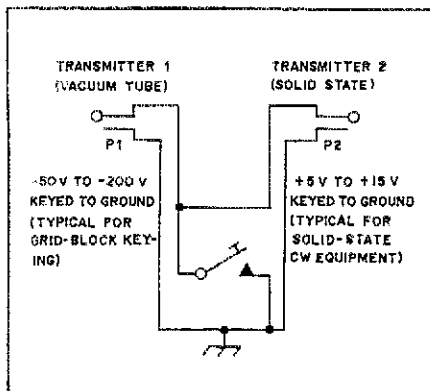


Fig. 1 — *Wrong way!* Connecting the keying circuits of the two transmitters in parallel may result in damage to either or both.

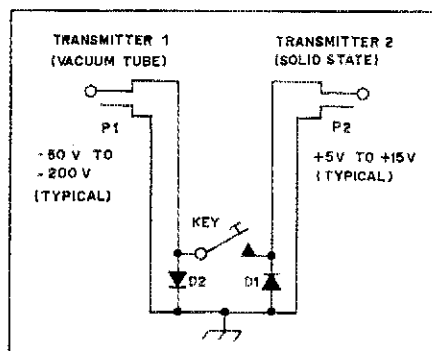


Fig. 2 — *Right way!* The diode-clamp circuit allows a single key to control two transmitters which require the keying of opposite-polarity voltages. (See text for specifications of D1 and D2.)

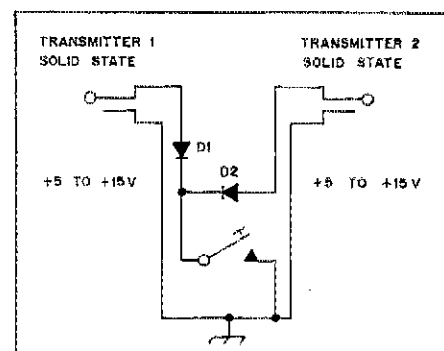


Fig. 3 — This circuit can be used to connect one key to two transmitters having the same polarity on the keying line. The transmitter not intended for use should be turned off or in the standby mode. D1, D2 — see text.

at a potential of approximately  $-0.7$  volt (the potential difference across the forward-biased D1, assuming that silicon diodes are used). D2 must have a minimum peak-reverse-voltage (PRV) rating of approximately twice the keying voltage developed by transmitter 1, as D2 is reverse biased by transmitter 1 during key-up conditions.


Transmitter 2 is keyed by passing current through D2 when the key is closed. During the key-down condition, the key is at a potential of approximately  $+0.7$  volt (the potential difference across the forward-biased diode, D2). D1 must have a minimum PRV rating of approximately twice the keying voltage developed by transmitter 2, as D1 is reverse biased by transmitter 2 during key-up conditions. The current rating of almost any diode will be more than adequate for this circuit, as most transmitter keying circuits operate at maximum (key down) currents of less than 50 milliamperes. The transmitter not intended for use should be turned off or in the standby mode while keying the other transmitter.

This circuit has worked well for more than a year, while being used with a Swan 500 (vacuum-tube transceiver) and a Kenwood TS-700SP (solid-state transceiver). The diodes contain both junction capacitance and bulk resistance, thereby "softening" the keying waveform, to minimize the tendency for key clicks. During the time this circuit has been in use, it has not been necessary to add R-C filters to the keying circuit to modify the keying waveform.

### Two Solid-State Rigs?

The circuit in Fig. 2 will work only in cases where the two keying lines are opposite in potential. Thus, if the reader desires to connect two solid-state or two tube-type transmitters safely, a slightly different circuit must be used. In Fig. 3 a diode is connected in series with each of the two keying lines and the keying lines are connected in parallel. These diodes effectively isolate the voltages. Again, the transmitter not intended for use should be turned off or in the standby mode while the other unit is being keyed.

One final note is that both of these circuits will work with a manual key or an electronic keyer utilizing a relay in the output circuit. The circuit in Fig. 3 should work with a keyer having electronic switching in the output; however, the circuit in Fig. 2 should not be used with this kind of keyer. It will be necessary to add a relay to the keyer in order for it to work with the circuit in Fig. 2.

Now that you have seen a couple of different ways to safely connect two voltage sources you may want to consider other equipment in your shack that can be simplified. Where else can you use diodes to isolate one voltage source from another? 

# Strays

## ARRL FILM BOOKING INFORMATION

The new ARRL film, "The World of Amateur Radio," is distributed on 16-mm film by Modern Talking Picture Service, Scheduling Center, 5000 Park St. North, St. Petersburg, FL 33709, Tel. 813-541-6661. For regular ordering, three weeks or more before show date, mail your order to the scheduling center. For short notice showings, 10 days to three weeks before show date, telephone your order to the scheduling center. If possible, indicate acceptable alternate show dates. If the agency cannot supply the film for a convenient date, contact your division director (see *QST*, page 8), who has a print that may be available. — *Marge Tenney, WB1FSN*

## ATTENTION AFFILIATED CLUBS!

Do you know that an officer of your club receives a quarterly newsletter, "Radio Club News," from the ARRL Club and Training Department? If it's addressed to you, why not pass it around to the rest of your club? — *Sally O'Dell, AESP*

## MILLIWATT FIELD DAY TROPHY

The Milliwatt Field Day trophy is still being offered to ARRL Field Day participants. The award is limited to one-transmitter, two-operator stations using a maximum output of 5 watts. To compete for the trophy, interested people should submit a copy of the official ARRL FD summary sheet along with a declaration that a power output of 5 watts was not exceeded. Also send an indication whether or not operation was portable, away from home QTH, and type of power source used.

Scoring is one point per QSO times power multiple (5-watt output =  $\times 4$ , one watt output =  $\times 5$ ) times 1.5 for battery/solar/wind power, plus 150 bonus points for full portable operation. Send applications to Ade Weiss, K8EEG, 83 Suburban Estates, Vermillion, SD 57069.

## LIFETIME NOVICE?

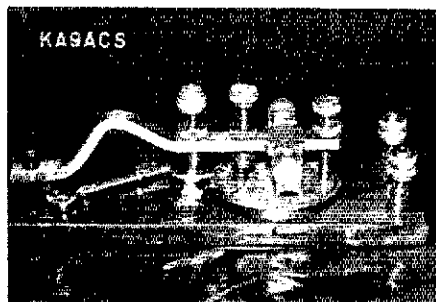
Charles Royall, WD5CJI, has been a Novice for four years and plans to remain a Novice. In his words: "I have no desire to work any mode other than cw." He goes on to say: "It's against all teachings. Supposedly, a person should be wanting to upgrade, but not me. I enjoy being a Novice and helping other Novices." He



Charles Royall, WD5CJI, of Denver, Colorado, has used this antenna arrangement to obtain WAS on 15 meters. His next objective is DXCC. (WD5CJI photo)

has 120 hours of radio theory and copies 100% at 40 wpm, but just likes being a Novice!

Charles began using the mobile antenna shown in the photograph when he moved to Denver, Colorado. It is mounted on a metal picnic table on the veranda of his second-floor high-rise apartment. With the mobile antenna he has obtained WAS on 15 meters, plus 25 countries. DXCC is his next objective. Charles also operates mobile cw with his Swan Astro 150 while his wife drives the family car. He says that Novices get a kick out of working his Novice mobile cw station. We're sure he'd like to hear from other Novices who operate mobile — if there are any!



This handcrafted, all brass, straight key is the work of Charles L. Wertz, KA9ACS, of Antioch, Illinois. Made from 1/4-inch brass, the handsome unit is mounted on a black walnut base. (KA9ACS photo)

# Technical Correspondence

Conducted By  
John C. Pelham,\* W1JA

The publishers of QST assume no responsibility for statements made herein by correspondents.

## AIRCRAFT ELT MONITOR CONTROL FOR REPEATERS

□ A 1974 law passed by Congress requires that all piston-powered aircraft be equipped with an ELT (Emergency Locator Transmitter) that, in the event of a crash, automatically transmits a distress signal on 121.5 and 243 MHz. This law has undoubtedly been beneficial in saving lives. The fallacy in the law, however, is that there are no provisions made to require monitoring for these emergency signals. As a result, many people have died simply because no one was listening.

I have a solution to remedy the problem, provide a public service and gain personal satisfaction: Install ELT 121.5-MHz receivers and control systems at our repeater sites around the United States. The plan works like this: When a signal breaks the ELT monitor receiver squelch, and continues for at least 6 minutes, the control-board circuit keys the repeater transmitter for a 2-minute period and transmits a low-level audio alert tone. This alerts amateurs that an aircraft is down and needs immediate help. Twenty-four-hour monitoring stations equipped with decoders tuned to the repeater alert tone, direction-finding (DF) antennas and aircraft with DF gear are just a few of the things that can aid the program.

The schematic diagram of the control circuit is shown in Fig. 1. The input to the circuit, at J1, is to be connected to a point in the ELT receiver that goes positive (0.5 to 5 volts) when a distress signal is received. Q1 is a Darlington

pair, providing gain for lower input voltages and minimum loading of the ELT receiver circuit. Q2 is an inverter which enables U1. The timing components for U1 are selected to produce eight pulses in a 6-minute period. When eight pulses have been received from U1, the output of the pulse counter, U2, goes high, enabling U3. Timing components for U3 are selected for an on time of 2 minutes. The high output from U3 turns on Q3, which turns on the repeater transmitter via contacts on K1. U3 also enables U4, a tone oscillator, which is fed to the audio input of the transmitter via another set of contacts on K1.

All the parts for this circuit were obtained at Radio Shack, so the project should be easy to reproduce. Several months of operation under all kinds of conditions have been gratifying. I used point-to-point wiring on a Vectorbord for my construction, but the circuit is a natural for a pc board. — *Edward S. Kimber, W7VEW, 590 Bonnie Brae St., Lander, WY 82520*

## POISON IN THE HAM SHACK

□ Radio amateurs may be poisoning themselves with one of the most insidious chemicals produced in the last 50 years. The chemical may be present in the oil of oil-filled capacitors and transformers. It contaminates everything it touches. It can be absorbed directly through the skin into the bloodstream. It does its subtle damage over a period of months or years. Because of this, its effects are seldom detected until long after any possible corrective or preventive treatment is possible.

The poison involved is PCB, short for polychlorinated biphenyl. This chemical is fre-

quently added to mineral oil or glycerine to improve the dielectric properties of these organic solvents for use in capacitors and transformers. Almost all such devices built in the 1950s and 1960s contain some of this compound. The transformer oil often used in rf dummy loads probably contains PCB.

PCB may enter the body by ingestion, inhalation and absorption through the skin. It tends to accumulate in body fats and is poorly metabolized. In the U.S. population, background levels of PCB are 5 to 20 parts per billion in body fluids and 500 to 5000 parts per billion in fatty tissue. In human exposure studies, body fluid levels of 50 parts per billion have been associated with skin lesions, hyperpigmentation (spots on the skin) and abnormal liver function. Children born to mothers exposed at this level are of low birth weight, may be hyperpigmented and may develop skin lesions from PCB in their mother's milk.

Because of these dangers, federal legislation in 1976 mandated that the manufacture and distribution of PCB in this country cease within 2-1/2 years, and that all nonenclosed use of this chemical be banned. However, since much equipment containing PCB is still in use, exposures may still occur.

Most publicity about PCB poisoning has centered around contamination of livestock feed and subsequent high levels of the compound in meat, poultry and milk. Usually contamination occurs from leaking power transformers in the feed plants.

As long as PCB-containing oil remains sealed inside its container, be it a capacitor, transformer or dummy load, it is safe. But if any of these devices leak, a serious hazard ex-

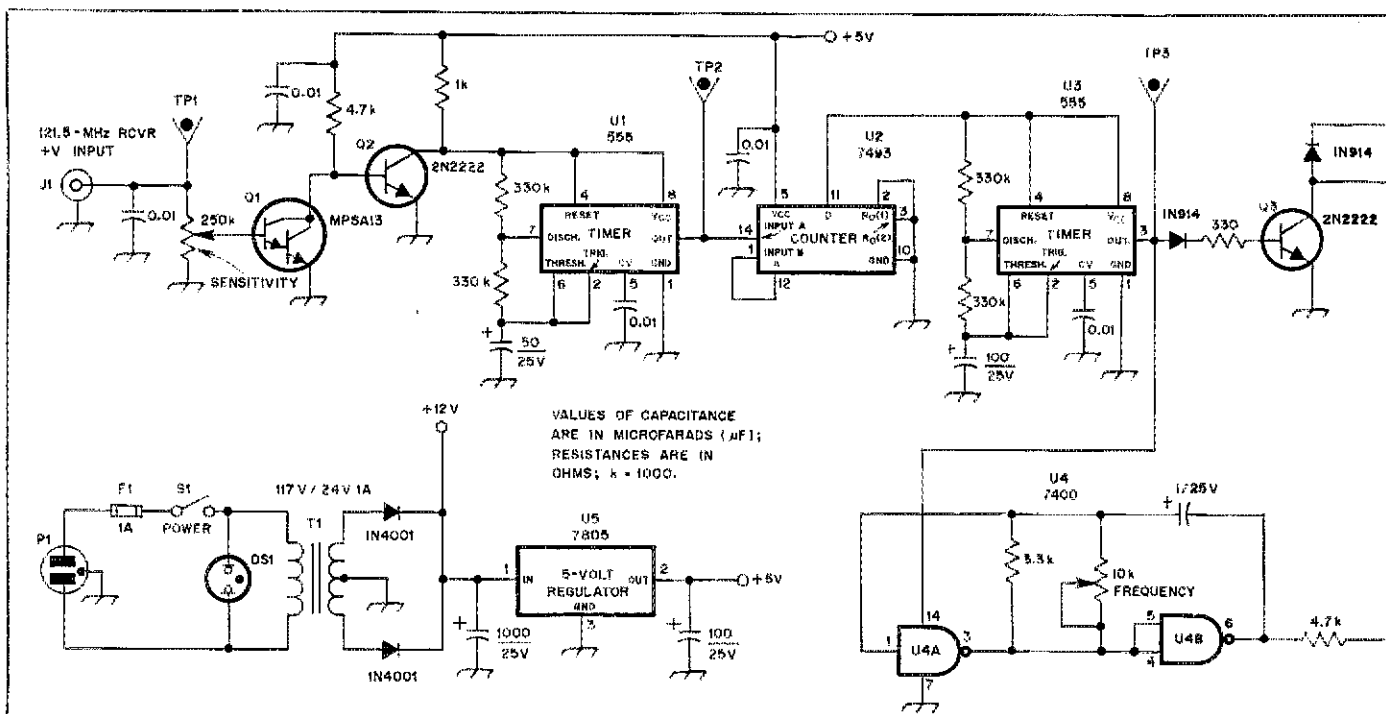


Fig. 1 — The W7VEW ELT monitor control circuit. See parts identification above. Resistors may be 1/4 watt.

ists and the object should be disposed of immediately. Disposal of leaking devices and any other contaminated objects or storage containers should be done with great care to avoid spreading the contamination to soil, watersheds and ground-water sources. The only safe economical method of disposal is to seal the contaminated material in a watertight, impervious container and bury it in a landfill that is approved by health authorities for disposal of hazardous waste. Amateurs are also cautioned to keep all oil-filled devices of this nature, even if not visibly leaking, inaccessible to children or pets. — Larry W. Strain, N7DF, Box 213, Fort Duchesne, UT 84026.

[Editor's Note: Current regulations of the Environmental Protection Agency (EPA) require that any amount greater than 6 pounds of PCB or PCB-contaminated material (this would include a 1-gallon dummy load if it contained PCB-contaminated oil) must be disposed of by placing it in a 55-gallon drum filled with sawdust. The drum must then be transported to an EPA-approved disposal site. Unfortunately, these regulations had industrial PCB users in mind rather than the individual radio amateur. Such an individual would be well advised at least to seal any leaking or suspect components in an impervious container such as the author mentions while awaiting a proper means of disposal.]

## SSB OPERATING FREQUENCY

□ I would like to make a few comments on "The Nitty-Gritty of Simple Receivers," March 1980 *QST*. First, I get the impression that there is a tendency to confuse what is defined as the "operating frequency" of an ssb signal. Amateurs have always used the carrier frequency as the operating frequency, whereas the military and possibly others use the center of the passband of the transmitted frequencies as the operating frequency. The writings about a 1.5-kHz offset (page 24, center column) and Fig. 5C in the article imply that we are leaning toward the latter! Is this intentional? I vote for keeping the carrier frequency as the operating frequency (even if it is suppressed). This would replace Fig. 5C in the article with Fig. 2 here. Notice that the BFO frequency would not be

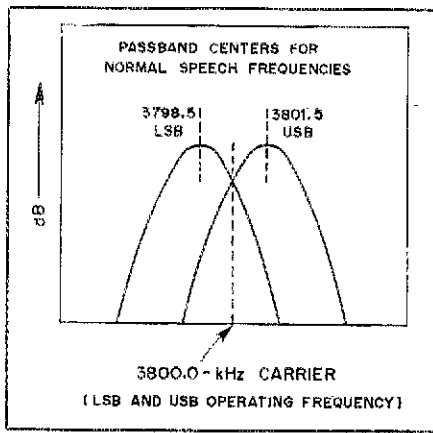


Fig. 2 — The operating frequency of an ssb signal in Amateur Radio is the carrier frequency — it is the same for lsb and usb. In a direct-conversion receiver (which does not give single-signal reception), a VFO frequency equal to the operating frequency will allow correct demodulation of these lsb and usb signals.

changed for usb or lsb reception, but the receiver rf tuning would be slightly changed (if at all necessary with these simple receivers). On page 24, left column, where a presumed ssb signal of 3580.0 kHz is stated, one 3580.0-kHz crystal would be all that is needed for either usb or lsb reception in a direct-conversion receiver.

Second, on page 24, center column, usb and lsb are switched around in a sentence. The correct statement should read: "The VFO is tuned slightly above the desired ssb signal for lsb reception, or slightly below it for usb reception." Note also that the ssb signal referred to here is that of the sideband frequencies, not that of the carrier, which must always be zero beat with the VFO. Correct Fig. 7 in the article to label the 8998.5-kHz crystal for usb and the 9001.5-kHz crystal for lsb.

I hope these corrections and suggestions help to establish the frequency of an ssb signal as used in Amateur Radio. Future confusion is bound to exist if this matter is not defined specifically. — Franklin Swan, W9SLA, 15933 Grove, Oak Forest, IL 60452

## A TWIST CALLED "TWIST"

□ Those who built the "First-Class Touch-Tone Encoder" in February 1979 *QST* may have had some trouble getting their units to access the repeater autopatch. I had such a problem. However, a bit of asking around narrowed the problem to something called "TWIST." TWIST is the allowable difference in amplitude between the two tones leaving the encoder, and is specified by Bell as no more than 4.5 dB. The MC14410 tone generator is described by Motorola as having typically 2.5 dB of amplitude difference between the two tones. By the time these tones go through the transceiver audio circuitry, the repeater receiver circuitry, etc., it's not hard to visualize exceeding the 4.5-dB limitation.

The cure is very simple: Change the 10-kΩ summing resistor from pin 15 of the MC14410 to 15 kΩ. This equalizes the two tones and clears up the problem.

I have also shown in Fig. 3 a monitor circuit which may be added to your encoder. With this addition you can listen to all of the beeps and whistles as you punch them in. The penalty to be paid, however, is an increase in supply cur-

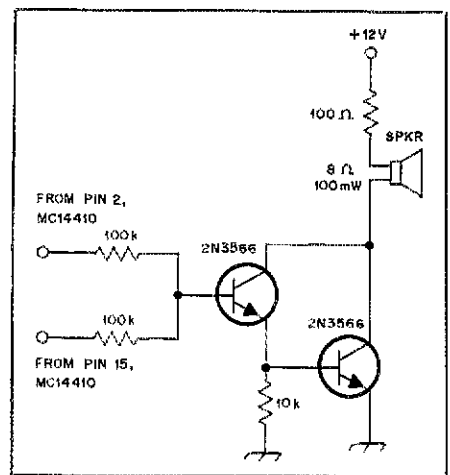


Fig. 3 — Circuit for a monitor that can be added easily to an existing encoder.

rent from approximately 15 mA to about 100 mA; still a very small drain on the battery. I used an imported 1-1/2 inch (38 mm) diameter loudspeaker glued to the inside of the encoder case. It provides sufficient volume. The two transistors should be high-gain types, but are otherwise uncritical. — Ken Grant, VE3FTT, 46 Merryfield Dr., Scarborough, ON, Canada M1P 1J9

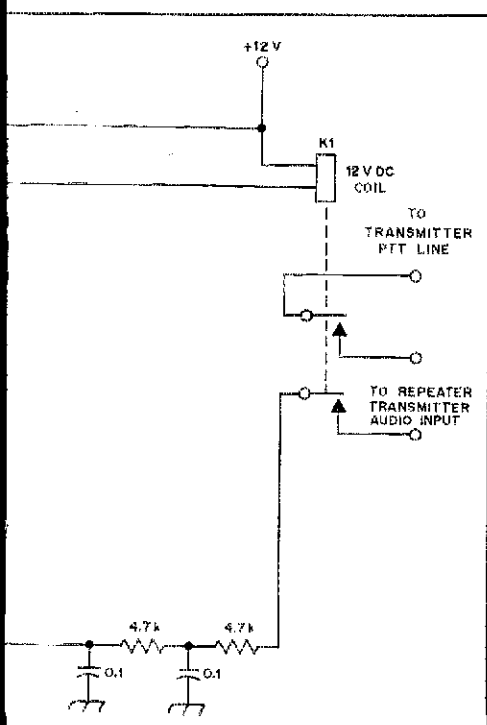
## Feedback

□ In "The Nitty-Gritty of Simple Receivers," March 1980 *QST*, Fig. 9, page 26, a 100-Ω resistor should be added from pin 6 of U1 to the switched 12.6-V bus. In Fig. 11 on page 27, the 100-kΩ resistor connected from G2 to S of Q1 should be 10 kΩ. The 180-Ω resistor connected from the 12-V bus to a pad above Q2 should be 100 Ω.

□ In the Hints and Kinks presentation of "FT-101ZD Final Amplifier Current Monitoring," May *QST*, page 40, the shunt resistor connections are incorrectly shown on the solder side of the board; they should be moved (one to each side) of the cut pc foil cathode connections immediately above. Thanks to George Tyler, W6CUI.

□ An error was made in the listing of the 1979 Field Day results by the Monroe County (MI) Radio Communications Association. Their score should have been listed as 6424 points, making them the 8th call area leader in the 4-A category.

□ There are some errors in "The NOR-Gate Break-in" (May 1980 *QST*, pp. 23 and 24). In Fig. 2, the "connecting dot" between pin 4 of U2B and the 330-kΩ and 2.2-kΩ resistors was omitted. Capacitor C4 is a 22 μF, 25-V electrolytic. Resistor R4 is 1 MΩ instead of 100 kΩ as shown on the parts-placement guide. The parts-placement guide should show pin 4 of U1 connected to pins 8 and 9. In Fig. 5 an arrow from C of Q2 "to Volume control" was omitted. The 10-kΩ resistor should go to U1A, pin 2 and the 10 kΩ resistor should go to U1B, pin 5. On page 26 U1A, pins 1 and 2 are reversed in portions of the text.



## The IRL FSK-1000 RTTY Demodulator

Perhaps the present atmosphere of technical interest and innovation among RTTYers can be traced to an old-fashioned attitude. Not so many years ago, all RTTY stations were homebuilt to a greater or lesser extent because commercial demodulators tailored to the amateur market did not exist. Fortunately, that situation has changed. Yet, because many "green key" aficionados are latent homebuilders at heart, they are not content to accept their appliances without scrutiny.

One would think that the process of converting an RTTY signal into current pulses to drive the selector magnets of a printer is a simple process that can be done only one way. Ask two different RTTYers the best method for accomplishing this and you will get four different views! Most advanced TUs (terminal units) are sharp skinning knives — narrow, fixed-frequency audio filters centered on the standard mark-and-space frequencies. Although this tool will secure the greatest amount of information, there are those who prefer the phase-locked loop — an electronic meat cleaver — cheap and quick, but wasteful in tight spots (QRM).

For many years, the beginning RTTYer started his operating career with a phase-locked loop, then graduated to a high-quality, fixed-frequency TU. He soon found that copying different shifts or drifting signals is sometimes more difficult with an advanced demodulator.

IRL's FSK-1000 could be called a third option. Tunable sixth-order Butterworth bandpass filters give one the flexibility of a phase-locked loop TU and the selectivity of a fixed-frequency version. The bandwidth of both mark and space filters is selectable (55 Hz or 100 Hz) to permit operation at data rates of up to 110 Baud (a possible future ASCII standard) or for times when the QRM situation becomes difficult. By coupling these flexible filters with separate, large tuning meters for both mark and space, the FSK-1000 was able to copy a variety of Baud rates at many shifts. One immediately recognizes the 850/425/170-Hz switches. Yet the operator is not limited by preset mark-and-space filters. A delta tuning control permits varying the space filter center frequency from 50 to 1000 Hz. Thus, nonstandard shifts and drifting signals are tuned in with little difficulty. Further flexibility is afforded by the ability to select the mark signal alone, the space signal alone, or a combination of both for normal FSK operation. It is thus possible to use the "low tones" (1275- to 2275-Hz) version for use with an hf transceiver, and utilize the "mark only" mode to copy "high tone" (2125- to 3125-Hz) vhf transmissions. This feature might also prove useful for make-and-break (A1) transmissions used on various satellite-communication links.

Such shining flexibility does entail a slight design compromise, however. Most receiving conditions require some audio limiting before the mark-and-space filters to aid in counteract-

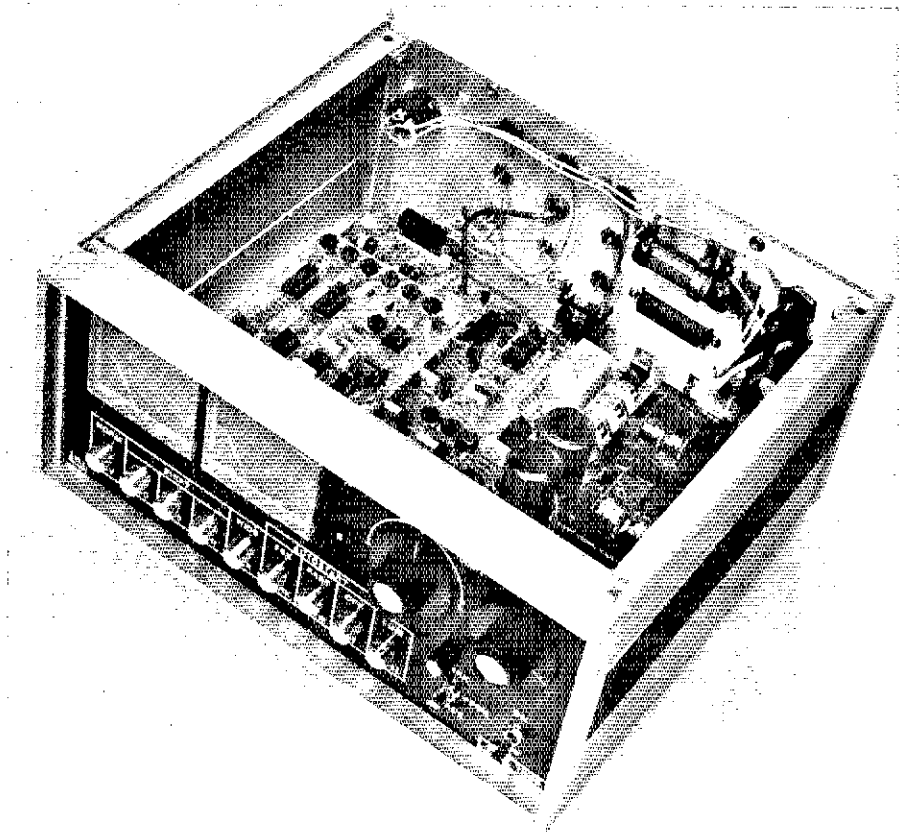


Fig. 1 — The IRL FSK-1000 with the top cover removed. Note the neatness of the internal component layout. The large front-panel meters are easy to read, even at a distance.

ing the effects of fading and noise. Most fixed-frequency TUs employ a narrow-bandpass input filter before the limiter; otherwise, a strong adjacent signal will tend to capture the limiter and make copy difficult. A close analogy would be the capturing of a repeater by an extremely strong carrier. Because the space filter in the FSK-1000 is tunable from 50 to 1000 Hz, there is no bandpass input filter in the audio input line. The FSK-1000 did an excellent job of separating signals of equal amplitude, but strong QRM captured the limiter and obliterated copy. IRL's solution is ingenious: A control is provided that varies the amount of limiting so if the above situation occurs, it is possible to reduce the level of limiting to the point where capturing will be prevented. An LED is used to indicate the limiting reduction required for AM operation. Some of the time, this procedure was effective. However, this reviewer feels that when the FSK-1000 is used with a receiver lacking a good 400-Hz i-f filter, it would be advisable to insert a homebuilt audio bandpass filter between the receiver and the demodulator. This addition would allow hard limiting under a much wider range of QRM conditions. An audio filter is simple to

construct and would provide the operator with the best of both worlds.

The FSK-1000 also features decision-level correction circuitry to compensate for selective fading, automatic PTT, an internal 60-mA (170 V) and RS-232 loop supply, and station-control circuitry. One unique and welcome feature of this TU is the ability to switch between mark-only autostart and FSK autostart. In the latter mode, both mark and space signals are required to start the machine. This mode was found to be nearly immune to triggering by cw and ssb signals. A front panel-mounted threshold control acts as an RTTY "squelch," but it was found to be not quite as effective as autoprint circuitry which is designed to prevent the machine from running open before the motor is shut off.

The FSK-1000 is a well-constructed and attractive piece of equipment. Most components are mounted on a single glass-epoxy pc board that is well laid out and readily accessible. IRL also offers both AFSK (FSK-1020) and video-terminal options. The price class of the FSK-1000 is \$400. Further information can be obtained from IRL, 700 Taylor Rd., Columbus, OH 43230. — *Chris Schenck, W1EH*

\*Assistant Technical Editor, ARRL

## THE HEATH IM-2215 HAND-HELD DIGITAL MULTIMETER

If you've been looking for an accurate, portable, digital multimeter (DMM) at a price you can afford, Heath has the answer. The IM-2215 is a hand-held, battery-powered, DMM exhibiting a high degree of accuracy and featuring a 3-1/2 digit, liquid-crystal display (LCD). The LCD numerals are large and easy to read (old-timers take note!) — the problem associated with reading an LED display in high ambient light areas is virtually nonexistent. The display also offers automatic decimal-point placement (depending upon the measurement range selected) and polarity indication. A LO BAT display warns you of a low battery condition and is activated during the last 20% of the life of the battery. With an alkaline battery, typical operating lifetimes of up to 200 hours may be expected. Approximately 100 to 150 hours of operation will be provided by the zinc-carbon battery types.

Ac and dc voltages and currents as well as resistance-measurement functions are provided. Within the specified limits, the meter is protected against overloads and transients by either a resistor-diode network or an internal clip-mounted fuse (no unsoldering necessary). Overload and over-range indications are relayed to the user by a flashing minus sign and a blanking of the display except for the most significant digit (MSD).

The '2215 may be line operated by using one of the optional 120- or 220-V Heath converter/chargers which are available. Advertised as "line cords," the units are more popularly known as "wall transformers." With the '2215, these converter/chargers operate as battery eliminators and *will not* charge the internal battery. The battery is disconnected when the converter is plugged into the DMM. Another available option is a leather carrying case with an attached belt loop.

Assembly of the '2215 may be accomplished within one evening. Total construction time for the unit assembled by this reviewer was approximately 5 (interrupted) hours. This included time taken to check each resistor, diode and transistor with an ohmmeter and scrape the component leads with a pen knife prior to soldering the part into the circuit board. Heath (thoughtfully) supplied a small plastic magnifying glass to enable the assembler to read the component markings. Unfortunately, the magnifying glass was difficult to focus, so I resorted to using my own illuminated hand-held magnifier. I'd recommend using a magnifying glass no matter how good your eyesight may be; it comes in handy when checking the solder connections on the pc board.

This is the first time that assembly of a unit required me to wash my hands first! The construction manual outlines a couple of important steps which should not be overlooked: Clean hands, handling of the main circuit board by its edges and avoidance of excessive rosin build up are procedures to be followed if contamination of the main circuit board is to be avoided. Heath warns that should contamination occur, the completed DMM may not meet the listed specifications when operated in certain environments, such as one with high humidity conditions. Should it be determined the circuit board is contaminated and requires cleaning, a simple procedure is outlined in the manual.

The components used in the '2215 are of the highest quality. I was pleased to find that even

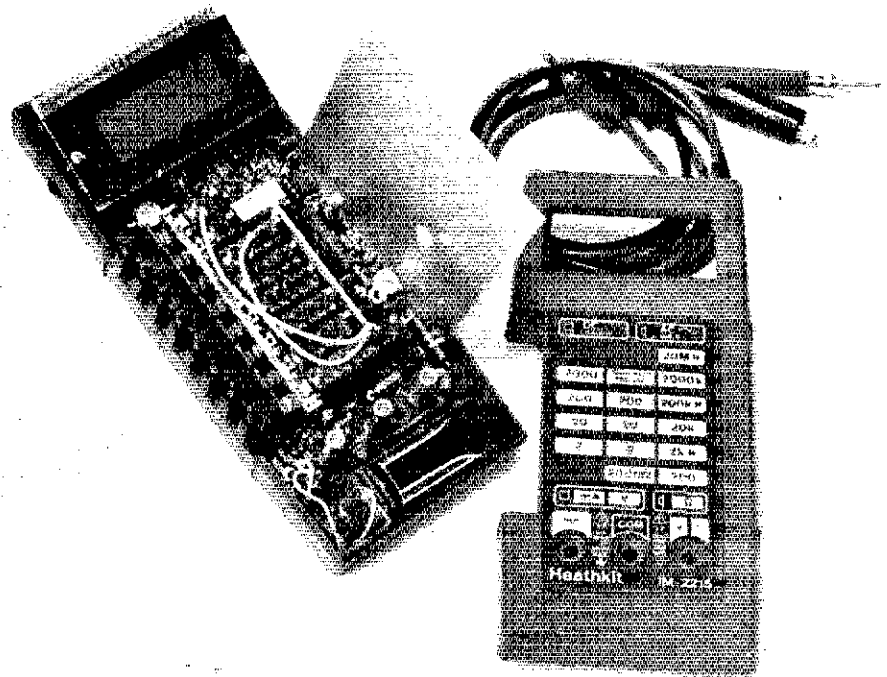


Fig. 2 — The Heath IM-2215 digital multimeter. The vertical panel to the right of the meter case is a flexible shield that is secured over the switch assembly during construction. The switch assembly requires the only point-to-point wiring necessary.

the test leads mated quite securely with their respective jacks, which are tubular aluminum types. There are a few specially selected components employed and these are mentioned during the construction process. You might notice the LCD digits flashing during handling of the display assembly. It's not your imagination; static electricity is causing this. No difficulties were experienced during construction with the exception of the test-point pin pc board holes being too small to allow the pins to pass properly and seat on the board. The two holes were enlarged using a no. 51 drill to permit a snug fit for the pins. A few changes had to be made to the manuals with information supplied by the accompanying errata sheet. One capacitor location on the board is marked incorrectly, but this is mentioned in the appropriate construction step. There is very little point-to-point wiring involved: five wires! Everything, with the exception of the battery and battery connector/fuse-holder, mounts either on the main or read-out circuit board. The meter is ready for calibration after a few operational tests to ensure proper circuit functioning.

Two calibration methods are possible: internal, using the built-in standards, or laboratory, by means of external voltage sources. The latter method requires the amplitude of the calibration voltage to be controlled to a great degree of accuracy  $\pm 0.05\%$  for a resultant meter accuracy of  $\pm 0.25\%$ . I used the internal-standards method and with two voltage measurements and corresponding adjustments, calibration was completed in less than five minutes. The internal references used to calibrate the '2215 are in themselves highly accurate. One reference voltage is obtained by using a selected low-voltage reference device made by Micro Power Systems, Inc. (MPSS010). The reverse-breakdown voltage

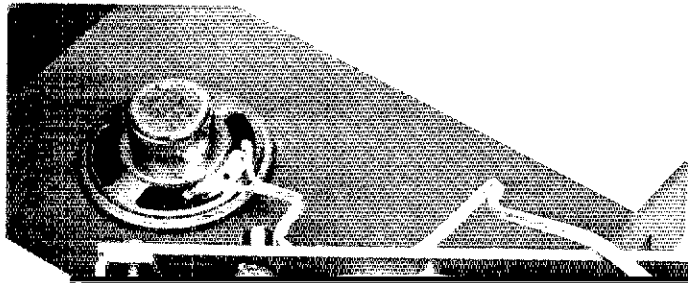
for the device, which is used for dc calibration, has been measured accurately and recorded. This device is packaged separately with the reference voltage value noted on the envelope. The voltage value is transferred to a label which is affixed to the inside of the meter for referral during recalibration procedures. The ac mode is calibrated by using the rectified backplane signal of the A/D converter.

The user should read the operations section of the manual carefully. Although the DMM is protected, there are some practical limits to the degree of protection of the '2215. High-voltage and rf probes may also be used with the meter and such use is explained thoroughly. Three ranges of the meter do not produce a full-scale measurement voltage sufficient to forward bias silicon junctions, but there are three others that do. The latter ranges are useful when checking and matching diodes and transistors, while the former ranges may be used to make in-circuit resistance measurements.

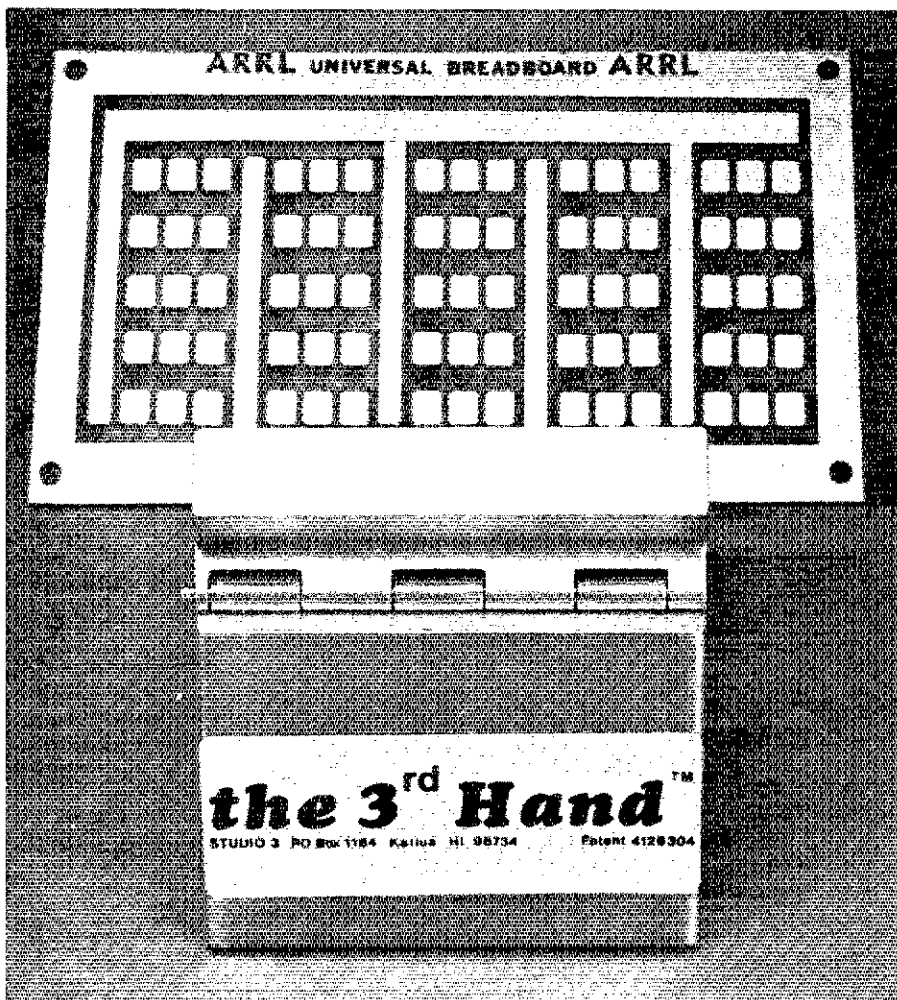
When measuring voltages, the display reading is in millivolts or volts. For dc voltages, negative polarity is indicated by the appearance of a minus sign to the left of the MSD. The absence of the minus sign indicates a positive polarity. No sign is displayed during ac-voltage measurements, except during recovery from an extreme overload. During current measurements, the foregoing polarity rules apply. Current readings are displayed in milliamperes. No polarity sign will be indicated during ac measurements, except during an overload recovery. When measuring resistances, the display is expressed in ohms, kilohms, or megohms with no polarity sign exhibited. The possible exception may occur during connection of the meter to an energized circuit. The overload/over-range condition is indicated by the blanking of all display digits except the MSD "1". It is normal for the units position of

the display to alternate one digit above and below a reading. This does not indicate a malfunction. During the measurement of ac voltages, it may take a few seconds (typically 8 to 10) for the display to stabilize at a  $\pm 1$  count indication and this, too, is normal.

It was noted that the '2215 was susceptible to RFI when operated close to an operating 300-watt transmitter that had been removed from its case. This came as no surprise. The degree of interference was greatly reduced when the meter was placed on the desk rather







This inexpensive and versatile circuit-board holder provides easy access to both sides of the pc board.

### THE 3RD HAND

Sound like something you might see in a thriller movie? Well, it's not. This little item supplies that extra helping hand you've so frequently wished you had when working on pc boards. Combining simplicity with ingenuity, the manufacturer has devised an inexpensive and versatile circuit-board holder that requires no adjustments to accept or hold different-sized boards. When clamped to the edge of the workbench, it holds the board at a convenient angle to allow placement of parts on the board and then flips forward for access to the solder (or wire-wrap) side of the board.

The model we received is a manufacturer's sample, identical to the commercial model except in length (about 1-1/4 in. shorter). Secured to the bench mounting bracket is a hinged aluminum channel. Within the aluminum channel is a section of spring-loaded PVC gasket. The circuit board edge is simply slid into the PVC gasket and is held firmly by the spring action; there are no arms or knobs to adjust. The 3rd Hand is manufactured in three different sizes. There's also an extension bench clamp which allows the work to be placed further back from the front edge of the bench. The 3rd Hand is available from Studio 3, P. O., Box 1184, Kailua, HI 96734. Price class; Model 3 B/C (4 in.), \$9.95; Model 3 A/C (5-3/4 in.), \$12.50; Model 3 C/C (7-5/16 in.), \$14.95; and

the extension bench clamp, \$4.95. — *Paul K. Pagel, N1FB*

### TRAVEL-PAK QSL KIT

Wayfaring amateurs take notice! Save time and money with Sameo's Travel-Pak QSL Kit. With this convenient system it's a simple matter to convert a picture postcard or photograph to a QSL card — in one minute or less! The results can be very professional.

The reviewer had a need for a limited number of QSL cards each year after vacationing on the various islands of the Caribbean. Some years the DXpedition is merely a token type of exercise, with skin diving and other tropical activities dominating. As a result, fewer than 100 or 200 QSL cards are required to confirm contacts with those who need a new country. The cost of having quality QSL cards printed, plus the wait for delivery, can be discouraging. A speedy and low-cost technique for developing QSL cards was discovered while reading *QST* Ham Ads. An inquiry to Sameo brought a hasty response, complete with samples.

How does the technique work? Well, your call is printed on clear acetate strips which are adhesive-backed. Similarly, the QTH line (or lines) is printed on a similar strip. The protective backing is peeled away easily, then the strip is affixed to a postcard, photograph or existing

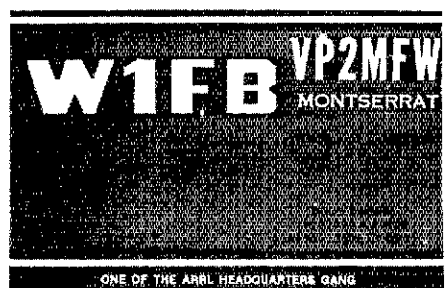


Fig. 4 — Sample of an existing QSL card that was modified to include VP2MFW and the QTH, "Montserrat."

QSL card. Fig. 4 shows how the VP2MFW call and the word "Montserrat" were added to the existing W1FB cards. A standard-format report strip is also available. These are handy for pasting on the back side of postcards which are converted to QSLs.

There are three letter-size choices for the call letters (5/8-, 1/2- and 3/16-inch heights — 16, 13 and 5 mm, respectively). Color choices are white, red, blue, gold, green, black and copper. A variety of prices is listed for various kits, but the "quantity discount kit" gives you 250 calls, QTH lines and report forms (enough to make 250 QSL cards) for \$15. This reviewer chose to order 100 calls and 100 QTH lines, but no report forms. The cost was \$6, postpaid.

Those who take vacations in the USA and operate Amateur Radio from various states and counties may find this type of QSL card fabrication excellent for use with picture postcards from the area where the operation took place. You can mail the QSL card right from the location without delay!

The quality of the product is excellent. It was a wonderful surprise to get both the samples and the order a couple of days after the requests were sent. In both instances the merchandise was shipped the day the order was received! A few more amateur equipment merchandisers could benefit from that kind of turnaround time!

A brochure and samples are available at no charge, provided an s.a.s.c. accompanies the request. The address is Travel-Pak QSL Kit, Box 203, Wyantskill, NY 12198. — *Doug DeMaw, W1FB*

### THE 1980 ARCHER SEMICONDUCTOR REPLACEMENT GUIDE

There's a new 1980 edition of the *Archer Semiconductor Replacement Guide* available at your nearby Radio Shack dealer or store. This 224-page, 8-1/4 x 11-inch book features cross-reference and substitution listings for over 100,000 devices. These listings have been totally computer generated and based on careful analysis of the important parameters of the listed devices. Information is given relating to transistor testing, case styles and dimensions, the care and handling of transistors and integrated circuits, optoelectronic devices and displays. A glossary of words, symbols and abbreviations relating to semiconductor devices is included, too. A pair of pages is devoted to major semiconductor components and lists the name of the device, the circuit symbol, electrical characteristics and major applications. Some typical applications and circuit diagrams are given for a number of ICs. The new guide is priced at \$1.99. — *Paul K. Pagel, N1FB*

## VK2SV MODIFICATION FOR THE HEATH NOISE BLANKER/75S-3 COMBINATION

The fitting of a modified Heathkit noise blanker in the 75S-3 was well covered by Doc Lask, K6CUF, in February 1979 *QST*. The modification really works. In my case, because I had updated my 75S-3 to fully solid state by means of a set of Tubesters, a further modification became necessary. Use of the Tubesters, supplied by Jim Bowles, W6DLQ, means that the 11-volt supply for the blanker could not be obtained from the cathode of the 6BF5 output tube.

A small pc board was made to fit into the space left by the omission of the edge connectors. An 11-volt regulated voltage-doubling supply powered by the 6.3-volt line was fabricated. See the accompanying drawing. To enable the circuit to be peaked at the center of the i-f passband, a further essential modification had to be made. Accordingly, a 5- to 60-pF trimmer capacitor placed across L3, instead of the 36-pF capacitor suggested by Doc Lask, did the trick. To permit the blanker to be switched in when necessary, a miniature push-button switch mounted on a small bracket located under the finger hole in the top cover has been added.

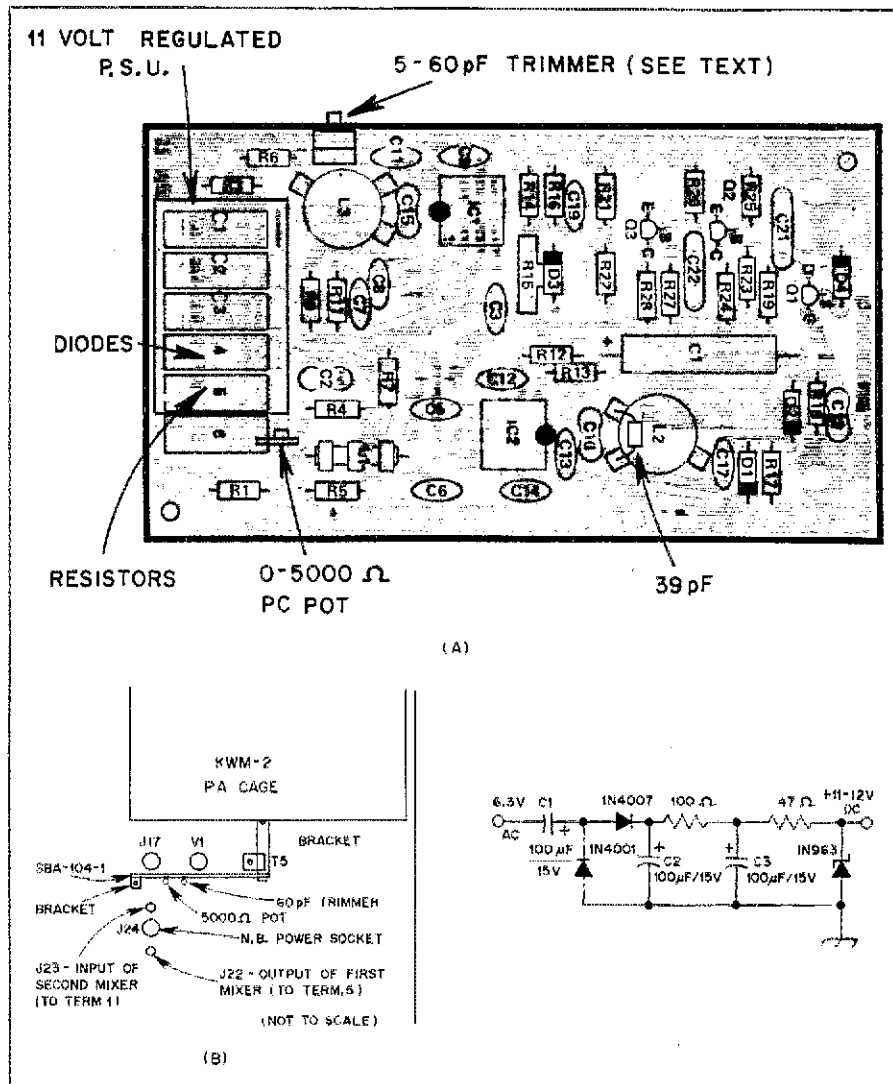
Installing the noise blanker in the KWM-2 proved to be a much simpler project than expected, for Collins engineers have thoughtfully provided a pair of phono jacks (J22 and J23). These are normally jumpered between the first and second receiver mixers. Additionally there is a noise-blanker power plug (J24) that provides a circuit to the noise blanker switch on the front panel.

Remove the jumper and install a pair of short, shielded cables, terminated in phono plugs, from the SBA-104-1 to jacks J22 and J23. I used a small voltage-doubler supply powered by the 6.3-volt line available at the noise blanker socket.

A 5000-ohm pc-board potentiometer, mounted in a vertical position at the no. 6 edge connector position, serves for setting the desired blanking level. Both the 60-pF trimmer and this potentiometer are positioned such that adjustments can be made when the blanker board is installed in the KWM-2. Do not remove R3, 33 ohms.

The SBA-104-1 is mounted in a vertical position immediately in front of V1 and L9, and behind J23 and J26. A small bracket attached to the bottom left-hand corner of the board is fastened to a protruding coil-can bolt and raises the board about 3/8 inch (10 mm) above the chassis. Another bracket from the top-right corner of the board is fastened to the PA cage. No wiring changes to the KWM-2 are made, no holes are drilled, and operation of the blanker is made via a properly designated knob on the front panel.

To summarize the modifications to the SBA-104-1, discard L4, R29, the edge connectors and the 6-pin connector. Add a 5- to 60-pF



The VK2SV modification for adapting the Heath SBA-104-1 noise blanker to a Collins KWM-2. Location of parts on the SBA-104-1 circuit board is shown at A. The blanker board may be mounted adjacent to the KWM-2 PA cage as shown at B. J24 is the noise-blanker power socket. A suitable power-source circuit is shown at C. See text.

trimmer capacitor across L3. Place a 39-pF capacitor across L2 and add a 5000-ohm potentiometer between terminal 6 and the NB (noise blanker) switch to ground. *Do not remove* R3 (33 ohms).

This arrangement provides 20 to 25 dB of blanking. As with the 75S-3, the results are quite impressive. The performance of an already fine piece of equipment is further enhanced. — T. A. Dineen, VK2SV, ex-VE7SV, ex-ZS6TP, Port Macquarie, NSW, Australia

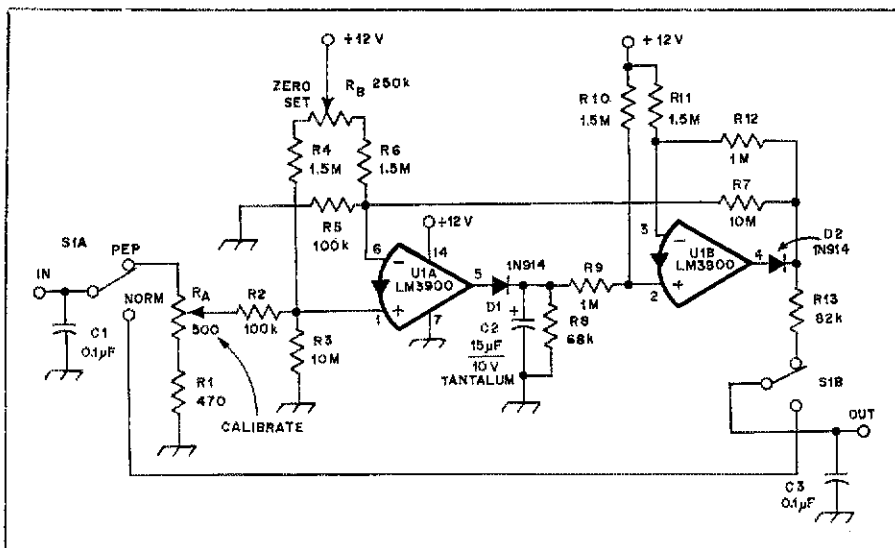
## PEP WATTMETER MODIFICATION

This modification of the PEP Wattmeter, described by George Rice (December 1976 *QST*), may be of interest. It is designed around the LM3900 Norton operational amplifier and

appears to be much less susceptible to the effects of strong rf fields such as mentioned in Rice's article. Also, it only requires a single supply line (rail) and performance of the decay circuit is predictable since it depends almost entirely on external component values (rather than on the input impedance of the operational amplifier).

U1A is a dc amplifier with gain determined by R2 and R7. C2, D1 and R8 form a peak detector with the decay time determined principally by C2 and R8. U1B is a unity-gain buffer amplifier with D2 providing a level shift, enabling the output voltage to fall almost to zero. Common mode biasing is applied to both amplifiers via R4, R6, R10 and R11, with R4 providing the means for adjusting for zero-voltage output when zero-voltage input is applied. There is virtually no interaction between

\*Asst. Technical Editor, *QST*



The 6Y5HJ modification of George Rice's PEP Wattmeter circuit (December 1976 *QST*). With this arrangement, the writer finds the wattmeter is less susceptible to the effects of strong rf fields. Resistance values are in ohms.

this zero-set control and the calibrate (CAL) control.

The unit is installed in a Heath SB634 station console. A PEP/NORMAL switch is fitted immediately to the right of the meter-selector buttons. Operating voltage (12 V at 9 mA) is taken from the digital-clock supply. This voltage passes through a dropping resistor and a Zener-diode regulator.

There was no particular desire to improve upon the circuit provided in Rice's article. My design came into being because I had the LM3900 on hand rather than the specified LM1458.

Acknowledgements are due the National Semiconductor Corporation for their comprehensive "Linear Application Notes." I found these to be invaluable as a means of learning how to design around this versatile operational amplifier. — *Jack Hollingsworth, 6Y5HJ, Kingston, Jamaica*

### THINK CLEAN

Many of us, at one time or another, have had experience with fluctuating grid drive and plate current, erratic antenna loading and a variety of intermittent problems. The first inclination is to plop the rig on the workbench, warm up the test gear and start checking tubes, components, circuits and whatever else is suspected of causing the problem.

As the result of some years of experience, I have adopted what I term "the medical approach" to such situations. My number-one rule is: "before performing surgery, clean the patient thoroughly." I have frequently found that dirty and corroded switches and controls are the prime causes of problems, especially in the case of intermittents. Often, after a good cleaning with contact cleaner/lubricant, some of the most frustrating troubles will disappear. In performing the cleaning operation, a good grade of cleaner must be used. The cheapest is not always the best. — *Ken Johnson, W6NKE, Canoga Park, California*

### A KEYING-POLARITY INVERTER

While operating the Ten-Tec Triton IV on

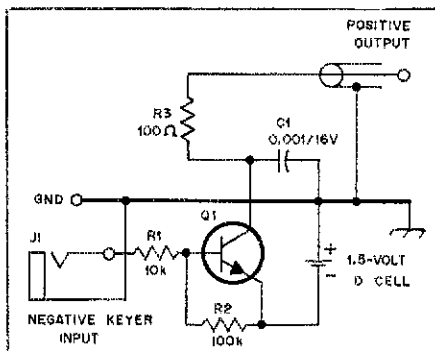
Field Day, WBØJYT brought over his programmable electronic keyer to alleviate the cw stress. After being educated in the use of the new gadget, I was dismayed to find it would apparently key only a negative potential toward ground. Most of the newer solid-state rigs have positive keying.

I formulated an ultrasimple circuit, shown in the diagram, to solve the problem. I was back at the FD operation after about 20 minutes of basement construction.

As the transistor provides an input/output



The transistorized circuit atop this battery, rigged by KØYQX, answered an urgent Field Day need to convert a keyer for positive-line keying.



A simple circuit for adapting an electronic keyer designed only for negative keying. Q1 may be any general-purpose, small-signal npn transistor.

polarity inversion in the common-emitter configuration, the keyer simply keys the base while the collector keys the rig. Note that the schematic diagram is drawn to show the ground graphically as the center line — plus polarity above and minus polarity below. The dry cell negatively biases the emitter and also completes the circuit for the very nominal keying current. With the direction of current flow defined as from negative to positive, note that the cell current flows into the emitter and then to both the keyer, via the transistor base, and to the rig, via the transistor collector.

The keyer we used has the capability of being converted to the opposite polarity internally. Since it was Field Day and I was not the owner of the keyer, a quick external fix was needed; the inverter unit seemed the best alternative. — *John Bipes, KØYQX, Mankato, Minnesota*

### FLOWER POT HIDES DUMMY ANTENNA

After several years of cussing tuner-uppers for their long-term carriers and their subsequent whistle solos, Tarzanian yelling of "Helllllooooo" and practicing arithmetic with "one-two-three-three-two-one," I bought a bucket-of-oil type dummy antenna. About the time oil splatters appeared on my operating desk in the den, my wife came home from a shopping trip with a pair of large clay flower pots. She wanted me to hang these from the rafters in front of the den window. While installing the necessary hooks, one of which was close to where my antenna coaxial cables enter the den wall, I had an idea. Why not put the dummy antenna inside one of the pots? My wife, a ham helper for 49 years, agreed to the idea.

The bucket of oil is well hidden in the pot. A length of RG-58/U extends through the den wall into the coaxial switch. Out of sight, but not out of mind, that can of oil is outside the house where leakage can do no harm to the desk, shelves or carpet. My wife planted growing flowers in one pot and stuffed plastic flowers around the dummy in the other one. The hanging pots look good from the street. Now I can whistle and yell "helllllooooo" while I tune up without someone thinking (or saying) "get a dummy, you dummy!" — *Don Hutchins, KB6DQ, Pomona, California*

### THE OLD TIMER'S NOTEBOOK: CHASSIS AND PANEL LAYOUT

A common practice in the machine-shop and sheet-metal industries is to coat the metal to be fabricated with a blue-colored alcohol-base dye, known as "layout blue." The dye enables the worker to scribe accurately the dimensions of holes, bending lines, etc. Once the item is fabricated, the layout blue is removed with either paint thinner or a commercial vapor degreaser.

I recently discovered that the common felt-tipped Magic Markers available in most stationery, five-and-dime, or drug stores will work exactly like layout blue. Using the marker pencil, it is possible to color areas where drilling, punching or bending is required. Scribe lines as required and proceed with the fabrication. When finished, remove the ink with common nail-polish remover. This technique lends itself to more professional and accurate chassis and panel work. — *Robert F. Aherle, W2QPP, Carle Place, New York, January 1963. QST*

# Discover an Endless Adventure



Mt. Rainier, the fifth highest mountain in the "lower 49" states, looms in the background of Seattle. (photos courtesy of Seattle-King County Convention & Visitors Bureau)

## SEANARC '80 focuses world attention on the 26th ARRL National Convention and Seattle, July 25-27.

By John Brown,\* W7CKZ

**T**he Amateur Radio community of the Pacific Northwest has conjured-up new excitement to try and top the show last March of the once-sleeping volcano, Mount St. Helens. Although the Convention will be milder than a volcanic eruption, it will have all of the activity and enthusiasm that the Amateur Radio populace can muster for the second big event in the Pacific Northwest for 1980!

\*725 88th Avenue S.W., Olympia, WA 98502

The convention committee has brought together an agenda of activities that will spotlight WARC '79 results, DX operation and personalities, Personal Radio Foundation, medium- and slow-scan TV, Amateur Radio public relations, ARPSC, narrow-band modulation and many more — plus exhibitors, speakers and lots of activities for the ladies.

### The Convention

The convention setting is across the

street from the SEA-TAC International Airport at the SEA-TAC Red Lion Inn. The hotel is surrounded by courtyards, gardens, an outdoor swimming pool, golf courses, and lakes, with a backdrop of 14,000-foot-plus Mt. Rainier. The architecture is a blend of authentic Pacific Northwest styles consisting of six 3-story wings housing 400 guest rooms and an adjacent 14-story tower with 300 additional rooms. The site is near major interstate highways, The Kingdome Stadium,

Seattle Center, the waterfront, downtown Seattle and Tacoma.

### The City

For time spent away from the Convention, Seattle offers visitors an array of interesting things to see and do. Piers, sidewalk fish bars, ferry and excursion boat rides, and a jumble of shops combine to make the waterfront a dynamic and hustling attraction. Close by is historic Pioneer Square. The original business center for Seattle in the 1800's, it is now restored with shops, galleries and restaurants.

Seattle Center, the site of the 1962 World's Fair, is also the center for cultural events, with symphony and opera performances. The center also boasts the 600-foot Space Needle, science center, stadiums, monorail and international fountains.

The 65,000-seat Kingdome Stadium plays host to Seattle's own professional football, basketball, baseball and soccer teams. Longacres Race Track features thoroughbred racing from May to September.

Outdoor recreation opportunities are abundant in and around Seattle. To the west is the spectacular Olympic Peninsula, and approximately three hours away is Mt. Rainier. Sailing and sightseeing are popular in the San Juan Islands.

### Transportation

The State of Washington is nearly 400 miles from east to west and 300 miles north to south, but State and U.S. highways lead to Seattle if you choose to drive to the convention. Many airlines also serve the area. Rail, bus and water transportation are also available to the Seattle area, so be sure to check with a travel agent or the appropriate transportation representative.

### The Convention Program

Registration will be held Friday, July 25 12 to 9 P.M., Saturday from 8 A.M. to 6 P.M., and Sunday from 8 A.M. to 12 P.M. An information booth will be available in the convention lobby each day. The grand prize will be awarded at 1 P.M. on Sunday, July 27.

The exhibits will be open Friday from 6 P.M. to 9 P.M., Saturday from 8 A.M. to 6 P.M. and Sunday from 8 A.M. to 12 P.M. The Royal Order of the Wouff Hong ceremony will be at midnight Saturday. The banquet, featuring Roy Neal, K6DUE, will be 6 P.M. to 8 P.M. Saturday. It will be limited to about 550 seats, so it is important to register *early* if you want to enjoy the evening banquet. A number of special activities, such as the ARRL forum and DX breakfast, will headline a collection of seminars and forums.

Ladies activities and special tours will feature an Historic China Town Tour on



Pike Place Public Market — home of fresh salmon and farm produce — is an appetizing sight.

Saturday. Seattle's Chinatown is unique, for it combines many Asian cultures in the one community. The tour starts with Japanese tea and cookies along with a 30-minute slide presentation giving the history of Seattle and the Asian Americans who contributed so much toward its growth. It then proceeds to the Old Nippon Kan, the Japanese immigrants' first theatre, which was recently placed on the State's Register of Historic Places. Entering Chinatown, the history of the Tongs comes alive. You will visit an old Japanese gambling den and finish the seven-block tour in Hing Hay Park under the gaze of the giant dragon mural. An authentic oriental lunch will be served at a picturesque restaurant. After lunch you may browse through Chinatown, including Uwajimaya, a gala Oriental "Supermarket Bazaar." This is a tour for the history buff; extensive walking is required, so wear comfortable shoes.

Other Saturday tours are: Discover Scenic Seattle, Seattle Downtown Tour, and the Pacific Northwest Arts and Crafts Fair. The Discover Scenic Seattle tour will take visitors aboard comfortable motor coaches for a tour of Seattle that features an intriguing blend of history, beauty and engineering. Visit downtown Seattle, scenic Magnolia Bluff, the Government Locks and the University of Washington, and pass the new Kingdome Stadium and magnificent Freeway Park. Discover the lively pace of Pioneer Square, faithfully restored in the architectural style of old Seattle, and stroll through Pike Place Public Market, where local farmers sell their produce in open-air sidewalk stalls, and everything from fresh seafood to antiques and imports can be found. On to

Seattle Center and the Space Needle, famous landmark of the 1962 World's Fair. The observation deck will be open for viewing the spectacular scenery. Leisure time at the Seattle Center grounds will give you time to browse through the Pacific Science Center, Modern Art Pavillion and the International House.

The Seattle Downtown tour encourages you to enjoy downtown Seattle at your own pace with a narrated riding and walking tour. The tour starts aboard the London Omnibus, but there are eight different stops where you can get off and have the freedom to enjoy Seattle's highlights. See the Washington Plaza, Pike Place Market, Space Needle, Pier 70, the Aquarium and Waterfront Park, Pier 51 and Pioneer Square. Stay as long as you like and then board the Omnibus to the next place you want to see.

### Other Program Highlights

SEANARC '80 will have the last scheduled FCC convention exams, so consult registration materials for the latest examination schedule.

The Friday night Tillicum Village dinner is worthwhile, if you can schedule it. It is a salmon barbecue that will include authentic Northwest Indian interpretive dances and artifacts. The Indian village is located on an island just 45 minutes from downtown Seattle. The boat ride alone is worth the effort to work this into your schedule. The Boeing Company will schedule a tour of their antenna laboratory and range-testing facility.

Other presentations and demonstrations will feature "Collecting and Investing in Original Graphics," YL Ham Conclave, craft demonstrations and an FCC forum.

### Who Will Be There

Harry Dannals, W2HD, president of the ARRL; Noel Eaton, VE3CJ, president of the IARU, and other members of the WARC '79 team will attend. Roy Neal, K6DUE, will be the featured banquet speaker, along with well-known DX operators who will be in Seattle to visit with their friends. Other ARRL officials will be present to assist with the many programs and forums.

Communications for visitors to the convention will be provided by K7RS (Radio Seattle), operating on 146.16/76.

### Registration and Visitor Information

Hurry and register for the banquet and convention by writing SEANARC '80, P. O. Box 68534, Seattle, WA 98168. Basic registration is \$7 before July 1 and \$9 after that. The Saturday night banquet is \$18 before July 1 and \$20 after that date. Remember: Only about 550 banquet seats are available, so hurry! Visitor information is available from the Washington State Department of Tourism, Olympia, WA 98504.

# The Collinear Yagi Sextet

This will be the fourth sunspot cycle in which W6KPC has built and tested experimental, high-performance antenna arrays for the hf bands.

By A. J. F. Clement,\* W6KPC

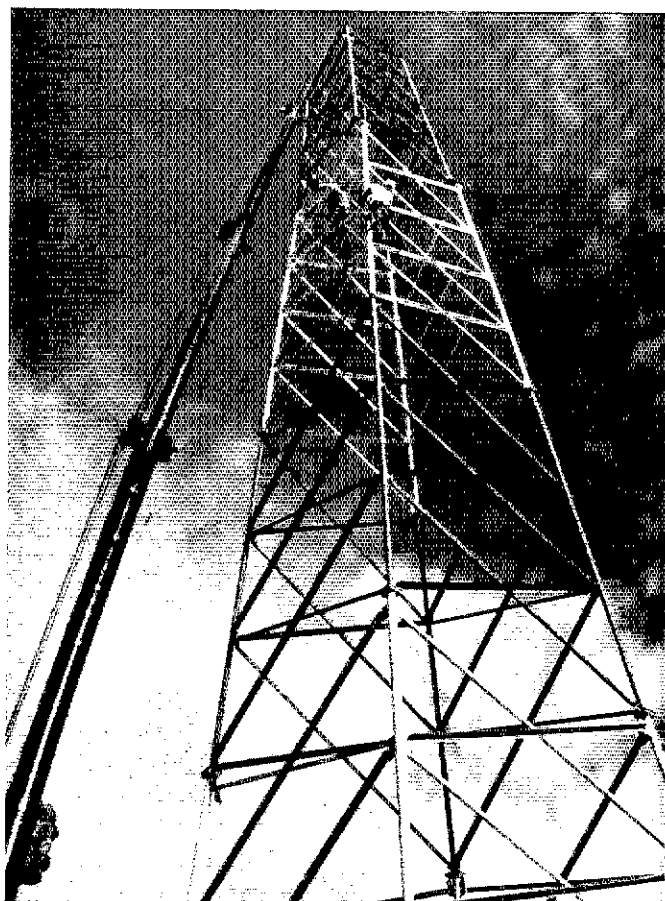
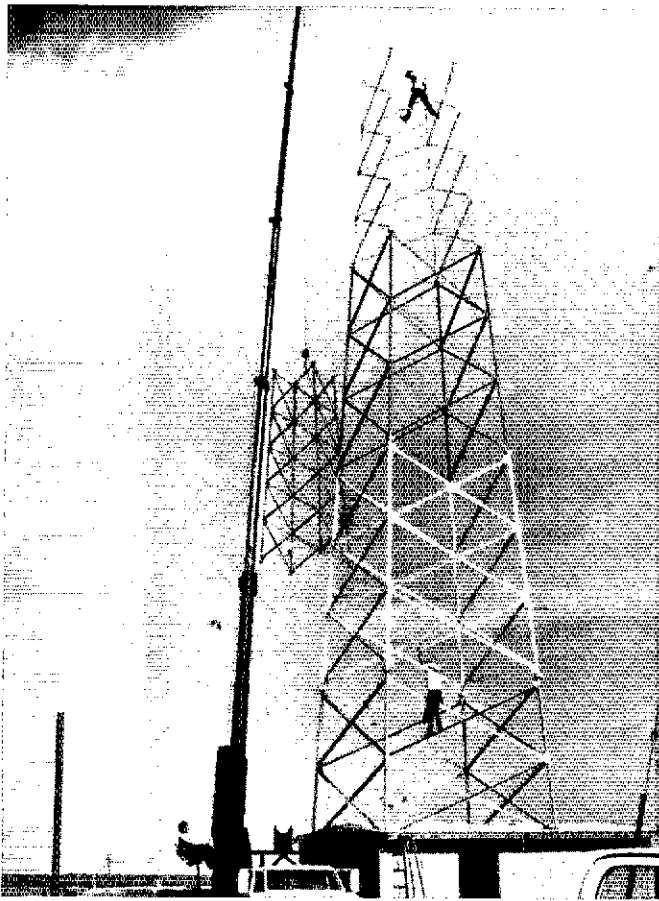
**D**reams can come true. Progress is made by dreaming, then designing, followed by building, testing and measuring. Nowhere is this more evident than in the series of DX antennas I have built. "Yagi-Dagi," a 12-element antenna, consisting of four horizontal 3-element beams fed in phase, one 3-element Yagi at a height of 60 feet, two side-by-side at 45

feet and a fourth at 30 feet, was described in September 1951 *QST*. "The Driven Beast," a 10-, 15- and 20-meter band opener, featured on the cover of May 1958 *QST*, was a second antenna extravaganza. November 1978 *QST*'s cover shows the third W6KPC antenna experiment, "The Collinear Yagi Quartet," two 6-element Yagis at 103 feet and two at 81 feet. The accompanying photographs show the latest W6KPC antenna and a

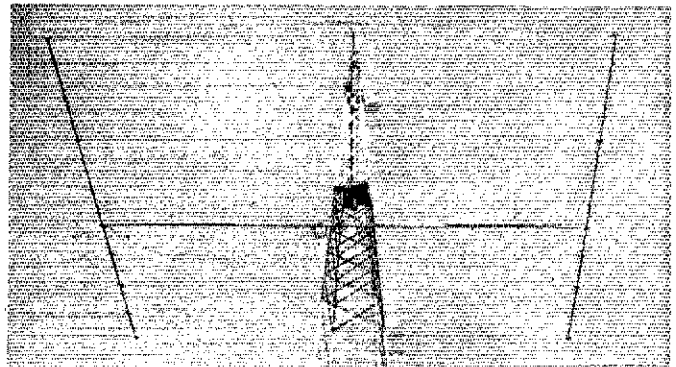
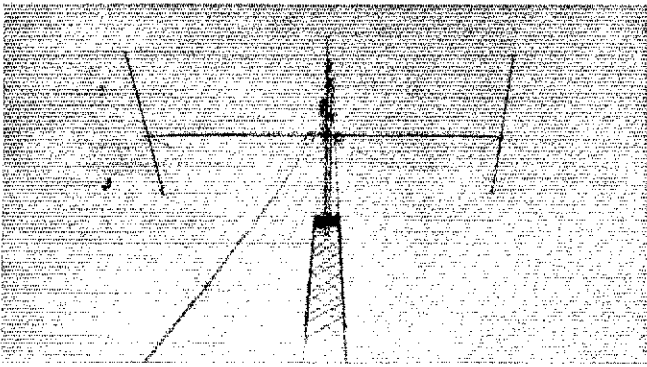
similar array at OH8OS.

The antenna systems at W6KPC and OH8OS are computer controlled. The computer is programmed to search through the eight modes to see which receives the incoming signal best. This is done by computer-controlled vacuum relays; eight S-meter readings are examined by the computer within a few milliseconds and stored in computer memory. When the operator first actuates

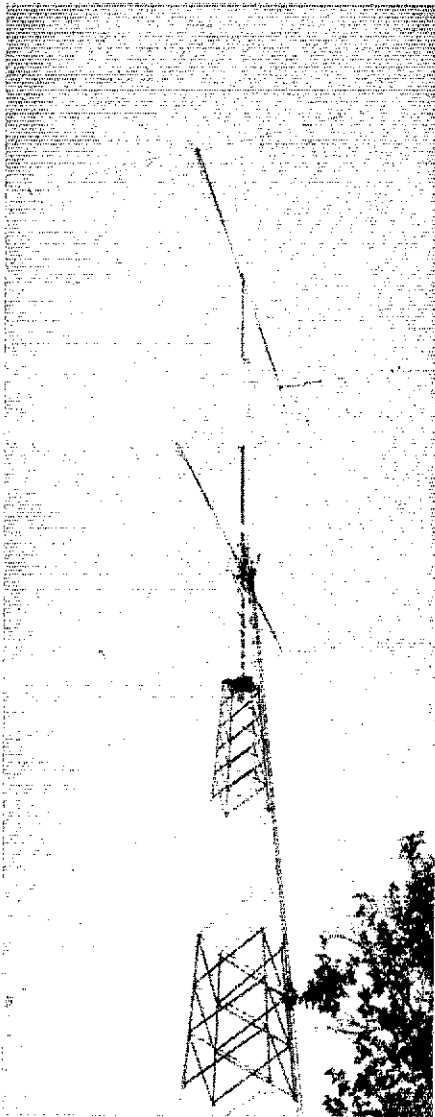
\*Rte. 1 — Box 116, McFarland, CA 93250



The lower section of the tower is a large, four-legged, free-standing, tapered Tri-Ex microwave tower. This "Square Rigger" rises to 126 feet and has a platform at the 106-foot level.



The array has been operated in stages. The upper duet was assembled and mounted in late February 1979. The Yagis used were carefully selected for gain, pattern, front-to-back ratio, feed-system reliability, efficiency and low wind profile. The KLM "Big Stick" was an easy winner.



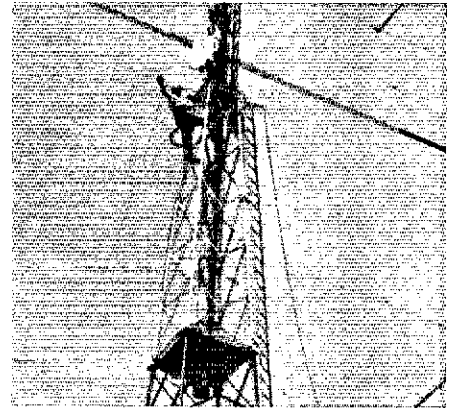
By midsummer 1979, the second bay had gone up. With 200 watts at the antenna, W6KPC joined the "big guns" on 20 meters. Each duet of Yagi antennas is held apart by a primary boom that is 66 feet (20 meters) long and weighs about 400 pounds (180 kg). The center of each boom is tubular steel, and the outer ends are made of fiberglass. The top and center duets are fastened solidly to the Sky Needle. The lowest duet will be installed soon and will be mounted on a ring and servo controlled (slaved) to the upper two duets.

**Table 1**  
Collinear Yagi Computer-Controlled Bay Switching Scheme

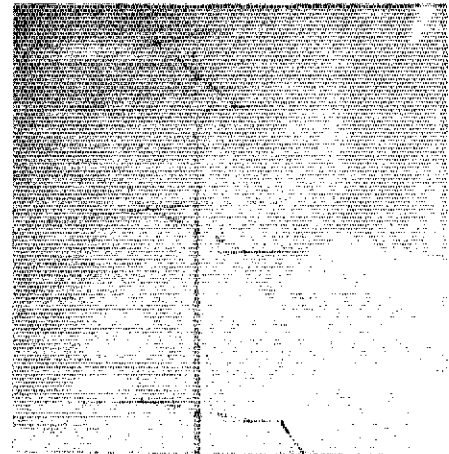
Mode	Bays(s)	Elements
1	All three	36
2	Upper	12
3	Middle	12
4	Lower	12
5	Upper and middle	24
6	Middle and lower	24
7	Upper and lower	24
8	Middle and upper	24

the push-to-talk key to transmit, the computer blocks his microphone audio for a few milliseconds while it sends a short burst of binary bits. This message is not audible to the operator on the other end but is heard by the other computer, which copies the short burst and stores the information in its memory. Statistical data collected at each end of the circuit is used to make the "best path" decision for transmitting. The computer refuses to let its master have anything but the best listening mode (see Table I).

I wish to express my sincere thanks to those who helped with the erection and testing of this antenna system. Simple words seem inadequate when referring to a dedicated DXer like Bob Thompson, K6SSJ. Bob spent countless hours of hard, dusty, sweaty work both building and testing the antenna. Jules Wenglar, W6YO, worked with Bob on the assembly of the Yagis, booms, cables and the like. Many members of the Central Valley Radio Club helped with the assembly and erection processes. Special thanks across the world to professor Simon Lheto, OH8OS, Oulu, Finland, for his computer runs, pattern data, analysis, encouragement and advice. Again, I bow toward Ohio State University and professor John Kraus, W8JK, a truly great experimenter, scholar and teacher. I also want to thank Mr. Donald Colley, president of Tri-Ex Tower Corp., for his assignment of willing and capable field personnel for the somewhat-dangerous assembly work.



A giant Tri-Ex freestanding 100-foot "Sky Needle" protrudes 80 feet out of the lower tower section. The Sky Needle is rotated by a B-29 proo-pitch motor assembly hung under the platform.



During the mid-1970s, Simon Lheto, OH8OS, studied W6KPC's QST articles, along with a host of other antenna-array articles from the world's leading publications, and decided to build a collinear Yagi sextet for 20 meters. With the assistance of a group of dedicated OH DX types, Simon constructed the now-famous 36-element collinear Yagi sextet on a slender, guyed, rotating tower near Oulu, Finland. The homemade, individual 6-element Yagis are built on 49-foot (15-meter) booms. The rotating tower is guyed immediately below each of the three duets, which are located at heights of 62 feet (19 meters), 125 feet (38 meters) and 187 feet (57 meters) above the ground.

# ARRL's Long-Range Planning Committee — A Progress Report

What's in store for Amateur Radio? What must we do to prepare for the future? The LRPC needs your ideas.

By Vic Clark,\* W4KFC

Survival of the species may hinge on how effectively radio amateurs are able to look ahead and take preparatory steps to adapt to whatever the future holds for them. We have weathered a critical World Administrative Radio Conference and emerged with our existing bands essentially intact — in some cases improved — and with some brand new frequencies in our future. But this is no basis for complacency; other WARCs and sterner challenges to our occupancy of valuable spectrum lie ahead.

Events about us offer clues that our world is changing in ways that make it uncertain as to just what tomorrow will bring. Electronics technology is experiencing explosive growth, while the need for improved communications among the people of the world has never been greater; electronics technology and communications are the staples of Amateur Radio. Energy shortages, inflation, employment levels, troubled international relationships, changing social mores and educational trends all impact upon the standard of living and quality of life. And they are bound to influence the destiny of Amateur Radio.

No one can precisely predict the future for Amateur Radio, of course, but ARRL's Long-Range Planning Committee (LRPC) has been established by the League's Board of Directors to serve as a clearing house for ideas and recommendations that will help us all to perceive the shape of things to come in time to initiate effective preparatory action.

Current membership of the LRPC, as appointed by ARRL President Harry J. Dannals, W2HD, is as follows: Vic Clark,

W4KFC (Chairman); Richard L. Baldwin, W1RU; Charles Dorian, W3JPT; Jay Holladay, W6EJJ; Herbert Hoover, III, W6ZH; Hazard E. Reeves, K2GL; Larry E. Price, W4RA; David Sumner, K1ZZ. President Dannals serves as an ex-officio member and attends all meetings.

## Planning Future Actions

During its first several months of existence, the LRPC has sought to gather the views of radio amateurs and knowledgeable officials regarding the years ahead, what they may have in store for us and what ought to be done to prepare for them. Hundreds of amateurs, including ARRL board members themselves, have responded with their thoughts and suggestions, their concerns and fears. The LRPC has met personally

with a number of recognized experts who share this concern, gleaned from these discussions much that will be helpful in the attempt to lay plans for future action.

Planning generally requires a knowledge of the past coupled with an awareness of a changing environment and circumstances. Any attempt at *long-range* forecasting relies in part upon the assumption that clues derived from short-term trends are valid precursors of the distant future, as well.

Most of the letters and comments addressed to the LRPC thus far have dealt with perceived developments that promise both near- and long-term effects. Many of these matters require action *now*, if we are to benefit from the opportunities that may arise farther downstream or to set up safeguards against either immediate or distant threats to the fortunes of the Amateur Radio Service. Recognizing this, the LRPC already is funneling recommendations to the ARRL Board of Directors for action on matters that appear likely to influence our future. It will be up to your elected representatives on the Board to evaluate these in terms of League resources and to set in motion appropriate responsive action.

## Areas That Need Attention

What *are* some of the areas of concern? Nothing that will surprise most active and concerned amateurs, to be sure. But we may expect that this deliberate effort to identify and articulate matters requiring early attention will be reflected in swifter and more effective action than has been possible heretofore. A few of the critical items that are widely perceived include:

1) The urgency of finding ways to better control the use of amateur frequencies and to discipline offenders, and the need



Carlos Roberts, Chief of FCC's Private Radio Bureau, during a recent meeting with members of the LRPC in Gaithersburg, Maryland. The discussions included a frank exchange of views regarding the future of Amateur Radio, particularly with respect to rulemaking matters.

\*Honorary Vice President, ARRL, 12927 Popes Head Rd., Clifton, VA 22024



to improve our capability for locating and identifying sources of improper transmissions.

2) The need for a stronger and more effective relationship with government, particularly the Federal Communications Commission, in order to improve the character and quality of rulemaking affecting the Amateur Radio Service.

3) The importance of expanding and strengthening international cooperative relationships established during the preparatory period for WARC-79.

4) The desirability of emphasizing quality rather than quantity in the development of the ranks of future newcomers to Amateur Radio and retention of the code requirement as a vital communications skill.

5) The importance of stimulating greater interest and participation in both the public service and experimental dimensions of Amateur Radio.

6) The considerable interest expressed by a significant number of respondents on the subject of increased membership involvement in League affairs.

7) The need for stabilization of the ARRL headquarters staff and for reassurance concerning the League's financial stability.

The LRPC, with the approval of the ARRL Board of Directors, is undertaking a survey of the general Amateur Radio population in order to obtain better demographic and attitudinal information for use in planning for the future development of the Amateur Radio Service and ARRL. This survey will be directed toward a randomly selected sample of the Amateur Radio community — both members and nonmembers of ARRL. Approximately 10,000 amateurs will be receiving survey forms developed in cooperation with Florida State University to: establish a profile of the Amateur Radio community, assess attitudes toward ARRL and its performance, acquire information as to possible changes in League services and activities, and gather information concerning future directions for the Amateur Radio Service itself. Results of the survey will be computer-processed by Florida State University and the results presented to the LRPC for evaluation. If you are one of those receiving a survey form, please complete it as promptly as possible and return it to Florida State University; a high response rate will help to assure the accuracy of this effort to appraise the attitudes and preferences of U.S. and Canadian radio amateurs.

Finally, the members of the LRPC want to hear from you directly, so please keep passing along your ideas and recommendations. The role of Amateur Radio is a dynamic one; planning, long-range or otherwise, isn't a one-shot process. We need your continuing help in the effort to peer ahead, to assess the opportunities

and the dangers that will confront the Amateur Radio Service, and to develop alternative courses of action in responding to them. Letters addressed to the LRPC are shared among *all* of the committee members. Here are a few brief excerpts from some of those already received by the LRPC:

☐ Radio amateurs are putting up higher and more complex antenna systems than ever before, often on city lots that are much too small for such installations. Often the amateurs who actually have the installations that are causing the trouble are not involved in any way with public service. . . . While amateurs are not always at fault when we have TVI problems, we compound the problem by also making our amateur operation distasteful to our neighbors by installation of antennas, which may be beautiful in our eyes, but ugly monsters to our neighbors (W6ZRJ)

☐ I think we have an area which has not been stressed nearly enough in giving the League a better image. Suppose we spend some time and paper spelling out what the League is and how it operates and forget for the moment what the member gets in the way of service and contests. I am sure there are a lot of potentially good members who can be impressed were we to spell out what a complicated machine the League really is (K6LK).

☐ Amateur Radio is excellent as a mental hobby, but it has one occupational hazard. It can get us so wrapped up in it that we fail to get enough physical exercise to keep our systems in working order. I've often noticed at hamfests how many of us show the effects of our sedentary existence (K4ZN).

☐ Frankly I think we could well do with some lessening of membership services, if this should be necessary, in order to finance the representation in Washington. I would rather have someone looking after our interests and keeping us informed than having someone sort QSLs at headquarters (W3GRF).

☐ I can speak from knowledge that the individual club serves as a "lonely outpost" of Amateur Radio. Seldom do we find out that a member has been awarded WAS, SBWAS, or any other award from ARRL. A lonesome, plain, brown envelope from Hq. brings the good news. No chance for the club to share in awarding the certificate. No P.R. through the club, no publicity, nothing (W7JIE).

☐ As part of a new foreign policy direction, President Carter has set up a Foundation of Technical Cooperation. Far from being only a government-to-government institution, it has as its major objective the soliciting of cooperation from private American entities. The ARRL seems an ideal organization to participate in this effort, since the aims are precisely to show developing countries technologies that they can readily adapt to their own use without the presence of highly paid foreign experts (K3ZO).

☐ Many of the missionary groups bend or ignore the rules of the International Amateur Service. One does not need to listen long to hear waybill information, personnel records, purchase orders and even stock market quotations being passed. Clearly Amateur Radio does not benefit from such behavior (W9KNI)

☐ The greatest potential for very serious damage (to the Amateur Radio Service) lies not with the FCC but with other federal agencies such as EPA, HEW and OSHA. Some of the questions raised about safety of electromagnetic radiations and environmental impact of towers are typical of the coming battle. Unlike much of the FCC, these regulators are not technical types, but lawyers, bureaucrats . . . and social activists who have a vested interest in increasing the scope of their activities and are less likely to be persuaded by traditional technical arguments (N1DD).

☐ If ARRL headquarters cannot afford more technical people, then why waste time and talent of present Hq. technical staff on preliminary article selection and rewriting, which is time consuming? Why not look back in the "catalog of authors" (i.e. recent issues of QST) to find outstanding articles, noting authors, their talents and specialties. Then . . . create a stable of "consulting technical editors" who, for the fun of reading prepublished material, do the article evaluation, initial putting-in-shape, error correction, before the articles go to the technical staff for final editing (W1RAN).

☐ Amateur Radio should be like the U.S. Marine Corps . . . quality not quantity. Instructors of courses and other Elmers should use discretion in recruiting C'Ber types. Many are undesirable for Amateur Radio (WB2MCB).

☐ We can't expect to hold our frequencies on the basis of gratitude for what we *used* to do. We must

redirect our emphasis on the things that we can, today, still do best. We have much to offer. (K4LMB).

☐ Increasing numbers have the advantage of attracting a broader base of persons who have the potential for making additional contributions to advancement of our professionalism, *providing these numbers are increased on a selective basis* (W5EDZ).

☐ Some method should be devised where the actual knowledge of the Section as gathered by the SCM could be fed into the board and be a help in their deliberations. Possibly the ARRL has outlived its present form of government. It may be advisable to have a two-house type of government. The SCMs would form the lower house and the 16 directors the upper body. This may bring many ideas to the front and improve the governing of our organization (W5GHP).

☐ Ham radio isn't a single hobby with homogeneous needs and interests; it is about 50 or so hobbies flying in loose formation. Nobody speaks for all of ham radio, or ever could. Thus, when somebody points out that some policy, rule change, or whatever, benefits some particular group or method of operating, it should not be assumed that it is good for all hams. We have DXers, traffic handlers, emergency autopatch specialists, tagchewers, computer hobbyists, propagation experimenters, and so on. It is most important that we don't freeze ham radio into the way things are being done at any given time, or put obstacles in the way of any particular segment of the hobby (ABIZ).

☐ Require every new amateur to have an "Elmer." Not just any Elmer, but someone who is genuinely interested in the new amateur and the development of Amateur Radio in general. The Elmer, obviously, must also be technically qualified. "Elmers" are a critical necessity. The ARRL membership must foster and support "Elmerism" (K47CDRI).

☐ In view of the sickness (jamming and obscenities) pervading Amateur Radio today, we should consider ourselves fortunate to have been allocated any frequencies at all by the recent WARC. I believe that the positive momentum from past years of exemplary performance is all that carried us through (W6EL).

☐ The furor over towers is a ball of worms. My personal view is that I don't approve of elaborate 70-foot towers with super tri-banders hanging over a small house in a residential area. Towers belong in a backyard, should be as inconspicuous as possible and safely installed (W7YS).

☐ Narrow bandwidth modes should be encouraged, with exposure in QST. If the new narrowband ssb still looks promising, let's see articles on equipment and operating results. Other developments such as coherent cw ought to be given full coverage. And keep stressing that cw is 10 times or more as efficient as ssb in terms of the number of QSOs that can practically take place in a given bandwidth (N2UN).

☐ There is certainly much room for improvement in FCC rulemaking. However, we can blame ourselves as we have not been willing to accept the ARRL as our spokesman. Right or wrong, the League can do a much better job if it is allowed to represent the amateur and eliminate those comments received by the FCC which indicate the ARRL does not speak for this or that group or amateur. We are actually killing ourselves through our stubbornness to accept the League as "union" for amateurs, and not QST (W3OKN).

☐ I feel we need to sit down and talk with the responsible citizens band groups and try to find out what we can do together. Many would call this heresy. We are getting many amateurs from this group and we need to talk and help each other in areas of mutual interest. REI and station installation are only a couple of areas (W5VRA).

☐ Absolutely under no circumstances should the requirement for ability to receive the Morse code be changed! It is more than pride or self-esteem, it is the one truly universal and basic language of the ham, and should never be discarded or diluted. When I read of persons both blind and deaf being able to master the code, then I want to hear nothing of those with all their facilities intact saying how impossible the code is to master (WA2PLR).

☐ I think we need to promote growth of Amateur Radio, but let's stress quality over quantity. If we relax the requirements too much, we end up with a lot of poor operators and a bad image. On the other hand, if our requirements are too strict, we run the risk of a membership so small that we become ineffective politically. I would vote for a program which promotes a modest but steady growth (K2UAN).

☐ The ARRL and all other (similar) organizations end up being run pretty much by the professionals who work for the organization and by rich people who don't have a rigid structure for their time, and by older retired people. If you could get more "just folks" to put time into ARRL I think you would find that it would change the organization a lot, and for the

better, but I don't know how you would ever do that when nobody else has ever figured it out (WA0NMA).

□ If the FCC could just get in a position of enforcing their rules governing the current misbehavior, we would get back to the position of being where we were . . . that of a state of being disciplined and of "self-regulation." I'd favor license revocations for language violations or deliberate interference. Since I probably won't live long enough to see that day, however, I think the ARRL is obligated to produce an educational program on the subject (W5C8N).

□ The recent growing interest in the practical application of microcomputers as an aspect and tool of Amateur Radio communications provides us with an ideal opportunity to attract the many computer-oriented professionals and hobbyists that exist today. In fact, Amateur Radio, perhaps more than any other hobby, lends itself ideally to providing a *raison d'être* for the computer hobbyist to justify the significant investment in what would otherwise be considered a mere expensive toy (WB2ROV).

□ Amateur Radio prospers in an environment of fair rules reasonably enforced. It disintegrates where government is either repressive or irresponsible. And, when government is derelict and rescinds or removes too quickly essential standards which act as mortar for the foundation of that social system, it crumbles! Amateur Radio, as it has been known for decades, is undergoing radical changes not for the better and not of its own choosing. What is still potentially an exciting field of scientific/technical/social/cultural exploration for young and old alike is being made distasteful and stagnant for a great many law-abiding licensees attempting to keep pace with rapid-fire changes in regulations introduced in the name of economy (W6POU).

□ ARRL representation in Washington, DC, has been a long-standing proposal by many people, and does not appear to have been taken very seriously by the ARRL . . . i.e. a permanent representative in Washington. I believe that representation by a person with appropriate qualifications would greatly benefit Amateur Radio in the Congress, the FCC, the military establishment and other government agencies (W4BW).

□ Digital communications will allow a great resurgence in amateur experimentation. The only restriction should be that it is a binary signal of a certain bandwidth. The format and nature of the binary data should be unspecified to permit the widest range of experimentation (W0LMD).

□ Pride in accomplishment generally supports pride in personal bearing, poise and behavior. Loose licensing means loose operators and loose operating. A hard-won license is seldom risked (W4GW).

□ Flag waving and public service has lost out to the huck and I feel Amateur Radio has to adopt aggressive modern methods of promotion and marketing to sell Amateur Radio, not just for quantity but for quality and purpose (W7CKZ).

□ We ought to plan some method to organize the amateurs . . . to speak with foreign hams in *their own tongue* (W4UG).

□ In response to your letter in the August issue of 73, the ridiculous ARRL does it again! Just as we are about to lose our 1-F bands at WARC, the ARRL comes up with a "Long-Range Planning Committee." After the ARRL's last blunder, "incentive licensing," I can't believe that any group of people could be so absurd (Anonymous).

The foregoing represents only the tiniest sampling of the correspondence directed to the LRPC, but it will offer an idea of the range and caliber of comment being offered. Some of these excerpts are from 5-, 6-, and even 12-page letters; we wish that space permitted sharing more of the incoming comments with you. Several of our respondents have written as many as four and five letters, updating their thinking and providing new grist for the mill. It is the kind of input that the LRPC and the ARRL Board of Directors need to have in order to carry out the tasks confronting them. We will appreciate hearing from you. Write to LRPC, c/o Chairman Vic Clark, W4KFC, 12927 Popes Head Rd., Clifton, VA 22024. ☐

## Strays

### TWO-METER FM IN THE LAND OF THE MIDNIGHT SUN

□ Last summer my family took a long-planned trip to Sweden to visit friends. We also scheduled time in Norway and Denmark. The trip, which covered rural and urban areas, was made by rail, ferry steamer and rental car. Portable operation, using hand-held equipment, has long been one of my main operating interests; there was no way I was going to go on this trip without a 2-meter fm rig!

Licensing in the Scandinavian countries is easy; application forms and instructions are readily available from ARRL hq. All three countries require that a completed application form and a copy of the applicant's U.S. license reach them at least one month before the license is required. I'd suggest two months.

Norway and Sweden require two additional items — a "Certificate of Good Conduct" from one's local police department, and an FCC endorsement of the reciprocal-license application. The former was easy to obtain, as the local police chief had a form letter available. The latter requirement took a bit of nosing around, since the New York City FCC field office was unaware of such a procedure. It turned out that the Licensing Division is responsible for this function. License fees are 50 Norwegian crowns (about \$10), 70 Swedish crowns (\$17) and 20 Danish crowns (\$4).

The IARU Region 1 band plan is observed in Scandinavia. Repeater outputs are placed from 145.6 to 145.775 MHz (channels R0 through R7) with 25 kHz spacing. Inputs are 600 kHz lower. Common simplex frequencies are 145.5 (channel S20) and 145.55 (S22), although some localities use different frequencies.

A few days before departure my recently purchased, synthesized hand-held failed and had to be returned to the factory. An older model, a crystal controlled, 6-channel hand-held was pressed into service. This immediately posed a problem, as I had no crystals for the Scandinavian frequencies. Oh well, Europeans must need crystals too, I figured. So I took the rig along and waited to see what developed.

On a tip from AC1Y, at ARRL hq., I explained my problem to the Norwegian society, NRRL, on arrival in Oslo, and was referred to a local dealer. He soon had my rig on the test bench, tried a few different crystals, and found the right match. I later did the same thing in

Stockholm and had the same experience with the Swedish society, SSA, and a Swedish dealer. I ended up with six pairs of crystals, which served me in good stead everywhere.

Since Scandinavian current is generally 240 volts, 50 Hz, an ac adapter was required to run my eliminator/battery charger. I strongly suggest an ac extension cord and a variety of adapter plugs, since some ac sockets are recessed so that the power adapter will not fit.

All of the repeaters I encountered use a tone burst of 1750 Hz for initial access, after which they may be carrier operated until activity ceases for a period of time. Tone-burst duration varies from one repeater to another, making it difficult for travelers to use this feature.

I opened up for the first time: "LA7ZO mobile, this is W2RS stroke LA portable." A fine QSO in English followed — Tore is a commercial airline pilot and visits the States frequently. I found that the Oslo regional repeater on channel R6 (145.15/75) could be accessed easily.

In Stockholm, the action is on SK0RIX, the R1 repeater (145.025/625). This pattern, of only one or two repeaters in each area, is common throughout Scandinavia, a consequence of only having eight repeater frequencies available, as opposed to our wider U.S. allocation. Scandinavian repeaters are of excellent quality, and the operators are as friendly as hams everywhere.

In most of the places I went a W2 call sign is a rarity on 2 meters, and pile-ups even resulted when I gave my call. Most contacts said I was one of the few Americans they had ever heard on vhf. In Vadstena, a beautiful lakeside town in central Sweden, I heard an unexpected signal on R1 and found it to be SK5RIM, a new repeater, in neighboring Motala. Rolf and Lars, SM4BNZ and SM5CAK, asked me to give their regards to W2GT and W2TP, two fellow North Jersey DX Association members. Small world!

Another interesting repeater is SK7RGM, the R1 channel in Olofstrom, which I was told has been built by W9CDB. I could access it from over 30 miles away. From a high spot on a small Danish island, I called CQ on S20 (145.5) and back came OZ4WX, who said my call sounded familiar. It turned out that we had worked several times via AMSAT/OSCAR 6, when Axel was OX3WX, on Greenland.

One advantage of a hand-held for travel is that it fits easily into my photo-equipment bag, enabling me to take it everywhere. My log shows contacts from such places as medieval castles, parks, boats and even Copenhagen's famed Tivoli Gardens. The Scandinavian countries have a great deal to offer the U.S. visitor, and 2-meter fm made the trip even more enjoyable. — Ray Soifer, W2RS, Glen Rock, New Jersey

# Canadian NewsFronts



Conducted By Harry MacLean,\* VE3GR0

## CRRL Officers and Directors

**President:** Ronald J. Hesler, VE1SH  
**Executive Vice President:** Mitch Powell, VE3OT  
**Honorary Vice President:** Noel B. Eaton, VE3CJ

**Secretary:** Fred Towner, VE6XX  
**Directors:** Thomas B. J. Atkins, VE3CDM  
A. George Spencer, VE6XN  
Albert Daemen, VE2IJ

## WEATHERADIO CANADA

Occasionally there is an occurrence such as the disaster at Mississauga, Ontario, but most emergencies requiring the assistance of Amateur Radio operators tend to be weather-related. Canadian amateurs can now receive up-to-the-minute weather information from one of six stations operated by Atmospheric Environment Services of Environment Canada. Locations and frequencies are as follows:

Vancouver	162.400 MHz
Regina	162.550 MHz
Winnipeg	162.550 MHz
Toronto	162.475 MHz
Montreal	162.550 MHz
Halifax	162.550 MHz

All stations operate on voice fm mode and have a range of about 65 km. Weather information is presented in five-minute "cycles" and is broadcast continuously, 24 hours a day, seven days a week. Severe weather warnings are accompanied by a 1050-Hz tone that will activate alarms in receivers fitted with decoders. Now you know what to do with that old Motorola or GE Prog Line receiver strip cluttering up your shack.

## MEET YOUR CRRL VICE PRESIDENT

This month we are pleased to introduce you to our CRRL vice-president who, of course, also happens to be our ARRL Canadian Division Director. Mitch Powell, VE3OT, lives in London, Ontario. He is 43 years old, married and has two children. Amateur Radio has been an important part of Mitch's life for 31 years. Mitch was first licensed as VE1WN in 1948, when he was 13. During high school, he served as a radio operator in northern New Brunswick. After graduation, he worked on the cw circuits at Resolute Bay and Isachsen, NWT, and the then-new ssb network on Baffin Island. Later, Mitch spent seven years on design and installation work with Defence Research Board in Ottawa.

Mitch is a graduate of Ryerson Institute of Technology. He has two university degrees. Since 1966, he has been a teaching master at Fanshawe College, London, where he specializes in communications and biomedical electronics. For the past 11 years, Mitch has conducted the highly successful Amateur Radio courses offered by Fanshawe College. Hundreds of London and area amateurs owe their licenses to Mitch's fine teaching.

Mitch operates mostly cw. He has a 40-wpm code proficiency, and he actively chases DX

and works contests. Mitch builds much of his own radio gear and devotes a great deal of time to helping other amateurs, particularly beginners. A member of QCWA, CANAD-X, RSO and CARF, Mitch is also a life member of the League. Mitch's other interests include flying, music and radio club work. He has been a president of both London ARC and Ottawa Valley Mobile ARC. As CRRL vice president and ARRL Canadian Division director, Mitch continues to keep busy, travelling to club meetings and hamfests. Many amateurs across Canada will have the opportunity to meet Mitch personally in the coming months.

## MARSHALL KILLEN, VE3KK, RECEIVES CERTIFICATE OF MERIT

One of Canada's outstanding traffic handlers, Marshall Killen, VE3KK, was awarded the CRRL Certificate of Merit at the 1980 March meeting of the Kitchener-Waterloo Amateur Radio Club. Marshall is 76. He has been an active amateur since 1919 when he was a boy in Ireland. Before his retirement, Marshall served as a commercial radio operator, both here and overseas, and as a radar technician with the RCAF.

Marshall operates from the 16th floor of an apartment building in Waterloo, Ontario. Despite antenna restrictions that severely limit the strength of his signal, Marshall efficiently handles 200 to 300 pieces of traffic each month. In December 1979 he handled 703 pieces, and in December 1978 a record 1003!



Marshall Killen, VE3KK, receives the CRRL Certificate of Merit from Mitch Powell, VE3OT, at a recent meeting of the Kitchener-Waterloo Amateur Radio Club. Marshall is one of Canada's outstanding traffic handlers. (VE3AVY photo)

The brass-pounding (Marshall was the first Canadian to earn the League's 40-wpm code proficiency certificate) begins daily at 4 P.M. and does not end until close to 11.

In nominating Marshall for the Certificate of Merit, Noreen Nimmons, VE3GOL, noted the joy that Marshall continues to bring to the lives of people, through the messages he handles. On presenting the award, Vice-President/ARRL Canadian Director Mitch Powell commented, "Marshall is a gracious gentleman, an active traffic handler and a top-notch League supporter. He is a great example to us all."

## DOC NEWS

The Department of Communications is introducing a national computerized licensing system for the General Radio Service (GRS or CB radio). The move follows experimental introduction of the system in the Department's Pacific Region, and is expected to cut costs and improve service by allowing the Department to redirect manpower resources now tied to the task of processing licenses manually.

The Department of Communications advises that a revised ground conductivity map has been developed for Canada. Copies will soon be available for general distribution. The map formed part of Canada's proposal at a conference held in Buenos Aires in March dealing with frequency assignments in the 535- to 1605-kHz broadcast band. This map will certainly be of interest to serious antenna experimenters across the country.

Reciprocal operating privileges with Japan should soon be a reality. Text of an agreement, approved by both DOC and the Department of External Affairs, is now in the hands of the Canadian Embassy in Tokyo. W. W. Scott, Director of Regulations Development, Telecommunications Regulatory Services, DOC, writes: "Judging by a letter from the Japanese Amateur Radio League, there is little doubt that our proposal will be well received."

## POTPOURRI

Congratulations to Ron Grant, VE5RG, who won the CRRL Directors' Medallion for his fine effort in the 1979 CARTG RTTY Contest. Plans are already underway for the 20th CARTG RTTY Contest, which will take place October 18, 1980.

Closing date for nominations for CRRL Amateur of the Year is June 30, 1980. The CRRL Board will vote on the final ballot shortly after that date. The award plaque will be presented to the winner at the 1980 RSO Convention to be held in Toronto in October. Submit your nominations, with documentation, to CRRL, Box 418, Sackville, NB E0A 3C0. [EFT]

\*163 Meridene Crescent West, London, ON N5X 1G3

## Simplifying Amateur Identification Proposed

The FCC has proposed a rulemaking that would eliminate the requirement that operators give the call sign of the station with which they are in contact. The only exception would be if the communication involves international third-party traffic. The Notice of Proposed Rulemaking (NPRM) also proposes that stations conducting teleprinter operations be required to send the call sign of the station with which contact is made if the communication involves international third-party traffic. The proposal is contained in PR Docket 80-136.

Under the present rules, §97.84 states, in part, "... at the end of an exchange of telegraphy (other than teleprinter) or telephone

transmissions between amateur stations, the call sign (or the generally accepted network identifier) shall be given for the station, or for at least one of the group of stations, with which communication was established."

Addressing its role in international third-party communications, the FCC noted its obligation to enforce the International Radio Regulations, which provide, in part, that amateur stations not transmit international communications on behalf of third parties. While the U.S. has agreements with 29 countries permitting third-party traffic, most countries prohibit such communications. Without the identification now required by FCC rules,

enforcement of the third-party traffic prohibition would be difficult, the Commission said.

Extending the "other station" identification requirement to teleprinter communications involving an international third party would, according to the Commission, strengthen the enforcement mechanism available with a minimum impact on the licensee.

Comments are due on or before July 16, 1980, and reply comments on or before August 15, 1980. An original and five copies should be furnished to the Commission with "PR Docket 80-136" clearly marked on the top page of each set of comments. Address these comments to FCC, Washington, DC 20554.

### MARITIME MOBILE ON THE HIGH SEAS

If you are operating an Amateur Radio station aboard a vessel of U.S. registry, you must possess an Amateur Radio license issued by the FCC, even if the vessel is in international waters. This latest ruling comes from FCC Assistant General Counsel Norman B. Blumenthal, in a letter sent in response to an amateur's inquiry.

This ruling is based on Section 301 of the Communications Act of 1934, as amended, which states in part: "No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio ... (e) upon any vessel ... of the United States; ... except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act."

In practice, this means that a U.S. citizen must have in his possession an amateur license issued by the FCC before he can operate an amateur station aboard a U.S.-registered vessel. A foreign amateur operating aboard a U.S.-registered vessel must possess a reciprocal operating permit issued by the FCC.

In addition, a U.S. amateur, when operating within the territorial jurisdiction of another country, must operate in compliance with that country's pertinent regulations. Such compliance may involve obtaining a license or permit to operate on that country's territory. — *Hal Steimman, K1FHN*

### FCC RECONSIDERS COMPUTER INTERFERENCE CONTROL

The FCC will grant a partial reconsideration of its September 9, 1979 action intended to control interference to radio and television reception caused by computers and other digital equipment. The Commission had ordered that all computers manufactured after July 1, 1980, meet certain technical specifications before they could be marketed. Responding to comments and petitions contending that the July 1 date was too soon to achieve compliance, the Commission set three new dates for compliance with the new rules: January 1, 1981, for products such as personal computers having a high

interference potential; October 1, 1983 for all other computing devices that are in production before October 1, 1981; and immediately for all new devices put in production for the first time after October 1, 1981.

The Commission said it expected manufacturers to take the initiative and not wait until 1981 to begin implementation, adding that until their equipment complied, manufacturers would be responsible for correcting any reported cases of harmful interference. Amateurs may be interested in reading "Microcomputers and Radio Interference" (March 1980 *QST*, page 17) for background information. — *Rick Palm, K1CE*

### JAMES R. FISK, W1HR, EDITOR-IN-CHIEF OF HAM RADIO AND HAM RADIO HORIZONS

The Amateur Radio community is mourning the passing of James R. Fisk, W1HR, who died of a heart attack April 18, 1980, at the age of 45. Jim was the founding editor of *Ham Radio*, a magazine which quickly achieved, and has always maintained, a high standard of technical excellence. *Ham Radio* began publication in 1968.

Jim was an active amateur in and out of work. An avid DXer, he was a Life Member of the ARRL, a member of the Antique Wireless Association, honorary Life Member of the City of New York Amateur Radio Club and a member of the Nashua (New Hampshire) Amateur Radio Club. Jim's non-Amateur Radio interests included auto racing and photography.

Contributions in Jim's memory may be made to the Jimmy Fund, Statler Hotel, Boston, MA 02117, or the American Heart Association, 33 Broad St., Boston, MA 02109.

### FRANK L. BAKER, JR., W1ALP, LONG-TERM SCM

The recent passing of Frank L. Baker, Jr., W1ALP (March 19, 1980) marks a great loss to Amateur Radio. Born in Boston and a resident of Halifax, Massachusetts, Frank was a dedicated Section Communications Manager for the Eastern Massachusetts Section for 38 years. Taking office in 1940, he held that post longer than any other SCM in history. After

retiring from the Raytheon Corporation, he continued a high level of activity in Amateur Radio. First licensed December 1924, he was an ARRL member since 1923 and a former Vice Director for the New England Division (1951-1955 and 1957-1959). Frank was an Assistant Director for the New England Division, held EC and OBS appointments, was past president and past secretary South Shore Club, and was also a member of the Massachusetts Amateur Radio Club.

### IN MEMORY OF CLARA REGER, W2RUF

The ARRL Foundation has recently received generous contributions to the scholarship fund, in memory of Clara Reger, W2RUF. Clara spent much of her life working for Amateur Radio and helping others to get started in our hobby. The New York State CW Net, the New York State County Net and the New York Public Operation Net members felt that contributing to the fund was the most appropriate way to honor her memory and assure the amateur community that her good work will continue. — *Rick Palm, K1CE*

### EXEMPTION FROM AMPLIFIER BAN DENIED

The FCC has denied petitions from the Allegheny County Fire Radio Advisory Board (ACFRAB) and the Public Safety Communications Council (PSCC) to lift the ban on the manufacture and sale of external power amplifiers capable of operating at frequencies from 30 to 35 MHz. (Section 2.815(b) of the Commission's Rules prohibits the manufacture and marketing of any external radio frequency power amplifier or amplifier kit capable of operating on any frequency in the 24- to 35-MHz band, including the amateur 10-meter band.)

ACFRAB argued that the ban severely hampered its firefighters because it prohibited them from using their hand-held portable radio equipment in conjunction with charger/amplifier units installed in vehicles. PSCC supported the ACFRAB petition and asked that the amplifier ban be modified to allow the manufacture and marketing of amplifiers for the frequency range of 30 to 35 MHz, arguing

\*Deputy Manager, Membership Services, ARRL

that such revision would still provide a 3-MHz guard band on both sides of 27 MHz.

The Commission reaffirmed its overriding concern of the illegal use of power amplifiers in the Citizens Band (CB) Radio Service causing interference to electronic home-entertainment devices, such as television receivers. It feared that external amplifiers designed for operation in the 30- to 35-MHz band could be modified to operate in the CB Radio Service. The Commission also felt that such an exemption would create confusion in the marketplace and encourage other radio service users to submit similar proposals. Besides, the Commission pointed out that ACFRAB could accomplish its objectives without any waiver.

As long as the in-vehicle unit can be used only in combination with a specific hand-held transmitter model, Section 2.815 of the Commission's Rules would not apply. The transmitter/amplifier combination forms an integral package when used together, and the Commission would assign only one equipment type-acceptance identification number. Such combination would be considered to be a transmitter with two output power levels (with and without the amplifier).

For additional information about this ruling, contact John Reed at FCC, Washington, DC 20554. Tel 202-632-7040.

## FCC SCORECARD

The following is a list and brief summary of actions pending before FCC which may affect Amateur Radio. Only those proposals that have proceeded to the point of being assigned docket numbers are listed.

*Docket 19852:*<sup>1</sup> Amateur Satellite Rules. Notice of Proposed Rulemaking (NPRM) adopted November 20, 1979. See February 1980 *QST*, page 80.

*Docket 20654:*<sup>1</sup> Notice of Inquiry (NOI) into interference from spark-type ignition systems in motor vehicles.

*Docket 20777:* This docket has often been referred to as the "Bandwidth Docket." Originally, this proceeding was started to investigate better ways of defining emission types. Recently, it was a vehicle to permit amateurs the use of ASCII (American National Standard Code for Information Interchange). See April 1980 *QST*, page 74. The docket remains "open" for future proposals regarding further deregulation of radioteletype emissions in the Amateur Radio Service.

*Docket 21116:* Amplifier Ban Docket. It prohibits the manufacture and marketing of external radio-frequency power amplifiers capable of operation between 24 and 35 MHz. ARRL recently lost a case filed in the U.S. Circuit Court of Appeals seeking judicial review of the FCC's decision. See April 1980 *QST*, page 74, and the article about this docket elsewhere in this column.

*Docket 21117:* Type Acceptance Docket. Requires type acceptance of some equipment for the Amateur Radio Service. (Considered in conjunction with Docket 21116.)

*Docket 21135:*<sup>2</sup> Call Sign Docket. Simplification of licensing and the call-sign assignment system. The Commission's most recent action in this docket was to discontinue licensing of new club, RACES and military recreation stations, but allowing those presently licensed to be renewed and modified. See May 1980 *QST*, page 54.

<sup>1</sup>Filing deadlines for comments passed. Awaiting Commission action.

<sup>2</sup>Some provisions adopted, others pending.

*Docket 21418:*<sup>2</sup> FCC inquiry into the improper issuance of its staff of licenses and call signs in the Amateur Radio Service. (See January 1980 *QST*, page 71.)

*Docket 78-250:*<sup>1</sup> NOI into the administration of code tests to handicapped applicants. (See October 1978 *QST*, page 54.)

*Docket 78-307:*<sup>1</sup> NOI investigating a consumer-oriented grading system for TV receivers. (See January 1979 *QST*, page 63.)

*Docket 78-316:*<sup>2</sup> FCC Fee Refund Docket. (See December 1979 *QST*, page 80.)

*Docket 78-352:*<sup>1</sup> Quiet Zone Docket. NPRM would establish a quiet zone for amateur repeaters to protect the National Radio Astronomy Observatory and Naval Research Laboratory from harmful interference. (See January 1979 *QST*, page 62.)

*Docket 78-369:*<sup>2</sup> NOI on the susceptibility of electronic equipment to radio-frequency interference (RFI). (See March 1979 *QST*, page 9.)

*Docket 79-140:*<sup>1</sup> NOI on the creation of a new Personal Radio Service at 900 MHz. (See March 1980 *QST*, page 72.)

*Docket 79-144:*<sup>1</sup> NOI to solicit comments on the effects of rf exposure standards on radio services and equipment, and whether FCC should consider the biological effects of radio-frequency radiation when authorizing the use of radio-frequency devices. (See March 1980 *QST*, page 72.)

*Docket 79-285:*<sup>1</sup> NPRM to extend the sub-band on which amateurs may use standard-bandwidth fm on 6 meters. (See March 1980 *QST*, page 72.)

*Docket 80-7:*<sup>1</sup> NPRM to provide frequencies and standards for nationwide Civil Disaster Radio Response Program. (See May 1980 *QST*, page 55.)

*Docket 80-135:* NPRM to permit the continued use of 420-450 MHz for nongovernment radiolocation on a shared, noninterference basis. Comment deadline was May 16, 1980. Reply comments are due June 2, 1980. (See May 1980 *QST*, page 56.)

*Docket 80-136:* NPRM to simplify amateur station identification rules. See the article elsewhere in this column. Comments are due July 16, 1980; reply comments are due August 15, 1980.

## FCC ASKED TO FAULT USER FOR REPEATER VIOLATIONS

Two California hams have filed a petition with FCC asking that repeater users — not licensees — be held responsible for the content of user stations' transmissions. Robert Thornburg, WB6JPI, and David A. Faraone, WA6KOS, requested that the amateur rules be changed to make the content of a signal being retransmitted by a repeater solely the responsibility of the originating station, not the repeater licensee. However, the repeater licensee would continue to be responsible for the technical operation of the repeater and rules violations originating at the repeater itself.

FCC enforcement personnel from the Long Beach, California, office have stated that they would hold any repeater licensee jointly responsible for rules violations committed by the user stations. This would, according to petitioners, impose responsibility on the repeater licensee where control or prevention cannot exist or is impractical. "It only takes one word, or one note of music to have a violation." The Commission has assigned RM-3618 to this petition.

## PROPOSAL TO COMBINE CB/RADIO-CONTROL LICENSES WITHDRAWN; PETITION TO COMBINE AMATEUR AND CB LICENSES DISMISSED

The FCC has withdrawn its proposal to combine CB and radio control (R/C) licenses. The Commission concluded that any beneficial effects from a combined license were offset by the detrimental consequences that are likely to occur. The chief disadvantages, it said, were (1) the possibility that some CB licensees might believe that with a combined license they could communicate on R/C frequencies in the voice mode, and (2) the administrative burden that it would place on the Commission to determine which call sign to assign to persons already holding both R/C and CB licenses.

The Commission also dismissed a rulemaking petition (RM-2798) proposing that amateur and CB licenses be combined so that an amateur license, upon issuance, would authorize all the frequencies and operating privileges of CB radio stations. The Commission felt that although there was some merit in this proposal in that over 40 percent of the amateur operators are also CB licensees, the disadvantages in combined licensing in this case would outweigh any potential cost benefit. The Commission also noted that confusion might result from people thinking the amateur and CB services had been combined, with interchangeable frequencies and operating privileges. — *FCC News Release*

## AMATEUR OPERATION IN AIRPORTS

When Rob Dietsch, WD4NEK, of Atlanta, Georgia, was told recently that he must remove the batteries from his 2-meter hand-held before passing a security checkpoint at Atlanta's Hartsfield International Airport, he complied without argument. Later, when he returned to the same checkpoint, the security supervisor toned the "demand" down to a "request."

Wayne G. Reel, director of Delta Airline's Atlanta station, confirmed that even such a "request" has no legal basis. Reel wrote that security employees "have been advised that there are no laws or statutes presently in force that prevent radio communication on our courses."

Management of the security company acknowledged that their employees had made errors in the incident by both demanding that the hand-held be disabled and in claiming that amateur communications were prohibited beyond the checkpoints. Checkpoint guards do not receive explicit instructions on how to ascertain that a radio is just that and not a bomb or gun. In the deadly serious business of searching for harmful items in American airports, such double-checks are agreeably endured by most people.

A security executive confirmed that the contracted security guards have no authority to detain anyone. That authority is limited to law-enforcement personnel with legal cause. Security employees can, and occasionally do, escort persons with suspicious or unusual hand baggage to the gate areas to report that baggage to airline employees or flight crews. Such a report might be made if a security guard believed that a traveler intended to use a radio on an airliner without proper permission. Such use is banned.

— *The Atlanta Ham*

# Washington Mailbox

Conducted By Richard K. Palm,\* K1CE

## ASCII

No news to anybody is the fact that ASCII is now authorized for use in the ham bands. Previously, amateurs were restricted to the Baudot Teletype code — a mode that was fine in the past but is inconsistent with today's state-of-the-art technology. ASCII has taken the lead as the new standard code for information exchange. In the editorial entitled "ASCII — At Last" (December 1979 *QST*), the overall implications of the ASCII-FCC action were discussed. This month, in the Mailbox, we'll take a look at some of the technical and regulatory aspects of this exciting new amateur privilege.

*Q. The FCC has just amended the rules permitting amateurs to use ASCII. What do these letters stand for? Is the acronym pronounceable?*

A. ASCII (pronounced *askee*) is the acronym for American National Standard Code for Information Interchange — a seven-level code for conducting information exchange similar to the Baudot code. ASCII may be used for "... such purposes as (but not restricted to) radioteleprinter communications, control of amateur radio stations, models and other objects, transfer of computer programs or direct computer-to-computer communications, and communications in various types of data networks (including so-called 'packet switching' systems)..." (97.69 of the new rules). For the full text of the new rules concerning digital transmissions, see "Happenings" April 1980 *QST*. Note that in drafting the new rules, the Commission declined to specify technical standards. They are counting on amateurs themselves to develop their own standards such as common shifts, speeds and so forth, thus simplifying the task of monitoring by FCC and the amateur community in general. This principle is consistent with the amateur service being basically a self-policing entity, but also with the FCC's need to monitor all amateur communications.

*Q. Well that's all very fine business, but just what is ASCII?*

A. It's simply a code, like Morse or Baudot. Information can be coded into ASCII and subsequently decoded. Most computers presently use ASCII as a method of coding and decoding information. Prior to its authorization in the ham bands, amateurs trading computer programs over the air had to translate their ASCII programs into Baudot before transmitting them — and then translate back again. But now that we have ASCII, this often-embarrassing conversion is no longer necessary.

*Q. What does it look like?*

A. Each alphabetic and numeric character, and certain command functions, are given a seven-bit (or level) binary number. For example, the letter "A" translated into its ASCII counterpart, is 100 1010. A binary number is used to simplify internal computer operation, as only two digits are involved, 0 and 1. In computer hardware systems, a 0 signifies an OFF state

\*Membership Services Assistant, ARRL

and a 1 means an ON state. For further discussion, refer to *The Radio Amateur's Handbook*, chapter 4.

*Q. What frequencies are available for use with ASCII?*

A. ASCII encoding is permitted on those frequencies between 3.5 and 21.25 MHz where F1 emission is authorized. Between 28 and 225 MHz, ASCII is permitted where F1, F2 and A2 emissions are authorized. Above 420 MHz, ASCII may be used on frequencies where F1, F2 and A2 emissions are already authorized (97.69).

*Q. The new rules say that only F1 emission may be used for ASCII in the non-voice bands between 3.5 and 21.25 MHz. How can I use my sideband rig for this mode?*

A. AFSK, when employed as part of a single-sideband, suppressed-carrier (SSBSC) emission, has similar characteristics to an F1 emission, and is therefore allowed on any frequency band for which F1 emissions are authorized. This means that Baudot and ASCII may be generated as F1 emissions by feeding audio tones into the audio input of a high-quality ssb rig having good suppression of the carrier and unwanted sideband.

*Q. Is there anything else to worry about along these lines?*

A. Well, yes, though this advice belongs to the more-technical realm: Make sure that your transmitter can take the steady load of teleprinter operation (i.e. 100% duty cycle). With voice operation, the rig is only asked to work about a quarter of the time (25% duty cycle).

*Q. The new rules also say that ASCII as used by amateurs shall conform to the definition in American National Standard Institute (ANSI) Standard X3.4-1968. What does this mean?*

A. The word "standard" implies consensus and consistency. The American National Standard for Information Interchange was developed as a guide to aid the industrial and consumer communities and the general public by providing a standard coded character set to be used for information interchange among information-processing systems, communications systems and associated equipment. Incidentally, the rules state that standard X3.4-1968 is to be used. The ANSI standard X3.4-1977 may also be used, however, as the actual code is the same. A few definitions have been changed to reduce ambiguity and present the standard in a manner more consistent with U.S. terminology.

*Q. No shift frequency is specified for ASCII. What will be the norm?*

A. As mentioned previously, that decision has been left up to us. It is expected that the most common shift will be 170 Hz, with some use to be made of 425 and 850 Hz.

*Q. What is the maximum sending speed permitted when transmitting ASCII?*

A. Where ASCII is permitted between 3.5 and 21.25 MHz, the sending speed must not exceed 300 bauds; between 28 and 225 MHz, 1200 bauds; and above 420 MHz, the sending speed must not exceed 19.6 kilobauds (97.69[b]). A speed of 1 baud is 1 pulse-per-second. A bit (binary digit) is 1 pulse long. The space between bits is also 1 pulse long, so that a sending speed of 300 bauds means that you're actually sending 150 bits per second.

*Q. When using ASCII, how do I identify my station?*

A. Part 97.84(a), as it applies to radioteleprinter operation, states that "an amateur station shall be identified by the transmission of its call sign at the beginning and end of each single transmission or exchange of transmissions, and at intervals not to exceed 10 minutes during any single transmission or exchange of transmissions of more than 10 minutes duration." Additionally, you must identify in Morse code (97.84[g]).

Incidentally, the Commission has recently released a Notice of Proposed Rulemaking that, if adopted, would require amateur stations conducting radioteleprinter communications to identify the station they are in contact with, if international third-party traffic is involved. Presently, the rules do not require amateurs conducting radioteleprinter communication to identify the other station in addition to their own at the end of a contact.

*Q. Can I transmit ASCII (or Baudot) by cw (A1 emission)?*

A. No. The new rules do not permit ASCII by A1 emission.

*Q. Why is the adoption of ASCII for use in the ham bands so significant?*

A. ASCII is an encoding system for digital transmissions that is compatible with most "personal computers" in existence today. The proliferation of these units, because of their small size and economic practicality, has had a substantial impact on the amateur community, and ASCII will serve to promote experimentation with such things as computer-to-computer communication (with or without Doctor Forbin's consent!).

The FCC, in implementing the new amendment, has recognized and responded to the amateur's need. It has acted in a manner consistent with one of the most basic purposes of the amateur service — "Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art." (97.1[d])

[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.]

# Correspondence

Conducted By Bruce R. Kampe,\* WA1POI

The publishers of QST assume no responsibility for statements made herein by correspondents.

## SPECTRUM MADNESS

□ Having been a ham for only three short months I too am not impressed by the childish actions of others in respect to malicious interference. It would seem to me, among the Novice class Ops there is a lack of education in common on the air courtesy and proper operating procedure.

Therefore I am in favor of stricter screening of volunteer examiners and a long look at the code and theory elements of the Novice examination. I have been a League member for three months; this is my first correspondence with ARRL. Keep up the good work. It is appreciated. — *Richard K. Thompson, KA5GYJ, Denver, Colorado*

□ It seems to me the solution to malicious interference lies in policing our own activities through the use of local committees who could publicize any local offender, as well as distant offenders. Peer pressure should curtail some of the offenders. FCC surveillance followed by citations to persistent offenders should further reduce the problem to its irreducible minimum. License (if any) suspension and confiscation of radio equipment should be automatic, following a day in court with appropriate monetary fine, and/or imprisonment. Beheading is probably a bit severe, although fitting the crime. — *J. C. McCowen, W0CUB, Collins, Iowa*

□ We all know that committees, vigilante groups, clubs, peer pressure tactics and what have you, will not work against the perpetrators of malicious interference. We as hams can assist the FCC by identifying the culprits but the FCC must take it from there.

A few license revocations and/or suspensions would have most of the offenders sitting up and taking notice and would greatly reduce the interference problems. The hard-core interfeerer would have to be dealt with more harshly.

We, the Amateur Radio fraternity, and the FCC, must come to the realization that this is an extremely serious situation and will require serious measures. — *Gerald Strauss, KB6BP, Yorba Linda, California*

## INVASION OF THE BODY SNATCHERS

□ I went on the 10-meter band at 28,050, called CQ, and then heard a CBer come back to me. I switched the mode from cw to lower sideband, and heard him tell me to get off the frequency. If I did not, he said, they would find me and fix me good. Also, if they could not talk, I would not be able to, either. I found out the CBer lives just down the street from me. But what will the FCC do? I just wonder if they do anything? I just thought you should know what we have to look forward to in times to come. — *Richard Mowery, K9OFD, Granite City, Illinois*

\*Membership Services Assistant, ARRL

□ It is obvious that lobbies have complete control over all aspects of government. The proposal to authorize additional frequencies for ssb to CB operators below the 10-meter Amateur Radio band is solely to promote industry to make more money in the production of rigs.

Current illegal ssb operation on these frequencies by CBers is being legalized! Fantastic. The fallacies of the FCC are now well known.

CB ssb stations running up to 2 kW are creating very serious problems — cutting out MARS and moving up to ruin hams on 10 cw. What a mess! — *Karl T. Weber, WA3CAL, Doylestown, Pennsylvania*

## THYME WAS . . .

□ Congratulations! The reincarnation of Larson E. Rapp has been accomplished just in time. The proactive effects of Justin's transmission system might be made more stable by using it in conjunction with one of OM Rapp's great breakthroughs — the underground antenna. If Justin recovers, get him to write another technical note in thyme for the April 81 QST. — *John R. Knott, WHLE (ex-W0USP), Quincy, Massachusetts*

□ After some simple calculations, I found that the ham of the future must be in motion in order to be heard through FDX. The equation which must be satisfied is:

$$V > \frac{2U}{1 + \frac{U^2}{C^2}}$$

where C is the velocity of light (2.99792456 × 10<sup>8</sup> m/s), U is the phase velocity of the atomic-overdrive transmitter, and V is the speed of the ham in the future. This is an obvious disadvantage, since the signals will fade as soon as the ham of the future slows for a stop sign (if they exist in the future).

It would be nice if a method could be found which didn't have this problem. After considerable research I came across an excellent book covering this very subject. James P. Hogan<sup>1</sup> discusses the use of Tau waves to transmit information into the past. This same technique can also be used to send signals into the future. Those of you who worry about the effect upon the past of sending a signal back in time will find a superb treatment of this in Hogan's book (loc. cit.).

In the near future, the Cornell Amateur Radio Club is hoping to place a beacon on the air using 10 GeV Tau waves with a cw id (W2XM/TAU) followed by the time and date of transmission. Signals will only be sent into the future to avoid the problems of Murdoch Ross.<sup>1</sup> Anyone receiving our beacon is requested to send complete details.

I wish Mr. Thyme a speedy recovery and hope he will begin research on Tau waves as an alternative to phase-velocity transmitters. Happy FDXing. — *John B. Socha, WA6YBJ, Ithaca, New York*

<sup>1</sup>Thrice Upon a Time. Ballantine Books, 1980.

[Editor's Note: It seems Justin Thyme has lots of fans. We simply did not have space for the many letters that resulted from his recent article.]

## 30-METER BAND PLANS

□ I agree with N1AL/6 that the band should be restricted to the narrow modes such as cw and RTTY. I believe that if conventional ssb were allowed, only a precious few will enjoy the band. Since an overdriven ssb signal can easily cover 5 kHz, space would always be at a premium. — *David F. Routh, WD4AMQ, Greensboro, North Carolina*

□ Having such a small bandwidth, the 10,100-10,150 kHz band should be limited to cw, allowing maximum usage. In addition, the band should be restricted to General and higher classes. Being a Novice, I know of the congestion on the Novice frequencies, and I do not want to see another band ruined. — *Dave Mihelcic, KA9EKW, Belleville, Illinois*

□ The new 30-Meter band should be used for cw and RTTY/ASCII only by Advanced and Extra-Class amateurs. — *Michael G. Weber, WB9WFJ, Milwaukee, Wisconsin*

□ About the only way to go is 50-50 cw-phone. Cw is a more efficient, frequency-thrifty way to go, but the howls would be heard from coast to coast if the band were made cw only. — *Fred Streib, W6NA, Palo Alto, California*

## RADIO CONTROL TROUBLE

□ I have recently obtained my amateur license (KA6IUY, Technician) and I often operate radio control model aircraft on 6 meters.

I am very concerned about interference. Although other hams have told me that the R/C frequencies (53.1, 53.2, 53.3, 53.4 and 53.5 MHz) are not used for radio communication by virtue of custom and practice, I have not been able to find any formal warnings of this in the ARRL Handbook.

I don't have to tell you of the tremendous danger to persons and property posed by a model airplane out of control by interference. Today's models weigh as much as 50 pounds. Some racing planes fly over 140 miles per hour. Just last year one person was killed and another seriously injured by an uncontrolled R/C aircraft.

I'm not certain, but, being a lawyer, I believe liability for such an injury could extend to any unwitting ham whose radiotelegraphy or radiotelephony interference is the cause. Liability may even extend to the ARRL for failure to issue warnings of this clearly foreseeable danger. The FCC may even be exposing itself to liability for granting licenses in frequencies where dangerously inconsistent uses are not clearly prohibited.

A report has already been published in *Model Aviation* magazine pointing out interference recently caused by 6-meter repeaters. — *Stephen L. Spears, KA6IUY, Los Angeles, California*

□57-1

# Coming Conventions

**June 7-8**  
Delta Division, Senatobia, MS

**June 7-8**  
West Gulf Division, Dallas, TX

**June 21-22**  
Georgia State, Atlanta

**July 5-6**  
West Virginia State, Jackson's Mill

**July 25-27,**  
Oklahoma State, Oklahoma City

**August 1-3,**  
Florida State, Jacksonville

**August 2-3**  
Louisiana State, Shreveport

**August 30-September 1**  
Pacific Division, San Jose, CA

**August 31**  
Illinois State, Rockford

**September 5-7**  
Southwestern Division, Los Angeles, CA

**September 26-28,**  
Dakota Division, Fargo-Moorhead, ND

**October 3-5**  
New England Division, Boxborough, MA

**October 3-5**  
Virginia State, Virginia Beach

**October 10-12**  
Midwest Division, Lincoln, NE

**November 7-9**  
Hudson Division, South Fallsburg, NY

## ARRL NATIONAL CONVENTIONS

**July 25-27, 1980**  
Seattle, Washington

**March 13-15, 1981**  
Orlando, Florida

**July 23-25, 1982**  
Cedar Rapids, IA

## DELTA DIVISION CONVENTION

**June 7-8, 1980, Senatobia, Mississippi**

The Chickasaw Amateur Radio Association of northwest Mississippi will sponsor the fifth annual 1980 Delta Division ARRL Convention on Saturday and Sunday, June 7-8, at the Northwest Mississippi Junior College Coliseum, in Senatobia.

There will be a complete program of forums, including DX and ARRL. Many dealers will be represented. A flea market and ladies tour are among the activities scheduled. The huge air-conditioned coliseum will seat over 5000 people. Unlimited tree parking in the immediate area. Self-contained RVs welcome. Overnight camping available at nearby lakes. Doors open from 9 to 5 Saturday and Sunday. Commercial exhibitors may set up Friday afternoon and Saturday morning.

An all-you-can-eat seafood banquet will be held at the Ramada Inn in Senatobia. Special

guest speaker will be Harry J. Dannels, W2HD, president of the ARRL. Other guests include Max Arnold, W4WHN, ARRL vice president and Lionel "Al" Oubre, K5DPG, Delta Division director. Advance registration for the banquet (limited to approximately 100) must be received by June 2. Banquet tickets are \$10. Talk-in on 146.31/91, .52 simplex and 3.9875 MHz. For more information and preregistration, please contact K5FC, CARA, P. O. Box 2, Hernando, MS 38632. Advance room reservations through Ramada Inns, or direct to Ramada Inn, 401 E. Main St., Senatobia, MS 38668, tel. 601-562-5241. Please indicate that the reservations are in conjunction with the convention.

## WEST GULF DIVISION CONVENTION

**June 7-8, 1980, Dallas, Texas**

The 1980 West Gulf Division Convention will be held this year in conjunction with Ham-Com 80 in Dallas, at the North Park Inn June 6-8. This will be the third annual Ham-Com Convention and will be the biggest and best ever with the participation of the ARRL.

The entire convention will be held in the air-conditioned Convention Center at the North Park Inn, all under one roof. Exhibits, with over 70 booths, will be open Saturday 9 to 5 and Sunday 9 to 2. Major manufacturers and distributors will be represented. The giant indoor, air-conditioned flea market will be open for setup at 5 A.M. on Saturday, and will be open to the public 7 to 5 on Saturday and 7 to 2 on Sunday.

Forums and seminars will be presented on both Saturday and Sunday, and the ever-popular Sky Warn school will be held on Sunday. Topics covered will include DXing, antennas, technical topics, ARRL forum, and Amateur Radio and the law.

A special feature this year will be the Saturday evening banquet sponsored by the Dallas Amateur Radio Club. This will be an extra-special event, with the DARC pulling out all the stops. Space is limited so make your reservations early. Following the DARC Banquet, the Royal Order of the Wouff Hong will be bestowed. Don't miss this super-special Ham-Com event.

Registration information may be obtained by contacting Ham-Com, Inc., Box 25145, Dallas, TX 75225, or by calling 214-521-1512. Registration by preregistration is \$5 for an individual or \$7.50 for a family registration, which registers one ham and up to three nonham members of the immediate family. Banquet tickets are \$30 per couple or \$16.50 for an individual. Flea market tables are \$5 each; space is guaranteed if the table is purchased during preregistration. There will be many prizes! A special award will be restricted to those who preregister.

## GEORGIA STATE CONVENTION

**June 21-22, 1980, Atlanta, Georgia**

The Georgia State ARRL Convention and Atlanta Hamfest will be held on Saturday and Sunday, June 21 and 22, at the Atlanta Marriott Hotel. Over 100 commercial exhibitors will be showing the latest in ham and computer gear. The exhibit hall will be open from 9 to 5 on Saturday and from 9 until 3 on Sunday. The gigantic, covered flea market opens at 6 A.M. both days. Flea market spaces

are available on a first come, first served basis at \$3 per space per day. There will be plenty of forums on DX, technical subjects, vhf, computers and many others.


Registration is \$3 in advance, \$4 at the door. If you do not receive a preregistration mailer before May 15, write to The Atlanta Hamfest, P. O. Box 45183, Atlanta, GA 30320. For hotel reservations write directly to the Atlanta Marriott Hotel, Courtland Street and International Boulevard, Atlanta, GA 30303 or call 404-659-6500. Be sure to mention the Atlanta Hamfest to obtain the special room rate of \$36 per night. Talk-in will be on 146.22/82.

## WEST VIRGINIA STATE CONVENTION

**July 5-6, 1980, Jackson's Mill, West Virginia**

The 22nd annual West Virginia State ARRL Convention, sponsored by the West Virginia State Amateur Radio Council, will be held at Jackson's Mill 4-H Camp, near Weston, on July 5 and 6. Commercial exhibitors and flea marketers are welcome -- no charge. To add interest to convention happenings, there will be many prizes -- including some for ladies and children.

The program will include an ARRL forum, cw contest, technical forums and various net meetings. Guest speaker from the League will be George Woodward, W1RN, senior assistant technical editor of QST.

Registration fee will be \$5 at the Mill, or \$4 in advance. Dormitory-type lodging and meals are available at a reasonable rate. For more information contact Karl D. Morris, WB8CJDY, 1009 Sand Hill Dr., St. Albans, WV 25177. Come to the beautiful mountain state and enjoy a truly different Amateur Radio convention. 

# Hamfest Calendar

**British Columbia:** The Maple Ridge ARC hamfest will be held on July 5 and 6 at the Maple Ridge Fairgrounds, located 30 miles east of Vancouver. Preregistration, \$10 until June 15, includes banquet; \$11 at the door. Food, prizes, swap and shop, bunny (fox) hunt and ladies programs. Camper space available (no hookups). Talk-in on 3.755, 34/94 and 19/79. For advance registration or more info, write Bob Haughton, VE7BZH, 20625-114th Ave., Maple Ridge, BC V2X 1S7.

**California:** The Satellite ARC will hold its 1980 Santa Maria Swapfest and BBQ on June 15. Prizes, swap tables, contests. Tickets are \$7 for adults and \$3.50 for children 6 to 12. For tickets or info write Santa Maria Swapfest, P. O. Box 1615, Vandenberg AFB, CA 93437.

**Illinois:** The Jacksonville Area ARC will hold its 15th annual hamfest and flea market at the Morgan County fairgrounds in Jacksonville. Indoor facilities, free coffee and doughnuts from 8 to 9 A.M. Food available on grounds. Talk-in on 52/52. Tickets \$1.50 each or four for \$5. For more info write Ken Gotsch, 213 Brookside, Jacksonville, IL 62650.

**Illinois:** The Six Meter Club of Chicago hamfest will be held June 8 southwest of Chicago at Sante-Fe Park on 91st and Wolf Rd., Willow Springs. Advance registration \$1.50, \$2 at the gate. Large swappers row, talk-in on 146.94, prizes picnic grounds, parking available, refreshments, AFMARS meeting. Advance tickets from Val Hellwig, K9ZVW, 3420 S. 60th Ct., Cicero, IL 60650.

**Indiana:** The Wabash Valley AKA will hold the \*ARRL Hamfest



34th annual WVARA hamfest on June 15 at the Vigo County Fairgrounds, Terre Haute. Overnight camping available. Free outdoor flea market, covered flea market \$2 for 12- by 12-foot space with some tables and ac available, Bingo, food and refreshments. Giant shopping mall nearby. Advance-sale tickets \$2 or 3/\$5; at gate \$3, children under 12 free. Prizes, talk-in on 25/85 and 52. For tickets and info send an s.a.s.c. to WVARA Hamfest, P. O. Box 81, Terre Haute, IN 47808.

**Indiana:** The Lake County ARC hamfest will be held on June 15 at the Industrial Arts Building, Lake County Fairgrounds in Crown Point. Tickets \$2 at the gate or \$1.50 in advance. For more info write Reed Tromble, WD9FOT, 1502 W. 2nd St., Hobart, IN 46342. Tel. 219-942-4422.

**Kentucky:** The Northern Kentucky ARC Ham-O-Rama will be held on June 1 at the Boone County Fairgrounds in Burlington. Flea market, exhibits, prizes. Admission \$4, children under 12 free. Joe Rice, W4RHZ, will demonstrate early-type telegraph used by railroads and Western Union. For more info write James A. Jett, K4EMU, P. O. Box 257, Erlanger, KY 41018.

**Maine:** The Yankee Radio Club will hold the Yankee Hamfest '80 on June 28th at the Oxford County Fairgrounds in Oxford. Computer displays, talks on selected subjects, ladies program, youth program, swap tables, prizes and a buffet dinner in the evening. Talk-in on 146.28/88 and 146.52. Camper hookups available for Friday and Saturday night at \$2 per night. Registration will be \$8 complete with dinner, \$7 for early registration. Admission at gate will be \$2.50. For more info and registration send s.a.s.c. to Lynda Mount, 198 Cony Extension, Augusta, ME 04330.

**Maryland:** The Frederick ARC will hold its third annual hamfest on June 15 at the Frederick Fairgrounds, East Patrick St., Frederick. Grounds open at 6 A.M. for commercial and tailgating, breakfast available. Hamfest opens at 8 A.M. for general admission. Donation \$3, \$2 extra for tailgating. YLs and children free. Food, drink and parking available. Talk-in by K3ERM, 146.52. For more info contact Mike Staley, WB3LJK, 2 W. Main

St., New Market, MD 21774, or Hamfest Committee, P. O. Box 1260, Frederick, MD 21701.

**Michigan:** The Central Michigan ARA will hold its sixth annual Swap & Shop in Midland at the Midland County Fairgrounds. Computer demonstrations, prizes, talk-in on 146.73 and 146.52. For tickets and info send s.a.s.c. to R. L. Wert, W8QOI, 309 E. Gordonsville Rd., Rt 12, Midland, MI 48640.

**Montana:** The Prairie Electronics Radio Club will hold the 25th annual northeast Montana Hamfest on June 14-15 at Lewis and Clark Bridge Park, south of Wolf Point. Free overnight parking and camping spaces. Flea market, used gear auction, prizes, pot-luck picnic. Talk-in on .52 and 3900 kHz. For more info contact Edward J. Boysom, SR 231, Box A-850, Wolf Point, MT 59201.

**New Jersey:** The ninth annual hamfest and electronic flea market of the Raritan Valley Radio Club will be held on June 21 from 8-4 at Columbia Park, Dunellen. For details write RVRC, R. D. 3, Box 317, Somers, NJ 08873, or 201-356-8435.

**New York:** The Northern Chautauqua ARC will hold the second annual Lake Erie International Hamfest and Flea Market on June 28 at the Chautauqua County Fairgrounds in Dunkirk. Admission \$4 at the gate and \$3 advance. \$1 per flea market space. Indoor dealer exhibits, outdoor flea market and prizes. Talk-in on 25/85 and 52. For more info write Mike Samulson, WB2DFM, P. O. Box 319, Brockton, NY 14716.

**Ohio:** The Wood County ARC will hold the 16th annual Wood County Ham-O-Rama on June 29, at the Wood County Fairgrounds, Bowling Green. Gates open at 10 A.M. with free admission and parking. Prizes, tables and trunk-sale space available. Talk-in on 52. Advance table rentals to dealers only. For more info write to Wood County ARC, c/o Clifton Falls, W81-1, 201 Martindale, Walbridge, OH 43465.

**Ohio:** The Champaign-Logan ARC Hamfest will be held June 29 at the Memorial Hall in Belle Center. Tickets \$1.50 advance, \$2 at the door. Prizes, trunk and table space \$3. Talk-in will be on 146.52. For more info contact CLEARC, Inc., P. O. Box 637, Bellefontaine, OH 43111.

**Ontario:** The Burlington ARC will hold the sixth annual Ontario Hamfest on July 5 at the Milton Fairgrounds south of the intersection of highways 401 and 25 (exit 39) in Burlington. General admission \$3, children and spouses free. Preregistration before June 15 \$2. Gates open Friday, July 4, at noon, Saturday July 5, at 7 A.M. Flea market opens at 8 A.M. Tables free. Camping, food and prizes available. Talk-in on 147.81/21. For more info write BARC Box 836, Burlington, ON L7R 3Y7.

**Ontario:** The Lake Simcoe Hamfest will be held June 13-15 at Molson's Park, Barrie. Preregistration is \$4, at the gate \$5, children under 18 admitted free. Doors open at noon. Talk-in on 146.85 and 3780 kHz. For info, reservations or tickets write Lake Simcoe Hamfest, P. O. Box 2283, Orillia, ON L3V 6S1.

**Pennsylvania:** The Harrisburg RAC annual Firecracker Hamfest will be held on July 4 at the Shellville VFW picnic grounds, exit 27 of I-81, north of Harrisburg, at SR 39, 1 mile from exit. Shade trees and pavilion. Parking to hold 1000 cars. Food available. Admission \$3, spouses and children free. Tailgating \$1.50, prizes. For more info contact Richard A. Kerlin, K3AM, 635 Lenker Rd., Harrisburg, PA 17111.

**Washington:** The Tri-City hamfest council, Tri-Cities, Washington, will sponsor a hamfest and computer fair June 28-29. Displays, seminars, swap shop, commercial vendors and a nationally known guest speaker at the Saturday evening banquet. Hamfest hours are 9-4 on Saturday and 9-2 on Sunday. Talk-in on 04/64, 16/76 and 52. For further info contact Tri-City Hamfest Council, P. O. Box 563, Richland, WA 99352.

**West Virginia:** The Tri-State ARA will hold their 18th annual hamfest on June 7-8 at the Huntington Civic Center, Huntington, 11-5 on June 7 and 8-4 on June 8. Admission is \$3 for both days, children under 12 free. Commercial dealers, flea market, childrens activities, forums, demonstrations, prizes and left-footed cw contest. Saturday night banquet, with ARRL Honorary Vice President Vic Clark, W4KFC. Hotel reservations and R. V. hookups available. Talk-in on 146.04 and 16/76. For more info write P. O. Box 1295, Huntington, WV 25715 or tel. 304-736-2449. **DATE:**

## Silent Keys

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

ex-W1AAK, Charles F. Fitzgerald, Tavernier, FL  
 W1ALP, Frank L. Baker, Halifax, MA  
 W1DJC, Fred G. Edwards, Manchester, CT  
 ex-W1EFVW, The Rev. Walter A. Reilly, Bridgeport, CT  
 W1GHL, Arnot W. Smith, Shelton, CT  
 W1HNN, Solomon Smith, Wellesley, MA  
 W1HR, James R. Fisk, Greenville, NH  
 W1ILZ, Willard A. Staten, Salem, MA  
 W1IV1, Franklin C. Scribner, Calais, VT  
 W1KP, Hugh L. Walker, Amherst, MA  
 W2LBR, Max P. Keppler, Schroon Lake, NY  
 K2CMB, Fred G. Howard, Jackson, NJ  
 W2CSE, Charles N. Dahlinger, Jersey City, NJ  
 W2DQH, William J. Clark, Nutley, NJ  
 W2GRJ, Edward W. Stewart, Brigantine, NJ  
 K2GRZ, Albert Husbands, Jamaica, NY  
 W2HQR, Joseph E. Hoynos, Miller Place, NY  
 K2JN, Carl O. Almquist, Northport, NY  
 ex-W2KRU, Morris Measnikoff, Lindero, NJ  
 W2P5A, Marion Demchko, Richfield Springs, NY  
 W2RQS, Harold A. Clark, Endicott, NY  
 W2RUF, Clara C. Reger, Buffalo, NY  
 W2UVW, Dorrance P. Cook, East Rockaway, NY  
 WB2WHE, Harold Doswell, St. Albans, NY  
 K3AFF, Mark T. Hodgson, Hazleton, PA  
 K3AQO, John Franklin, King of Prussia, PA  
 K3DFZ, Donald A. Lewis, Worthington, PA  
 W3FDG, George S. Williams, Philadelphia, PA  
 W3HPY, Robert F. James, Monroeville, PA  
 W3G11, Margaret R. DeRosa, Houston, PA  
 W3HNT, Vincent A. Scavazzo, Scranton, PA  
 W3KAF, Gerald L. Coulter, Franklin, PA  
 W3KVI, Stanley T. Parsyck, Munnhall, PA  
 W3OY, Arthur C. Jacoby, Lancaster, PA  
 W3QMD, Joseph T. Moore, Sewickley, PA  
 W4E1Y, Jacob I. Wexkoff, Sr., Lincolnton, NC

WB4UFF, Eliot R. Brauer, Hollywood, FL  
 K4IIA, Loy H. Lear, Jr., Macon, GA  
 W4IAR, Eugene Minter, Danville, VA  
 W4IJI, Paul C. Luster, Norfolk, VA  
 W4LEIS, Richard P. Crumkshank, Mauldin, SC  
 W4MUQ, William E. Henderson, Greenville, SC  
 K4UB, William S. Feinsberg, Otto, NC  
 \*WB4UUV, William F. Coldewey, Dunedin, FL  
 K4UV, Lewis M. Clement, Pompano Beach, FL  
 W4YCS/ex-W8ANE, Francis W. "Dunc" Duncan, Ft. Lauderdale, FL  
 WB4ZPV, Stewart D. Allen, Miami Beach, FL  
 WB4ZQA, Scott C. Dawson, Allandale, FL  
 W5DKN, Wesley E. Hickey, Hillsboro, TX  
 W5EJB, William E. "Dub" Roberts, Tyler, TX  
 W5IBX, Clarence D. Northen, Port Arthur, TX  
 W5BRAI, Bill R. Kinney, Houston, TX  
 W5RXX, Charles D. Serak, Port Neches, TX  
 WASSLR, Richard N. McLeod, Hot Springs, AR  
 K5TEX, Archie L. Wallis, Tulsa, OK  
 W5VMY, Gertrude C. Strebeck, Houston, TX  
 WA5YIJ, William S. Miller, Del City, OK  
 WA5YKQ, Joe W. Washam, Lufkin, LA  
 W6BJC, Conse A. Emerald, West Covina, CA  
 K6BRG, Betty L. Lynch, Carson, CA  
 K6EHV, Read C. Easton, Riverside, CA  
 W6EPF, Benram A. McNaughton, San Francisco, CA  
 K6ERO, Ralph V. Johnson, San Diego, CA  
 WA6INI, Merritt S. Franken, Encino, CA  
 W6JXI, Roy F. Stuart, Orinda, CA  
 K6MTN, Philip Leonard, San Diego, CA  
 WB6NVR, Sam H. Okuye, Livingston, CA  
 WA6QXW, Paul V. Storm, Midland, TX  
 K6VPQ, Mary F. Stavos, Santa Barbara, CA  
 WA6ZAC, Robert H. Ruby, El Cajon, CA  
 W7BVV, William G. Gibson, Salem, OR  
 W7FSU, James Bruce, Prineville, OR  
 W7GND, Charles L. Barker, Pullman, WA  
 WB7OEJ, Robert E. Quinn, Emmett, ID  
 W7OKV, Ralph L. Harris, Hillsboro, OR  
 ex-W7QCP, Gladys S. Neyland, Brady, MT

K8AZK, Vernon Sturgill, Sopha, WV  
 W8BC, Everett L. Knapp, Dearborn Heights, MI  
 W8CCP, Paul S. Van Deusen, Lowell, OH  
 ex-W8CKH, Gertrude P. Roddy, Bethesda, MD  
 W8DQP, Dr. C. F. Schweigert, Detroit, MI  
 W8HUP, Dr. Abe R. Bozarth, Parma, OH  
 WD8KZQ, John J. Horvath, Trenton, MI  
 ex-W8WJ, Charles E. Floyd, Salem, OH  
 W9AEV, Leo P. Devine, Milwaukee, WI  
 W9JSL, John F. Smith, Berkeley, IL  
 W9MPZ, Francis J. Loftus, Milwaukee, WI  
 W9RC, Malcolm W. McRae, Park Ridge, IL  
 K9SBP, Christian C. Kessler, Jerseyville, IL  
 W9UAG, Alvin L. Cox, Jr., Oak Park, IL  
 WB9UHW, George E. Howell, Richmond, IN  
 W0AXL, Don M. Eidenron, Poplar Bluff, MO  
 W0BCD, Charles L. Smith, Kansas City, MO  
 KAOBOR, Harold C. Samuel, Austin, MN  
 W0CVN, Paul W. Mark, Wichita, KS  
 W0EJM, Ben H. Rinehart, Rapid City, SD  
 W0FXU, Roy E. Testerman, Springfield, MO  
 W0JFR, James H. Quinley, Falls City, NE  
 W0IMB, James E. Reynolds, Denver, CO  
 VE1CD, William J. Harrison, Renous, NB  
 VE1FS, Sperry I. Green, Centreville, NB  
 ex-VE1GG, William Snell, Sydney Mines, NS  
 ex-VL1HB, George E. Howell, Ottawa, ON  
 VE7EC, George C. Goode, Kelowna, BC  
 VO1EG, Earle B. Noble, St. John's, NF  
 VO1GW, W. Brock Doherty, Head Base D'Espoir, NF  
 G5SR, Stan Riecut, Gloucestershire, England  
 ZS6IK, Louis Grusd, Johannesburg, Republic of South Africa

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column.

\*ARRL Life Member

# In Training

## TWO CODES INSTEAD OF ONE?

You're probably thinking that the FCC has come out with a new mandate concerning licensing. Well, if you thought that, you're wrong. The "other" code I referred to in the title is the "Amateur's Code." It's devoid of dms and dabs, but it might contain food for thought that's as important as our international cw language.

Take a few seconds to think of what has bothered you the most about Amateur Radio lately. Chances are that your biggest gripes are probably what your fellow amateurs have said or done on the air.

Let's face it. Most of us are not really irked by equipment that doesn't work up to snuff, or by our own laziness in not upgrading to that class of license we want. Instead, it's what that "idiot" did or said on 20 meters, 75 meters or the repeater.

Patience and consideration are getting to be lost art forms in Amateur Radio. Plenty of theories have surfaced as to why this less-than-chivalrous situation has developed.

Possibly the dynamic, fast pace of life that we are living has accelerated lack of respect and cooperation among hams. Certainly "doing your own thing" has been more "in" during the last two decades. The excesses arising from this philosophy have not always been the most pleasant!

There are those who feel we have been overzealous in recruiting anyone and everyone into the ham fraternity. Others attribute the situation to the influx of CBers into our ranks. But it should be quickly pointed out that older call signs are noticeably represented in some of the most unpleasant outbursts heard on the air. Squabbles over pre-net frequencies below 4 MHz and DX pileups on 20 meters are prime examples.

Great. We've recognized the problem and looked at a few of the possible reasons why, but what can we do about it? "Back to the basics" is an often-heard cry in education today. There might be a close parallel between that concept and our operating problems in Amateur Radio.

In wandering back through the cobwebs of my mind, I remembered a set of ideals set forth by Paul M. Segal known as the "Amateur's Code." (It is reproduced in the *Handbook*, right up front where it belongs.) The first part of the code speaks directly to the above-mentioned problem. Too often we do not

## The Amateur's Code

### ONE

*The Amateur is considerate . . . He never knowingly uses the air in such a way as to lessen the pleasure of others.*

### TWO

*The Amateur is Loyal . . . He offers his loyalty, encouragement and support to his fellow radio amateurs, his local club and to the American Radio Relay League, through which amateur radio is represented.*

### THREE

*The Amateur is Progressive . . . He keeps his station abreast of science. It is well built and efficient. His operating practice is above reproach.*

### FOUR

*The Amateur is friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance, cooperation and consideration for the interests of others; these are marks of the amateur spirit.*

### FIVE

*The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community.*

### SIX

*The Amateur is Patriotic . . . His knowledge and his station are always ready for the service of his country and his community.*

PAUL M. SEGAL

incorporate this statement into our initial touch of the key or squeeze of the mic button. Point two accentuates encouragement and support to another ham. In listening to some local repeaters and/or nets, surely more positive things could be said and done in this direction.

Who is never rusty when it comes to some form of operating procedure? How do you react to an on-the-air report that your signal is too broad, or to an official observer notification that you were 597 the other day? Did you consider it a personal attack or a friendly way of informing you that you are not keeping our shared frequencies the cleanest? Point three

underscores the need to keep in practice and keep informed.

Amateur Radio would be stronger and healthier if discouraging words were *not* heard on the bands. How many of us tend to do a better job at something when we mainly hear put-downs instead of praise? When was the last time you operated the Novice bands with an appropriate slow speed to set a good example for future old-timers? Point four reminds us that there is at least a little of the instructor in every radio amateur.

Is too much leisure time causing an imbalanced approach to our hobby by some of us? Point five seems to say something about trying to mix ego trips and Amateur Radio. Contest excesses and less than fair play associated with working a rare DX station come into this category.

Laws state that an ordinary driver's license is a privilege, not a right. Does the same thinking apply to an Amateur Radio license with reference to the last part of the code? Should the mere passing of tests be the sum total of a person's worthiness to hold an amateur license?

Call it spirit, fraternity or whatever, there is more to Amateur Radio than regs, theory and Morse. That "something" is what separates our licenses from those of the Commercial Class in a unique way.

The "Amateur's Code" is a tough challenge worth striving for. But as a ham and possibly an ARRL registered instructor, how does one convey the abstract ideas of the code? Consider the following:

- 1) Teach what is right, best and most effective for your students.
- 2) Live up to the image in the "Amateur's Code"; set a good example.
- 3) Encourage and use the best operating practices.
- 4) Always be ready to learn something new yourself and to take criticism well.
- 5) Think in terms of attitude as well as subject matter when preparing a lesson or acquainting someone with Amateur Radio.

One of my goals in the Training Department will be to explore methods of teaching courtesy in Amateur Radio-related situations. But help is needed! Whether you are a student, Novice, instructor or casual reader, the Department needs your views on both the problem and solutions.

Are you instructors using any materials or lessons to cover this area? Please bring your methods and techniques to our attention. With ARRL's complement of over 5500 registered instructors, plus others who take an occasional glance at "In Training," I'm sure some good ideas will be forthcoming.

Don't forget the codes — either one of them! — Bill Gunn, W0MFK

# Club Corner

Conducted By Sally O'Dell, \*AE8P

## IN THE GOOD OLD SUMMERTIME

Summer is here! Some clubs just close down because members disappear. People fade into the woodwork, into a swimming pool or into any activities that have nothing to do with Amateur Radio. This year, once again, gas is limited and expensive. Could that mean more people will be spending their summer vacation at home? This could be the time to make your club active 12 months of the year instead of eight or nine.

There are many public service activities in which you (and your club) can become involved. The March of Dimes Walk-a-thon has received coordination assistance from clubs across the country. The walk route had to be coordinated with the people up front, and hams were there to help. Many similar charitable activities occur in the summer months; perhaps one of them would be ideal for showing the public what your club and Amateur Radio are all about.

But possibly a walk-a-thon, a parade or a canoe race just isn't your thing. Perhaps you help with one or two activities a year, and now that summer is here, you want something else. Is it up to your club to entertain you if they want your presence? How about helping out? Suggest an activity everyone would want to participate in. Sometimes an activity that is held just for fun, such as a fox (or bunny) hunt, can be preparation for a future emergency. According to WA2DHF, the only place a bunny hunt can be held is within walking

distance of a Playboy club. Others have debated this, but Steve is firm in his beliefs.

Most of you already know what a fox hunt is. But for those of you who don't, the object is finding a hidden transmitter. If the transmitter is operated by a friend, it is called a fox hunt. If it is operated by someone who isn't playing, it can be called interference, malicious or otherwise.

AE8Q and I bundled the baby into the car last November and set out on a fox hunt. The homebrew antenna wouldn't fit in the car. Pete wore heavy gloves (it was cool) and held out antenna on the roof while I drove. At regular intervals we pulled the car to the side of the road. I would jump out, run to Pete's side, grab the antenna and wait for the signal. As soon as it began, I would rotate 360° and back. Pete watched the meter. I would recede the coax, hang it over the a-m radio antenna, run back to the driver's side and start driving again. One of the hunters overheard a comment about a strange lady who must have found a TV antenna in a dump and was taking it home.

We were fourth out of five cars to find the fox — under a bridge. It was fun (we didn't finish last!). Malicious interference can be tracked down by people trained in these *fun* procedures. Add something special to your hunt. Check odometers before you leave. The lowest-mileage car could be the winner.

Another summer activity could be handling traffic for a summer camp. Anyone, including kids, likes to send a message home. What about a mini club contest, for four hours or so? Award a trophy to the winner. Have you heard of "share the rig" activities?

Members with different rigs bring them in, tune up and let others who are interested see what it is like to operate something different.

Has your club ever set up at a shopping center or state fair? An exhibit where traffic is sent in just a demonstration of Amateur Radio operations can provide the public with a good look at what we do. ARRL will provide exhibit kits to groups that are interested in this type of activity.

Does anyone in your club work OSCAR? Perhaps one person who is familiar with the procedures can put on a demonstration for the rest of the club. Maybe the whole club would like to get involved in an OSCAR project. This is the way to do it.

Want to keep in touch with your club members who are away for the summer? What about a club net once a week (or month)?

Your club could plan a visit to a commercial TV or radio station followed by dinner at a local eatery. It could be a nice family outing.

Many clubs plan to attend nearby hamfests. What about hiring a bus so the whole group can go together? You all will save some money and gasoline.

Then, you could have an *old timers night*. Do any of your club members have some homebrew gear that might be slightly different from what we see on the market today? Some gear might even go back to spark gap.

Instead of jumping into that swimming pool this summer and letting the chlorine wash all thoughts of ham radio out of your mind, think about your hobby. Think about your club. What do your members have to share this summer?



## Operating from Where the Grass Really is Greener: Beaches, Palms and QRP

Most DXers experience pile-ups from the screaming end. Waiting for a few hours for the opportunity to give their call and a quick "59." Sometime in their career, most DXers wish that just once they could be at the other end. Ulrich Steinberg, DJ8GO, did something about that wish.

"On a business trip to Australia last year, I decided to stop over for three days in the kingdom of Tonga (Friendly Islands). Because I had nothing else to do since it was raining most of the time, I applied for a Tongan ham license at the T & T office. To my astonishment, a couple of weeks later, back home, I found a letter with colorful Tongan stamps from Mrs. Vaka Ahi, the T & T secretary, telling me that I had been assigned a beautiful Tongan call — A35US.

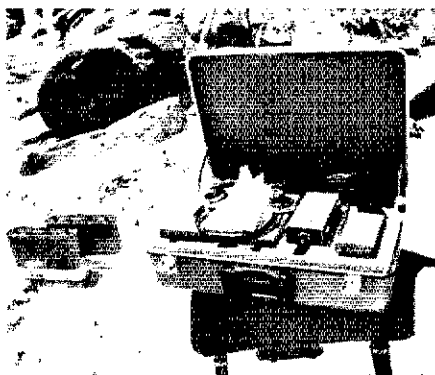
"Now, a rare call sign is certainly not reason enough for a trip, but I was intrigued by the idea to be, for once, on the other side of a pile-up. My XYL, who normally at best tolerates my hobby, and I discussed the idea. We finally came up with a plan for a Christmas vacation in the South Pacific: Cook Islands, Tonga and Fiji.

"I had made friends with a young couple in the Ha'apai Islands group in Tonga. They had invited my XYL and me for Christmas. After a few letters back and forth our schedule was firm: We would spend a week in Rarotonga, Cook Islands, the Christmas days with our friends in Tonga, and start the new year in Fiji, which we know and love from previous vacations. I would also take some kind of short-wave rig with me to make some DXers happy with a rare country.

"Tonga is not like the United States; you cannot expect to find electricity in the smaller villages. Therefore my equipment had to run on batteries. Heath HW-8 seemed to be a good choice. I modified an HD-1410 keyer to reduce current drain by replacing the standard TTL ICs with low-power Shottky versions. Test runs for several hours into a dummy load showed that this combination could produce about 1-watt rf on 21 MHz when powered by two Eveready 'Hot Shot' batteries. The life expectancy of the batteries was calculated to be in excess of 30 hours. How about the antenna? My experience had been that a dipole is hard to beat when it comes to performance and portability.

"My experience is that my HW-8 does not hold frequency calibration well. So I packed a small hand-held frequency counter. The remaining space was filled by headphones, a cordless soldering iron, tools, logbook and cables. I also took a dual-voltage ac power supply for the HW-8 in case I could find electricity somewhere. Most of this fitted quite neatly into a small foam-padded camera case.

"Finally the great moment came, and we arrived in Rarotonga after some 17 hours of



The entire A35US station, ready for travel.



The dipole antenna, complete with its palm-tree supports.

flight. Since it was raining the first morning, I attempted the same feat I had done in Tonga. Thanks to the tremendous support of Archer Hosking in the Cook Islands' T&T department, I walked out as ZK1AXB a short time later. I strung my dipole between the hotel balcony and a palm tree, and was on the air the same evening. (Good thing I didn't forget the power supply!)

"Having never worked from a small Pacific island before, I just couldn't believe how quiet a hand could be. There just was no local QRM. There were no power lines or appliances to produce any noise. I first thought 15 meters was dead — until I got my first QSO with a VK. Then I worked ZL, KH6 and W6, and when I

caught the first JA the pile-up started. After two days I had made about 40 contacts — may all those who didn't make it forgive me for lying on the beach or touring the island most of the time. Rarotonga has a reputation as one of the most beautiful islands in the South Pacific, and the XYL was as happy as I was.

"I left the Cook Islands after making about 50 QSOs, mostly JA's. The longest distance covered was to Rio, in Brazil, about 7200 miles. Not bad for 1-watt output to a dipole! Unfortunately, it turned out that the USA is difficult to reach with QRP. That wall of multi-kilowatts in W6 drowns you very effectively and most don't listen for anything below S9. I ended up with only a few stations from the west coast and some KH6s.

"In Tonga our friends had prepared a big Christmas feast, and we had all kinds of strange roots and leaves from the traditional earth oven, the 'oumo.' Of course, I had told them about my radio experiments. I had to give them a little demonstration, during which I worked some VKs with my dipole 5 feet above the ground.

"We spent most of our time in a small village of palm-leaf huts right next to the beach. After some little boys showed me how to run up a palm tree, I decided to have them rig up my antenna. During the day I worked right on the beach — the XYL beside me improving her sun tan. After dark I retired to our hut with its gas lamp.

"As in the Cook Islands, I worked mostly JAs. I admired their discipline in pile-ups. Once, when I finished late at night, before I could work all the stations in the queue, someone thanked me on behalf of all the operators who had not yet reached me. He promised they would try the next night — and believe me, they were back the next night! Since I don't like contest-style QSOs, the total number of 150 contacts from Tonga is smaller than it could have been, but every single one was certainly fun.

"While in Tonga I did not make a single contact with the U.S. mainland. The few U.S. stations I worked were from KH6 and KL7. When I answered the CQ DX of a W6 several times, he came back telling me that he really meant DX and was not interested to work one of those funny new A-calls in the U.S.! At least I know it could have worked. Despite poor propagation conditions, the longest DX was to Fairbanks, Alaska, which is about 6100 miles from Tonga.

"The equipment worked flawlessly, and the DX capability with 1 watt far exceeded my expectations. The soldering iron was never needed, but the frequency counter was absolutely necessary to recalibrate the HW-8. When I unpacked it the first time, the calibration was off by 10 kHz! The dipole could be the ideal antenna for this kind of expedition. If you can afford the bulk, the 'Hot Shot' batteries are probably the most cost-effective power supply. After 31 hours of operation they

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Inside at night, and out of the beach by day, the operator and station of A35US.

just showed the slightest trace of degradation — they even survived a short dip in the ocean. “Would I do it again? You’d better believe it. When we were in Fiji I applied for a 3D2 call and, looking on my map, the Tuvalu group (former Gilbert Islands) looks like a nice place. Should I get these calls, I think I’ll talk the NYL into another trip to the South Pacific later this year, which won’t be too difficult!”

Ulrich’s DXpedition wasn’t the big-gun 10,000-contact type expedition. It was simply an enjoyable vacation for him. Making 10,000 QSOs from a rock in the Indian Ocean is a fun vacation for some folks, but not for everyone. Some prefer a little less excitement. Fortunately, nobody has ever laid down laws regulating the scope of an expedition.

Whether it’s a large operation from a

remote, hard-to-get-to spot, or a simple operation from a hotel room in the Caribbean, DXpeditions can be tremendous fun. But they require planning and advance information. Next, we’ll explore the various obstacles a DXpeditioner might face and how to overcome them. With the fall vacation season just in view, now is the time to begin planning.

Next month: Where to go, how to get there and what it will cost.

### GUYANA CALL IS VALID

K9EF/8R1, Woody, is at the U.S. embassy in Georgetown, Guyana. The government there still issues reciprocal licenses to visiting U.S. amateurs, so you may hear others on the air from time to time. QSL K9EF/8R1 to K1RH.

## QSL Corner

Administered By Joan Becker

### ARRL-Membership Overseas QSL Service

This is an “outgoing” service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

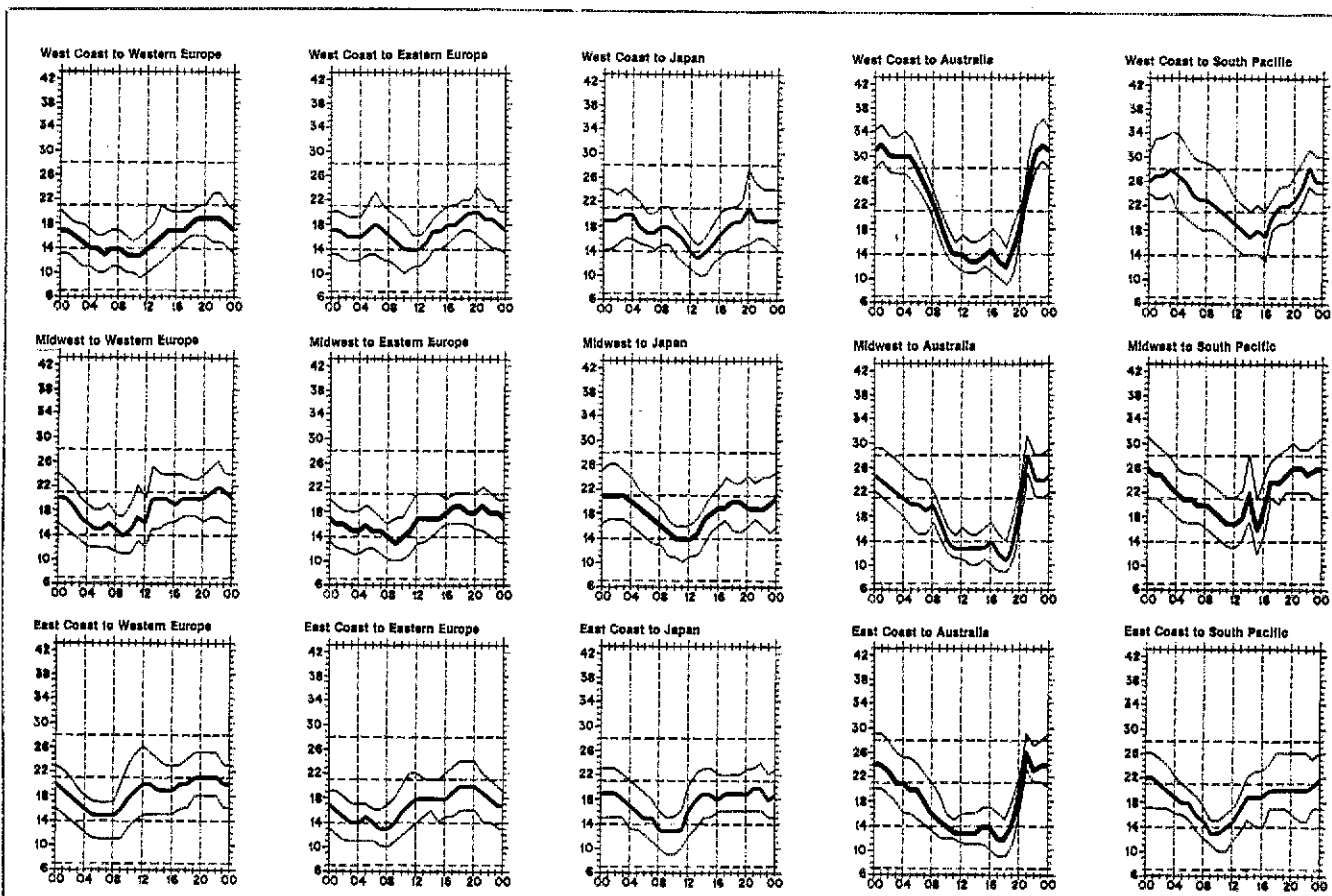
An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just \$1 per pound or portion thereof (155 QSL cards average a pound).

The ARRL-Membership Overseas QSL Service operates *only* in an “outgoing” capacity. To receive QSLs from DX stations, see “The ARRL DX QSL Bureau System,” published every other month on this page.

U.S. amateurs may send SWL reports to foreign short-wave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers; write for details.

#### Requirements

- 1) Presort your DX QSLs alphabetically by call sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, JA2, etc.).
- 2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their



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

QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive QST should indicate that the QSLs are from a "sightless member."

ARRL affiliated club stations may utilize the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash.

Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

For those of you who would like to QSL direct, this information is passed along as we receive it and, therefore, may not be accurate.

EL7K (W5OD)	OR7EJ (ON7EJ)
GM3MBP (G3YOG)	RU2QD (N6HR)
HP1XOG (WA4TWS)	S2BTF (W5RU)
HP1XOJ/H31LR/	W5NUT/PJR (W5NUT)
KZ5OI (WB3KGY)	WD8QOQ/KH7
J6LOU (KA4BO1)	(KH6JEB)
K2E1/VP2A (K2EJ)	S9RVE (WA0JYJ)
K7SE/VP2A (K7SE1)	ZD8HR (N6HR)
K7SE/PJ5 (K7SE)	6Y5DL (6Y5DL)
VP2VGB (K7SE)	6WAR (WB4FMI)
OA4BZ (W1DKB)	8P6KY (WB4RRK)

#### Corrections

HH2BM (W7WQ)  
S2BTF (W5RO)  
WA0NCR/HRJ (N5EE)

W6ZO (CT2IA)  
4Z4NUT (WA1YAU)  
8P6BU (W3HNK)

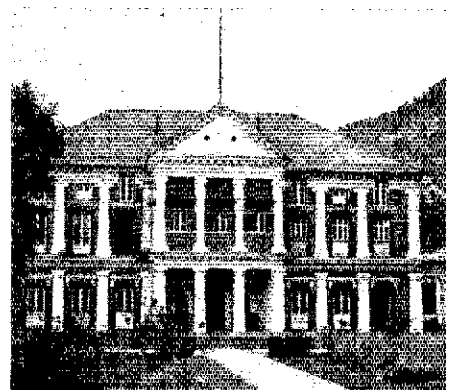
#### QSL Manager Volunteers

WA1PDG  
WB0QPA

W4JEY  
W0PXM



Dick Johnson, W8CFG, manager of the eighth call area QSL bureau.



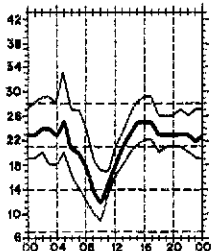
While visiting Nepal, Murray Yaco of Fowierville, Michigan, stopped in on Father Moran, 9N1MM. He took these pictures of the antenna at 9N1MM and the school at Katmandu. (photos courtesy WB8RMD)

### A QSL BUREAU MANAGER

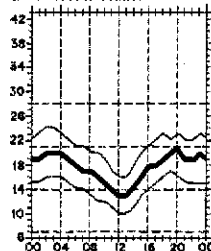
Dick Johnson, W8CFG, was born in Danville, Ohio. First licensed in 1946 as W9IME, he is married and has four grown children. Dick served in the Army Signal Corps, in the South Pacific during World War II, and received his B.S.E.E. from the University of Illinois, in 1947. He is presently on the technical staff at Bell Labs in Columbus, Ohio. In 1950, Dick got his Class A ticket, then in 1978 earned the Extra Class license. In April of 1971 he was appointed manager of the eighth call area QSL bureau. Although his primary amateur interest is DXing, Dick enjoys building gear, too — the linear and antenna tuner in the photo are homemade. Thanks to you, Dick, and all your volunteers for your fine service.

[Editor's Note: From time to time, "QSL Corner" will feature brief profiles of the various people who keep the bureaus running smoothly.]

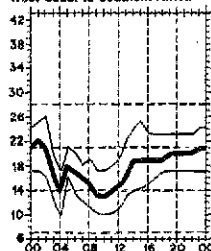
West Coast to South America



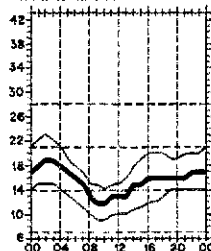
West Coast to Central Asia



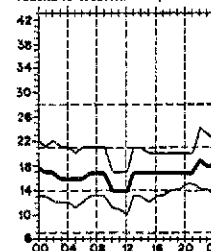
West Coast to Southern Africa



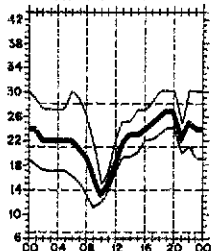
Alaska to East Coast



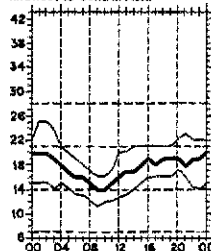
Alaska to Western Europe



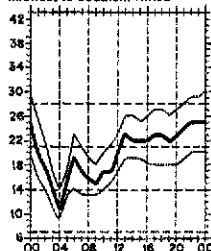
Midwest to South America



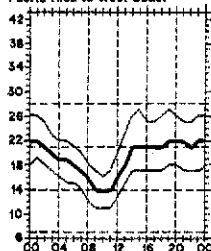
Midwest to Central Asia



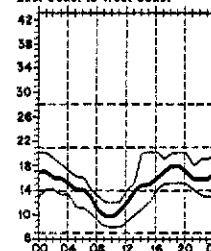
Midwest to Southern Africa



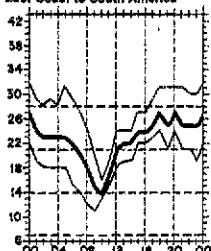
Puerto Rico to West Coast



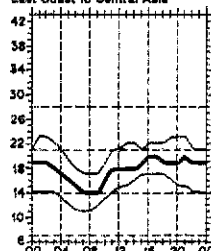
East Coast to West Coast



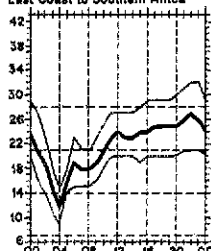
East Coast to South America



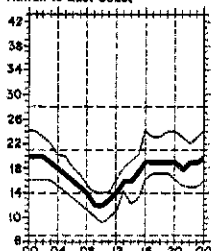
East Coast to Central Asia



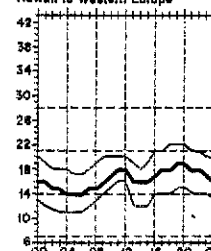
East Coast to Southern Africa



Hawaii to East Coast



Hawaii to Western Europe



lowest curve (optimum traffic frequency, or *fof2*). 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 June 15 to July 15, 1980, assume a sunspot number of 145, which corresponds to a 2600-MHz solar flux of 190.

# DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 1 through January 31, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

## New Members

### Mixed

DF3FR/110	JH1IFS/309	VE1EJ/100	N2AWM/107	WB3JZ/118	WB4YFW/106	K7CE/105	WDBCR/227	WB9YLR/105
DJ8CN/147	J110BV/100	VE4QP/100	N2HE/100	WD4LRB/105	W7FJE/101	W7JE/101	WDBEI/101	WB9ZQA/101
DL9WU/263	J11GZN/118	YU2AWL/105	N2TW/101	N5BET/103	W7HN/114	W7JFI/101	WDBMC/123	WD9ADB/101
G3EGG/103	JK1ASJ/101	YU2WA/107	WA2JZL/102	KJ4W/154	W5WF/105	WA7MOK/102	WDBPK/123	K0FA/128
G3JYT/100	JA2JZT/146	6Y5RL/132	WA2JWJ/242	KK4A/104	WA5FVJ/222	WA7MOK/102	WDBRIN/100	K0IXC/104
G3SJH/302	JA3D8D/108	K1JA/173	WA2NEW/113	N4CDZ/106	WD5FVQ/108	A8DJ/100	AJ9D/243	K0JSY/230
GM4BVD/100	JA7TJ/132	K1VUT/127	WA2QVE/100	N4WQ/103	AF6S/263	K6EM/124	K9RFW/107	N0AIT/116
HB9AGH/202	KH6BZF/262	N1ACU/108	WA2VUR/103	W4ROA/113	K6EKP/107	K8PM/110	K9WWT/115	N0IN/206
HB9ARH/156	KL7JFI/146	W1KX/101	WB2KQE/102	WA4WFB/102	N6ST/152	W8DCW/114	NSALC/100	N0XA/255
HB9Z/106	OK1AMU/105	WB1XKS/113	WB3MZE/171	WA4WFC/102	W6CS/108	W8GKM/330	WA5GFR/105	WB0RYN/109
HM1QD/103	ON7FJ/162	K2EXL/101	W3M2G/171	WA4NTP/103	WA5AGO/100	WB8JH/115	WB9JVR/100	WB0TTA/106
I2MOV/225	SL0AS/106	K2BLI/101	WA3VPL/111	WB4BBN/150	WB6JMS/130	WB8WZ/103	WB9LAG/161	WB0WLJ/100
I3SVA/104	SM6HPJ/109	KA2K/161	WB3HPJ/107	WB4VMS/100	WB6RWJ/219	WB8ZUW/107	WB9YCK/103	WB0PE/100
JA1AJK/110	SM6CTQ/257							

### Radiotelephone

AP2MQ/146	J11GZN/116	58AAP/117	9J2NG/109	AA4FF/130	WB4COO/106	N6ADI/132	K6ZE/215	WB9VGJ/100
DF4ZL/105	J11KUV/142	SM6AHS/216	KA1ACC/110	K4DSK/130	WB4VWU/126	N6AVU/104	K8BDW/102	WB9ZBG/100
DJ60Y/102	JA2JZT/146	SM6CTQ/194	K1BGY/100	K4RUG/105	WD4HZQ/107	N6ST/120	WB8AJH/112	WB9ZQA/104
OK71Z/117	JA3DBD/105	VE2EWO/114	WB1SXS/113	K5AIL/115	WD4KWR/120	WA6DJS/113	WDBPK/123	WD9ADB/101
OL8WU/242	KA1MI/108	VE3AZU/161	WB1CTO/104	KJ4V/144	W5YQ/126	A7P/123	WD9DQM/111	WD9DB/108
G3SJH/302	KL7JAA/110	VE3HFL/151	WA2JWJ/237	N4CDZ/103	W5LJO/104	K7CE/104	K9DN/100	WD9IMB/105
G3VCF/109	KL7JHI/145	YK2VC/107	WB2EIB/102	W4WFB/102	W5ZKJ/102	K87FM/118	N9RS/241	WD9JKT/109
H18GGL/164	LA2GN/102	YU2RJV/111	AB3/129	W44BBN/127	W5WJX/104	WA7PVE/100	W9NGB/142	K0JSY/230
HM1QD/103	LA2GN/102	YU6ZA/113	AD3R/125	W44BRQ/109	WD5EQZ/230	WB7SIC/108	W9WS/202	W0LOH/108
I2MOV/225	ON6NY/109	2D7HH/125	K6JG/121	WA4CNZ/173	K6BON/105	K8OOG/100	W9ZFM/100	W0PXM/100
I3QBR/109	PA0DM/108	ZS6AL/3105	K3CX/151	WA4FRY/102	K8EKP/101	K3TL/148	WA9GFR/104	WD9AWL/107
I6LUJ/110	PA0MA/122	6Y5RL/130	WA3ZHM/101	WA4VCX/102	KC6H/100	K8TU/112	WB9TDR/100	WD9FVW/102
JA1AJK/102	SP1CTN/102							

### CW

DF3EP/111	OH2BSQ/114	VE1ANU/103	W1BWS/110	N2IT/117	WA4RDS/110	AJ5Q/124	N6IC/107	W7TC/108
DL1MD/116	ON7FJ/152	VK1PG/108	W1HNN/220	K3UC/127	WB4EBX/122	K5KR/145	N6OZ/184	WB8EKW/101
DL7SY/183	O22E/107	YU4VAI/100	WB1EVI/VE2/100	AA4FF/114	WB4POT/110	K5KV/104	W6SZ/108	WB8TR/121
I5OTC/104	O25V/102	ZL1ADI/102	K2PZ/101	AA4KT/100	WB4WUQ/113	AF6S/243	W6TCC/243	WD8IFX/103
JH7CKF/181	SL0AS/105	K1JA/144	K82BK/124	N4BPP/101	AF5K/108	K6TC/160	K7EC/100	WD9IFW/104

## Satellite

### WA2CBB

### 5BDXCC

JA5CPL	AA4M	K3NZ	W7NCO	W4EZ	DK5XR	W8RCM	PA2TMS	FP8DX
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## Endorsements

### Mixed

DF1FX/127	OK1APS/122	K1DFC/332	N2CW/304	WB3DWH/199	WD4CKS/149	W6NNV/313	K8TL/314	W9KB/327
DJ4XA/285	O21TD/141	K1EM/254	N2IT/136	WB3IXF/163	WD4KRK/178	WB6PMT/217	K8BCR/147	W9MYG/250
DJ8CR/280	O22E/189	K1FI/272	W2SUA/316	AA4FF/206	A6H/207	W6SQ/241	K8BZ/150	W9NBG/291
OK6PR/310	O25V/292	K1GFH/232	W2AK/221	AB4Z/270	K5AO/322	W6TC/306	N8AA/330	W9WAB/200
DL1KS/309	O27N/203	K1MUM/300	W2CKR/229	K4ADU/305	K5MK/250	W6TFO/275	N8I/320	W9WEE/183
DL1LD/305	PA0TAU/320	K1MEM/300	W2GWT/241	K4AVU/320	K5ACC/182	W6BRSU/159	W8I/240	W9WWT/200
DL1MD/310	PY4ALC/255	K1VR/299	W2HNI/254	K4BFB/329	N5AX/283	W6BRSU/159	WB8I/284	WB9TST/121
DL7WL/163	SM3EVR/304	W1CNU/263	W2IRV/346	K4CM/140	N5WJ/316	W6BRSU/159	W6BRSU/159	WB9TST/121
DL8NU/335	SM5AZU/335	W1ETH/149	W2KN/240	K4CDT/200	N5RR/329	W6BRSU/159	W6BRSU/159	WB9TST/121
DL9GH/182	VE3BX/327	W1FH/333	W2LPE/350	K4HFG/301	W5RDA/342	A7C/211	W8EG/276	WB9TST/121
F2NB/301	VE3ECP/236	W1HR/231	W2OBX/284	K4NV/230	W5SKT/218	A7P/123	W8EJ/276	WB9TST/121
F9PDJ/227	VE3XM/126	W1LU/252	W2REH/320	K4NY/306	W5ZDQ/262	K7PV/202	W8EJ/276	WB9TST/121
G3GIG/132	VE4U/200	W1RLV/304	W2VYX/300	K4PVZ/257	W5EJG/200	K7WTF/200	W8EJ/276	WB9TST/121
HB9DI/179	VE4OX/334	W1WLW/282	W2ZZ/327	K4S/282	W5EJG/200	W8EJ/276	W8EJ/276	WB9TST/121
H18LC/280	VE6HT/263	W1LCCR/206	WA2CBB/320	K4FTI/219	AC6V/122	W7BC/281	W8EJ/276	WB9TST/121
I1ZL/351	XF2MX/217	WA1LOU/160	WA2NDB/139	K4P/100	K6XT/307	W7GS/273	W8EJ/276	WB9TST/121
I8EWM/154	YU2CBM/304	WB1AHF/160	WA2WSX/278	KN4B/288	KC6X/151	W7YV/292	W8EJ/276	WB9TST/121
I50DTK/145	YU5AE/169	WB1HIX/165	WB2HPP/254	N4RF/300	N6ADI/138	W7Z/209	W8EJ/276	WB9TST/121
IT92GY/354	YU7ODO/304	AG2U/157	WB2LFO/270	W4EZ/290	N6J/249	W7Z/209	W8EJ/276	WB9TST/121
J11KUV/150	ZE4JS/329	K2FU/199	WB2VF/306	N40T/120	N6HL/292	W7Z/209	W8EJ/276	WB9TST/121
JA2AH/316	ZL1ADI/221	K2FW/205	AD3R/145	W4KFC/337	N6SV/295	W7Z/209	W8EJ/276	WB9TST/121
JA2KVD/274	K3KA/250	K3MNU/288	WB2VF/306	W4A0AN/269	N8V/240	W7Z/209	W8EJ/276	WB9TST/121
JA4ZA/340	Z5BIV/340	K3OX/203	WB2VF/306	W4A0AX/139	W6CS/305	W7Z/209	W8EJ/276	WB9TST/121
JA5EN/286	4X4KM/247	K3UC/212	WB2VF/306	W4A0BX/254	W6DZ/222	W7Z/209	W8EJ/276	WB9TST/121
JA9CF/256	44DX/279	K2PZ/154	WB2VF/306	W4ASKE/220	W6ETR/198	W7Z/209	W8EJ/276	WB9TST/121
KH6CF/289	AA1K/269	K2QXS/140	WB2VF/306	W4AWPN/222	W6JZU/308	W7Z/209	W8EJ/276	WB9TST/121
KP4EQF/249	AD1S/181	K2JUFM/295	WB2VF/306	W4BAGT/160	W6MUS/256	W7Z/209	W8EJ/276	WB9TST/121
LUBBA/258	AG1U/250	K2ZCD/240	WB2VF/306	WB4EBX/152		W7Z/209	W8EJ/276	WB9TST/121
OE1U/230	AG1K/226	KB2EN/225						

### Phone

CT1BH/329	I8ACB/290	AD1S/181	N2CW/279	AK4E/167	K5BG/210	W96UJO/309	N8II/209	W9DDX/250
CT1MW/306	I0EKM/150	AG1J/248	W2EV/283	K4BFB/329	K5MK/200	WD6AQK/155	W8CBA/240	W9J/237
CT2BB/275	JH8G/315	K1DFC/301	W2GVV/270	K4RUG/105	K5V/229	AA7C/148	W8MAV/290	W9KB/305
DL4XA/252	JA2KVD/246	K1HBM/151	W2IQ/289	K4VAA/161	N5NW/298	K7YDO/254	W8PNC/283	W9TE/220
DL1MD/302	JA9CF/256	K1MEM/300	W2SUA/314	K4XN/299	W5AFVI/222	K7AUH/244	W8PNT/283	W9TJ/245
DL8KS/299	KH6BZF/262	W1ETH/141	W2YLL/342	N4AVB/219	WB5CJ/219	W7BCT/279	W8RFR/159	WB9HIP/250
DL8NU/332	LA5WN/127	W1HR/208	W2ZZ/282	N4BVC/144	WB5SV/205	W7GSP/273	W8SVP/152	WB9JXT/146
E2HX/340	NL7A/160	W1WXZ/270	WB2BT/163	W4NYN/315	WD5DI/205	WA7TTM/240	W8SVP/152	AC0A/178
EA3AAC/270	OE1SBA/148	WA1EOT/256	WB2DND/170	W4ADAN/240	WD5JFM/130	W7CLU/245	W8SVP/152	K0LD/212
E44YL/186	O25V/287	WA1PML/240	WB2HPP/254	W4A0DE/261	AC8V/209	WB7FDE/140	W8SVP/152	K0RDJ/140
F5VU/322	SM5AZU/332	W1HTR/208	K3MNU/288	W4AGLE/126	K6HN/216	W8TLE/194	W8SVP/152	K0SE/153
F6AOC/320	VE3BX/315	WB1AHF/150	K3RX/273	W4AMMO/289	N6J/248	K8CMO/278	K9SVQ/288	W0CQJ/160
F6BFH/311	VE3ECP/232	WB1DOC/252	K3LC/163	W4A4WT/300	N6J/248	K8CMO/278	K9DIN/166	N0RR/301
F9MD/331	VE4AT/253	WB1DWO/147	W3QJW/198	W4A4WT/300	N6J/248	K8CMO/278	K9FV/270	W0BWJ/223
GM4FIW/140	VE4OX/313	W2KAI/220	K3WJ/162	W4A4WT/300	N6J/248	K8CMO/278	K9HVL/710	W0NZA/200
HK3DD/209	XE1X/202	K2PZF/140	W3AP/278	W4A4WT/300	N6J/248	K8CMO/278	K9HVL/710	W0RWC/281
I1EVI/183	ZE1BP/272	W3EJF/279	W3FZE/279	W4A4WT/300	N6J/248	K8CMO/278	K9HVL/710	W0WAB/151
I4FAF/225	ZL1ADI/200	W3YQ/180	WB3EFC/199	W4A4WT/300	N6J/248	K8CMO/278	K9HVL/710	W0WAB/151
I5FCK/303	4X4KM/239	KA4P/152		W4A4WT/300	N6J/248	K8CMO/278	K9HVL/710	W0WAB/151

### CW

DL4XA/146	JA1QER/169	W1WLW/183	K2PF/136	WA2QRX/185	N4RR/219	K6CBL/240	K8LJG/220	W8UVZ/251
DK5PR/120	JA2KVD/165	WA1CCR/150	N2CW/228	K3AP/211	W4LOO/140	K6RLY/183	K8VM/200	W8JYE/240
F3AT/269	SM3EVR/271	AC2U/255	W2SSC/140	W4VU/220	WA4DAN/120	W6TFC/227	K8WW/241	K9LW/181
F6CR/201	VE3ECP/133	K2KA/183	W2ZZ/148	N4OT/187	K5OGX/167	AA7C/183	N8II/187	N0RR/263

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from February 1 through February 29, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

## New Members

### Mixed

DJ5LE/161 DJ6DU/101 EA8TY/100 HB9BNF/101 JA1KFH/111 JF1SLN/106 JJ1AOS/114 JA3UPM/118 JA5JGY/216 K7GCC/199 K7LEO/101 LA3JI/104 LA4XT/100	ON6GB/100 S8AAT/108 SP9AGW/100 SP7KTE/160 VE2AGP/110 VE3BH/109 VE3BHG/109 VE3OCU/109 VE5JM/132 VE7DTS/211 YU3LT/126 YU3TAN/103 YU3TGB/123	9V1SH/206 AE1JJ/137 K1ITS/104 K1LEC/101 WA1SHR/109 WA1YGA/115 K2JK/100 KA2FRW/122 KA2X/108 KB2KN/108 WA2IF/S/219 WB3JCX/126 WA2RVF/107	WB2DHY/106 WB2HDE/100 WB2OEI/100 WB2YOF/101 WB2AGS/110 KA3BDW/101 KB3FA/134 N3ARK/114 N3FG/103 W3HYJ/270 W3OVV/100 WB3OVA/187 AA4AR/290	K4GXH/234 K4LQ/263 K4VAY/100 K4XA/102 K4ABWD/100 KB4TS/101 N4AIG/101 N4AM/178 N4AYO/111 W4FCO/136 W4PNY/104 W4XC/108 WA4CCP/101	WA4CXZ/308 WA4EPN/102 WA4FXJ/104 WA4GQA/153 WD4NBX/115 WD4SEU/100 AD5F/104 K5DPG/106 KA5CRT/104 W5LBT/124 W5LBT/108 W5BUFR/105 W5UJN/117	K6GEH/103 K6BGJ/116 N6AFI/108 N6HK/105 W6DDB/137 W6DQ/119 W6L/103 W6UGT/100 WA6OQG/269 W6QYI/110 W67VC/105 W67VU/111 A18V/101	K8HHZ/104 K8KM/102 K8QYC/111 K8RW/108 WA8CAJ/101 K9TI/115 KB9JF/109 WA8AQN/105 WA8EKA/128 WA8OPV/101 WA8VIR/100 WB9GCU/100	WB9QIZ/103 WB9QDT/119 WB9TZZ/124 WD9ARM/102 W9EJE/101 K0BM/103 K0XB/100 K0ZFL/102 W0PBK/100 W0UJK/102 WB0GPR/221 WD0BH/115
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### Radiotelephone

DA1MP/152 DF2EO/104 DF7GK/123 DK5WC/125 DK5WRH/151 DL3CV/115 HL3JON/W2/122 HM1SX/102 I2RSB/109 I0HMD/117 J28AZ/140 JF1SLN/104	JA2BMU/149 KA2RF/105 JA5JGY/162 OE3SLX/181 ON6GB/100 S8AAT/104 VE2FTI/100 VE5JM/122 VF7BEN/131 YU2OO/115 ZS4W/106 9V1SH/195	AE1JJ/133 N1AHN/103 W1BWS/113 W1TPB/101 WB2YRV/105 WA1VTA/100 AD2S/112 K2JF/100 K2RVG/101 KB2ED/102 W3RDE/108 WB3BOA/178	WA2JQK/138 WA2RVF/104 WA2WCV/137 WB2DCP/109 WB2YRV/105 WB2AGS/105 KB3FA/134 W3BUI/101 W3ETB/104 W3HAY/104 W3RDE/108 WB3BOA/178	K4BWC/100 K4KYI/102 K4LQ/124 KQ4O/208 N4AYO/107 N4CRU/101 W4PNY/101 W4WMO/108 WA4FXJ/104 WA4WXX/107 WA4ZUS/104 WB4KTG/121	WB4ZLK/100 WD4AAM/110 KB6CV/119 WD4LDS/100 WD4OCO/116 W5CRP/121 W5HII/107 WD6ANV/102 WD6ERX/101 W5BMSU/110 W5UJN/112 W5SBN/105 AA6BB/109	K6UCG/109 KA6V/124 KB6CV/119 WA6OQG/269 W6BVI/134 WB6ZNV/102 W5HII/107 WD6ERX/101 N7AET/102 N7AKQ/110 W7MBW/112 WA7CYP/110	WA7ZPO/101 WB7QVB/101 WB7VC/104 K8KIC/106 W8JQR/101 WA8BCG/104 WA8CAJ/101 WB8TGS/112 WB8DEL/110 WDBPUG/101 K9MDO/109 KB9CJ/109	KB9JF/108 W9KA/106 W9MWD/149 WA9MCM/134 WB9QIZ/103 WB9VY/107 W9EJE/101 KB0A/119 W0ZXX/119 WA0PDA/102 WB0GPR/175
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### CW

HB0NL/101 JA1CZ/118 JA3UPM/126 JA5JGY/104 OE1WY/W/104	OK3CAR/108 OZ1BI/102 TG9ML/104 VE2DAP/112 YU2AAU/102	YU3TAN/100 9V1SH/114 A1S/130 W1KXZ/101 WA2JIC/100	W2GND/101 WA2MUA/120 AE3Y/118 N3SL/101 W3ARK/183	W3EVW/228 AA4KA/119 K4CXY/118 K4LQ/195	KM4D/110 W4VPI/100 W4YDL/102 WA4EGQ/107	WA4MFS/111 K5AC/208 K5EE/108 K5PR/100	N5QQ/101 W5AQ/113 N6AXD/108 W7MBW/142	N8DE/144 K9TE/105 W9LNV/141 WB9UIA/125
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## 5BDXCC

OK2QX W1TRAN	YU2AAU K8SQE	W4AI K94CM	DM2CYO DK5KN	K2DSV W1XD	N5RQ JH1QOJ	UP2BAR	N4TJ	UR2QD
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## Endorsements

### Mixed

DF4FX/274 DJ2EH/300 DK7XX/160 DL1CF/341 DL1DA/224 DL1DC/346 DL7CW/283 DL9YC/226 G3DOG/276 HA5KKK/206 HB9AMO/292 HB9AQW/304 HB9BBB/123 HB9DX/344 HK3YH/176 I5EFO/227 I8FRD/270 I9WVG/299 JA15J/258 JA1VE/185 JA1HWN/295 JA2HMF/163 JA3VLD/295 JH6RY/212 JA7JAA/282	JABEL/314 JA9AQE/225 K8CZ/120 K7JAI/146 LA3SG/253 OZ5MJ/166 SM5RH/200 SM6DY/277 VE3BWW/345 VE3DNR/241 VE3CFE/212 VE3DUS/199 VE3GFN/220 VE3II/300 YU1NYP/318 YU1NZW/205 YU2RTW/301 YU3TKT/200 YU4HA/301 Y5BAE/326 4X4NJ/290 AA1K/271 AB1P/185 K1CC/290 K1FR/4/120	K1GVV/153 K1THP/183 K1VKO/183 N1ACW/271 N1UN/272 N1XX/330 N1ZZ/273 W1BL/282 W1GBL/106 W1GDO/315 W1JJA/124 W1LOU/204 W1RLO/344 WA1JMP/290 WA1UVX/252 WA1ZLK/180 AA2Z/175 AB2W/181 AB2Y/167 AD2S/128 AF2L/181 K2AVX/154 K2PLF/3/216 K2PX/164 K2QF/181	K2SP/272 K2TV/258 K2UJ/310 K2YGM/276 K2ZSL/140 N2GZ/123 W2AZX/332 W2CU/139 W2CUE/200 W2FVJ/158 W2IYX/310 W2KE/279 W2LXJ/301 W2MP/314 WA2MTI/242 WA2MUA/189 WA2OH/230 WB2OH/210 WB2QEU/144 AE3Y/196 K3NB/140 KA3BFX/145 N3GB/253 W3ARK/260 W3UJ/283	W3XX/292 WA3DMH/248 WA3UXU/155 AA4KA/175 AA4NC/203 AF4M/242 K4KJ/254 K4DSE/255 W4IBP/273 K4JEZ/218 K4KJZ/204 K4KUZ/185 K4PR/151 K4SMX/321 K4ZUJ/310 K4G/200 K4M/288 N4VA/273 N4VZ/301 N4XZ/271 N4CZ/322 N4ZS/233 W4JD/324 W4KA/292 W4LVM/305	W4NBV/308 W4YA/322 W4YV/315 WA4CTA/250 WA4JJW/250 WA4LZR/209 WA4MFS/242 WA4MOQ/182 W4OSN/289 W4OSS/331 W4SVU/122 W4UME/187 W4MJE/206 K6CLV/122 W4DHY/142 W4KOC/124 WD4OCO/121 AB5P/255 A15A/141 AK5B/153 K5JUC/212 N6A/W/252 N6OZ/262 W6DPD/153 K5TA/151	KA5BML/154 KB5QA/158 N5IH/201 N5MM/219 N6RQ/270 W5GEL/325 W5IF/332 W5MMD/356 W5ODD/134 W5D5BCY/185 W5D5DKT/207 AE6U/285 K6BMX/201 K6CLV/122 W6DT/335 K6UD/303 K6ZOR/180 KF6A/220 K6S/120 N6ANN/252 N6A/W/252 N6OZ/262 W6DPD/153 W6FW/342	W6GO/252 W6KPC/286 W6MYP/192 W6NYP/284 W6NZ/279 W6SN/330 W6UY/316 W6YQ/250 WA6DZM/180 WB6DXU/310 K7SFN/262 W7DV/300 W7LGG/271 W7NP/270 W7UZA/273 WA7NEQ/201 WB7XK/200 KA8A/151 K8A/300 K8UE/233 K8WD/200 KB8KW/260 N8DE/267 W8II/263	W8KPL/354 W88PH/140 WB8TG/159 WD8OOY/132 K9UR/201 N9KV/276 W9BB/161 W9FKC/356 WB9NZ/121 WB9RG/290 W9SIL/129 WB9NKH/258 WB9QJ/248 AC0M/199 AG0A/157 K0BS/324 K0GS/300 K0QQ/144 N0ALL/299 W0NAR/299 W0TU/183 W0ULU/175 W0WAN/169 WB0SNG/240
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### Radiotelephone

DA4BS/318 DF4FX/268 EA13R/325 DL1Y/319 E8AJJ/328 F6DZU/280 G3DOG/247 I5EFO/227 I8AA/336 I8AGS/240 I93TOE/203 I98BY/207 JH1HWN/292 JA2HMF/154 JA3VLD/196 JH6RY/210 JABEL/294 LA3SG/215	LA9GV/271 K7JAI/137 PP5UG/310 VE3DNR/241 VE3II/299 VE4IS/175 VE4SD/239 VE7WJ/310 YU0T/249 YU1NZW/150 ZL3ON/323 ZS6BB/317 K1ATL/160 K1CML/289 K1GXU/280 N1ACW/265 N1ZZ/216 W1GKN/280	W1YOU/199 WA1UVX/251 WA1ZLK/199 K2SP/270 K2TV/241 K2UJ/307 N2BJ/230 W2HXF/239 W2IYX/310 W2LXZ/293 W2MP/292 W2NCL/250 WA2CBB/210 WA2ELJ/130 WA2HFT/184 WA2MUA/164 WB2OEI/139 WB2SJC/208	N3GB/233 K3LRI/150 KA3BFX/142 W3DR/202 W3HYJ/269 W3UJ/160 W3KFC/223 W3CHS/171 W3GIV/249 W3KQJ/128 AA4AR/290 AA4NC/164 AB4H/307 AG4L/261 K4CAH/317 K4GXH/230 K4IE/311 K4KJZ/204	K4KUZ/155 K4LSP/315 KB4BW/163 WB4HJ/151 N4VA/240 N4CZ/306 W4LVM/290 W4MID/216 W4NBV/293 W4WV/140 WA4CXZ/306 WA4ECA/183 WA4GQA/153 WA4MFS/221 WB4GOL/129 WB4NCJ/150	WB4OSS/315 WB4SW/211 WB4VCO/152 WB4YNL/149 AE5E/155 K5MFA/224 K5UKN/303 KA5BML/150 KB5DN/177 N5IH/198 W5FHY/126 W5SGI/159 W5DCG/161 WA5VH/244 WB6VSK/206 AJ7V/219 W7AE/282 W7EKM/315	N6AW/314 N6NA/329 W6ARJ/330 W6AXH/305 W6DPD/153 K5MFA/224 W6GO/241 W6KPC/291 W6UY/305 W6YMH/125 WA6HAA/220 WA6JZ/200 WA6LFN/244 WA6VH/255 WB6VSK/206 AJ7V/219 W7AE/282 W7EKM/315	W7MSI/238 W7OGT/178 WA7KNK/243 WB7RGN/160 K8GFL/343 K8MG/199 K8WD/200 KB8KW/230 N8DE/170 W8GKM/330 W8NVP/254 W8ZET/310 WA8MFW/165 WB8WZ/230 W8DMJ/121 K9LKA/331 K9PSN/164	K9IS/153 N9BA/240 N9MP/240 W9TC/254 W9YRM/290 WB9BGJ/290 WB9JH/129 WB9NKH/241 WB9JW/161 K0BS/323 K0EPE/285 K0GS/261 K0IUC/279 K0QQ/241 W0GIG/343 W0ULU/175 WA0PVM/271
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### CW

DK7XX/152 HB9AL/199 HB9BBB/120 HK3YH/158 JA1VE/138	JH1PBR/204 JA7JAA/239 OZ1DYU/153 W2LXZ/118 VE7CNE/200	YU1NZW/144 YU2RTW/268 A1K/185 N1ACW/136 N1RW/144	K2PX/162 K2QF/139 K2TV/149 W2LXZ/118 WA2CBB/130	WA2EA/150 W2GBS/273 W3KFO/158 AB4H/207 K4IE/277	KD4Z/180 N4VA/193 W4JID/159 W4LVM/242	WB4OSN/214 WB4QME/148 W5JW/204 W5ODD/128	AE6U/245 K6DT/245 W6GQ/135 W7OK/132	W9M/290 WA0P/164 W0JF/121 W0RJU/180
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## DXCC NOTES

### Satellite Award Rule Modification

Both AMSAT and the DXCC have recommended modification in the DXCC Satellite award for Phase III Satellite contacts. The ARRL headquarters Award

Committee and the Communications Manager have approved the following change to the DXCC rule (F), which will not allow Phase III contacts for DXCC Satellite credit:

(F) Satellite; contacts made using the satellite since March 1, 1965. This DXCC is only available for con-

tacts made through polar-sun synchronous satellites of altitudes less than 1500 miles. This DXCC is not endorsable.

A further detailed explanation of this modification will appear in the "Operating News" section of July QST.

## After 66 Years, Coggie Hasn't Lost His Spark

Ivan S. Coggeshall, KA1AVG, known as "Coggie," was born in Middletown, Rhode Island, on September 30, 1896. Coggie and his wife, Ada, live in Middletown, just outside Newport. First licensed as an Amateur First Grade radio operator in 1914, Coggie made his career at the New York headquarters of the Western Union Telegraph Company. He retired in 1960 as assistant vice president, submarine cables. From 1941 until 1953 he was a director of the Institute of Radio Engineers, and in 1951 he became its president. He was executive officer at NDB, the net control radio reserve station of the third naval district, New York, from 1937 to 1940. During WW II he held radio and cable assignments at the Navy Department in Washington. In 1952 he became a Commander, U.S. Navy Reserve, and retired in 1957. His awards include an honorary degree of Doctor of Engineering from his alma mater, Worcester Polytechnic Institute; the 1963 IEEE Communications Group award for integration of wire and radio; the 1978 IEEE Haraden Pratt Award for services to his profession; and the Antique Wireless Association 1979 Harry Houck Award for documentation of the history of early wireless. Amateur Wireless Watch Over Atlantic Sea-Lanes — Newport, 1908-1911 and Maritime History of Electrical Communications, are fine examples of his writing skills. He even wrote an article, "When the World's Radio Speed Title Changed Hands," which appeared in November 1933 QST.



First licensed in 1914, Ivan S. Coggeshall, KA1AVG, tells us: "I still comb the bands, 160 down to 10, with my Hammarlund receiver, but they won't let me go on the air with my old spark!"

tuning and the use of a pair of phones, and also other detectors. Our favorites were galena, silicon, carborundum, and copper and iron pyrites. On tuning, some of our early receiving coils were very large. I made one, according to directions in an early electronics magazine. It was 1 foot in diameter and 2 feet long, wound with double, cotton-covered bell wire which was "skun" down a channel to get the contact with the sliders. We had crude condensers that were made out of metal sliding in wooden channels. That's about all I can say on the receiving side. On the transmitting side we had spark coils of different kinds. Everybody had a helix that was required to change the natural frequency of the antennas that we put up to somewhere around 600 to 1200 meters, in that range.

**QST:** You reported on the code-copying contest at the Chicago World's Fair in 1933. How does the interest and enthusiasm shown toward code today compare with your recollections of the old days?

Coggeshall: Today's amateurs have a choice, and many prefer phone. In my days of amateur wireless, there was no voice apart from the commercial experimenters like Fessenden and De Forest. I never caught their transmissions. Phone came in with World War I and vacuum tubes.

**QST:** What do you think of "no code" licensing proposals?

Coggeshall: If no-code licenses were adopted I think a major source of potential defense operators would dry up. Of course ham radio and the ARRL would have more appeal to am-

bitious and talented CBers. The whole picture of voice/code amateur spectrum would change, and some of the fun would be gone.

**QST:** Of the many advances you have seen in Amateur Radio since you were first licensed 66 years ago, what has most impressed you?

Coggeshall: I believe it is the mix of interests afforded. There are vacuum tubes, transistors, capacitors, antennas, feeders, propagation under control, meters and measurement, contests — golly!

**QST:** What is your most memorable Amateur Radio-related incident?

Coggeshall: The code-speed contest. In 1933 I did a piece on it for QST, reporting the official ARRL code-speed contest at the World's Fair in Chicago. That year the championship changed hands from Ted McElroy, of Associated Press, who had held it since 1922, to Joe Chaplin, of Press Wireless. The speed was, I believe, 57.3 wpm. My fellow judges were Commander F. H. Schnell, W9UJ, of Chicago, and Lieutenant A. A. Hebert, W1ES, then treasurer of ARRL.

**QST:** What are your present Amateur Radio interests?

Coggeshall: My main interests are attendance at meetings of the Newport County Radio Club and reading QST.

**QST:** What do you see in the future of Amateur Radio?

Coggeshall: I see about the same as the immediate past, certainly no diminution. It has been a characteristic of radio that something new is always opening up. Today it's satellites and computers, tomorrow it may be something else that is now hidden.

**QST:** You have received many awards for your interest and dedication to the communications field. What award has the most significance to you, and why?

Coggeshall: The IEEE Communication Group's award for integration of wire and radio. Out of amateurism I became a professional. Putting cables and radio links together, end-to-end, on a global basis, was new when I was at it. Recognition by my peers gave me great satisfaction.

**QST:** Can you tell us what some of your other writings have been? We know about the Amateur Watch Over Atlantic Sea-Lanes and Maritime History of Electrical Communications.

Coggeshall: I wrote for the *Encyclopaedia Britannica*, the current article on telegraph. I've written other articles on radiotelegraph for *Britannica*, but they have become outdated and replaced. I did a chapter on telegraph in the *Radio Engineers Handbook* of Keith Henney, McGraw-Hill. Most of my writings have been on telegraph, cable and the interplay between wire and radio.

**QST:** How did you get started in Amateur Radio?

Coggeshall: I guess it was by being associated with an older boy who bought a spark coil, detector and telephone receiver. The story, with logs, is in *Amateur Watch Over Atlantic Sea-Lanes*, in the Newport Historical Society.

**QST:** How did your early Amateur Radio activities differ from those of the present?

Coggeshall: In those days there was nothing you could get out of town with. Sending range was limited to in-town amateurs. All the fun was listening to ships and distant code stations. Navy ships would occasionally work us, two-way, but most of them were in port here in Newport. The old logs do show some contacts with battleships and with the Navy station in Newport.

**QST:** Do you have anything more that you can tell us about the early days?

Coggeshall: We used the embryonic spark coil and some kind of detector. The first one that we were successful in using was a steel needle balanced on a couple of sharpened carbons that we got out of arc lights. These were discarded carbons which we sharpened into V-shaped points and balanced the needles on. They were our first detectors and we used them with a single telephone receiver. Later on we

\*Editorial Assistant, QST



# YL News and Views

Conducted By Jean Peacor,\* K1JJV

## ... And Then Some

Ham radio is great, and then some. Vacations are fine too, and then some. Combine the two and you can have the time of your life, and then some. You can be a DXpedition.

To me, DXpeditions were always something that others did. Weren't they lucky? Two years ago that all changed. To be bitten by the DXpedition bug is to find unequalled excitement. It all began because of an ad in *QST*. Four of us, two OMs and two XYLs, decided to inquire further. There was a house for rent, complete with radio antennas, on the island of Montserrat. After we found the island on the map, Montserrat became a household word. We applied for rental and calls and became VP2MCU, \*MCV, and VP2MBJ, \*MBK. For one glorious week in March of 1979, we operated, swam, snorkeled and went sightseeing, and had the pleasure of meeting many wonderful people on that beautiful island. We fell in love with Montserrat.



Bitten by the bug (l-r): VP2VFTW1JP, VP2vFI/K1JJU, VP2VfV/K1JJV and VP2VFU/WB1ABF.

Once you've been bitten by this bug, your mind begins to race. What plans should be made for next year? The decisions become difficult. Should we return to the island we'd grown to love? Try another that we knew nothing about? Would it work if you had to bring along all the radio gear, antennas and so forth?

We had read about hams swimming ashore with gear on their backs. Something a little more comfortable was what we had in mind. With memories of Montserrat still fresh, we tried to keep open minds as other possibilities were examined. Could another trip hope to equal the first?

We had learned that four people can live as cheaply as one — almost. Sharing the rental fee and food costs had proven ideal. Since the greatest expense is for air travel, the idea of staying for two weeks became popular.

The *New York Times* produced an interesting ad along about then for a house rental on the island of Tortola, British Virgin Islands. Out came the maps again. ARRL's International Services Officer was most helpful with advice on applying for calls. To assure ourselves, my OM applied and received VP2VFI in a matter of six weeks. Things looked good.

The brochure we received upon inquiry made the house sound like a dream come true. This

prompted a phone call to the owner asking if there were trees on the property. We needed trees for a dipole. He assured us of trees; we assured him that nothing would be damaged in the process. A \$200 damage deposit assured us all. Our deposit was in the next mail. We were headed for Tortola — for two weeks.

Application was made for three more calls and for plane reservations. With plans completed in November, March seemed forever away. The winter months sped as we organized radio gear and antennas. One rig had been used on Montserrat. This time we would try two. Tote bags with wheel bases were perfect for taking the two transceivers — carry-on luggage that did fit under the seat of the plane as required.

Antennas? We invested in a 2-element mini beam. Dismantled, its length was 5 feet. After brainstorming with many hams (as can only be done via repeaters), we decided that a cylindrical rug carton with added wooden end pieces could carry the beam. The addition of a carrying strap allowed it to go easily through with our luggage. Customs officials smiled. Most people take fishing rods? With the help of a tuner, a dipole would be our second antenna. Do all cw-lovers insist on their own key? Three keys travelled with us to Tortola.

Clothes were kept to a minimum; bathing suits being the most important item. We prided ourselves on being well organized. Just one, who shall remain nameless, forgot the bathing suit. This was rectified the first day.

Arriving in any strange place just after dark is exciting. Tortola proved unbelievable. A taxi would take us from one end of the island to our destination, the opposite end of the island, a mere 14 miles. Fourteen of the most exciting miles ever. Our minds eased when the driver finally turned on the headlights. We curved, climbed and descended many times in the darkness. Paved roads were left behind us. The trip's culmination was reached when the driver suddenly reached a sharp curve, put it in reverse and proceeded to back up (with no backup lights) a rocky, narrow, extremely steep mountain. We had arrived! Not until daylight did we see the sheer drop on one side of that road.

First things first. We wine and dined, had the mini beam assembled, strapped to the patio railing and ready to be aired approximately two hours after arrival. It worked. Our first of many exciting contacts was made at 0310 UTC, March 8, with LUBARW.

A panorama of beauty greeted us on our first morning. From our patio, seven islands lay stretched before us on a Caribbean Sea as blue as only that sea can be — sailboats galore — white sandy beaches. Both stations were set up to take full advantage of the site. There were indeed trees, the taller one on the uphill side and the shorter on the downhill side, but we managed to raise a dipole to end all dipoles. Necessity is the mother of invention. One end of the dipole was so well placed, it is still there. Catch and keep, which grows in abundance,



Joanna "Mae" Martin, VP2MN, is one of the few native-born Caribbean YL operators. Mae contracted "radio fever" from her OM, Bobbie, VP2MO. They now share this well-equipped station. Look for Mae on ssb; she welcomes QSOs from YLs and OMs alike. (photo courtesy W1FB/VP2MFW)

encircled one of our chosen trees. Its growth produces sharp thorns that certainly do catch. Not only did it catch our dipole, it kept one end. That's how we learned why *the tool* of the islands is the machete.

One-land calls aren't exactly rare. To suddenly have a VP2 call, and have stations excited because you have it, is a taste of heaven. Our receivers never burst into flames as Justin Thyme's did (April *QST*); however, you could sense them smoking once or twice.

It wasn't all work and no play. We managed to swim, snorkel, sail, sightsee, meet some of the "belongers" and make many new friends. This provided the only cooling process for both rigs.

Departure day did not end the excitement. There's great joy in opening the stacks of mail that result. Nice memories accompany every QSL card that you write.

We are now back at square one. We love both Montserrat and Tortola. Should we go back to an island we know and love — or? With a little planning and for the time of your life, you too can be a DXpedition. It's an adventure, a rewarding experience. "and then some."

## CLARA REGER — W2RUF

The sudden passing of Clara Reger, W2RUF, on February 1 is a great loss to the Amateur Radio fraternity. Whether she was handling the code contest at hamfests, net control on a traffic session or teaching a new group the basic elements of cw, this 83-year-old, 90-pound operator was a bundle of dynamite. She earned the highly cherished Edison Award in 1957 for her work with handicapped youth. She was the originator of YLRL's "33" (love sealed with friendship); the closing to contacts between YLs now used worldwide. A talented musician and teacher. Clara was an asset to Amateur Radio for the 47 years she held her license. □

\*Country Club Dr., Monson, MA 01057

# The World Above 50 MHz



Conducted By  
William A. Tynan,\* W3XO

## ATV Frequencies

This conductor's comments in the January column concerning the future of the world above 50 MHz, brought the following rebuttal from longtime ATV protagonist KB9FO, formerly WB9WWM. It is presented essentially as received with a minimum of editing.

Dear GM,

I was moved by your comments in the January 1980 issue of QST, enough to drop you this note.

Just as it is unreasonable to expect (and has proved so) that when the higher hf bands were found to be viable for long-distance communications, the a-m, then ssb stations did not abandon 80 and 40 meters for the exclusive use of 15 and 10. There is a mix of cw/ssb stations, as well as RTTY and FAX on the hf bands, all in harmony. Even SSV occupies specific frequency areas by gentlemen's agreement. [The other modes mentioned are permitted on the hf bands but FAX is permitted only above 50 MHz. — Ed.] Therefore, it is unlikely and certainly unwise to suggest that just because the rest of the world has discovered that 450 MHz is good for more than 100 feet DX, that the ATV and other pioneers will simply vacate 450 for the lure of higher bands. ATVers and others will occupy 450 and will continue to do so, simply because it is a good beginning area, since it is the lowest frequency in which ATV is allowed. If ATV were allowed on 6 meters, or on 220 MHz or 144 MHz (provided that sufficient band was provided), ATV would have begun there. As it is, 420 MHz is the lowest band with sufficient bandwidth to allow normal ATV operations. And they will continue on 450 — particularly since the advent of ATV repeaters has produced a large influx of new ATVers and expanded the utility of the mode. ATV operation has long enjoyed operation on bands besides 450. Many stations in California and a few stations in other areas routinely operate on 1240 MHz. There are at least three crossband repeaters (now that crossband repeaters are finally allowed) which operate between 434 and 1240 MHz. I and several other

ATV/vhf/uhf experimenters have also operated on the higher bands of 2305, 5.5, 10 and 24 GHz. Not that there is a lot of activity up there; there isn't. Likewise, until equipment and general populace of hams provide someone to talk to (view) there will be few of us willing to spend the money simply to "do it because its there." While color is expensive, a growing number of ATVers are operating in color. Generally this is because there have been some "dumps" of out-moded color cameras in the \$400 to \$500 range, and the increasing use of home VTRs, which, if you recall, I used to market in the early 70s to ATVers and video hobbyists. The current interests are not in color, or 1240 (passé) but in computer video. Linking one's TRS-80 or whatever to the video system. Jane Veeder and others in the Chicago area are deep into this subject and have even presented broadcast TV programs on the subject as well as displays of video art at the Chicago Art Institute.

There is more to ATV than meets the eye, and promoting or hinting that ATV will be on 1240 or in color by 1990 is as outdated as last week's newspaper. It is self evident since we are already in color and operating on 1240 (and other bands), but we will not abandon 450 MHz, as that is where the "action" is and will be for the next few decades, unless someone discovers that you can get transcon DX on 1240, or 2.3 GHz, in which case ATVers will be there to set new DX records for the mode and enjoy some real DX beyond the 550 mile limit so far found on 450 MHz.

We do not expect other spectrum users to move to other bands; don't expect us to move.

73,  
Henry B. Ruh, KB9FO

I thank Henry for his letter and I am happy to give him this opportunity to air his views, but I stand on what I said in the January column. I believe strongly that, if ATV is to gain the popularity that it deserves, it must have

more elbowroom. The 70-cm band offers room enough for only two ATV channels, at most, if other worthy activities such as fm simplex and repeater operation, satellite communication, EME and terrestrial work are not to be disrupted. I fail to see how two channels can support the ATV growth that is almost sure to come in the next 10 years. And I am not in favor of disrupting the aforementioned activities in order to support additional ATV channels, which wouldn't be enough to handle the load anyway. I am certainly not opposed to ATV operation on 70 cm as long as it is conducted in such a manner so as not to disrupt the other activities on the band. Neither is there any reason for those using other modes to operate in parts of the band customarily used for ATV. WARC is over and we in the U.S. have been very fortunate to retain the entire 30 MHz from 420 to 450. Our Canadian brethren were not quite so fortunate; they lost the lower 10 MHz even before the conference started. If the band had been cut, we probably would have had to rethink our band usage. But since this didn't happen, I don't see any reason why we can't continue with the existing band plan originally suggested by the VUAC and VRAC.

As I said in the April column, which summarized the results of WARC and their impact on the world above 50 MHz, the proposed new 900-MHz band might provide some help to the ATV frequency problem as well as offer some interesting challenges in other areas.

## CENTRAL STATES VHF CONFERENCE, AUGUST 15-17

The annual conference sponsored by The Central States VHF Society is always one of the high spots of the vhf year. The 1980 affair promises to be no exception. The fact that it is being held in Colorado Springs, on the slopes of the Colorado Rockies at the foot of Pike's Peak, should be enough to guarantee a great time. But, on top of that, the program being put together by AAOL, K0KE, W0PW and the others on the Conference Committee is sure to make this one of the most memorable of the many fine gatherings held over the years.

Among the topics on this year's program will be techniques for 1 GHz and up. Also, Jan King, W3GEY, and Tom Clark, W3FWI, are to be on hand to inform everyone about the Phase III satellite, which should be in orbit well before conference time. Of course, there will be noise-figure measurements and antenna-gain tests. The dates are August 15 through 17, at the Holiday Inn, North Colorado Springs. For full information, send a large s.a.s.c. with 28 cents postage to Society Secretary Ted Mathewson, W4FI, 1525 Sunset La., Richmond, VA 23221. CU there!

## MISCELLANY

Late flash: At presstime it was learned that on April 10 between 0010 and 0025 UTC, ZB2BL completed 6-meter contacts with JA1 BK, TGS and PVI, and JA2GHT. Signals ranged from 579 down to 439 as the end of the opening approached. Both Jimmy's antenna, and those of the Japanese, were beamed long path.

A new vhf newsheet has begun operation. Called *The West Coast VHFer*, it is published monthly by

WA6IJJ. For information, write to him at 616 East Main St., Ventura, CA 93001.

For those chasing "wallpaper." W2IDZ calls attention to an award for working all New Jersey counties. It's sponsored by the Morris Radio Club. For details, send an s.a.s.c. to the club at P. O. Box 53, Whippany, NJ 07981.

Another very attractive and worthwhile award has come to my attention. It is available to any amateur submitting proof of contacts with all Canadian provinces and territories on a single band. As yet, no one has claimed this award for 6 meters, or any higher band. It should be within reach on 6, but the other bands will probably have to await more-widespread EME activity. For details send a self-addressed envelope to VE7BBO, 203-1946 York Ave., Vancouver, BC V6J 1E3. An IRC would be appreciated.

## FIREWHEEL DX?

W3BDP calls attention to the Firewheel experiment being launched on Ariane along with our new Phase III amateur satellite. The Firewheel satellite, built by the Max Planck Institute for Extraterrestrial Physics will dispense a cloud of barium high over the equator where it will be ionized by the sun and glow like a green moon for a short period. Sam suggests that we may be able to take advantage of this lofty bit of ionization for some good DX. Sounds like it's worth trying — so get ready, as any significant ionization is not expected to last longer than minutes to an hour or so. Listen to WIAW for news on when the cloud will be dispensed.

## ON THE BANDS

**6 Meters** — After a long dry spell, the latter part of March and early April saw the return of F2 DX for a few 6-meter stations located in southern climes. Particularly well blessed were south Florida, Texas south of San Antonio, and parts of Arizona, New Mexico and southern California. These areas experienced propagation to South America, New Zealand and even Australia. For example, W51YX, San Antonio, reports working ZL2CD and ZL4OY on April 1. The

day before, W5FF and K5FF, near Albuquerque, hooked up with the same ZLs plus ZL3NE. An exception to the "southern" rule occurred on April 2, when at 2115 UTC ZL2CD and VE1ASJ completed a two-way. In addition, on the 5th, DK1PZ is said to have heard LU3EX, and 1 U8MBT was reportedly received by a PA0. On April 1, ZB2BL was active completing QSOs with PY2XB and a number of LUs. Jimmy also hooked up with a new station, ZB8TC. It is understood that ZB2CF also participated in this opening and that EI6AS worked ZB8TC as well. Incidentally, EI9D is now on, making the third Irish station active on 6. JA1VOK reports two long-path openings via the South Pole to KP4. On March 10 at 0300 UTC JA4MBM contacted NP4A, and on April 3, JA1VOK and 10 other JAs worked KP4CK and XYI KP4CL between 1430 and 1520 UTC. Signals from Puerto Rico peaked up to S-9 at Hatsu's QTH for a short time. Otherwise, he says, conditions from Japan to South America have not been as good this year as last.

That FY7JHF beacon really gets around. H44PT has heard it numerous times, leading to the contact with FY7AS reported last month. Also, VK8GB has received it on several occasions, including a period from 1500 to 1535 UTC, April 5. This is an interesting time as it is late at night in Darwin.

Between April 6 and 10, the ZLs were into south Florida every afternoon with 4LT, 4LV, 4OY and 3NE being most prominent. WSUWB, Kingsville, Texas, south of Corpus Christi, adds that he worked four ZLs on the 7th — 3NE, 4LV, 2CD and 3AQ. This opening followed by 30 minutes a backscatter session to Arizona. The New Zealanders were in again the following three days, with the 9th producing signals of over S-9. Among those John worked that day, in addition to the above stations, was ZL1MQ, completing a sweep of ZL call areas in one afternoon. On the 13th, ZL2CD reports working Florida stations W4WD, N4NJ and WB4 OSN, LMQ and LOX, as well as KP4s EOR, EIT and AAN, and NP2AE. NP2AF notes that he has worked 13 ZLs as of April 15. The recent authorization enabling the ZLs to work down to 50 MHz before 1V hours is paying dividends for many.

\*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

## 2-Meter 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. Compiled as of April 7, 1980.

### WAS Holders

1	K8MOS	IA	12	W2AV	NY	44	14	K3GNC	PA	22	8	K5PTK	TX	29	9	WB8FEZ	MI	30	8	W0TG	KS	37	10
2	K5DM	OK	12	W2AZL	NJ	41	10	WB4EXW	NC	48	18	WB5JVR	TX	26	10	WABMIL	MI	30	8	W80IUT	NE	37	10
3	N0JA	MO	12	N2MB	NY	39	11	WA4GPM	VA	47	10	W5ASTE	TX	25	8	WABLYL	MI	26	8	W80UFQ	MO	36	9
4	K9HMB	IL	12	W2CUX	—	38	8	W44CQG	AL	43	8	W5SXD	TX	25	6	WBLCY	OH	26	8	W80FW	CO	35	9
5	K1VHS	ME	12	W2BLV	NJ	37	12	K4IXC	FL	40	10	W6PO	—	32	10	W8TIU	MI	24	8	W8ENC	SD	35	9
6	W4AMVI	NC	12	W2PGC	NY	37	11	W4HJQ	KY	40	10	W6BGM	MI	23	7	W8LI	OH	24	7	W80WFY	MO	35	8
7	K5JL	OK	12	W2BWK	NJ	35	8	W4DFK	VA	39	11	K6GEH	AZ	21	10	K8ZES	OH	22	8	W8RAP	IA	32	—
8	W9SDOT	WI	12	K2QVS	NY	34	12	W4HHK	TN	38	9	W6GDO	IL	18	5	K8ZSGD	IL	45	12	K8TLM	MO	29	9
9	WB0ZXU	IA	12	WA2FGK	NJ	33	8	K4CAW	NC	38	9	W6WSQ	IL	16	4	W8UJ	IL	45	12	W8VHQ	MO	29	7
10	K9CA	IL	10	WA2PMW	NY	32	8	WB4NMA	GA	38	9	K6HAA	—	13	4	W9YF	IL	45	10	W80BVC	KS	28	8
11	W0SD	SD	20	K2OR	NY	30	11	WA4LYS	FL	37	11	K6JYO	—	13	4	K9UIF	IN	45	10	W8DRL	KS	27	9
12	K5BMG	LA	12	W2CRS	NY	30	8	WD4MUO	VA	37	9	W6AJRA	IL	11	5	K9CT	IL	42	9	KH6HP	—	22	13
13	K5GW	TX	12	W2EWW	—	29	8	WD4HS	GA	37	8	K8HMS	IL	11	4	W9AAG	IL	41	9	KH6NS	—	3	2
14	WB5LUA	TX	17	K2CEH	NY	29	8	WD4GXN	VA	37	8	N6CA	IL	8	3	K9AAJ	IL	41	9	WA8LPK/KL7	—	34	11
15	K4GL	SC	11	WB2CUT	NJ	29	8	K4KAE	SC	36	13	N6TX	IL	7	4	WB9CAS	IL	41	9	K6YNB/KL7	—	15	11
16	W8VBL	MN	12	W2CNS	NY	28	11	W4MKJ	KY	36	12	K6GAD	IL	6	6	W9VI	WI	41	9	VE1ASJ	—	18	6
17	WB5LBT	LA	12	W2UZX	NY	27	8	WB4LHD	TN	36	10	K7CAD/B	—	6	2	N9SS	IL	41	9	VE12N	—	7	2
18	K4PKV	NC	12	K2BWR	NJ	27	7	K4QIF	VA	36	9	W7JF	MT	44	14	W9WVH	IL	41	—	VE2DFO	—	4	10
19	W0RWH	MO	15	K2DNR	NY	27	7	W4VHH	NC	36	8	K7NII	AZ	41	12	W8VEM	IL	40	12	VE2YU	—	32	8
20	W8IDU	MI	23	WA2SLY	NY	25	9	W4WD	FL	35	8	W7CI	AZ	31	9	W9NLP	WI	40	10	VE2HW	—	18	6
				K2YCO	NY	24	7	W4ZD	FL	35	8	W7KYZ	WA	30	10	W9IP	IL	40	9	VE3ASO	—	38	9
								WA4FBH	GA	35	8	WA7KJU	OR	30	10	K9XY	WI	38	11	VE3FN	—	37	11
								W4LNG	GA	34	8	W7YEW	—	24	7	K9UNM	IN	38	8	VE3DSS	—	37	8
								W4FJ	VA	34	8	K7ICV	NV	21	9	W9BRN	IN	36	9	VE3BON	—	37	8
								W4ISS	GA	33	8	W7BFBM	AZ	21	7	W9VWY	IL	35	9	VE3UH	—	35	11
								W5FF	NM	49	16	K7CVT	AZ	20	6	W9EJA	IL	34	8	VE3ECC	—	33	8
								K5FE	NM	49	14	K7CXA	AZ	13	4	W9PBP	IL	34	8	VE3FKX	—	30	8
								K5MB	OK	46	12	WA1JXN/7	MT	12	9	W9QBU	IL	34	—	VE3AIB	—	29	10
								W5CRC	OK	46	11	W7HAH	MT	9	—	W9QUB	IL	33	—	VE3EVS	—	29	8
								K5MWH	AR	46	10	W8WN	MI	47	10	W9AUB	IL	33	9	VE3AOG	—	28	8
								K5SW	OK	45	10	K8AT	OH	45	10	W3EP9	IN	31	8	VE3EMS	—	27	8
								W5UGO	OK	43	10	W8HTL	MI	40	9	W9TPV	IL	30	9	VE4MA	—	27	8
								W5RCI	MS	42	9	K8AXJ	OH	38	11	W9JDJ	WI	29	8	VE4MA	—	27	8
								N5KW	OK	41	10	K8KJN	OH	38	—	K8CJ	MN	46	12	VE7BOH	—	32	22
								K5WXZ	TX	40	10	W52DIN/B	WV	36	9	W8LER	MN	46	10	SM7BAE	—	31	21
								W5HN	TX	39	12	W8IDT	MI	36	8	W8RL	MN	45	9	G5CSZ	—	23	15
								W5JTL	MS	39	10	K8HWL	MI	36	8	W8OHU	MN	45	9	I4AET	—	12	64
								W5HFW	OK	38	10	W8YIO	MI	36	8	A10L	MO	44	11	G4DZU	—	11	8
								W5HNC	TX	35	12	W8NLC	MI	35	9	W8EMS	NE	44	10	W1NJV9P	—	8	3
								W5SWV	TX	34	8	K8DEO	OH	35	8	K8DAS	IA	44	9	YK5MC	—	7	7
								K5VWV	TX	33	10	K8WVK	MI	35	8	W8RWG	MO	43	10	SM6CK	—	5	4
								W5JKV	LA	33	9	W8PAT	OH	34	9	W8RRY	IA	43	9	VK3ATN	—	4	4
								W5EID	AR	32	12	K8IE	MI	34	8	W8DGY	IA	41	9	ZL1AZR	—	2	2
								W5UWB	TX	30	9	W8BIGY	OH	33	8	W8PN	MN	40	11				
								W8SBKY	OK	29	9	W8NOH	OH	31	8	W8VYV	CO	40	9				

In addition to all of this ZL activity it is known that XE1GF has worked a number of VKs. As an example, on the 13th Geott hooked up with seven VK3s, three VK7s and four VK5s.

In addition to all of this E2 action, the more-southerly-located stations have also been treated to almost nightly TE openings into South America. W5UWB reports that he worked seven LUs on March 19, three on the 23rd and, on the 30th, several more LUs plus CE3OK and CE3DZ. YV57Z notes working 1Us 3FX, 7FA, 3AAT, 8MBL, 8DIN and 8AHW in addition to PY5 2DM, 2XB and 6BN, CE3DZ, CX8BE, HC1BI and T12NA, all since March 18. Ed also reports contacts with H44PT and H44DX. He has moved to a new QTH with a much better shot in all directions and says he will be active this summer during the Es season. YV5ZZ is running a beacon on 50.068 when not active on the band.

It appears that the rest of us are back in the "black hole." Oh well, the Es season is not far away and, in fact, should be well underway by the time this appears.

**2 Meters** — Over the winter "doldrums" a group here in the Maryland area has been holding regular nightly schedules with stations located in north-central Ohio. Even under the average-to-poor conditions that prevail this time of year, only on a couple of occasions have they failed to make contact. Signals have not been ear busting, running S-2 to -3 on the average, but none of the stations involved boasts more than 200 watts. One, W3WN, Frederick, Maryland, runs 10 watts to an 11-element beam and has been successful many times. Other 3s include K1GSR/3 and K3HCE, near Baltimore, and WB3JHP and WB3HAL, here in the Washington suburbs. On the Ohio end are WB8GGM, WB8VZK and WD8AML. All three are using eight-element Quagis with powers of 10, 70 and 160 watts. The gang meets at 2145 local time on 144.170 and will be glad to welcome others. Another Ohio station holding regular schedules is K8RZB. Bob has been meeting N4ANK, Virginia, and K4GZO, North Carolina, but he does not provide time and frequency. Using 80 watts to a 17-element Yagi at 70 feet, his state total stands at 32.

Those looking for Montana, don't pass up WA1JXN. Lance is now operational on EME from his new QTH. As of April 1, he had logged some dozen QSOs and was predicting great things for the moonbounce contest. Address is P. O. Box 243, Frenchtown, MT 59834. Another moonbouncer who should be back in business by the time this appears in print is G5CSZ. Hoppy lost his array during a big

windstorm in December, but the new setup, consisting of four 13-element KLMs using 6-1/2-inch Heliac for phasing lines and a much-more-robust tower and rotator, are now up and working. Thanks to help from W6PO, K4PKV and K6OJM, the 8877 amp is now going. Address Walt Hopkins, Box 502, APO New York, NY 09210, for skeds. From Kansas, W8RT is on with four Booniers and a pair of 8930s. Rich can be reached at P. O. Box 671, Parsons, KS 67357.

**1-1/4 Meters** — Reports of continuing, or impending, activity on this band arrive in increasing number. One of the latest is WB9HNS, Bob is looking for other Chicago-area sbb operators who would like to hold schedules. His address is Robert S. Beatty, 105 Burr Ridge Club Dr., Burr Ridge, IL 60521.

EME seems to be gaining a greater toehold on the band each month. WSFF and XYL K5FF, near Albuquerque, report recent QSOs with W4WD in south Florida, W6PO, and W1JR Massachusetts. W1JR's QVS report contains a description of his new 1-1/4-meter EME array consisting of eight 15-element Yagis. Apparently it works.

K5FF is busy compiling a list of active sbb/w 1-1/4-meter stations. If you fall in that category and were not on the preliminary list she has already sent out, drop a note to Lee Fish, P. O. Box 73, Edgewood, NM 87105, and provide details of your setup.

The 220 Spectrum Management Association has been attempting to come up with a new proposed "band plan" applicable to their state of California. Although some thought that their efforts might be aimed only at fm usage, such has not been the case. A letter from WA6PEA notes that they have consulted with weak-signal operators, especially WB6NMT, who is the 6th-call-area representative on the VUAC. The proposed plan that resulted calls for weak-signal slots at 220 and 222 MHz, as well as an experimental, non-fm segment at 221 MHz.

**70 Cm** — The rare state of Arkansas is now available in a big way. K5MWH has a kW and four F9FTs going and is looking for skeds. Mike can be reached at 2902 Kaylane St., Springdale, AR 72764. One who testifies to the potent signal put out by K5MWH is W8RT, Parsons, Kansas. Rich is running 10 watts to a single 16-element KLM at 50 feet, which has netted him nine states so far. On March 18 he managed to work K0VXM in South Dakota over a 520-mile path, his best DX to date.

The word has been getting around concerning a new East Coast 70-cm net that meets every Wednesday

evening at 2100 EDT. Net control is usually W4ATC, Raleigh, North Carolina, with an alternate of K4CAW, in Greensboro. Both have kW and four-bay arrays so they should be heard. Normal procedure calls for beginning with the beam south, proceeding around to the west arriving at north-west by about 2125, so don't get impatient if you don't hear much right away. All 70-cm enthusiasts are invited to check in. K2UYH, in the May issue of 432 EME News, says that the SK-97 GaAs FET is available from Lunar Electronics in San Diego for \$3. The better model, SK-98, does not seem to be available, but AI notes that SK-97 is about equal to a good NE-645 without some of the problems that device can exhibit.

**23 Cm and Down** — Those skeds between K6ZMW in the Los Angeles area and K7GNV, Phoenix, finally paid off. To turn the trick K7GNV had to move the station to a portable site on a desert hilltop outside Phoenix, but they did make contact on both cw and sbb over the 300-mile path. K6ZMW used right-hand circular polarization throughout the tests, while K7GNV tried vertical and horizontal as well as right-hand circular. Contact was maintained with all three, but results seemed more consistent when both stations used similar polarizations. Signals ran about 5 x 5 both ways. This is thought to be the first 23-cm work between California and Arizona. Congratulations to both K6ZMW and K7GNV for persevering and for their eventual success. K6ZMW says he's now looking for 5s!

W5GVE, Corpus Christi, Texas, reports that his best DX to date is 366 miles to WB5LUA, north of Dallas, but he is hoping to work across the Gulf to Florida which is 800 to 1000 miles away. Bill notes that it has been done on 70 cm, so it should be possible here also. From New Haven, Connecticut, KA1GT writes that he has 100 watts to a 38-element loop Yagi and a 3-dB receiving setup. He has worked W1JR near Boston, and regularly talks to WA1VUV in Meriden, Connecticut. Bob, who was active in the UK as G8EKB, makes some comparisons between 23-cm operation here and in G-land. He feels that we need more incentive to promote activity, and particularly notes the value of the QTH Locator System used in Europe to provide contest multipliers and a measure of station accomplishment. He suggests that such a system would be more equitable here than our present system of counting states and ARRL sections.

Activity on the microwave bands is not confined to the more populous parts of the country. W7JF reports from Montana that he has worked K7PO, 16 miles away, on 23, 13 and 3 cm.

# Results, 1980 ARRL Novice Roundup

Only the beginning. . . .

By Tom Frenaye,\* K1KI

Things have changed a bit since the very first Novice Roundup in 1952. In that year just five of the 92 Novice entrants managed to surpass the 100-QSO mark — and the NR was a 40-hour contest back then. This year, for the first time, two stations broke the 1000-QSO mark! Of course the new crop of Novices have it a little different. Back in 1952 the Novice license was good for just one year and not renewable, and they had 2-meter privileges. In addition, they didn't have 10 meters, had to run less than 75-watts input and could not use a VFO.

Most Novices had homebrew transmitters (6L6s were popular at about 10 watts), while

today nearly everyone owns commercial gear. Oh yes, 532 logs were received this year from 383 Novices, 46 Technicians and 102 "upperclassmen." This was a slight decrease from last year's 561. Just over 82% of the Novice/Technician entries indicated a transceiver was used, 17% chose the transmitter-receiver route, and one person used a converted CB rig on 10 meters. Looks like homebrew equipment and contest operators don't go together too well these days. The one person who used homebrew gear indicated that he wasn't going to submit a score because he didn't enjoy the NR.

On the other hand, Novices seem to put a lot of their energy into antenna experimentation. Dipoles were by far the most popular antennas, with 68% having at least one of them up. Beams were second on the list with 27% reporting their use. Farther down the list were trap verticals (15%), verticals (11%), inverted vees (9%), long wires (8%), trap dipoles (6%) and ground planes (1%). At least one person reported using an inverted L, double bazooka, Windom, loop, V beam or sloper. Many people changed or rebuilt their antenna systems part way through NR week as they found out how well their existing systems did or did not work.

Many of the General class and higher participants commented on the wide variation in code speeds heard during the NR. Some people were obviously on the air for the first time, while others were doing so well it seemed they shouldn't be Novices any more! The five-year renewable Novice license may give the slow starters a better chance to upgrade but also gives you fast talkers an excuse not to. Most people who spent more than a few hours in the NR were able to build up their code speed considerably. Don't stop now; do some more studying and upgrade as soon as you can. After all, the DXing and contesting is much more fun outside the Novice bands!

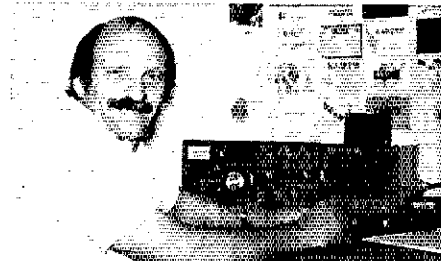
How about dropping us a letter telling us what kinds of articles you'd like to see in *QST*? We aim to please everyone, beginners and old timers, so the more you let us know, the better we can meet your needs.

## FEEDBACK

Last year's writeup contained a couple of errors: third place in Colorado went to WB0GXR, fourth place in Idaho went to KA7CKE; and KA2BNF and KA4AUR should have been listed in the less-than-two-years-licensed category.



In her first contest, KA9FWD/T gathered in 208 QSOs and her first DX QSO. (WD8QJB photo)



KA6EUS/N looks like he's on his way to a completely QSL-covered wall with that patented smile of his.



With his code speed increased by more than 5 wpm, KA4KIZ/N should be well on his way to upgrading.



It only took 15 hours for KA6EWF/N to make the 200-QSO mark. Looks like he just added a new state to his collection, judging by the big smile.



KA0DOO/N can now claim the honors as top Novice scorer from Minnesota.

\*Assistant Communications Manager, ARRL

## Top Ten Novices

WD5COV	108,253
KA2BNF	95,920
WD0HCG	76,440
WB5LVL	71,148
KA9BSD	69,065
KA2CLQ	65,484
WB1FPF	64,768
WD8NKC	61,050
WB1AOG	58,368
WD8BHE	51,450

## Top Five Technicians

KA2CMC	87,010
KA8FDW	61,072
KA0DNI	47,064
WB2DNP	44,916
WB3JW	18,960

## Division Leaders

### Novice

KA3DCT	Atlantic
KA9BSD	Central
WD0BWH	Dakota
WD5JZL	Delta
WD8NKC	Great Lakes
KA2BNF	Hudson
WD0HCG	Midwest
WB1FPF	New England
KA7FPP	Northwestern
KA6GDB	Pacific
KA8BI	Roanoke
WD5COV	Rocky Mountain
WD4AHZ	Southeastern
KA6FAP	Southwestern
WB5LVL	West Gulf

### Technician

KA2CMC
KA9FWD
N0BHC
N5AVN
KA8FDW
WB2DNP
KA0DNI
WB1EIH
KA7DRN
WA6HKP
WD4KEP
WD5IWP
KA4GSK
N6CJA
WD5CSQ

Score listings indicate call sign, score, QSOs, ARRL sections plus DXCC countries and total hours (i.e., WB1DVE/N had 16,213 points, made 291 QSOs in 53 sections/countries in 15 hours).

U.S.A.		3		5		Oregon		Wisconsin	
<b>1</b>		<b>Delaware</b>		<b>Arkansas</b>		<b>KA7FPP/N</b>		<b>KA8FOX/N</b>	
WB1DVE/N 16,218-291- 53-15		WN3RGP/3N 15,795-243- 65-30	KAQDV5/N 32,976-458- 72-30	KA7FPP/N 50,000-625- 80-30	KA8FOX/N 34,370-441- 70-30	WB7PV/N 37,525-551- 79-30	WB7PV/N 30,489-425- 67-28	KA9DCE/N 23,528-346- 69-30	KA9DCE/N 20,907-293- 69-30
KA1DQW/N 15,330-210- 73-29		WA3BZT/T 4230- 84- 45-20	KA5EVR/N 29,700-386- 75-15	KA7CCR/N 36,186-469- 74-29	KA9DCE/N 23,528-346- 69-30	KA7DNJ/N 24,128-416- 58-16	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1DQW/N 13,516-218- 62-25		WB3LTC/N 420- 30- 14-13	KA5FZM/N 8232-147- 56-17	KA7DNJ/N 24,128-416- 58-16	KA9DCE/N 23,528-346- 69-30	KA7LUS/N 18,840-275- 64-22	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CMQ/N 13,399-231- 58-14			KA5CKR/N 6210-135- 46-30	KA7LUS/N 18,840-275- 64-22	KA9DCE/N 23,528-346- 69-30	KA7DRN/T 12,648-204- 62-26	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CZ7/N 11,514-202- 37-30				KA7DRN/T 12,648-204- 62-26	KA9DCE/N 23,528-346- 69-30	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1DQY/N 10,664-238- 43-14				KA7EON/N 12,096-224- 54-18	KA9DCE/N 23,528-346- 69-30	KA7BVC/N 4280-107- 40-11	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
				KA7BVC/N 4280-107- 40-11	KA9DCE/N 23,528-346- 69-30	KA7BYL/N 3665- 84- 37- 7	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
<b>Eastern Massachusetts</b>		<b>Eastern Pennsylvania</b>		<b>Louisiana</b>		<b>Utah</b>		<b>Colorado</b>	
WB1PFP/N 64,768-679- 92-30	KA3CSM/N 49,475-632- 93-30	W5EAE/N 27,528-357- 74-26	KA3CAN/N 19,856-292- 68-17	W5EAE/N 27,528-357- 74-26	KA3EFC/N 11,883-233- 51-17	KA7FSW/N 13,115-204- 64-24	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1EJ/N 47,585-589- 85-30	KA3AJK/N 19,695-302- 65-29	KA3EFC/N 11,883-233- 51-17	KA3JST/N 12,815-118- 55-20	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7FWE/N 28,840-402- 70-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CBQ/N 34,456-462- 73-30	KA3CXD/N 11,000-200- 57-27	KA3EFC/N 11,883-233- 51-17	KA3CG/N 14,023-210- 57-27	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CLV/N 18,810-270- 66-30	KA3BTG/N 9660-210- 42- 9	KA3EFC/N 11,883-233- 51-17	KA3CTE/N 4725- 95- 45-12	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CZ7/N 15,616-274- 64-21	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BON/N 12,610-245- 50-26	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CLX/N 12,220-245- 47-19	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BQF/N 11,210-190- 59-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BQF/N 9065-125- 49-21	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1QX/N 7439-158- 43-23	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1AQB/N 6027-132- 41-20	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1AJT/N 5952-124- 48-27	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1DGO/N 1008- 38- 21-20	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA3EFC/N 11,883-233- 51-17	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
<b>Maine</b>		<b>Maryland - D.C.</b>		<b>New Mexico</b>		<b>Washington</b>		<b>Iowa</b>	
WB1CBP/N 17,236-258- 62-30	WB3JRJ/N 48,471-463-107-30	W5COV/N 108,253-1051-103-29	WB3FT/N 4494- 92- 42-12	W5COV/N 108,253-1051-103-29	KA7AEX/N 12,966-213- 57-23	KA7FWE/N 28,840-402- 70-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CZ7/N 11,514-202- 37-30	WB3FSB/N 41,472-412- 95-27	KA5EOL/N 13,456-222- 58-20	WB3JFW/N 21,442-287- 71-27	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CZ7/N 10,530-162- 55-29	KA3DFL/N 21,442-287- 71-27	KA5EOL/N 13,456-222- 58-20	WB3JFW/N 21,442-287- 71-27	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BPN/N 9000-170- 50-30	KA3JW/T 18,960-237- 80-30	KA5EOL/N 13,456-222- 58-20	KA3DFL/N 21,442-287- 71-27	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BHL/N 901- 43- 17- 6	KA3JW/T 18,960-237- 80-30	KA5EOL/N 13,456-222- 58-20	KA3JW/T 18,960-237- 80-30	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1AWL/N 782- 34- 23- 7	KA3AKC/N 17,160-276- 60-24	KA5EOL/N 13,456-222- 58-20	KA3JW/T 18,960-237- 80-30	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BGL/N 527- 31- 17-12	KA3CNB/N 17,024-266- 64-21	KA5EOL/N 13,456-222- 58-20	KA3AKC/N 17,160-276- 60-24	KA5EOL/N 13,456-222- 58-20	KA7AEX/N 12,966-213- 57-23	KA7EON/N 12,096-224- 54-18	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
<b>New Hampshire</b>		<b>Western Pennsylvania</b>		<b>Northern Texas</b>		<b>Wyoming</b>		<b>Missouri</b>	
KA1DJR/N 36,223-407- 89-30	KA3DRO/N 32,080-386- 80-25	KA5AS/N 50,095-685- 71-30	KA3DRO/N 32,080-386- 80-25	KA5AS/N 50,095-685- 71-30	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CZ7/N 11,514-202- 37-30	KA3DDU/N 20,740-290- 68-29	KA5FTD/N 32,152-417- 76-29	KA3DDU/N 20,740-290- 68-29	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
WB1WGL/N 25,599-361- 69-30	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1AUK/N 21,760-340- 64-20	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
K1FUB/N 19,274-247- 72-19	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BQI/N 15,846-268- 57-27	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BNN/N 15,600-260- 60-30	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
WB1EII/N 15,314-237- 62-30	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BHN/N 5537-103- 49-16	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BHL/N 3129- 76- 33-14	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1KX/N 758- 32- 24-20	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	KA3DGO/N 14,740-268- 55-24	KA5FTD/N 32,152-417- 76-29	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
<b>Rhode Island</b>		<b>Alabama</b>		<b>Oklahoma</b>		<b>Michigan</b>		<b>Kansas</b>	
KA1EAL/N 40,182-513- 74-30	KA4JYH/N 90- 10- 9- 4	W5CSQ/T 13,926-211- 66-14	KA1EAL/N 40,182-513- 74-30	W5CSQ/T 13,926-211- 66-14	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1BXX/N 24,086-363- 62-28	KA4JYH/N 90- 10- 9- 4	KA5DAV/N 13,680-213- 60-15	KA1BXX/N 24,086-363- 62-28	KA4JYH/N 90- 10- 9- 4	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1DUM/N 15,930-245- 51-27	KA4JYH/N 90- 10- 9- 4	KA5FM/N 8736-158- 62-30	KA1DUM/N 15,930-245- 51-27	KA4JYH/N 90- 10- 9- 4	W8BNC/N 61,050-799- 75-28	KA7AEX/N 12,966-213- 57-23	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30	KA9DCE/N 20,907-293- 69-30
KA1CPO/N 13,600-200- 68-12									

# Results, 33rd ARRL VHF Sweepstakes

The VHF SS is looking for a few *more* good operators.

By Bill Jennings,\* K1WJ

From the "good old days" department -- when was the last time there were over 900 logs received for the VHF SS? Hint: The price of gold was \$38 an ounce, Pittsburgh beat Baltimore four games to three to win the World Series. Gasoline was less than 50¢ a gallon, and in that same year mainland China was granted United Nations membership. Give up? 1971.

Did it again this year, 1980, with the 33rd running of the VHF Sweepstakes -- 987 logs were received, up quite nicely from the 861 of 1979. Not quite up to the all-time-record year of 1961 when 1563 entries came pouring in, but quite respectable when compared to the 1000 to 1100 logs that were the order of the day for the SS in the early to mid 1960s. With a little coaxing of retired vhf contesters and our repeater friends, we can probably surpass the magical one-kilo-log barrier for the 1981 contest.

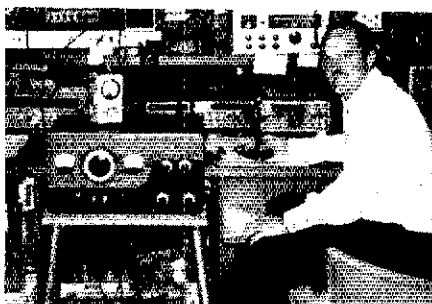
From all reports received with the contest entries, the contest weekend, January 12-13, was no barn burner of fantastic propagation and monster openings. Just your average January vhf/uhf conditions with a little better-than-average effort on the part of the Sweepstakes participants. A chance for a good operator to show his stuff and a time to put those recent station improvements to the test. Look at the single operator Top-Ten listings. Led by the sultan of Sweepstakes, WA3AXV, the top-three stations are the same three as last year, with one important difference -- an average 12-kilo-point increase in score. Not surprising to find that 12 k points is the average increase that the Top-Ten average score of 57,624 in the '80 SS represents over the 1979 average of 45,696. Besides 'AXV, W3HQT and K3MWV, old friends from the '79 Top-Ten also include WA2DPU, N3AHI and WB2SZK, who make it again in 1980. We'd also like to welcome newcomers WB2WIK, WB3CDE, WA1MAO and WA1NGR/3 to the Top Ten.

The multioperator Top Ten saw WA1RWU's stalwarts make their move from a fifth place finish in '79 to the top spot for multis in 1980. By virtue of the 'RWU move, the K8III gang, in what they claim will be their last multioperator effort, moved down one slot to second place from number one in 1979. The average score for multiop stations (46,845, remained virtually unchanged from the 1979 average of 46,011.

Since it's fairly easy for anyone interested enough to scan the scores to find the total number of QSOs and multipliers for any given

## Top Ten

Single operator		Multioperator	
Call	Score	Call	Score
WA3AXV	77,064	WA1RWU	70,400
W3HQT	70,344	K8III	65,000
K3MWV	68,760	W3KKN	50,112
WB2WIK	63,070	WA8ONQ	50,102
WA2DPU	62,650	W8DJY	49,410
N3AHI	55,204	K2CBA	39,672
WB3CDE	48,840	WB3CZG	37,924
WA1MAO	46,134	W2SZ	37,520
WB2SZK	42,960	WB2LCC	36,868
WA1NGR/3	41,218	K1XR/I	31,472



Kudos to Charlie, K3ICH/4 for his accomplishments in this VHF SS; top Virginia Section single operator, Roanoke Division leader, and top entrant from the Potomac Area VHF Society.

station, we've decided to replace the QSOs/Multipliers box with a QSOs-per-band box for the top single operator station from each call area. An all-time division-leader box is also included for the first time since 1978.

## Club Competitions

In the unlimited class competition and overall club aggregate total the winner is -- the tension mounts -- The Mt. Airy VHF Radio Club. As they have each year since 1961, the Packrats have rallied their forces to lay claim to the title of top club in the VHF SS. The Packrats' 1.3-megapoint score, with 77 members submitting, represents a 200-k point increase and an additional two members submitting over their totals from 1979.

The Rochester (New York) VHF Group did not rest on past laurels either. With 46 fewer entries, Rochester managed to add to their 1979 club point aggregate with a fine 905-k showing.

With the appearance of the *other* Rochester

(Minnesota) group, The Rochester ARC, in the unlimited club class, we're going to need a scorecard to keep the players straight. There'll be a little more on how the gang from Minnesota got their act together for the unlimited-class competition.

The competition for the club gavel in the medium-club class was just about as close as they come. The South Jersey Radio Association made it two medium-class gavels in a row, by adding 50 k points and three additional entries to their 1979 effort. The Ramapo Mountain ARC, formerly the 550 ARC, slid into a very close second place behind the SJRA by a scant 2000 points.

Again in the local class of club competition the race for top spot was oh so close. The MIT Radio Society managed to hold onto a 2000-point edge over a much-improved Warminster RC, which managed to more than quadruple its 1979 club aggregate score. The MIT Radio Society is a second-time winner of the gavel for the local-class club competition in the VHF SS.

As promised, a few notes on how the Rochester (Minnesota) ARC hit the unlimited class of club competition. Of course everyone/every club doesn't have the resources/operators to go into the unlimited class (50 or more entries -- see January QST for club competition rules and class breakdowns). But it's not all that hard to get a group/club together to participate in the VHF SS or any ARRL contest that has a club-competition portion. Since the club must be ARRL-affiliated, the first step would be to write to the Club and Training Department here at Hq. for the affiliation papers to get the ball rolling. A few simple forms to fill out and your club is on the way to affiliation. After affiliation has been confirmed, it's only a matter of assessing the club's capabilities and preferences, complying with the regulations and going to town in the contest of the club's choice. It's that easy. No reason why almost any group that wants to participate as an affiliated club can't do so.

We strayed a bit, so back to Minnesota to hear from club members W0RCU and W0VB. In going back over past VHF SS contest results, the first listing we find for Rochester was in 1977 when they had three entries and 2100 points. Quite a difference from their 1980 effort of 56 entries and 43 k points.

W0VB organized the first multiop station for us in the June VHF QSO Party three years ago and things have been on the upswing ever since.

\*Communications Assistant, ARRL

### All-Time Division Leaders

Single Operator				Multioperator		
Call	Score	Year	Division	Call	Score	Year
WA3AXV	77,064	80	Atlantic	W3KKN	50,112	80
K9RO	30,080	80	Central	K9HMB	45,312	78
WA0CSL	8190	76	Dakota	K0VXM	7830	79
WB4JGG	16,884	80	Delta	WB4HEL/4	8880	73
K8LEE	41,080	76	Great Lakes	K8III	80,984	79
WB2WIK	63,070	80	Hudson	K2OWR	65,562	76
K9ECV/0	12,690	68	Midwest	K0VUY	14,196	76
WA1MAO	46,134	80	New England	WA1RWU	70,400	80
WA7KYZ	10,296	79	Northwestern	K7ND	9690	79
WA6JUD/6	23,868	76	Pacific	WA6BMV	24,814	77
K3ICH/4	23,744	80	Roanoke	W4BFB/4	27,392	80
N6NB/7	6120	80	Rocky Mountain	WA0PHZ/0	8062	68
W4GDS	26,400	73	Southeastern	W4VO	18,966	78
N6NB	25,880	79	Southwestern	W6FNE/6	20,352	63
K5CM	14,100	78	West Gulf	K5STI	12,804	59
VE1ASJ	21,156	79	Canadian	VE1DXA	13,266	79

### 1980 Division Leaders

Single op	Division	Multiop
WA3AXV	Atlantic	W3KKN
K9RO	Central	K9AKS
K0VXM	Dakota	WB0UIP
WB4JGG	Delta	K4VPK
WA8TTS	Great Lakes	K8III
WB2WIK	Hudson	K2CBA
WB0TEM	Midwest	K0TLM
WA1MAO	New England	WA1RWU
K7KOT	Northwestern	K7ND
WB6KBZ	Pacific	WB6NMV
K3ICH/4	Roanoke	W4BFB/4
N6NB/7	Rocky Mountain	N0KV
WA4NJ/P	Southeastern	W4VO
W6ABW	Southwestern	K6MEP
K5CM	West Gulf	WD5FZM
VE3BQN	Canadian	VE3AEA

### Club Competition

Club Name	Score	No. of Entries	Club Winner
<b>Unlimited Class</b>			
Mt. Airy VHF RC (DE/NJ/PA)	1,369,830	77	WA3AXV
Rochester VHF Group (NY)	905,794	184	K2YCO
Rochester ARC (MN)	43,090	56	W0VB
<b>Medium Class</b>			
South Jersey Radio Assn.	217,076	22	WA2KOK
Ramapo Mountain ARC (NJ)	215,060	33	K2MLB
Hampden County Radio Assn. (MA)	142,566	26	AC1T
West Jersey Radio Assn.	135,830	21	N2ASC
Potomac Area VHF Society (MD/VA)	116,296	15	K3ICH/4
Murphy's Marauders (CT/MA)	88,460	5	WA1MAO
Gloucester County ARC (NJ)	80,624	13	WA2PFC
Northern California CC	32,308	5	N6CT
Mitre-Bedford ARC (MA)	25,292	8	AD1C
Mobile Sixers RC (DE/PA/NJ)	22,872	19	WA3JMM
<b>Local Class</b>			
MIT Radio Society (MA)	31,126	4	W1MX
Warminster RC (PA)	29,938	7	WB3KNU
Wellestey ARS (MA)	25,884	4	K1FWF
Central Michigan ARC	18,580	7	W8SQL
Michigan City ARC (IN)	17,080	7	K9EFX
Six Meter Club of Chicago	16,992	10	WA9FIH
Mt. Tom Amateur Repeater Assn. (MA)	15,742	3	W1JP
Plano AR Klub (TX)	14,100	5	WD5HDM
Skylands ARC (NJ)	12,528	3	WB2NCF
Northrop RC (CA)	7398	4	W6CN

### Single Operator Call Area Leaders — QSOs per Band

	50	144	220	432	1296
WA1MAO	222	419	18	11	—
WB2WIK	214	443	61	61	—
WA3AXV	194	432	116	78	—
K3ICH/4	160	176	20	23	—
K5CM	102	60	—	14	—
WB6KBZ	74	182	2	26	5
N6NB/7	15	117	14	5	—
WA8TTS	259	109	—	26	—
K9RO	134	232	—	5	—
WB0TEM	38	89	5	2	—
VE3BQN	80	192	7	22	2

Rochester ARC came through with flying colors. Over 50 local club members caught the fever of the contest and gave old 146.52 a workout like it had never seen in this area.

"Suggested operating times were given in the club paper and the members rose to the occasion.

"As a first-time club contest coordinator, I found, much to my surprise, that the contest did not end for me when the actual contest operation ended. In fact, rounding up the logs and scores from the participants proved to be as challenging as working stations during the contest. My hat is off to the contest chairmen of the larger clubs. I sure could use some helpful hints on how to make the job a little easier for next year's SS." — W0VB.

That's about it for VHF SS '80. If you enjoyed this bash, you might want to check out the June VHF QSO Party on the weekend of June 14-15 and/or the UHF Contest on the weekend of August 2-3. Rules for the June VHF Contest announced in May QST were not clear in two areas: The required exchange is the ARRL section *only*, and time limits on 223.5 and 146.52 MHz are four hours *each*. Comments, suggestions, praise and criticisms of the ARRL VHF/UHF contest program are always welcome. If you've got something to say, let us know.

CU in VHF SS 1981.

### SOAPBOX

Conditions here in Sterling (Virginia) seemed to be no better than average. A few locals reported hearing the VEs, but no soap here. . . . I guess the timing of aiming the increasingly narrow patterns was not right for me. I wish more of the ops would either move their antennas around more or else consider the use of smaller, vertically stacked antennas with more horizontal beamwidth (especially on 432) (W31Y/4). Heard no E or F layer opening on 6 meters this year. Scatter was fair, with bursts all day on Sunday. Condx on the rest of the bands were about average for a January test (WA3AXV). There was a small aurora

"When Terry (W0VB) suggested that we could make the jump into the unlimited category (more than 50 entries), nobody took him seriously. Most of the operators that he was counting on were only on 2-meter fm and had never participated in a contest!

"As can be seen from the logs, Terry did an exceptional job. He was ably assisted by Joe,

K0TS, who coordinated things from the club's end, and Bill, WB0YEE, who helped to get the word out to the people who were on 2-meter fm. — W0RGU

"Typical propagation for the contest from here in Minnesota. With the exception of a one-hour aurora, no sporadic E, tropo or ducts to speak of. However, the members of the



Eastern Pennsylvania's number-two multiop entry, WB3CZG. Left to right are WB3CZG and WA3NV5 — operating and logging, WB3CZG's antenna farm, and WB3IWZ and K3MKZ enjoying a little snack. No — that's not crow the guys are eating, but good old home-fried chicken.



Delaware is always a welcome multiplier. Candy, N3AVP, represented Delaware on 2 meters in her first encounter with the VHF SS.

opening on Sunday morning, but other than that, no openings. This was discouraging to some, particularly considering the phenomenal F2 DX which was observed almost daily from mid October through the first week in January (W2EIF). . . my compliments to the consistently good 2-meter operators who make the VHF contests so much fun (W3EYF/WB4OZJ). High speed cw. computer generated, could provide

some people with new stations via the short bursts. . . It would be nice if everybody interested would pick a common frequency away from the high density areas (VE3JQZ). From the Corpus Christi, Texas area, it is over 200 miles to the next nearest different ARRL Section. This always makes VHF and UHF contesting a challenge from here. Some years we have band openings to help out with the multipliers. I this year, we had absolutely nothing. Absolutely nothing. That's the bad news. Here's the good news. For some perverse reason, there was more activity this year than in any past. I do believe that everyone who owned a VHF/UHF rig in the Section dusted it off for this contest (W8QVE). Was doing fine until a small mushroom cloud rose out of the top of the linear! (W8QOI). Where were all the Californian stations? After many, many hours of calling CQ with the beams pointed west, it appears that we worked the hands dry after only three southern California stations (W7LUX). With no 6-meter opening, the operator with good 2-meter ssb capabilities makes it big around here (VE7ASI). The four hour limit on 146.52 is bad enough, but now you've added 223.5 as well — this is a real hummer (W1AIM). I often wonder what happens to all these contest participants after the contest is over. Do they all dissolve and only reform again for the next contest? It's a shame that a contest is required to get any decent activity on 6 and the low end of 2 meters (WA2CWA). You guys at hq. must have

something against me. It seems that about every contest that I enter is the weekend before final exams at school. But then I start to think of what it would be like to take the finals if I were awake. . . I have come up with a compromise to the fm problem. Instead of giving fm QSOs full point credit, give 1/4 credit. For example, on 2 meters each fm QSO would be worth 1/2 point. This would give incentive to the timer to try cw and ssb and perhaps the mountain-toppers would spend less time on 52. This would allow the contester in the less populous areas to still use fm. What do you think? (WA6PMX). Loss of commercial power, due to ice storm, put a crimp in our contest activities (food freezer got priority on the emergency power source!). Power was out for about one week (N7DB).

### Feedback

Refer to pages 79-83 May 1979 QST for the following corrections to the VHF SS of 1979.

We beg His Majesty's pardon and are quick to adjust the score of WA3AXV (the top scorer in the 79 SS) upwards to 65,376 points, 753 QSOs and 26 multipliers.

With 14 section multipliers, K4LHB should have been listed in the multiplier leaders from the fourth call area. Sorry, Thom.

Ditto on WD4MUO.

### Scores

Scores are listed in order, single-operator stations first within each section. From left to right: Call, score, number of QSOs, number of multipliers and bands operated (A-B) MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2304 MHz, G-3300 MHz, H-5 GHz, I-10 GHz).

### U.S.A.

Section	Call	Score	QSOs	Multiples	Bands	
U.S.A.	WA1WLM+(K1WL,WA1 PRY	9720-149-17-BD	787	7	A-B-C-D-E	
	ZLD,WB1EW,W2CHY,	9600-215-11-BD	787	7	A-B-C-D-E	
	W2ZSJ,W5NEM)	6100-175-13-AB	787	7	A-B-C-D-E	
	4094 78-13-ABCD	787	7	A-B-C-D-E		
	Western Massachusetts					
	K1WGN	12,792-210-16-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E
	AC1T	10,348-175-16-ABC	9600-215-11-BD	787	7	A-B-C-D-E
	W1ZJ	8404-191-12-AB	6100-175-13-AB	787	7	A-B-C-D-E
	W1WU	7874-163-14-AB	787	7	A-B-C-D-E	
	W1NIP	7774-154-13-ABD	787	7	A-B-C-D-E	
	W1BIE	7657-187-13-AB	787	7	A-B-C-D-E	
	W1VUCU	1175-156-13-AB	787	7	A-B-C-D-E	
	W1WIK	6670-121-3-ABCD	787	7	A-B-C-D-E	
	W1EJTS	5612-122-13-AB	787	7	A-B-C-D-E	
	K1GXU	5014-109-13-AB	787	7	A-B-C-D-E	
W1UOKR	4554-99-13-AB	787	7	A-B-C-D-E		
W1CJG	3652-93-12-B	787	7	A-B-C-D-E		
W1KUL	3118-74-11-AB	787	7	A-B-C-D-E		
W1WLE	2880-60-8-B	787	7	A-B-C-D-E		
W1LUWX	2858-72-11-AB	787	7	A-B-C-D-E		
W1RIFP	2070-69-5-AB	787	7	A-B-C-D-E		
W1IAUR	1939-51-9-B	787	7	A-B-C-D-E		
W1BLAW	1444-38-5-AB	787	7	A-B-C-D-E		
N1CM	1288-46-4-B	787	7	A-B-C-D-E		
W1LAPD	1260-45-4-B	787	7	A-B-C-D-E		
W1LPH	824-34-3-AB	787	7	A-B-C-D-E		
W1YUOK	884-34-3-AB	787	7	A-B-C-D-E		
K1YU	840-30-4-B	787	7	A-B-C-D-E		
W1I ZKY	780-30-4-B	787	7	A-B-C-D-E		
W1BIPI	780-30-4-B	787	7	A-B-C-D-E		
W1BIOZ	546-21-3-B	787	7	A-B-C-D-E		
W1EGR	494-19-3-B	787	7	A-B-C-D-E		
K1JJ	442-17-7-BD	787	7	A-B-C-D-E		
W1UW	408-17-2-B	787	7	A-B-C-D-E		
W1ADNB	390-15-3-AB	787	7	A-B-C-D-E		
W1UJOL	390-13-5-AB	787	7	A-B-C-D-E		
K1BNN	95-4-2-B	787	7	A-B-C-D-E		
W1EJUK,YOL,KALAPR,	84-4-2-B	787	7	A-B-C-D-E		
W1SEGR,LPU,UQC,WJL,	84-4-2-B	787	7	A-B-C-D-E		
ALV,CAC)	84-4-2-B	787	7	A-B-C-D-E		
W1YK(K1S,IR,K URN,LAN,	70,400-834-30-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W1S PQY,YOJ,ZLQ,ops)	21,634-392-19-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
K1BE+(K1A,LA,LM)	2304-64-8-AB	9720-149-17-BD	787	7	A-B-C-D-E	
2						
Eastern New Jersey						
W2ZTF	21,266-343-21-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZTEQ	17,748-292-18-ABCFE	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZANZ	11,136-182-19-BCOI	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZEHF	7390-135-17-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZRRH	6256-136-13-AB	9720-149-17-BD	787	7	A-B-C-D-E	
K2G5F	5616-104-17-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLYM,W2 286-4-1-BCDI	286-4-1-BCDI	9720-149-17-BD	787	7	A-B-C-D-E	
K2CBA/AZGX,AJZO,KQCE,	286-4-1-BCDI	9720-149-17-BD	787	7	A-B-C-D-E	
W2Z PFC,OGN,OUS,VAX,	286-4-1-BCDI	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZT BYP,DNE,FPC)	286-4-1-BCDI	9720-149-17-BD	787	7	A-B-C-D-E	
39,672-470-25-ABCDE	39,672-470-25-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E	
W2SZ2/WA1S, LKD,UJG,KZ3,	39,672-470-25-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E	
LDU,TR,NZFL,225,GN,CDS,	39,672-470-25-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E	
W2Z BXP,CFC,DFD,ops)	39,672-470-25-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E	
AF2C+(WB2IXR)	4462-97-13-B	9720-149-17-BD	787	7	A-B-C-D-E	
New York City - L.I.						
K2OVS	17,052-294-19-AB	9720-149-17-BD	787	7	A-B-C-D-E	
K2DTE	14,352-276-16-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZQBT	13,662-232-17-ABC	9720-149-17-BD	787	7	A-B-C-D-E	
K2RWI	13,440-217-14-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLW	1,928-209-19-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZIKL	1,400-210-10-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZTWO	8426-153-11-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZFUZ+(W2ZYF)	21,896-308-18-ABCDE	9720-149-17-BD	787	7	A-B-C-D-E	
Northern New Jersey						
W2ZWIK	63,070-779-25-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
K2ZML	36,800-542-23-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZCWA	20,020-385-16-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZQQQ	19,430-275-19-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
K2JWE	19,256-332-19-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZVUN	18,476-298-21-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZWHH	18,408-295-18-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZCWT	15,138-261-19-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZWNX	11,180-215-16-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZQEA	10,692-203-17-AB	9720-149-17-BD	787	7	A-B-C-D-E	
WA2ZWH	9720-149-17-BD	9600-215-11-BD	787	7	A-B-C-D-E	
WA2ZWC	9600-215-11-BD	6100-175-13-AB	787	7	A-B-C-D-E	
KAZAV	7636-166-13-AB	787	7	A-B-C-D-E		
KAZAYQ	7140-251-11-ABD	787	7	A-B-C-D-E		
W2ZTFH	4830-131-5-BC	787	7	A-B-C-D-E		
W2ZBAC	4230-77-5-B	787	7	A-B-C-D-E		
K2ZAC	3220-70-13-B	787	7	A-B-C-D-E		
W2ZHM	3090-91-5-BC	787	7	A-B-C-D-E		
W2ZHLK	3008-94-6-B	787	7	A-B-C-D-E		
K2BZP/2	2460-82-5-B	787	7	A-B-C-D-E		
W2ZBHV	2430-81-5-BC	787	7	A-B-C-D-E		
K2BDN	2310-65-5-BC	787	7	A-B-C-D-E		
W2ZNL	2310-65-5-BC	787	7	A-B-C-D-E		
K2ZG	2100-70-5-B	787	7	A-B-C-D-E		
W2ZNT	1752-52-2-BC	787	7	A-B-C-D-E		
K2KME	1680-56-5-BC	787	7	A-B-C-D-E		
K2ZDF	1552-52-3-BC	787	7	A-B-C-D-E		
K2ZFXA	1316-47-4-B	787	7	A-B-C-D-E		
W2ZLH	1260-45-4-B	787	7	A-B-C-D-E		
W2ZVZ/W	1248-37-2-AB	787	7	A-B-C-D-E		
N2G5S	388-38-3-AB	787	7	A-B-C-D-E		
W2ZCA	910-35-3-B	787	7	A-B-C-D-E		
K2ZFWB	888-37-2-B	787	7	A-B-C-D-E		
W2ZWLW	840-30-4-B	787	7	A-B-C-D-E		
W2ZJL	754-29-3-AB	787	7	A-B-C-D-E		
N2LA	576-24-2-B	787	7	A-B-C-D-E		
W2ZBC	572-22-3-AB	787	7	A-B-C-D-E		
W2MZ	572-22-3-AB	787	7	A-B-C-D-E		
K2ZDT	17-17-2-B	787	7	A-B-C-D-E		
K2ZJG+(W2ZLV)	19,116-308-17-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
N2AI+(K2YJ,N2BA)	18,098-270-20-ABD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLHG+(W2ZARS)	17,118-297-17-BC	9720-149-17-BD	787	7	A-B-C-D-E	
N2AAZ,(K2PL,W2TFM,	16,128-352-11-ABC	9720-149-17-BD	787	7	A-B-C-D-E	
WD25AAI,ADZ)	16,225-243-15-BCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZUPK+(W2ZDT)	10,868-223-12-ABC	9720-149-17-BD	787	7	A-B-C-D-E	
AC2UI+(K2Z)	8200-183-13-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLH	8200-183-13-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLH	8200-183-13-AB	9720-149-17-BD	787	7	A-B-C-D-E	
K2DD+(N2ANI,W25NMI,	2652-73-7-AB	9720-149-17-BD	787	7	A-B-C-D-E	
REV)	2652-73-7-AB	9720-149-17-BD	787	7	A-B-C-D-E	
Southern New Jersey						
W2ZDPU	62,660-744-25-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2Z57K	62,960-895-20-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZEF	32,438-460-19-ABCFE	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZKOK	26,468-438-16-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZEMB	24,596-412-16-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
AB2Y	22,214-336-19-ABD	9720-149-17-BD	787	7	A-B-C-D-E	
N2FY	20,328-364-18-AB	9720-149-17-BD	787	7	A-B-C-D-E	
N2F5G	19,200-320-20-AB	9720-149-17-BD	787	7	A-B-C-D-E	
N2SG	19,050-321-15-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZGX	17,942-302-17-ABC	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZAD	15,408-321-14-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZADS	14,204-277-16-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZDZ	14,204-277-16-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZJUL	12,338-257-14-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZQIU	11,904-248-14-AB	9720-149-17-BD	787	7	A-B-C-D-E	
N2AQJ	10,648-207-12-ABCD	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLA	10,400-200-16-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZNEP	10,350-200-16-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2BN	10,350-225-13-AB	9720-149-17-BD	787	7	A-B-C-D-E	
K1T8Z/2	9960-233-10-ABC	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZDFC	9466-167-19-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZLV	9466-167-19-B	9720-149-17-BD	787	7	A-B-C-D-E	
N2P1A	9440-236-10-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZORA	9328-212-12-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZRHJ	8112-169-14-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZNPJ	7832-178-12-AB	9720-149-17-BD	787	7	A-B-C-D-E	
K25Q5	7350-175-11-G	9720-149-17-BD	787	7	A-B-C-D-E	
N2C0S	6900-200-7-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZDOOS	6800-150-12-AB	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZKLN	5600-147-10-B	9720-149-17-BD	787	7	A-B-C-D-E	
W2ZFY	5480-137-10-B	9720-149-17-BD	787	7		



KBZJW 1100-50-1-AB  
W2RQF 1040-35-3-AB  
WB3FQ 1104-52-3-AB  
KAZY 990-46-1-B  
WA2PYH 902-41-1-B  
WA2MKX 880-40-1-B  
W3P5NM 880-40-1-B  
N2BAD 792-36-1-B  
WB2ZLU 792-36-1-B  
WA2RHW 762-27-3-AB  
WA23YW 762-27-3-AB  
WB23VY 762-27-3-AB  
N2JC 638-29-1-B  
WB2EVD 638-29-1-B  
WA2NZD 638-29-1-B  
WA23YV 638-29-1-B  
W2EJY 396-18-1-A  
WA2YRL 242-11-1-B  
WA22KD/2 176-1-1-B  
W3ACNS 576-8-1-B  
KA2FER 142-6-1-B  
K2QIE(+KA2HDQ,WB2WSV)  
27,090-367-29-ABD  
W2UTH(+WA21FH,LRV,UKK,  
VUB,VZF,WB2GPI)  
21,418-366-23-ABD  
WB2UE(+KB21AW,LCJ,WB2S  
BGI,EFB,ops)  
21,470-298-38-ABD  
W2AV(+WB2KAO)  
21,318-312-23-ABD  
WB2PSI(KA2SD,VBK,WA2ZKD,  
WB2PO,ops)  
17,889-297-16-ABD  
WA2KGM(+KA2FND,WB2KGLI,  
L4,EM,ops)  
WB2EMS(+KA2HDK,WA2MVF,  
WB2EA11,992-302-12-ABD  
WA2WVL(+WA2RUE,WB2PLI)  
13,920-282-27-ABD  
WA2AAZ(+K212G,H,WB2SS,  
WA2GAI,MC,D,WB2FWR,MB2  
SSB,TGU,TR,ops)  
12,822-259-14-ABD  
W2AZJF(+K2R,WY2WA,2SLT,  
RQC,WB2F,MY2,FB,ops)  
10,712-184-16-ABD  
W2JUC(+W4M,FB,ops)  
10,500-267-27-ABD  
WB2HWO(+W1LV,W3K,H)  
8,944-229-8-AB  
WB2IE(+WA2ZLU)  
7,904-205-8-ABD  
K2UW(+WA2ZLU)  
6,816-213-6-AB  
N2BNE(+KA2CF,K,WB2MKL)  
5,528-282-1-AB  
WB3LHQ(+W2M,QP)  
4,680-395-2-AB  
K2JJD(WB2JQH,WB2LH,ops)  
3,688-112-3-AB  
WA2GUP(+WA2XJ)  
484-27-1-B

### 3

Delaware  
WAJNGR 41,218-478-27-ABCD  
KACHE/3 10,350-220-13-ABD  
WA3WUL 9072-189-14-B  
WB3DP 4004-91-12-B  
WA3CRM/3 2464-66-4-BC  
N3AVP 1064-38-4-B  
W3CGV 896-32-4-AB  
WA3UVR 132-6-1-AB

### Eastern Pennsylvania

WA3AXV 77,064-802-28-ABCD  
W3HQT 70,344-789-26-ABD  
K3MWW 68,740-802-26-ABD  
N3AHI 55,004-608-27-ABD  
WB3CDE 48,840-626-23-ABD  
W3HMU 34,452-430-19-ABD  
K3IUL 33,750-502-15-ABD  
WA3YUW 32,368-467-18-ABD  
WA3JDF 30,914-389-14-ABD  
K3LQM 30,218-461-19-ABD  
WA3WAS 29,984-450-18-ABD  
W3BIT 29,984-450-18-ABD  
AET 26,994-403-23-ABD  
K3ACR 26,104-423-15-ABD  
W3CJU 24,550-415-15-ABD  
W3LCL 23,760-398-13-ABD  
WA3JUF 21,022-373-3-ABD  
WA3AAJ 20,284-361-12-ABD  
N3MMW 19,916-304-16-ABD  
W3ANFY 19,608-288-16-ABD  
K3BPP 19,536-330-14-ABD  
WA3AQA 17,986-326-13-ABD  
K3AKY 17,000-310-13-ABD  
W3SMK 14,880-246-14-ABD  
K3NHX 14,700-283-11-ABD  
K3KVS 13,170-260-10-ABD  
K3MAM 12,800-240-9-ABD  
WB3JYD 12,768-264-9-ABD  
K3VYU 12,008-244-9-ABD  
K3IGK 11,924-204-12-AB  
K3HMK 11,700-218-15-ABD  
K3GAS 11,320-222-10-ABD  
KB3SE 10,920-210-11-ABD  
K3HIN 10,438-266-7-ABD  
N3AHK 10,360-206-12-ABD  
W3ZD 10,208-158-12-ABD  
W3CXU 10,044-176-8-ABD  
WB3HPH 9,570-246-5-ABD  
WB3CWF 9,476-175-13-ABD  
WA3T5F 9,476-175-13-ABD  
WA3AFJ 9,270-194-10-ABD  
W3NSI 8,840-189-7-BC  
K3EPB 8,840-189-7-BC  
WA3OVB 8,800-230-5-ABD  
WB3HJK 8,204-221-4-ABD  
WB3KNU 7,720-193-10-AB  
K3DMA 7,600-199-9-ABD  
WA3SHI 6,604-194-7-ABD  
K3KMM 6,188-154-7-ABD  
K3UWJ 5,728-133-6-BC  
WA3JMM 5,520-140-9-BC  
WB3JCT 5,070-127-5-BC  
K2KRC/3 4,316-17-3-ABD  
WA3AWJ 3,944-115-7-BC  
K3PHY 3,752-104-4-AC  
WB3IND 3,708-103-8-AC  
W2JST 3,432-7-AC  
W3FQD 3,420-88-8-AC  
WB3JQC 2,942-81-6-AC  
WA3HVL 2,874-53-3-BC  
W2JIG 2,800-50-3-BC  
WB3KES 2,228-66-2-ABD  
WA3KSK 2,212-79-4-AB  
K3EBE 2,210-85-3-AB  
W2JGV 2,188-72-3-AB  
WA3EHD 2,106-61-3-AB  
K3LVB 2,054-56-3-ABD  
K3DLS/3 1,968-41-2-C  
WA3TEM 1,968-41-2-C

WA3SPR 1716-41-3-ABCD  
K3IGQ 1680-70-2-B  
WA3EFS 1092-42-2-AB  
WA3NUQ 930-31-5-AB  
N3AKF 832-32-3-AB  
K3VEQ 738-28-3-AB  
KA3AFT 708-34-1-AB  
WB3BDP 696-29-2-AB  
K3RSK 676-26-3-A  
WA3NDE 672-14-2-C  
WA3JNF 598-14-2-AB  
KA3AUR 585-45-3-AB  
WB3NBR 576-15-2-BC  
WA3IMT 528-22-2-A  
K3HEH 432-13-2-AB  
WA3HFJ 312-10-2-AB  
K3GZT 264-10-2-AC  
WA3DZT 240-10-2-A  
WA3EJ 154-5-1-BC  
WA3NAQ 120-8-2-AB  
N3AHP 72-3-2-AB  
W3KNN(+K3KMM,W3CUL)  
20,117-662-22-ABCD  
WB3CZG(+K3KNZ,N3AVC,  
WA3NVS,WB3IWZ)  
37,924-454-28-ABD  
WA3FDF(+K3S,2,FM)  
15,872-70-13-ABC  
N3EG(+WB3IHY)  
18,240-394-10-ABC  
WB3LZ(+WB3G,25)  
17,737-77-19-B  
K3JUZ(+WB3ONH)  
19,888-77-14-ABD  
W3LW3(+GF,NJUZ,UH,  
WA3CUQ,ops)  
15,022-259-19-AB  
WB3FRL(+AG3R,WB3S,BLE,  
DJF,ops)  
10,474-217-15-AB  
W3SHT(+K3A,2)  
10,074-219-13-B  
WA3ZOU(+K3DMA,5+)  
1416-59-2-AB

### Maryland - D.C.

K4JZO 15,934-224-21-ABD  
WB3LJK 14,432-236-21-AB  
W3XCO 13,676-235-16-ABD  
WA3NXL 10,816-151-22-ABC  
K2ZJ 10,462-217-13-ABC  
WA3OYW 9,120-162-14-ABC  
K3AKK 8496-156-14-ABC  
WB3JUT 7840-140-18-B  
WA3EQD 7832-147-12-ABC  
WB3CSH 7632-159-14-B  
W4NWW/3 6762-139-13-ABC  
W3HQX 5412-123-12-B  
WA3LMT 4412-123-12-B  
K3LFO 4232-56-13-ABD  
W3EYF 3960-90-12-B  
N3AFM 3916-89-12-AB  
K3UJG 3266-58-9-ABD  
W3JPT 2754-81-7-AB  
W3M5N 1952-76-6-ABC  
N3API 976-24-2-AB  
K3DUA(+WB3CCK)  
25,320-369-20-ABD  
W3IP(+K3S,HOI,YDX,W3FG,  
WB3S,I,CL,TR,WB3CB)  
34,400-37-18-ABD  
W3PGA(+K3S,FRX,PHH,HOJ,YZ,  
KA3CTA,K3BCV,N3S,AID,IT,  
W3DF,JD,VRID,W3S,FHV,  
L3M,7UN,WB3S,AKP,BS3,BIT,  
KUH,ops)  
9,308-179-16-ABD  
AC3P(+AC3F,WB3EB)  
1110-37-5-AB

### Western Pennsylvania

WA3FFC 11,178-194-17-ABD  
WB3COW 3680-80-13-AB  
W3CSA 3440-86-10-AB  
WB2KAF 1890-63-8-AB  
W3HDT 912-22-9-AB  
WA3JSM 630-21-5-B  
W3KWH(WB3S,IOH,S,VJ,ZR,WA3S  
F,VJ,VX,WB3S,HQ2,EL,MD,HT,  
16,800-7-7-ABD  
W3PIE(+WA3S,DIJ,WAU,WB3S  
CBB,JHC11,842-188-21-ABD

### 4

Georgia  
W5ANJP 17,136-250-25-AB  
W4WA 900-38-6-AB  
W4IS5 750-20-5-ABD  
AK41 208-12-2-B  
W4VVO(K4KCS,WA4BI,WB4AEG,  
WD4JL,ops)  
18,600-301-21-AB

### Kentucky

WA4PI 8932-168-12-BCD  
KA4GBI 2670-65-19-B  
KA4KI 1800-36-1-ABD  
W4SMU 1380-41-5-BD  
WB3JUF/4 1024-32-6-B

### North Carolina

WB4NPG 6026-131-13-AB  
WA4Z1A 4218-88-9-ABD  
W44IXU 3240-82-8-ABD  
W4ZZ 1938-57-7-AB  
K4ROM 1008-36-4-AB  
WA4WZQ(+KA4HKK,K4YBC,  
WA4WZP,W44HE,W4D4G3U)  
4470-132-5-ABD

### Northern Florida

W8HUQ/4 1638-39-11-AB  
W4ODW 1470-45-5-ABD  
W4CSS 868-29-4-ABD

### South Carolina

N4D1 3610-91-9-ABCD  
WD4NBE 264-11-2-AB  
W4BFB/A(AA45,CC,22,K4S,LVV,  
TK4KL,WA45,CC,22Q,WB4S,  
PCS,TLX,ZND,WD4S,ABZ,LMM,  
QDM,ops)  
20,117-662-22-ABCD

### Southern Florida

WD4IYS 2928-120-2-ABD  
W4LJL 2928-120-2-ABD  
K1FJM/4 902-39-1-ABD  
T4KUZ 275-25-1-AB

### Tennessee

WB4JG 16,884-201-32-AB  
W44YR 1418-23-1-ABD  
WD4EKA 1512-42-8-B  
WA4DPS 384-32-6-AB  
K4VPK(+K54J)  
2760-69-10-AB

### Virginia

K3ICH/4 23,744-369-18-ABCD  
W3IY/4 17,136-266-18-ABD  
N4CD 12,644-202-19-ABD  
W455BC 6524-18-14-ABD  
WD4GXN 6445-15-6-ABD  
K4LHB 6116-127-12-ABC  
WD4CXU 5800-108-5-BC  
W2KFC/4 5200-13-13-ABC  
K4AB 454-99-1-AB  
N4RA 3662-66-11-AB  
K4FJW 2144-67-6-AB  
WA4MCP 1482-39-9-AB  
N4M 1392-24-9-AB  
WD4AZG(+K4G4OF)  
3864-92-11-AB  
WA4GPM(+WA4DQX)  
1188-25-8-ABD

### West Indies

K8MMM/KP4 132-6-1-A

### 5

Louisiana  
N5JM 44-2-1-A

### Mississippi

W5UCY 1120-38-4-ABD  
WB5OWX 216-9-2-B  
WB5QCB(+WA4AUX)  
384-12-6-AB

### New Mexico

WB5AOX 1440-45-6-B  
K5MAT 1320-52-1-ABC  
N5RR 850-59-1-A

### Northern Texas

W5VJB 7380-270-5-ABD  
W5BERG 1940-10-2-ABD  
WB5KT 4440-170-2-ABD  
W5HUV 462-21-1-B  
K5IS 168-6-4-AB  
N5IB 110-5-1-AB  
W5JUL 110-5-1-AB  
W5DFZW(+K4SDOBQ)  
2402-158-2-ABD

### Oklahoma

K5CM 11,680-176-26-ABD  
K5QNM(+K5NSI)  
504-18-4-B

### Southern Texas

W5AVE 2688-85-2-ABDE  
W5BERG 1940-10-2-ABD  
WB5YU 1584-58-1-ABD  
W5SHY 1536-52-2-ABD  
WA3OV/C/S 588-49-1-B  
K5NA 330-15-1-AB  
K5ATL/S 22-1-1-B  
K5AAW(+K5ACIO,N5FO,  
W5HPD,W5NSGBX)  
3380-111-3-ABCD  
W5UWB(+W5B,4-4-ABDE  
2380-58-4-ABDE

### 6

### East Bay

N6AMG 9216-233-8-ABD  
W6B0B 1860-61-5-ABD  
K6XO 364-14-3-B

### Los Angeles

W6ABW 2536-130-4-BC  
K6DGM 5054-49-3-BC  
W6CN 1482-57-3-BC  
W6NXP 936-18-3-C  
WB6DT 32-1-1-B  
N6NO 624-12-3-C  
WB6AAG(+WB6S,HUJ,CD)  
4200-94-5-ABCD

### Orange

W6PMX 4674-123-9-AB  
K6KM 3976-142-4-B  
K6IBY 116-11-4-C  
W6XC 224-8-4-A

### Santa Barbara

W6EJO 584-22-4-BC  
K6NEI(AC61,K6S,ELQ,VMN,WA6S  
DJS,IJZ,ops)  
18,312-328-11-ABCD

### Santa Clara Valley

WB6KBZ 15,936-289-14-ABD  
W6G6Z 15,921-310-14-ABD  
K6KLY 7956-214-8-ABC  
WB6ZKD 7650-202-7-BC  
W6G6D 6810-171-5-ABDE  
W6N 6800-122-7-BCDE  
WB6CKT 4140-138-5-AB  
WB6FTW 2970-80-5-ABD  
K4FTO/6 1404-84-3-AB  
A16T 309-25-2-D  
W6NQM(+WA6S,VPH,ZJF,WB6S  
MYC,NC)  
12,060-256-9-ABD  
N6RZ(+WA6S,7)  
10,800-232-10-ABD  
W6YX(K1J,H,WA6T,V,N,M,H,  
WB2I,ops)  
4384-126-7-AB

### San Francisco

N6CT 12,048-261-14-AB  
K9AT/6(+WB9L,OP)  
2250-68-5-BC

### San Joaquin Valley

W6YKM 10,080-133-11-ABD  
K6JKQ 3774-75-7-ABCD

### Sacramento Valley

W6SX 120-5-2-B  
W6KOD(+W6S,FM)  
1160-39-5-ABD

### 7

Arizona  
W6V7S 1392-44-2-ABDE  
W7LUX 1176-34-4-ABD  
WB7FDQ 1080-36-5-A

### Idaho

WA7YAX 416-16-3-AB

### Montana

KA1EA/7 110-5-1-AB  
W7KNT 44-2-1-A

### Oregon

K7HSJ 1638-52-3-ABCD  
N7DB 240-10-2-AB

### Utah

N6NR/7 6120-151-8-ABCD  
N7BHC 132-6-1-B

### Washington

K7KOT 3380-113-3-ABCD  
WB7JUP 592-56-3-ABCD  
K7LY 352-16-1-A  
W7IDZ 130-20-3-AB  
K7/ND(+WB7DT)  
7360-196-6-ABD

### Alaska

KL7WE 1034-40-1-ABD  
WA9LPK/CL7 352-12-1-ABD  
WB4WXE/CL7(WB4YL,R)  
22-1-1-A

### 8

### Michigan

WB8DGJ 13,824-243-17-ABD  
WB8DSV 10,712-205-16-AB  
WA8SLQ 9072-205-11-ABD  
W8ABAN 3872-88-12-AB  
KL7JL 7400-140-15-ABD  
WB8AAX 2240-70-6-B  
WB8QI 1870-55-7-AB  
K8BSZ 1800-50-8-B  
K8BCL 4704-49-14-D  
WB8GWL 1080-39-8-AB  
WB8KAY 1054-31-7-A  
K8BDDQ 654-23-4-B  
K8AJC 132-6-1-A

### Ohio

WA8TTS 26,120-394-33-ABD  
WB8CTX 11,286-196-17-ABC  
WB8PAT 10,476-170-17-ABDE  
K8DIO 9457-166-17-ABD  
W8TJL 7400-140-15-ABD  
K8GGB 6554-113-19-A  
W8NRM 5760-112-11-ABD  
K8EUL 5250-125-11-B  
K8WVW 4704-49-14-D  
K8DW 4704-103-11-ABD  
WB8JPP 4400-87-10-BC  
N8AAK 3952-101-4-ABD  
K8BVC 260-26-6-AB  
K8YLS 2528-70-6-BCD  
W8LJC 1696-53-6-B  
K8HRR 1036-37-4-AB  
W8PFL 988-38-3-B  
WB8TPV 724-38-3-AB  
K8MR 432-18-2-B  
K8III(+KA8DCZ,W8RCN,  
WB8KRY)  
65,000-650-40-AB  
W8BONQ(+K8VVV,K8FCF,  
W8B,8NJR,OGS,ONQ,W8BRY,  
W8CFLX,90102-500-37-ABCD  
W8CJL(+K8C,8JUL,CL,  
WB8NF,W8AJD)  
49,410-605-35-ABCD  
WB8SMC(+WB8W,DB8M,ops)  
1222-44-3-BC

### West Virginia

WB8LX 7900-151-15-ABC  
W8TN 1638-38-11-ABD  
W8VFI 672-31-6-AB  
WB8BM 364-13-6-B  
WB8ZL(+WA8QM,W8BCDT)  
12,240-207-20-B

### 9

### Illinois

K9RO 30,080-371-30-ABD  
GW3NJV/9 19,850-361-15-ABD  
K9MBX 1110-11-1-ABD  
WB9SNR 3990-83-9-BCD  
WA9FH 3042-102-3-ABCD  
WB9QBU 2844-69-8-BCD  
WB9S 2700-61-5-ABD  
K9B2T 1920-52-5-BC  
K9ZVW 1848-73-2-ABCD  
K9ZWU 1848-73-2-ABCD  
K9CNC 1764-68-4-AB  
W9IVI 1760-55-6-AB  
K9GJU 1532-62-2-ABD  
W9UZE 1564-46-7-B  
N9AKY 1340-50-9-B  
W9ACJZ 1080-45-2-AB  
WA9AHZ 870-29-5-A  
Y9ABA 700-50-2-AB  
W9JQA 668-27-2-B  
K9AKS(+K1TX,N1AGD,W9EP,  
W9IP,SZ)  
29,644-406-24-ABD  
WD9EBQ(+A29D)  
2747-71-7-AB  
W9AZ(KA9CQM,WB9S,STR,WOC,  
WD9S,EVV,FBF,ops)  
1632-51-6-AB  
WB9BHK(+WB9G,6)  
660-58-2-B

### Indiana

K9WZB 13,632-284-14-B  
WA9FK 6528-136-14-AB  
WB9NTL 5920-61-1-ABD  
K9EFX 5320-140-9-B  
K9DZE 9206-137-9-AB  
WD9EME 3040-75-9-ABD  
W9B 296-81-6-AB  
N9AZC 2240-56-10-B  
K9BID 1862-49-9-B  
WD9BUD 1404-64-3-AB  
WB9NR 296-81-6-ABD  
WD9EIX 1064-38-4-B  
N9AVJ 650-25-3-B  
W9BPH 520-20-3-B  
K9SLQ(+K9AR,1)  
W9FAOJ/3,932-253-17-ABD  
WD8NMZ/9(+K8DHK,N8FU,WD8S  
BYS,SDL,W9EWD)  
4590-153-5-AB

### Wisconsin

WB9LP 4536-98-11-AB  
WA9JFM 4914-91-9-ABD  
WD9ACV 3914-103-9-AB  
K9X 3672-67-17-ABD  
WA9CUH 2122-5-9-ABD  
WA9LZM 832-26-6-AB

### 0

### Colorado

WB9VJ 1908-53-7-AB  
N9KWT(+AA0L,N9S,87,OV)  
5192-109-12-ABD  
WB9ZL(+W9BWT,W9S,I,KI,  
OPV)  
1144-43-3-ABD

### Iowa

WB9TEM 7050-134-15-ABD  
KA9Y 4830-110-11-ABD  
WB9AP 2448-80-8-ABD  
K9VM 2122-5-9-ABD  
WA9RJ 1360-40-7-B  
WB9ZKG(+KA9CLQ)  
4924-107-13-AB

### Kansas

WB9ISW 2656-61-6-ABD  
W9QAA 1152-32-6-ABD  
WB9RSJ 1102-27-9-ABD  
NOLL 864-24-8-AB  
WB9NRV(+W9E,YS)  
2592-69-8-ABD  
WB9RT(+K90BY)  
2318-56-9-ABD

### Minnesota

WB9V 4294-104-9-ABD  
WB9HU 3708-90-8-ABD  
K9CJ 2272-62-6-ABD  
K9SE 2560-81-5-ABD  
K9TS 1742-64-3-ABD  
W9DGA 1615-52-5-AB  
WD9HEB 1560-62-3-ABD  
WB9YFF 1430-5

## You're In Good Hands With All States

Working all states is an exciting accomplishment, not just working 'em but sweating out the QSLs to earn the coveted WAS. To date 34,130 amateurs have qualified.

But doing it on 50 MHz is really tough. Previous to the summer of 1979, only 194 amateurs had successfully endured the trials and tribulations of aurora, sporadic-E and meteor scatter to qualify. With the peaking sunspot cycle of 1979 came a flood of 6-meter activity that put many over the hump for the last few remaining states, especially Alaska and Hawaii. After sending in the precious pasteboards and waiting patiently for processing, the long-awaited prize arrived in the mail. But alas, no blaring trumpets, no embossed gold-leaf seal — merely 50 MHz typed on the basic certificate. To most the quest was more holy than the grail. But to others the reward was not sufficiently commensurate with the arduous chase.

Some of the 6-meter WAS achievers shared their disappointment with us, which prompted a review. The special Old English-lettered 50-MHz endorsement pictured on this page resulted. This met with a most favorable response. But now that we have given proper recognition for 50-MHz WAS, why not upgrade the other specialty endorsements?

A review of the entire program revealed that the endorsements available are not well defined. In the past, the you-work-it-we'll-endorse-it philosophy has not necessarily enhanced the award's status. There are some very worthwhile endorsement achievements that we feel should be more prominently recognized, as with the case of 50 MHz.

In addition to the separate numbering and handsome lettered endorsement for 50 MHz, we propose similar specialty recognition for the following:

- SSTV
- OSCAR satellite
- RTTY
- Two-letter Extra Class portion of 75 meters
- 144 MHz

The basic award would continue to be available and numbered sequentially as presently. The basic award could be further endorsed as follows with handsome stickers either upon initial application, or at a later date which would be indicated on the endorsement:

- SSB
- CW
- QRP
- Novice
- 160 Meters

A special plaque is offered for the first 10 to make WAS on 432 MHz. Two have been issued so far.

At the same time we would propose to simplify two administrative procedures that



### THE AMERICAN RADIO RELAY LEAGUE, INC.

#### OPERATING ACHIEVEMENT AWARD

THIS CERTIFIES THAT

operator of station

has this day submitted to the League satisfactory evidence of having conducted two-way communication with other amateur stations in each of the states constituting the United States of America. This certificate is hereby issued in recognition of this excellent performance. The operator is, in addition, authorized to include the letters W.A.S. (Worked-All-States) on his station cards and correspondence.

50 MHz



SSB

Dated at Annapolis, Conn.

Harry J. Stenmark, W4RO  
President  
John F. Lindholm, W1XX  
Communications Manager

continually plague processing. Before the advent of the 5-Band WAS, individual band endorsements were made. The practice has continued for lack of review. An administrative nightmare now occurs as cards are oftentimes processed twice: first for individual band endorsements and then again for 5-band. This is made necessary because of the 5-band start date. Processing costs money and derails other needed projects. With the 5-band plaque having been available for 10 years, it would no longer seem necessary to issue individual band endorsements (other than 160 and vhf). As is the usual case now, the applicant would collect and hold all the cards for five bands for a single submission to qualify for the 5BWAS plaque.

Our mobile society and two FCC actions have created another problem. It is not unusual for a prospective applicant to work 49 states from one location, only to be transferred by the company to another state. The FCC has also abolished the necessity of portable designators. But the straw that broke the dromedary's back was the FCC's issuance of call signs "out-of-district." A few years ago the 25-mile rule was relaxed by Board action to permit changing location up to 50 miles. But that was previous to having W2s in California, or W6s in New York. It is now virtually impossible to confirm whether the applicant has achieved WAS without moving less than 50 miles. Perhaps it is now time to relax the rule completely — as was done with DXCC rule 9 — to permit moving anywhere within one's country. At first glance it might seem to give considerable advantage to the amateur who moves from coast to coast. But really, even on 75 meters, you can work the whole U.S. with

modest equipment. Such a relaxation would not appear to be in the best interest of preserving the integrity of making WAS on vhf, however, and some specific proof of maintaining residency within 50 miles would seem appropriate. With the number of applications for vhf relatively small, such administrative checking would be minimal.

Also under study is a newly designed distinctive certificate, perhaps featuring the red, white and blue of the flag, available for new applications or endorsements. Our artist is working on this project right now, but there is nothing definite yet.

In summary, we think that better recognition to legitimate, ardent WAS efforts is due, as is a definition of recognized specialty endorsements. And easing of moving restrictions faces the realities of new FCC licensing procedures.

We'd like to hear what you think about this.

#### WIAW NOTE

The complete WIAW summer operating schedule appears in April QST, page 97. A WIAW 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 WIAW Code Proficiency Runs.

#### SCM APPOINTMENT

In the Louisiana Section, S. T. Losey, Jr., K5TL, completed his term of office March 31, 1980. James R. Gianmanco, N5IB has been appointed SCM until the new election procedures are completed for Louisiana. Solicitations are now being made in April and May QST.

\*Communications Manager, ARRL

# 5-Band WAS

Awards issued September 1979 to April 1980

622 WB4BWN	689 WD8IYU
623 K0EUW	
624 K1NLQ	<b>690</b>
625 WB8AFJ	690 KB2DK
626 WD4ETG	691 N4UF
627 VE3ATE	692 AF1U
628 WA1OFP	693 WB8TJL
629 K1IU	694 AA4NC
<b>630</b>	695 K14W
630 W7KMA	696 K3KA
631 WA2IZN	697 WD4HYE
632 W5VSZ	698 W2CC
633 K9WA	699 W9ET
634 WA2SRM	<b>700</b>
635 WB3DDS	700 KC6H
636 W3OG	701 K5SW
637 WA7VSS	702 KB9DO
638 WB2JEZ	703 AG1K
639 KA2AZT	704 W5UJO
<b>640</b>	705 WB4KFW
640 WA7CMK	706 W6YMV
641 KH6DL	707 F6CVI
642 W5KFN	708 K2NG
643 K2NT	709 KP4DGT
644 N4AQA	<b>710</b>
645 K6SD	710 WB3FID
646 WB7DOS	711 KB8DB
647 WD0BMS	712 WA4JZS
648 WB0CLS	713 K9BJM
649 K4IEP	714 N0AJZ
<b>650</b>	715 WB0SNG
650 K7CS	716 W9LNQ
651 W0PUD	717 WB9JBH
652 N4ZM	718 N4AVB
653 WA1YIO	719 K4PR
654 K0SRL	<b>720</b>
655 K5KR	720 AD1S
656 AE1T	721 K2MF
657 K8IQB	722 WB0VRN
658 K8IWC	723 WA1WMS
659 W0UBT	724 WA6VHZ
<b>660</b>	725 WD8HIW
660 W0ULU	726 WA3WIY
661 K0QC	727 WA9WFK
662 WB7QYI	728 WD4GSF
663 WB9GUC	729 W0MNN
664 WA2FUM	<b>730</b>
665 N1YL	730 W5NJ
666 WB8YTE	731 K3ZCA
667 WB2YEL	732 WB8RFN
668 VE3CXL	733 WD0CXG
669 KB8JF	734 WD0BMR
<b>670</b>	735 WA3QQW
670 W9BW	736 K1ST
671 KL7HHX	737 W8KBZ
672 DJ6RX	738 AE1J
673 K1HMO	739 W2KI
674 WD4RCO	<b>740</b>
675 K0MT	740 AI9I
676 W6KBB	741 WD4LRD
677 WB9BGJ	742 D4CBC
678 N4WW	743 W1EQ
679 WA4NEU	744 AJ7E
<b>680</b>	745 VK3QI
680 K7IWD	746 K7ETU
681 N4AOE	747 K8MJZ
682 AG1J	748 WB4EGR
683 N9UN	749 WB4KVM
684 WB6UBR	<b>750</b>
685 W5VGC	750 KB0BA
686 VK6HD	751 K3RX
687 W7GB	752 K1OXD
688 K9CDB	753 WB3HPJ

## OSCAR 7

DATE (UTC)	Orbit No.	Time UTC HR MN	Eqx W. Long. Degrees
1 June	25,361	0132	93.7
2 June	25,373	0031	78.5
3 June	25,386	0125	92.1
4 June	25,398	0025	77.0
5 June	25,411	0119	90.5
6 June	25,423	0019	75.4
7 June	25,436	0113	89.0
8 June	25,448	0012	73.8
9 June	25,461	0106	87.4
10 June	25,473	0006	72.3
11 June	25,486	0100	85.8
12 June	25,499	0154	99.4
13 June	25,511	0053	84.3
14 June	25,524	0148	97.9
15 June	25,536	0047	82.7
16 June	25,549	0141	96.3
17 June	25,561	0041	81.1
18 June	25,574	0135	94.7
19 June	25,586	0034	79.6
20 June	25,599	0128	83.2
21 June	25,611	0028	78.0
22 June	25,624	0122	91.6
23 June	25,636	0021	76.5
24 June	25,649	0116	90.0
25 June	25,661	0015	74.9
26 June	25,674	0109	88.5
27 June	25,686	0008	73.3
28 June	25,699	0103	86.9
29 June	25,711	0002	71.8
30 June	25,724	0056	85.3
1 July	25,736	0158	89.9
2 July	25,749	0050	83.7
3 July	25,761	0152	88.3
4 July	25,774	0044	82.1
5 July	25,786	0146	86.7
6 July	25,799	0038	80.5
7 July	25,811	0140	85.1

## OSCAR 8

Orbit No.	Mode	Time UTC HR MN	Eqx W. Long. Degrees
11,416	J	0100	66.9
11,430	A	0104	68.2
11,444	AJ	0108	69.4
11,458	X	0114	70.7
11,472	A	0119	71.9
11,486	AJ	0124	73.1
11,500	J	0129	74.4
11,514	J	0134	75.6
11,528	A	0138	76.9
11,541	AJ	0000	52.3
11,555	X	0005	53.6
11,569	A	0010	54.8
11,583	AJ	0015	56.0
11,597	J	0020	57.3
11,611	J	0024	58.6
11,625	A	0029	59.8
11,639	AJ	0034	61.0
11,653	X	0039	62.2
11,667	A	0044	63.5
11,681	AJ	0049	64.7
11,695	J	0053	66.0
11,709	J	0058	67.2
11,723	A	0103	68.4
11,737	AJ	0108	69.7
11,751	X	0112	70.9
11,765	A	0118	72.1
11,779	AJ	0123	73.4
11,793	J	0127	74.6
11,807	J	0132	75.9
11,821	A	0137	77.1
11,834	AJ	0000	52.1
11,848	X	0005	53.3
11,862	A	0010	54.5
11,876	AJ	0015	55.7
11,890	J	0020	56.9
11,904	J	0024	58.1
11,918	A	0029	59.3

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. 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 Isb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Soviet RS data have been discontinued.

O 7 progresses an average of 28.7354° W. per orbit in a period of 114.9409 minutes.

O 8 progresses an average of 25.7734° W. in a period of 103.2243 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.

Mode AJ is simultaneous operation of both transponders.

### 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 approximate 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.

## Around the Bands

The year 1979 was FB for formal traffic-handling activities, as Table 1 will disclose. Anyone who was even moderately active in the nets this past year knows that the traffic load seemed to be heavier by a considerable margin. But the total is down over 1978. Although individual reports to the SCM increased, it would appear that many who were an integral part of their section's traffic operations neglected to report to the SCM. Look, it's no big deal. You can file this info by radiogram or on the newly revised CD-210. If you keep a running count of your message handlings throughout the month, you're ready to go. Reporting to your SCM provides a more representative measure of the system's function as well as garnering for yourself a certain amount of personal recognition and "bragging rights." Also in table format is the latest list, by continent, of those countries that have signed a third-party agreement with the United States and Canada. Remember, it is a violation of international law to handle messages of any kind with a country that is not signatory to such a treaty . . .

The brand-new, completely up-to-date *ARRL Operating Manual*, containing everything you ever wanted to know about on-the-air activities, should be hitting the streets right about now. For an inflation-defying five bucks, you can't go wrong. The op manual is available from your local radio store or directly from Headquarters. . . . Nominations are still open for appointment to the ARRL Emergency Communications Advisory Committee. Openings presently exist in the W7, W8, W9 and VE call areas. Nomination forms are available from Newington. . . . One reader opines that, in traffic work, using Q-signals on phone, saying "roger" for the affirmative and employing superfluous proverbs and cute-isms, brands one a lid just as vividly as the letter A branded Hester Prynne in Nathaniel Hawthorne's *The Scarlet Letter*. . . .

Latest *Radio Club News*, produced by the stalwart Club and Training Department, is devoted exclusively to emergency communications. Your local ARRL-affiliated radio club has a copy. . . .

From the bulletin of the Empire Slow Speed Net (W2WSS, editor): "Have you recently ground your teeth to stubs while copying a

**Table 1**  
1979 Traffic-Handling Statistics —  
Based on Reports to SCMs

	Total Reports	Total Traffic Handled
January	1741	164,446
February	1608	129,289
March	1511	125,873
April	1506	151,843
May	1506	131,683
June	1418	98,629
July	1371	103,095
August	1417	124,807
September	1437	119,146
October	1525	143,500
November	1523	133,911
December	1696	245,447
Total	18,696	1,671,669

series of 35-word texts, maybe originated with a college or special-event station? Have you ground the stubs to the gum line when reviewing the text and finding it repetitious, wordy, and that it could have been condensed to 10 words and an ARL-numbered message? Do unto others . . . When originating your own message or picking one up from the public, take a good look at it before you put it on the air. Could a lot of the verbiage be left out? Could it be rephrased more briefly? Could an ARL text be used? Of course, you cannot change a message once it has been given to you by a third party and you have accepted it; but you can work with the originator and suggest wording or ways to shorten the message. When engaged in a mass origination at a fair or special event, there is nothing wrong with (1) asking the public — verbally or with a sign — to limit their literary creations to 15 or 20 words, and (2) providing them with a numbered text alternative. You can even suggest short messages that are not in the numbered list. A different but closely allied point: Try to discourage the writer of the message from contractions, cute private jokes and excessive colloquialism; HIYA THERE OLD BUDDY X DONTCHA REMEMBER THAT CRAZY WROBBAT AT HEXY EXYS is guaranteed to require 25 minutes of valuable net time to pass correctly."

**Table 2**  
U.S. amateurs may handle third-party traffic with:

Continent	Countries
North America	Canada, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama.
South America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.
Europe	4U1ITU-Geneva
Asia	Israel, Jordan
Africa	Ghana, Liberia

Canadian amateurs may handle third-party traffic with:

Continent	Countries
North America	Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, United States.
South America	Bolivia, Chile, Colombia, Guyana, Peru, Trinidad and Tobago, Uruguay, Venezuela
Europe	---
Asia	Israel
Africa	---

Since the response to the "Repeater Log" roster that appears regularly in this column has been positive and heartening, we have expanded the categories. Please help us by providing the repeater call signs. Terminology such as "the local repeater was used" does not help our efforts . . . Have you registered your net for the next *Net Directory*? The deadline was June 1. . . .

We are still looking for design suggestions for the upcoming Public Service Honor Roll certificate. Any aspiring artists out there in radio land? . . .

. . . Field Day approaches — don't forget the special bonus points for message handlings.

## ARES REPORTS

□ Motino, Florida — November 11-14. Several railroad tank cars containing liquefied propane gas had derailed and were burning and 35 local amateurs assisted in the relief efforts which included the evacuation of 70 families from the dangerous area. WR4ACZ's autopatch was used extensively throughout the emergency for communications to the relief agencies involved in the operation. (WA2GIN/4, EC Escambia, FL)

□ ARRL Section Emergency Coordinator Reports. For March, 33 SEC reports were received, denoting a total ARES membership of 17,895. This represents a 3% decrease in reports received one year ago (34), but a 20.7% increase in ARES membership (14,827). Sections reporting were Ala, Alta, Ariz, Ark, Colo, Conn, EBay, Ind, Kans, Ky, La, Me, Mar/Nfld, Mich, Minn, Mo, Nev, NFla, NTex, Ohio, Okla, Ont, Org, SV, SDgo, SJV, SBar, SCV, Sask, SFla, Wa, WVa, WMass.

## REPEATER LOG

According to reports received between March 20 and April 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Medical Emergency	Criminal Activity	Vehicular Emergency	Public Safety Events Search and Rescue Fire	Miscellaneous Disturbances	Total
WR1ADP					1		1
W1AEC						1	1
WR1AHO						1	1
K1HF						1	1
WR2ACN				2			2
WR2AES	1						1
WB2NHO		1	10	2			13
VE2RM						2	2
W2VL		1	1	9			11
WR3ACU			1	1	3		5
WA3JDX				1			1
WR4ADU						1	1

\*Assistant Communications Manager, ARRL

Weather Emergency  
Criminal Activity  
Medical Emergency  
Vehicular Emergency  
Public Safety  
Search and Rescue  
Fire  
Miscellaneous  
Drills/Alerts  
Miscellaneous  
Total

WR44LJ						3
WA4PV						3
WR4ASV						2
WR4AUE	1					1
WR4AUT						1
WR4BBB						1
N4BJZ						1
K4EAJ						1
WA4GUE		2				2
WD4HWE						2
WA4LZR						2
VE4MAN						1
K4SCL						1
WB4UFA						1
WR5ABA		1	4			5
WR5ABI			6			7
WR5ABY	1		6			7
WR5AJG			4			4
WR5APK			4			4
WR5APN			1			1
WR6ACB				1		1
WR6ADU						2
WR6AEN						2
WR6AFV		1	10			11
WB6BJM	2		8	2		14
W6RCH						2
W7WGW		1	1			2
WR8ABI						1
WR8AES						1
WR8AJL						1
WR8APB	1					1
W8UPV				1		2
W8WRP				1		1
WR9ACF						1
WR9ADQ						1
N9AHP						1
WR0AEV				1		1
WR0AFT			2			3
Simplex	1			1	8	11
Total	4	4	9	68	11	32
						9
						2
						140

### March Reports

Area Nets	1	2	3	4	5	6	7
EAN	92	3207	34.9	1.094	94.3		
CAN	93	1566	16.8	.589	100.0		
PAN	62	1712	27.6	.797	100.0		

Region Nets	1	2	3	4	5	6	7
1RN	105	866	8.2	.487	—	91.4	
2RN	145	1139	7.9	.567	86.8	97.8	
3RN	93	643	6.9	.549	100.0	94.6	
4RN	124	1658	13.4	.548	86.9	96.8	
RN5	93	1137	12.2	.479	96.8	100.0	
RN6	124	1021	8.2	.339	88.0	100.0	
RN7	124	1284	10.4	.852	100.0	100.0	
8RN	123	1002	8.1	.458	89.2	97.8	
9RN	155	948	6.1	.354	95.0	100.0	
TRN	93	490	5.3	.273	98.6	100.0	
ECN	62	314	5.1	.402	87.1	86.0	
TWN	92	618	6.7	.313	86.7	100.0	

TCC	1	2	3	4	5	6	7
TCC Eastern	196 <sup>1</sup>	1003					
TCC Central	206 <sup>1</sup>	950					
TCC Pacific	118 <sup>1</sup>	738					

Sections <sup>2</sup>	1	2	3	4	5	6	7
Summary	6237	27,191	4.4				
Record	7050	54,333	18.1				

<sup>1</sup>TCC functions not counted as net sessions.  
<sup>2</sup>Section and local nets reporting (200): ABN AK-PAC  
 ASN SEASAW (AK), AENB AEND AENJ AENK AENM  
 AENS (AL), ARN OZK SCAHC (AR), ATEN HARC (AZ),  
 BCEN (BC), NCN NCTN (CA), CN CWN HNN (CO/WY),  
 CN CPN NVTN RASON WESCON (CT), DEPN DTM  
 (DE), AFPN DEN FAPT FPN FN GN MEN PEN QFN  
 QFN SBN SPARC SWFTN TPTN (FL), CVEN GERN  
 GSN GSSBN GTFCN GTN (GA), I75MN IACN TLOC  
 (IA), IMN MTN (ID/MT), ILLN ILPN (IL), ION ITN QIN (IN),  
 KPN KSN QKS (KS), KYN (KY), LAN LRN LSN LTN  
 (LA), EM2MN EMRI EMRPN HHTN NEEPN RAIN WMN  
 WMPN WMTN (MA/RI), MEPN MMN MTN WRIN (MB),  
 MERN (MD), AEN MPN OCRN PTN SGN SPN (ME),  
 MACS MATW MITN MNN QMN UPN (MI), MAWXN  
 MSN MSPN MSSN (MN), AQE MEOW MON NEMOE  
 TNT (MO), APN (MR/NF), MTN (MS), CMN CNCTN JFK  
 M2ZMN NCSBPN PCTN RARS2MN THEN (NC), CN  
 (NC/SC), WNN (NE), G6FM (NH), JSARS MCN NJN  
 NJPN NJSN NJVN OBTTN UCETN (NJ), NMRR SWN  
 (NM), NSN (NV), BAVTN CNYTN NYPN NYS OCTEN  
 STAR WDN (NY), BN BNR ONN OSSN (OH),  
 OAN OFON OLZ ONON OPEN OTWN (OK), CMN LN  
 ODN OLN OPN OSN (ON), 1676 JCARES OARES OSN  
 PDXAARES SDFMN (OR), EPA EPAETN NWPATMTN  
 PTN WPA WPAPTIN WPATMTN (PA), WQVUH (PQ),  
 SCSSBN (SC), NJQ SDEN SDMM SDN (SD), SATN (SK),  
 MCRN METEN MTPSN RCARES TN TNYVHFN  
 (TN), DFV TEX TWN TTN (TX), BUN UCN (UT), VLN VN  
 YNTN VSN VSN (VA), WSN (WA), BEN BWN NWTN  
 WIN WNN WSN (WI), WYHBN WYMDN WYV WYNN  
 WVPN (WV).

- 1 -- NET
- 2 -- SESSIONS
- 3 -- TRAFFIC
- 4 -- AVERAGE
- 5 -- RATE
- 6 -- % REP.
- 7 -- % REP. TO AREA NET

### Transcontinental Corps

W0EJD has been appointed TCC Director, Pacific Area, for daytime activities.

	1	2	3	4	5
TCC Eastern	206				
TCC Central	217				
TCC Pacific	124				
Summary	557				

- 1 -- AREA
- 2 -- FUNCTIONS
- 3 -- % SUCCESSFUL
- 4 -- TRAFFIC
- 5 -- OUT-OF-NET TRAFFIC

### TCC Roster

The TCC Roster (March): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA EIR GN SSH XA, W2s CS COB EFU FR GKZ MTA RO ZQJ, Q2NY, N2YL, WA2s ICB SPL SYR, W3s FAF PQ, /NA3WQP, K3s KW NGN, N3SJ, W4s JK MEE SOQ UQ, WA4CCK, WB4PNY, K4s BXX KNP, N4s KB NK, KB4N, KB6FR/J, W8s PMJ VPW, WB8WTS, K8s AAZ KMQ, KC8C, VE3s CWA GOL JIR SB, Central Area (W5GHP/W9JUU, Directors) — W4ZJY, WD4HIF, K4YZU, WN4KKK, N4MD, W5s KLV RB SBE, WA5s BHF INJ RKU, WB5s OXE YDD, WD5HHK, K5s AJM GM MC PE TL, N5s RB TC, W9s CXY DND HOT JIJ JUJ NXG, N9TN, WB9WGD, W9s AM HI, WA9TNM, K9s CW EZ, Pacific Area (W5KH, Director) — N5s MR NG, W5KH, K5MAT, N6s GW PZ, K6DE, W6s EOT OA SX VZT YBV, WB6PVH, W7s DZX EP GHT LYA VSE, K7s HLR KSA MC, WA7GYQ, AD9A, K9s BN DJ, W9FG, VE7ZK.

### Independent Nets (March 1980)

	1	2	3	4
Amateur Radio Telegraph Society	31	1134	584	
Central Gulf Coast Hurricane	31	156	2815	
Clearing House	30	273	405	
Early Bird	31	797	440	
Empire Slow Speed	31	75	448	
Hit and Bounce	31	279	489	
Hit and Bounce Slow	19	47	154	
IMRA	28	429	1047	
Mike Farad Net		33	144	
Mission Trail	31	284	1448	
North American SSB Traffic	24	319	214	
North American Traffic and Awards	31	40	1320	
Piconet All Day Watch	159	311	3437	
Washington Region PON	22	22	426	
West Coast Slow Speed	30	163	400	
20-Meter ISSB	26	225	441	
75-Meter ISSB	31	573	1210	
7290 Traffic	47	568	2435	

### Public Service Honor Roll March 1980

435	121	WB4TZR		
W0WYX	VE3JIR		AF00	
353	K9PNC	109	KA1CC	
KA9CPA	WA2MFEV	99	KA2AM	
195	WB8NYN	107	K7GXZ	
K4TH	KC5M	WB2ZCM	WB2IQJ	
192	119	W9JUU	98	
N4AZI	K4SCL	106	AA3S	
182	W1TN	105	K0PIZ	
WA4CNY	W7VSE	105	WB6PVH	
169	WB5NKC	97	W4LX	
WD4COL	117	WA3ATQ	AJ3R	
WA4PFK	WA3WQP	104	WA3ATQ	
152	116	WB4Q	KBAN	
N4CCT	VE5AE	WB2PJU	K4TH	
147	WA2UWA	VE1WF	KBAAZ	
W2ZQJ	WA2UWA	WB2RMI	K4SCL	
137	115	KB6FR	WB7TQF	
N4NK	AA2H	103	VE3CWA	
136	W2RQ	103	KB6FR/3	
WA2SPL	AF2L	WA2ZJP	WD4HIF	
133	W2ZQJ	WB2TOM	W9JUU	
WD8LRT	114	WA1TBY	WB4PNY	
128	WA3NAZ	KB5TC		
WB7WOW	113	W3GGJ		
127	WB2EAG	102		
AG2R	KA4FZJ	N6AWH		
	W4MEE	WA4JDH		
	WB8YRY	KA1BJY		
	112	WA4STO		
	K7JV			
	WD4HIF			
	121	AF4T		
	111	KG5L		
	W2UEZ	W00YH		
	110	KB4N		
	124	W2MTA		
	WA5RVT	100		
	AFBV	WA3PXA		

WA2CQW	N4WA	K9BVE	K9UN
WB4FVW	K8AAZ	71	62
W4NWM	WB5YDD	W1KK	W7GB
WBVPW	WB3CAI	W6OTF	K88OT
91	80	K6SI	WA4ZHG
VE3JRT	WB3KYL	N3BEJ	W7EP
N9AUG	W2XD	KA5FAS	KF5A
WA0TNM	79	70	WD0BMR
K0EZ	VE3JLL	WB5LBR	WA1LOU
K2VX	VE5WM	WB9JSR	WA41KE
KA2CTU	AF1L	WA4NK	WA1IOG
90	W2AHV	WB2LZN	KH6JNQ
W2YJR	KA2DOH	69	61
WB0ZBJ	KB4OW	K7NTG	WB0HOX
WB1CPF	78	WD4PDK	N0ABA
N5TC	WB1BYR	W6JXK	WA4RTS
WB8YDZ	K8BMX	WD8DTG	W2P2L
WB8ZNS	77	WA1VAB	60
89	KA8AYJ	W4LXB	WD4CNR
WB7TQF	N6RD	68	K6YD
WB2BNY	KA2CNN	WB4FMN	K86FC
N9ASX	WB5YTD	W4ZJY	K8INK
W5KLV	WD5DQR	W2AET	K85EK
88	WB5LAT		W3DKX
N3AKC	AA5J	67	W9IEM
W1WP	76	WA6LVO	K0JCF
87	N5RB	WB5MMI	WD8PEI
W7FJZ	N8CW	W0HZU	WB8SIQ
K80Z	WB1ANT	WA8GMT	N2CR
W6VMP	K4BKX	66	W4WYR
86	75	KC4AM	KA3ALL
WA2KOJ	W7GHT	KA1H	
85	WA2GIN	WA2EQW	WD4CFZT
VE3JRO	N2APB	WD4EUV/T	WD4SIHT
K1BSO	N5BT	W7LNE	55
KA4BQK	74	W9XD	WD5YI/T
WB8SYA	WD4CQW	KF4U	53
W5HMR	WD4AVN	K8PXM	KA1CGP/T
84	KB2HM	K10SM	WD8BHE/N
K4EV	N4LE	65	49
VE5KS	WD8KZX	WD9GXW	WB1EZT/T
WD9BCM	WD5EUE	VE1BMN	48
K3JL	AJ5F	W9JUU	N2BDW/T
83	73	64	KA2DBW/T
VE3FGU	N3EE	WB8UBR	44
W5VMY	K1JHC	WA2AFE	WD8PID/T
W2SQ	WA2HEB	W9HOT	42
N8ABA	WDBKBW	63	WD2
WD5VD	W2TCA	K4VHT	KA2GT/YT
82	K14W	WD4AWN	KA4BBA/T
K4JGW	72	KA0AIT	41
W0VJD	VE3KK	WD8QMP	KA2BGX/N
81	W5JOV	N2BC	40
VE3CWA	WA4EYU	KA2GQQ	WB7CFH/T
	WB1FZX	WB3JYZ	WA2WULT

### Brass Pounding League March 1980

	1	2	3	4	5	6
W3CUL	885	964	1519	86	3434	
WA0HJZ	31	1198	0	517	1746	
W0WYX	53	740	319	421	1533	
WB0ZQY	0	863	35	568	1465	
KA9CPA	14	808	126	311	1259	
W4MEE	22	543	524	24	1113	
WA2SPL	0	542	525	40	1107	
WA3WQP	34	523	522	28	1107	
W9JUU	2	403	485	6	896	
WA0RWM	33	414	9	413	869	
W3VR	265	180	326	15	788	
WA4JDH	1	136	603	1	741	
W02WL	1	370	0	305	676	
WA4CNY	62	218	306	88	674	
WA4PFK	56	276	278	63	673	
W7DZX	27	322	313	2	684	
WB3GZU	66	242	292	49	649	
KC4AM	269	46	265	36	616	
VE3JIR	3	287	285	36	611	
WB7WOW	46	283	271	27	607	
W7VSE	5	283	307	17	592	
N4CCT	44	222	288	26	580	
WB6PVH	3	284	275	18	580	
W4LX	263	21	281	3	568	
AJ3R	2	198	337	14	551	
WA3ATQ	354	103	85	2	544	
KBAN	2	265	270	5	542	
K4TH	20	240	174	102	536	
KBAAZ	2	284	228	16	530	
K4SCL	0	273	243	13	529	
WB7TQF	42	209	232	41	524	
VE3CWA	115	114	253	38	520	
KB6FR/3	56	213	217	24	510	
WD4HIF	10	244	229	21	504	
W9JUU	30	236	230	6	502	
WB4PNY	3	260	217			

# Contest Corral

## A Roundup of Upcoming Operating Events



Conducted By Tom Frenaye,\* K1KI

### JUNE

3

**West Coast Qualifying Run**, (W6)WP prime, W6ZKJ alternate), 10-35 wpm at 0400Z June 4 (9 P.M. PDT June 3). 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.

7-8

**Teenage DX Contest**, May QST, page 92.

**Minnesota QSO Party**, sponsored by Heartland ARC, from 1800Z June 7 until 2359Z June 8. Phone and cw. Exchange signal report and county (Minnesota only), ARRL section or country. Novice and Technicians sign /N or /T. Score one point per phone QSO, two points on cw and five points for N/T QSOs. QSOs with club station WB0TTZ count 10 points on each band. MN stations multiply QSO points by sum of ARRL sections and DX countries for final score. Others multiply QSO points by MN counties worked (max. 87) for final score. Suggested frequencies: cw — 3600, 7075, 14,075, 21,050, 28,050 kHz; phone — 3950, 7275, 14,300, 21,400, 28,700 kHz; Novice — 3725, 7125, 21,150, 28,150 kHz. Dupe sheets required if more than 50 QSOs made. Include large v.a.s.e. for results. Mail by July 1 to Heartland ARC, Scott Nelson, WD0EZF, 421 W. Wisconsin Ave., Staples, MN 56479.

10

**WIAW Qualifying Run**, 10-40 wpm at 0200Z June 11 (10 P.M. EDT June 10). Transmitted simultaneously on 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz. The complete WIAW schedule appears on page 97 of April QST. Other details are the same as for the June 3 listing.

14-15

**ARRL VHF QSO Party**, May QST, page 74.

\*Asst. Communications Manager, ARRL

21-22

**All-Asian DX Contest** phone, sponsored by the Japan Amateur Radio League, 48-hour period UTC (cw will take place August 23-24). All bands below 30 MHz may be used. Entry classifications: single-op, single band; single-op multiband; and multi-multi. Note cw only on 160 meters. W/VEs call CQ AA. Exchange RS1 plus two figures denoting the age of the operator, YL operators use 00. No crossband contacts permitted. Only one signal per band regardless of category. Scoring: Non-Asians count one point for each complete contact with an Asian station, except two points on 3.5 MHz and three points on 1.9 MHz. The multiplier is the number of different Asian prefixes worked on each band. Note: Only JDI stations on Ogasawara (Bonin & Volcano) count for Asia. Contacts with KA stations do not count. (They are considered military rather than amateur.) Scoring: Multiply the sum of contact points on each band by the sum of multipliers on each band. Log separately for each band and use a complete summary, note the first time a new prefix is worked on each band. U.S. call area leaders will each receive certificates. The JARL Asian countries list: A4 A51 A6 A7 A9 AP BV BY CR9 EP HL HM IIS HZ JZ JA JE JF JG JH JI JJ JR JDI (Ogasawara) JDI (Okino Torishima) JT IY OD5 S2 TA UA UK/UV/UW 9-0 UD6/UK6C-D-K UF6/UK6E-Q-V UG6/UK6G UH8/UK8H UI8/UK8A-G-I-L-O-I-Z UJ8/UK8J-R UL7/UK7 UM8/UK8M-N VS6 VS9M/8Q6 VU VU (Andamans) VU (Laccadives) XV XV XW8 XZ YA YI YK ZC4/5B4 IS (Spratly) 4S7 4W 4X/4Z 7O (Yemen) 7O (Kamara) 8Z4 9K2 9M2 9N1 9V1 and Abu Ai. Contest results may be obtained by enclosing one IRC and an addressed envelope with your entry, which must arrive no later than September 30 (for phone) or November 30 (cw). Send to: JARL, Box 377, Tokyo Central, Japan.

**West Virginia QSO Party**, sponsored by West Virginia State Radio Council, from 1600Z June 21 until 1600Z June 22. Single-operator only. Same station may be worked on different bands for credit. Exchange signal report, serial number and county (West Virginia only), state or country. WV stations may work each other. WV stations multiply QSO total by sum of WV counties, states and countries worked. Others multiply QSO total by WV counties worked. Multiply score by 1.5 if you run 200 watts or less for final score. Suggested frequencies: cw — 35 kHz from lower edge; phone — 10 kHz from lower edge of General bands;

Novice — 35 kHz from lower edge. Logs should be mailed so they are received by July 15. Send to West Virginia QSO Party, Route 1-A, Box 6-A, Moorefield, WV 26836.

24

**WIAW Qualifying Run**, 10-35 wpm at 1300Z (9 A.M. EDT). See June 10 listing for more details.

28-29

**ARRL Field Day**, May QST, page 72.

JULY

4

**West Coast Qualifying Run**, 10-35 wpm at 0400Z July 5 (9 P.M. PDT July 4). See June 3 listing for more details.

9

**WIAW Qualifying Run**, 10-35 wpm at 0200Z July 10 (10 P.M. EDT July 9). See June 10 listing.

12-13

**IARU Radiosport Championship**, May QST, page 73

19-20

**SEANET (Southeast Asia) DX Contest**, cw.

**QRZ Summer Contest**.

**Maine QSO Party**

23

**WIAW Qualifying Run**

26-27

**CW County Hunters Contest**

AUGUST

2-3

**ARRL UHF Contest**

SEPTEMBER

13-14

**ARRL VHF QSO Party**

## 50 Years Ago

June 1930

□ The cover photograph of self-excited push-pull 852s on 10 meters comes close to the ultimate in beautiful breadboard construction for the times. In the 8-page article subtitled "Getting 3500-ke. Performance from the 28-mc. Transmitter," Technical Editor Jim Lamb spells out why methods that work on 80 meters fail on 10. The discussion of parasitic oscillations is excellent, but it must have seemed like black magic to many at the time.

Further on 10 meters, Clark Rodimon, W1SZ, describes the successful 10-meter station of W2JN: battery-operated, 3-tube (i.e., receiver, crystal-controlled transmitter with 160-meter crystal and doubling in each stage until 10 is reached, in the 852 output doubler stage. A Zapp-fed long-wire antenna is used.

A "Stray" mentions that the Radio Manufacturers Association convention will be held in Atlantic City in June. The latest broadcast receivers will be shown, and it is predicted that the new "pentode" tubes and their influence on future designs will be a major topic of discussion.

In the lead article, "Getting That D.C. Plate Supply," Assistant Technical Editor Grammer reviews the advantages and disadvantages of everything from homemade chemical ("slop jar") rectifiers to the commercial thermionic and mercury-vapor tubes. Ex-

amples of filter configurations and a good bibliography round out the 8-page "state-of-the-art" story.

Howard Anderson, WIBVS, tells how to convert a battery-powered broadcast superhet to a short-wave receiver tuning as low as 15 meters. The i.f. is modified to 1550 kc. and a regenerative second detector is used. Homemade plug-in coils do the band-changing job. A 1980 reader might be interested in Anderson's advice: "Procure from a local dealer a Crosley *Bandbox* battery set. This will cost from \$5 to \$10, although some dealers might give them away since the receiver is obsolete."

## 25 Years Ago

June 1955

□ An excellent example of ham ingenuity can be found in "A 200-Watt Grounded-Grid Linear Amplifier" by Hoover, W9SAR, and Peck, W9MOW. Type 1625 or 807 beam-power tubes (1625s were inexpensive war surplus) are modified by removing the bases, disconnecting the beam-forming plates lead and reconnecting it to a grid lead and then recentering the base back on the envelope. Tying the grids together gave a high- $\mu$  25-watt dissipation triode that was suitable for grounded-grid operation. The rig

described in the article used four modified tubes in parallel, a 1200-volt power supply, and a variable capacitor and variable inductor from a war-surplus BC-458 transmitter.

Another application of surplus gear can be found in "Better Selectivity in Mobile Operation," by Tell, W2TZL. Normal procedure for 75 and 40 mobile reception is to use a converter ahead of the car's h.c. receiver (a.m. only, of course). The author shows how to modify an ARC-5 surplus receiver to accept the 1430-ke. output of the converter and utilize the superior selectivity of the 85-ke. i.f. in the "Q5-er."

In an article filled with good humor and sound techniques, Charles Miller, W2RDK, tells how he improved the keying of a friend's commercial transmitter (Viking H) so that the c.w. quality was acceptable both to the owner and a ham (Miller) who had been suffering from the clicks and occasional chirps.

The ever-popular subject of antennas is not neglected. Camillo, W9GZJ, and Dick Purinton, W1SX, tackle bandwidth of a dipole in "A Broadband Antenna for 75 Meters." Their approach is a fan-type dipole, and they report on their impedance and s.w.r. measurements of a typical installation. "A Lightweight 40-Meter Ground Plane" is described by Phillips Smith, W2OTC, complete with a quarter-wave coax matching section. And, in "Guys Who Have To Guy," Abraham, W6FHR, spells out the considerations for designing guying systems for towers, taking wind loading into consideration. V.h.f. is not neglected; Bill Tynan, W3KMY, describes a (drool, drool) "5 Over-5 for 50 Mc.," a neat stacked Yagi-over-Yagi with 5/8 wavelength spacing. — By Goodman, W1DX

# Section Activities

A-1 OPR X EC X DXCC X RCC X WAS X STM X OES X OTS X NM  
SCM X ARES X OVS X SEC X OBS X TCC X OO X NTS X WAC X CP X

## CANADIAN DIVISION

**ALBERTA:** SCM, S. T. Jones, VE6MJ — SEC & Asst SCM: E. Roy Ellis, VE6XC. Net MGR. (APSN) VEAFO. Net MGR: (ATN) VE6BBL. The Alberta disaster services sponsored a communications exercise during the last week in March and hams were invited to take part. On Monday a message was invited to take part. On 3700 kHz and relayed on several two-meter repeaters. Coverage of the province was our aim. Another message was sent by VE6XC on Wednesday via two meters to a repeater in an aircraft flying at 10K feet piloted by VE6APO with VE6HR as operator. Testing was carried out for over two hours. Approximate distance achieved from aircraft to receive stations about 135 miles. A report is being prepared to hand in to the department. Traffic: VE6HO 124, VE6AMM 20, VE6XC 12, VE6OB 10, VE6FZ 9, VE6CE 8, VE6QM 6, VE6ARN 4, VE6CCW 4, VE6CKA 4, VE6AAT 2, VE6CJT 2, VE6MJ 1, VE6YW 1.

**BRITISH COLUMBIA:** SCM, H. E. Savage, VE7FB — This month our request to update forms seven's been most gratifying. But the news is a new two-meter repeater for Burnaby ARC. The Nanaimo ARC Emergency Net and VE7DAR is improving from his stroke but his XYL is still healing from her fractures. Please help us to improve this report column. Traffic: VE7ZK 89, VE7COA 44, VE7FB 31, VE7BO 23, VE7DFY 9.

**MANITOBA:** SCM, Peter Guenther, VE4PG — Asst SCM, VE4JP. SEC, VE4TR, STM, VE4HC. Net Managers: VE4N, M. A. J. V. T. Some early stirring on Field Day as well as the Peace Garden Hamfest. Other than that, some fisherman are looking over the old reels. We hope VE4JF will have a fast recovery from surgery. . . he is reported doing well. MEPN: QNI 1285, QTC 18, sess 31; MMN: QNI 602, QTC 30, sess 31; MTN: QNI 2699, QTC 70, sess 31; WRIN: QNI 1553, QTC nil, sess. 5; Traffic: VE4A 27, VE4AP 44, VE4J 27, VE4K 23, VE4L 23, VE4M 21, VE4N 19, VE4O 14, VE4P 4, VE4R 6, VE4S 7, VE4T 6, VE4U 6, VE4V 6, VE4AAU 5, VE4C 4, VE4L 4, VE4N 4, VE4E 3, VE4L 3, VE4O 2, VE4N 2.

**MARITIME — NFLD:** SCM, Donald R. Welling, VE1WF — AS-SCM: VD1FF, STM: VE1WF, NMs VO1JN, APM open. Sent key, VE1YA, condolences. Please fwd your comments, queries and news. Cruise 80 will be visiting six VE1V01 ports in Aug, req comm assistance. Cct SCM for details. APN needs coverage in several areas, all welcomed. Wish VE10C best luck in future endeavors and thanks for past assistance. New Tfc Net ECN-Drop on 7170 kHz at 2100 UTC daily. Needs cktms from this sect. VO1CM mvig to VE6 Hospital: VE1AOO VE1CP VE1APU NSARA holding post WARC Symposium in Truro Apr. 13. HARC has formed RTTY group. Don't forget HAM CELLIOH 80, contact VE1IC for info. MAARC operated VE1SMB during Air Canada Silver Broom Ronspil in Moncton with good results. APN sess. 31, QTC 102, QNI 204. Traffic: VE1WF 241, VE1CLR 117, VE1BMN 92, VE1BXA 39, VE1OC 33, VE1HJ 23, VE1SMB 18, VE1KR 13, VE1XF 12, VE1AUL 12, VE1ABG 4.

**ONTARIO:** SCM, Larry Thivierge, VE3GT — AS-SCM: VE3BMG, SEC: VE3APK, STM: VE3GOL. Congrats to VE3GRO and his staff for their fine efforts in publishing the new CHRL Newsletter which is distributed free to League affiliated clubs, League officials and as many other amateur organizations in Canada that addresses are available for. Regretfully I announce the following have become Silent Keys: VE3S QBC, QNY and ADE. A number of members of the Windsor ARC have caught the RTTY bug. Our own Parliament has VE3ANY and VE3QN among its elected representatives. The Ont. Daytime Net (ODN) has given way to a daytime Regional net session of ECN on 7170 kHz at 2100Z. VE3s BNO and TP gave a most informative presentation of the AMSAT satellites and how to become involved with this mode of operation, to members of the Ottawa ARC. The Lake Simcoe Hamfest will be held June 13-15th at Molson's Park in Barrie. VE3GPN who has been chasing DX on 10 meters daily, has successfully completed a new home brew cw rig project for use on the traffic nets. VE3s IH, BJX HQV and HC are attempting to write the history of the Guelph ARC since its beginning. The contest is any pictures, stories, etc., that you wish to touch with them. The new phone ports on 40 meters, 7.050 to 7.100 MHz has provided some interesting evening DX such as VK7 and Lord Howe Island (VK2). VE3KBR is ten years old and plans are afoot to replace all present equipment with new gear and to link up with Pioneer Repeater VE3TEL in Ottawa. The GARTG Merit Award, created in 1967, has been presented to VE2QO for 1979. New members of the Scarborough are VE3s IGN EAU FTV HL and CMM. The National ARRL Convention will be held on July 25-27 in Seattle, WA. NPARC's Amateur of the Year is VE3WT. RSO Inc. sponsors two awards which are presented annually for Field Day operations. The 1st prize is the Brennan Trophy and the Keith Russell Trophy. BPLs were earned this month by VE3JIR and VE3CWA. Traffic: (Mar) VE3JIR 611, VE3CWA 520, VE3GOL 345, VE3DPO 219, VE3JLL 202, VE3KK 192, VE3GT 129, VE3JUT 110, VE3CYR 108, VE3JHO 96, VE3ISW 94, VE3SB 80, VE3HTL 78, VE3GFM 65, VE3EWD 62, VE3BVG 52, VE3DVE 51, VE3GYD 43, VE3IFP 43, VE3KXB 43, VE3FZG 41, VE3FGU 34, VE3FGV 31, VE3HCS 28, VE3EBC 25, VE3AIZ 24, VE3CBB 22, VE3WG 22, VE3APK 20, VE3JPP 20, VE3AW 13, VE3AJN 12, VE3JUK 12, VE3ANJ 11, VE3BZ 10, VE3GNW 9, VE3ABG 4, VE3IKB 4, VE3LVE 4, (Feb.) VE3GYD 44, VE4FZG 43, VE3FGV 34, VE3JUK 28, VE3IMR 27, VE3LVE 10, VE3AW 8.

**QUEBEC:** SCM, Harold Moreau, VE2BP — SEC: VE2DEA, STM: VE2FE. Congrats to VE2FE, our new appointed STM. Change of call: VE2EZI now AJAVE2; ex-VE2ZBF now VE3HA from Ottawa and he is heard on the Happy Gang Net. The VE2BG Technical Info Net which was started by VE2EBO seems to have come to the end of the trial period and is under review. The West Island ARC has a new club logo designed by VE2TY. Field Day is almost here, a good weekend to all. Plusieurs sont a se preparer pour le Field Day, notre section devrait etre bien active. Bonne Chance a tous. Traffic: (Mar) VE2EK 13, VE2FEX 7, AJAVE2 6. (Feb) VE2EC 20.

**SASKATCHEWAN:** SCM, Norm Waltho, VE5AE — SEC: VE5WM, MNs: VE5DC, VE5HG, VE5VM, VE5SF. Nets: SATN, 383 QNI, 30 QTC; SPN, 1237 QNI, 26 QTC; RARA, 427 QNI, 2 QTC; SKTN 2M, 314 QNI, 3 QTC; PWXN, 643 QNI. A very good month for the nets with lots of activity. Swap and Shop is being held on SPN Sun evenings after the regular session, 3785 kHz at approx 0130 Z, and on SKTN 2M Net on Sun at 030 Z. Congrats to the amateurs around Yorkton on the formation of the Parkland ARC. VE5SC and crew from the PARA have made a documentary on Amateur Radio that will be shown on the local cable network in Regina. By the time you read this the tourist season will be upon us and the chance of chatting to new voices over the repeaters — let's show them our hospitality. Traffic: VE5XZ 38, VE5AE 26, VE5HG 24, VE5XC 18, VE5VM 15, VE5AAT 6, VE5NJ 6, VE5QI 6, VE5AK 3, VE5BBH 3, VE5BD 2.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DKX — SEC: W3PO, STM: W3WD, W3QC, PSHR, N3AKC 88, K3JL 84, W3DKX 80. Congrats to WA3WYI on making 58and WAS #4726. HARC wishes his recovery at home. KA3ELF, Dover newcomer, is working computer cw and 2-meter sbs. K4CHE is ready for vhf contests with amplifiers and antennas on 220 and 432. Nets: DEP, QNI 62, QTC 11; DTN: QNI 326, QTC 63; Traffic: N3AKC 108, W3DKX 48, W3BDUG 46, W3OO 30, W3ADUM 27, K3JL 27, WA3WYI 23, W3WD 13, AC31 8, KA3DPP 2.

**EASTERN PENNSYLVANIA:** SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO, STM: K3NGN, Nms: K3NGN AG3R WA3WQP AJ3R. Net Reports: EPA, QNI 550, QTC 224; APN (2) QNI 74, QTC 18; EPAEPTN, QNI 520, QTC 151; PFN, QNI 353, QTC 387; PTIN, QNI 359, QTC 129; LVN (2), QTC 3, QNI 18; LVN, QNI 15, QTC 12; OO reports: W3CL K3KEC W3KCM WA3LD OO reports: W3YD W3CI, W3GTA, W3HK, K3DZD, OBS, VE3W, N3AUI WA3JYU, W3RW, W3GOA, W3ID, W3BEZ, WA3VJ BPL, WA3WQP, AJ3R, WA3ATO, K6BFRI3, PSHR, WA3WOP, AJ3R, N3BEJ, WB3CAI, WB3JYZ, K6FFR/6, WB3GZV, KA3ALL K3RHL. New Club, Phila. Amateur Radio Club, K3UKW, pres.: N3ABT, vice pres.: K3GYS secy/treas. Club holds novice classes on a weekly basis. WA3HBR new mgr of LVN (2). WA3ATQ reports 75 not so good in mornings. AJ3R reports QNI & QTC increasing on EPAEPTN. W3BGAV now on 2 meters. Wilkes Barre area hams recently upgraded: W3KUA, W3BJUK & KA3AHX to Advanced. N3BBW to Gen. KA3CHR & KA3EEO to Tech. Congrats: WA3QED & KA3BOD now QTS. AJ3R new hts with TS180S. W3FJU sporting new IC280 on 2 meters. New officers: HARC: WB3KNJ, pres.: K3PGI, vice pres.: KA3CAS, secy: K3UK, treas.: K3BS, trustee: K3AKN reports Juniata Area Net on 146.52 with 13 members. Murphy strikes again at W3VA & WB3JYZ antennas. W3GZV back on nets with his gear. The Luzerne County ARES Net meets Sun evening at 8 P.M. on the Wilkes Barre. K3ZP reports. See W3TB for info. Thanks for the nice cards and letters. I will do the best job I can to help keep EPA right up there. Traffic: WA3WQP 1107, AJ3R 551, WA3ATQ 544, K6BFRI3 510, K3NGN 228, WB3EL 226, WB3JYZ 90, W3AF 89, W3VA 98, W3YX 87, AG3R 77, N3AJL 60, KA3ALF 57, KA3BER 45, WB3CAI 45, N3AUI 41, WB3GUR 37, W3BGZV 30, K3EJP 26, WA3VIL 16, W3ID 15, W3CL 11, W3ADE 10, WB3CUF 10, W3HK 7, WA3YOE 6, WA3VJ 4, K3NB 4, K3RHI 4, K3EBZ 2, W3KCM 1, K3YD 1.

**MARYLAND — DISTRICT OF COLUMBIA:** SCM, Karl H. Madrow, W3FA — Congrats to new Extras WA3VPL N3AMA and WB3KDO, W3DQI was NCS for the Cherry Blossom Parade. W3CQD is back in the groove after FL vacation. WB3JRW has a new 6-meter rig and lotsa antenna plans. K3RXX is haunting 2-mtr sbs. W3WBV moves to FL about 1 May, into the new house Sept, and keeps in touch with the new mobile. KB3AP has a new TRS-80. W3JPT received the "Albert L. McIntosh Memorial Trophy" for his WARC '79 work. Congrats from all of us. W3ECN likes the look of the new contest tables. W3SKH wishes to make it on 1296 MHz. W3ZNW is back from a nagging cold. W3MSN covers 160M thru 450 MHz and at 73 is getting his sending speed up to snuff to make use of all that new gear. W5N2/3 says work with MEPN NCM with WB3GZU taking over. We hear W3GAX bought a car. W3OYY and W3DFW keep the NW corner of the section hopping! W0VJD/3 is thinking about becoming a civilian. K3ORW got the 75-meter dipole higher and better than before. AA3S lost the top of his tower in the winds. WB3KYL has a gold mine at College Park. W3FZY worked the VA and YL QSO parties. WA3YNW had the same wet spring that N3SJ had. K3IU is thinking about gardens, grass and mowers. N3QA puts up a 2-mtr beam to go with the new 2-mtr gear. WB3GZU takes a week off and still makes BPL! N3AFM hints things are getting noisy on 6 meters. KA3DZK, WB3LTA and WA3UOF were NCS for the Snow Storm CD callup with participants KA3AVH, KA3BAL, KA3BAW, WB3DAJ, WB3DIO, W3EXP, W3FYJ, WB3HAD, K3JHF, N3HI, WB3JIG, WB3KHD, WB3LHT, K3LYW, AD3S and K3USH. This was the 2nd time in 12 months for most of these volunteers. W3SW and W4KFC were honored with plaques by the FAR at the OCWA dinner. With the nets Net/Manager Sessions/IFCQNI average. MEPN/AA3S 29/193/27, 100% AC3W. Others: N3AGM, KA3ARH, W3BFB, WA3IHW, K3OMN, K3ONJ, and WA2YFM. MD3F, PONW3OYY 41/012.5. WP, PONW3DFW 22/22/19.4. Traffic: (Mar) WB3GZU 649, W0VJD/3 192, K3IU 172, WB3KYL 154, N3SJ 135, W3FA 100, AA3S 94, WB3KDO 71, WA3YNW 46, W3FZY 39, W3ECN 30, N3QA 27, K3RXX 24, WB3JRW 20, KB3AP 13, K3ORW 13, (Feb) WA3YNW 16, KB3AP 4, WB3LTA 3, W5N2/3 1.

**SOUTHERN NEW JERSEY:** SCM, Bill Luebkekmann, WB2LCC — SEC: W2HOB, STM: WB2GTW. This month I am pleased to announce the appointment of WB2GTW as the new Section Traffic Manager. He has been involved in traffic handling since the mid sixties, and has been actively involved in the affairs of three different states before moving back to New Jersey in 1978. I know you will all join with me in wishing him well in his new position. One of his first tasks will be collecting opinions,

comments and suggestions on the idea of a statewide vhf net. Many comments and proposals will be made, and it will be interesting to see what the section feels the best time for the net is. Some have suggested that the net replace NJNIL. Others have suggested ways to let both nets run at the same time. No doubt others will suggest alternate times for one net or the other. Culminating all of the discussion will be a statewide meeting sometime in June or July, where more input will be gathered and some sort of decision made. All will be invited to attend, so if you would like further details please contact me right away. Since this column is being typed April 4th, I am not able to give the exact date. And, if you have further comments, pass them along to WB2GTW at his 1980 Callbook address or via myself for forwarding. Traffic: AA2H 181, WB2LCC 195, WA2CUW 86, KC2A 78, WA2HEB 71, WA2DNW 66, W2ZO 64, WA2JQU 59, K2YB 38, WB2HUV 30, KA2GTC 28, WA2GXU 24, W4NLC 24, WA2WUL 22, WA2PTO 19, K2UL 17, N2AFN 16, WA2WSV 15, N2AEP 12, WB2GTW 12, WA2GTJ 10, KB2OE 8, AA2C 7, W2DAHO 2.

**WESTERN NEW YORK:** SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA, SEC: W2BCH, NO BPL this month. PSHR to W2ZJO, WA2MVF, W2MTA, WA2ZJP, KA2CTU, WA2KOJ, N2APB, W2AET, WA2AFE, W2PZL and KA2BGNX, who also made it for February, 73 to former SEC, WB2FTX, as he leaves his Erie County EC post to follow new employment in Syracuse. Best of luck. Welcome to new OTS appointees K2CJ, W2PPS and WB2MVC. Please note that only Novices and Techs qualify for PSHR with 40-59 "points." All others require 60 or more. WA2ZJP reports March major activity was shoveling snow! WA2SFS sporting a new F-107M and a 30 wpm Code Proficiency Certificate. Congrats to W0B1YUJ and K8ZKD on achieving 5BWA5 plaques nos. 689 and 690. WB2KJ on his red cross award for 40 years of service, and to WA2PUU on "grand-harmonic" no. 11. Traffic: WA2ELD 357, WA2MVF 265, W2ZJO 257, W2MTA 200, WB2VSJ 122, N2APB 120, WA2KOJ 120, KA2CTU 117, WA2ZJP 99, WA2AFE 89, KA2BGNX 81, W2PZL 78, WB2EOX 51, AF2K 43, WB2OMZ 35, WA2MVF 31, WA2AOG 30, WB2OWO 28, WB2FE 27, WB2QX 26, W2FR 25, W2AET 20, KB2GT 18, WB2PID 18, WB2NAO 16, KA2HCB 6.

**WESTERN PENNSYLVANIA:** SCM, Otto L. Schuler, K3SMB — AS-SCM: N3FM, SEC: WA3VPU, ASST SEC: WA3IBQ, STM: W3YQ, NMs: W3NEM, W3KUN, W3MML, WA3PXA & WB3JDJ.

Net	Sess	QNI	QTC	kHz	Time/Day
WFA	31	194	14	3585	8:00 P/D
WPAPTN	31	193	3983		6:15 P/D
WPA2MTN	31	682	93	146.28/88	8:30 P/D
NWPATMTN	26	206	16	146.04/64	9:00 P/D

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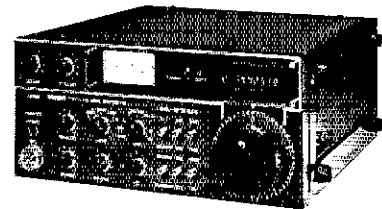
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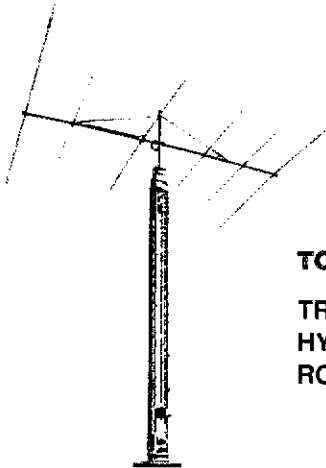
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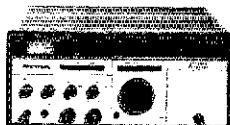
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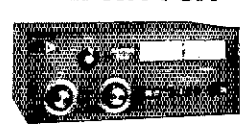
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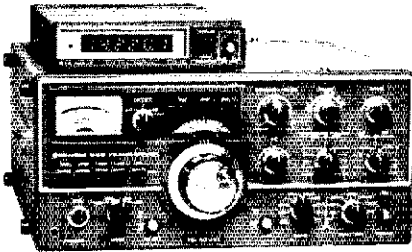
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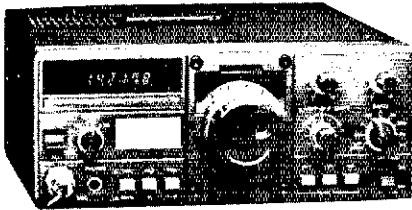
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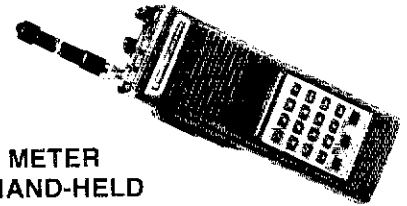
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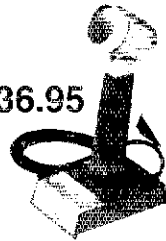


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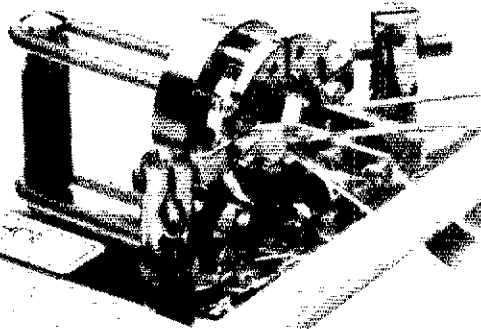
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WPARACES 3990.5 kHz 9:00 A/S PTTN 3610 kHz 6:30 P/D. Congrats to W3FVJ, editor of Indiana County ARC newsletter "Sine of the Times," for the award of EXCELLENCE from the Amateur Radio News Service. W3ELZ has been a ham for fifty years, that's super! Upgrades: WA3OKK is KB3IN. W3JJO is KB3IA. Everything changes fast. Irwin Area ARA's Repeater (146.925/325) demolished by lightning. N3DQ is a busy XYL, she has been instructing Pittsburgh amateurs and others in the application of the CPR life saving practice. Her time is given voluntarily and with a smile. Thank you! Penn State ARC officers for 1980/81 are: WN3VAW, pres.; W3AS, vice pres.; KA3EAW, secy.; WA3FLE, treas.; WA3BBR, sta dir.; K3MS WA3JBN WA2QAP, exec. hd Bedford County ARS officers: WA3UXP, pres.; K3SCM, vice pres.; N3AAD, secy.; W3ENK, treas.; Nittany ARC officers: N3WS, pres.; K3RBY, vice pres.; WA3ZPW, secy.; WA3SAY W3YA, treas. NARC has also put their emergency operations center at the Mountain View Hospital into operation. Congrats. Traffic: (Mar) WA3PXA 281, W3EGJ 269, N3EE 288, W3YO 126, W3SMV 109, N3FM 86, W3NEM 83, K3HCT 87, W3HGL 70, K3SMB 59, W3KMZ 53, W3UHL 53, KA3DJM 51, WA3JUNX 45, N3KB 42, W3KUN 37, W3GWJ 34, W3RUL 34, W3JGD 32, W3MML 32, W3HUJ 31, K3CR 29, N3WS 29, W3JDI 22, WA3VRE 22, W3TDW 20, WA3JBO 18, AC3N 16, W3EXC 10, AF3B 9, W3GJUK 9, W3SN 9, K3TJM 8, W3LOD 7, K3VOV 7, W3BOB 6, WA3WEE 6, K3ISO 4, W3TTN 4, WN3VAW 4, WA3JBG 1, K3JUA 1. (Feb) N3WS 31, KA3DXP 7, AC3N 6, K3VOV 4, W3GZR 2.

### CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst SCM: W9RYU. SEC: W9AES. NMs: WA9KFK and W9JSR. Cook County EC W9HPG.

Net	Freq.	Times/Days	TFC Sess.
ILN	3690	0030/0400 Dy	604 62
ILL Phone	3915	2130 Dy	139 31
NCPN	3915	1200/1700 Mon-Sat	152 49
IEW	3940	1400 Su	7 5
W9EYV			
Mem Stn	2-mtr		14 5

W9NXG has returned from his Florida vacation. The Mt. Carmel gang was active on the Indiana and Kentucky weather drill on March 12th. W9HOT reports that the 9RN daytime net during 93 sessions had a traffic count of 385 messages and Illinois participation was 100% with stations W9JJI W9YCE W9DFB W9WGD and W9FLX checking in. Our sympathy to the friends and families of W9DL who passed away on March 8th. The Illinois State ARRL convention will be held at Winnebago County Fairgrounds at Pecatonica, on Sun August 31st. W9SSGF AK9C W9DHEL and W9PCA are the 1980 officers of the Repeater Technology Group of Winnebago County (147.195/795). W9JJI is getting his antenna system ready for the summer traffic. The CND traffic for March was 577 (during 62 sessions). W9WGD W9NXG W9JJI W9HOT W9DFB and W9YCE helped make Illinois participation 100%. New appointments include W9IPX as EC of Logan County and K9AUB as an OO. NIAGD gave a slide show at the March meeting of the Central Illinois ARC of Bloomington. John Huttoon, treasurer of the American Radio Relay League, will be guest of honor at the Starved Rock Amateur Radio Club's Hamfest, Sun June 1st at Princeton. And the following weekend, Sun June 8th, the Six Meter Club of Chicago will hold their annual hamfest at Santa Fe Park in Willow Springs. KA9ERP returned from vacation in Hawaii with a new interim Technician license. The Tri-Town Radio Amateur Club will be celebrating their 50th anniversary with a dinner dance on May 2. The club has a membership of 200. At the March business meeting of the Egyptian Radio Club, W9EOPC was presented with a certificate for service during the club's 50th year. Their annual hamfest will be held on June 8th at Granite City. W9JJI is the only BPL recipient for the month. Traffic: (Mar) W9JJI 502, K9BVE 411, W9HOT 378, W9BPK 199, K9PVC 180, W9WGD 162, K9EA 131, W9JSR 123, W9YCE 111, N9FTN 92, W9DFB 87, W9OBS 89, KA9ALR 63, K9JUN 68, W9TLU 60, K9SBAW 52, W9OK 49, W9LNO 46, N9MX 37, W9OYI 32, K9SW 24, W9PRN 22, W9KR 17, WA9APA 10, WA1Z1 8, W9EBQ 8. (Feb) W9NXG 126, W9DFB 111.

INDIANA: SCM, J. M. Keil, W9LIJ — SEC: W9JMH. STM: W9JJI. NMs: W9QYY-ITN, W9D9XW-QIN, N9AEI-ICN, W9PMT-VHF. Net Reports for March: freq in kHz and time in UTC.

Net	Freq	Time	QNI	QTC	Sess.
QIN	3656	1430/0000/0300 Dy	261	413	92
ITN	3910	1330/2300 Dy	2045	207	62
ICN	3708	2315 Dy	109	25	30
IPN	3919	2130 Dy	1200	133	31
IPON	3910	1300 Sun	131	2	1

ind 100% on D9RN in March. Hoosier VHF Nets reports: QNI 2228, TFC 145 msgs from the 15 vhf nets reporting for March. If you are a vhf net manager, be sure your monthly report of total checkins and number of messages passed goes to W9PMT the first of each month by radiogram. On March 10th a meeting was called by the Nat Weather Service with all the Central Ind ARES and repeater groups to discuss plans for operation of this spring's Skywarn program. There was good attendance by the many groups and much progress made. The 1980 ARRL State Convention and "Indy Hamfest" will be held July 13, 1980 at the Marion County Fairgrounds. See you there! Congrats to W9JMH, who becomes the SCM for Indiana on the first of July. Your co-operation and support will make his term in office a success. Traffic: W9JJI 896, W9GKXW 209, W9FC 184, W9TG 157, WA9GCF 114, W9GCS 109, W9EJ 90, W9DUYU 86, W9DLF 56, W9HUF 54, W9BVJE 52, W9PMT 48, K9WWJ 47, N9AEI 46, N9PS 45, W9VAY 26, W9IOH 25, WA9OKK 24, W9XD 22, WA9TJS 20, W9JAB 17, WA9GJZ 16, W9WEL 16, K9CGS 12, K9KTB 12, K9CVZ 10, K9ET 9, W9RTH 9, W9QLW 8, KA9EGT 7, W9CM 6, W9BOP 4, K9DIY 3.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9LUG. NMs: W9AYK W9EIM W9B9IC K9AUG W9DM K9LUG, K9E/FBR1 will be home three weeks in June and returning 3rd week in July, he would like to contact anyone in the state. Governor's conference at Madison was well represented on the air by hams throughout the state. New Techs Wausau area: K9DQK W9GRC. New Novice Madison area: K9GPK K9BHZ. Green Bay Mike and Key Club Swapfest May 10. Sheboygan Swapfest July 19. 3f ARC Swapfest May 3. K9GVI Novice to Gen. W9YSD has Extra. New Advanced K9ARI W9PAW WA9LDX, K9FGY K9AFNE have Gen. Hope everyone enjoyed the QSO party, I sure heard a lot of activity, sounded good too. Don't forget

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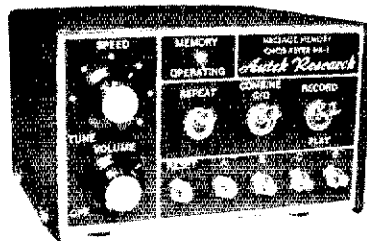
Autek filters gained their reputation by using a costly INFINITELY VARIABLE design. Yet, mass-production (we sell only ONE MODEL — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. PEAK CW (or voice) with an incredible 20 HZ

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WNA picnic at Dells of the Eau Claire northeast of Wausau July 13. As SCM for another 2 years I hope I can do the job you want me to do, if any gripes, write. WD9ESA K9EYQ Novice to General WD9ESU K9BIL Gen to Advanced. New General Rhineland area. KA9FMF. Stevens Point Swapfest June 8 NWTN had 455 QNI, 62 QTC. Green Bay 2-meter Net had 41 QNI, 4 QTC. KASCA made BPL Traffic: (Mar) KA9CPA 1259, WB9XY 242, W9YUW 195, W9UIX 176, W9A21 152, WB9YYP 152, W9IEM 141, W9DND 134, WD9FSZ 119, W9DHF 115, K9FHI 115, N9AUG 109, WD9BCM 93, W9AYK 92, WB9IC 76, W9IUM 65, WB9NRK 62, W9IUC 62, KA9ARI 53, W9IUV 52, K9AKG 47, W9LDO 47, K9AO 45, K9LGI 45, KA9CBN 38, WB9WHO 37, N9CP 34, W9FDY 31, WB9JSW 31, K9UJ 31, AG9G 30, K9JPS 26, K9CPM 25, K9HDF 24, KB9FM 21, W9IHW 20, K9KSA 20, W9SFL 20, W9PAW 18, N9AZH 17, W9CJE 12, WB9YPZ 10, WD9AJA 9, K9UFD 9, WA9LWJ 6, WA9WYS 5, WA9BZW 4. (Feb) W9GKO 15.

#### DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB0HOX —  
Net Freq Sess. QNI QTC  
MSPN/N 31 579 80  
MSSN 29 138 27  
MSPN/E 31 860 146  
WNX 31 470 317  
MSN 1 31 251 86  
MSN 2 31 167 49  
WR0AKB 34.94 03:30Z Sun 4  
W9CF 1463797  
K9RFS 5 140 16  
WA0DKW 4 47

Upgrades: Novice to Tech: WD0GCP KA0AJN KA0GM KA0GQX; Tech to General: KA0CSE, now N0BCO; General to Advanced: WB0ZBI N0AXU; Advanced to Extra: WB0ZBI. New call WD0FCX now KC0A Traffic: W0HZU 220, WA0AIN 163, WB0HOX 156, WA0ONE 132, K0PIZ 128, AF0O 126, KA0AIT 105, W0DFX 99, WD0GGM 79, WB0ZBJ 79, K0JCF 61, WB0UKI 43, KA0BZP 40, WB0GGM 37, WR0NZB 35, KC0SE 26, WA0LUT 17, W0DUW 15, K0TS 4.

NORTH DAKOTA: SCM, Lois Jorgensen, WA0RWM —  
OBS: W0DM SEC: WB0TEE GO: WD0CLO NM: WA0CRH. Congrats to the following Novice and upgrades: Novice, KA0GUV; Tech, WD0HP WD0CQB KA0AAV KA0DPL; Gen N0BMB WD0HPX KA0FXI WD0GRC N0ASB; Adv K0PVG K0ATK WB0CYP WB0GCH WD0ST WB0VRO ex-W0RIB SEC: WB0TEE wants to thank all the SCMs at the counties and hopes that SKYWARN will be successful. If you have any questions ask him. Also send your reports to him. Congrats to WB0TEE and XYL on their new harmonic. Hettlinger Club election result is: KA0BAW, pres., KA0BOA, vice pres., N0BBH, secy/treas. N0AVJ and N0AVJ are leaving for Indiana. good luck W0CJC suffered a stroke, is progressing, and will be back on the air. WB0AUM moved across the river from Bismarck to Mandan

Net kHz CST/Days Sess. QNI QTC  
Goose River 1930.0 0900 Sun 5 63 4  
DATA 3956.5 1830 Dy 30 393 24  
YL WX 3959.5 0730 Di 31 269 251

Traffic: WA0RWM 869, K80IP 774, WA0CRH 123, K0BZW 62, WB0JGM 24, N0AFP 23, W0CDO 6, WA0RWB 6  
SOUTH DAKOTA: SCM, Lydia S. Johnson, W0KJZ —  
Asst SCM: W0DVB SEC: WA0TNM. Congrats to PSHR winners WD0BMR 62, and WA0TNM 91 points; for BPL, W0ZWL with 676 total K0FRE and XYL back from a months southern trip. Sympathies to the family of W0DES, who joined Silent Keys; and to W0URD in the loss of his wife. They had moved from Watertown to Missoula, MT. EC: WB0PZO, reports having 35 ARES members, with WB0s BXI PZO CQH K80FS WD0BJO KA0AZX and KA0GGS having provided communications for the Bartlands Baha Races. EC: WA0BWF, reported Lawrenceville Farming Co. CD net with 126 QMS; and EC WA0BZD, that the Tri-State Net has 41 SARC vice pres. WB0JHI and W0KJZ call the LHCCD Net (slow speed) Sun on 3725 at 1500 GMT. Join them. SDN fortunate to have AK0S as NCS/NTS liaison to Ten for Dakota's Phone net members voted WA0VRE and WD0BMR to serve as summer mgrs. Traffic: (Mar) W0ZYL 676, W0MZI 485, WD0BMR 356, WA0TNM 130, W0HJZ 128, WA0UEN 116, W0DVB 108, WA0VRE 107, W0KJZ 45, WB0OMF 41, WA0BWF 20, W0IG 10, WB0EVQ 8, WA0NZA 2. (Feb) WB0EVQ 4. (Jan) WB0EVQ 8

#### DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: K5TML NMS: KC5E W5MYZ W5POH W5AZVZ. Nets freq time/day QNI: QTC Mgr. ARN 3.995 0030/Dy 1259 89 KC5E: OZK 3.760 0100/Dy 233 42 W5MYZ, SCARC 28.765 0230/M-T 93 10 W5VSV; APN 3.937 1200ZIM-S 821 39 W5POH; M-Bird 3.928 2239/M-F 904 21 W5AZVZ. NWAARC reports this year's Field Day will be held at Mount Gaylor. NWAARC reports NWA Novice Net meets on 28 180 with WB5JLO as NC each Wed Sat Sun at 0100Z NSANI now Advanced. Officers of NWAARC: W5SEP pres., K5BP vice pres., K4HEP secy.; WA5NRT, treas. New officers: MARG: W5BIV, pres.; K5SOL, vice pres.; W5GFA, secy.; W5SBIQ, treas.; K5FPS, activities. CAREN will be holding their meetings at the Red Cross Bldg beginning With Apr 3rd meeting. OBS WB5KUI 7, K5DW 3, KC5F 3. Traffic: K5AJM 200, K5AO 38, KC5E 30, W5POH 24, W5UAU 2n, K5DW 12, W5KL 6, W5BLP 5, W5BQGH 4.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst SCM: K5DPG SEC: W5TPG Net Mgrs: N5RB N5EK WB5YRT WB5TPG N5EK WD5CWK W5YZL WB5JZP WD5FLM and W5CCD all active on ORN5 N5EK new Net Mgr. of LTN and WB5YRT new Net Mgr of LSN. Congrats to both of them for their fine efforts in the past. I'm sure they will do a good job in their new positions. Attended Lafayette Hamfest last month and it was a real blast. Didn't get the count, but must have been over a thousand on hand to join in the activities. LARC did their usual super job. Don't forget Shreveport State Convention in August. Congrats to N5IR, our new appointed Section Communications Manager. For the last two years it has been my pleasure to serve in this position, and this being my last column, I would like to take a few lines and thank all Louisiana ARRL members for their help and assistance. To all who served in leadership positions, thank you, your efforts have kept the section in as good a shape as it is. To all the clubs around the state, thank you for your monthly newsletters, couldn't have written this column without them. Hear you on the air and see you at the hamfests.  
Net Freq Time QNI QTC Mgr.  
LAN 3615 kHz 7 & 10 P.M. Dy294 128 N5RB

# Barry Electronics Corp.

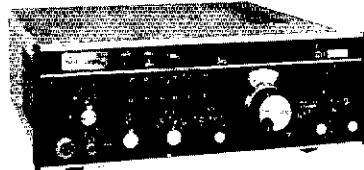
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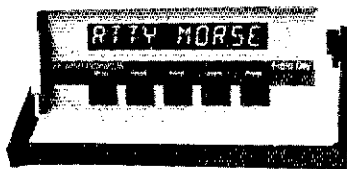


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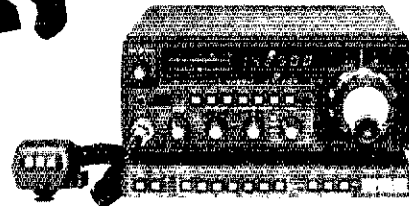
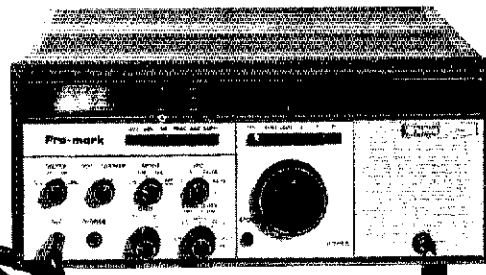
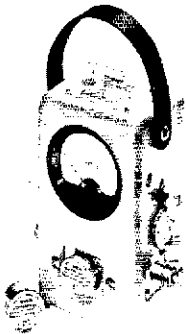


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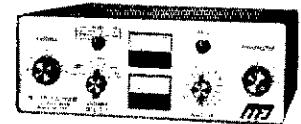
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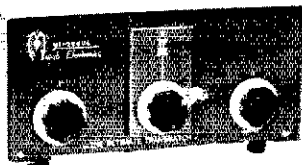


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Electra Company, manufacturers of Bearcat brand scanners is offering consumer rebates on selected synthesized scanners purchased during May and June, 1980. Most items are in stock for immediate shipment, so purchase your scanner from CE now!

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**The Ultimate Synthesized Scanner!**

Allow 90-120 days for delivery after receipt of order due to the high demand for this product. List price \$519.95/CE price \$339.00

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List price \$419.95/CE price \$279.00/\$20.00 rebate Your final cost is a low \$259.00

**50 Channels • Crystalline • Searches Stores • Recalls • Digital clock • AC/DC Priority Channel • 3-Band • Count Feature.** Frequency range 32-50, 146-174, 420-512 MHz. The Bearcat 250 performs any scanning function you could possibly want. With push button ease you can program up to 50 channels for automatic monitoring.

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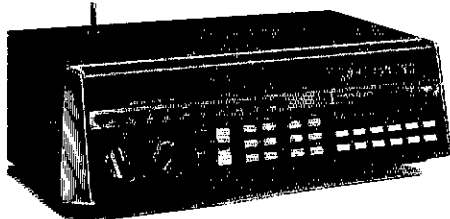
List price \$349.95/CE price \$229.00/\$10.00 rebate Your final cost is a low \$229.00

Frequency range: 32-50, 146-174, 420-512 MHz. The Bearcat 211. It's an evolutionary explosion of features and function. 18-channel monitoring. With no-crystal three-band coverage. Dual scan speeds. Color-coded keyboard. Even a digital clock. All at a modest price. More scanning excitement than you bargained for.

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**10 Channels • 3 Bands • AC or DC**  
Frequency range: 33-48, 146-174, 450-512 MHz. More features, more channels, more action. The Bearcat 12 has automatic squelch, individual lockout and more.

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**The newest low-cost crystal scanner!**  
List price \$129.95/CE price \$94.00  
**8 Channels • 3 Bands • AC only**  
Frequency range: 33-50, 146-174, 450-508 MHz. The Bearcat 5 is a value-packed crystal scanner built for the scanning professional — at a price the first-time buyer can afford. Individual lockout switches.

## NEW! Bearcat®

### Four-Six ThinScan™

List price \$179.95/CE price \$119.00  
Frequency range: 33-47, 152-164, 450-508 MHz. The incredible, new Bearcat Four-Six ThinScan™ is like having an information center in your pocket. This three band, 6 channel crystal controlled scanner has patented Track Tuning on UHF, Scan Delay and Channel Lockout. Measures 2 3/4 x 6 1/2 x 1 1/2. Includes rubber ducky antenna.

### Bearcat® ThinScan™

List price \$149.95/CE price \$99.00  
**World's smallest scanner!**  
There are now three models available. The BC 2-4 L/H receives 33-44 and 152-164 MHz. The BC 2-4 H/U receives 152-164 and 450-508 MHz. The Aircraft ThinScan™ model BC 2-4 AC receives 118-136 and 450-470 MHz. The Bearcat ThinScan™ measures 2 1/4" across. Just 1" deep. And 5/8" high.

## NEW! Fanon Slimline 6-HLU

List price \$169.95/CE price \$109.00  
**World's smallest 6-channel, 3-band scanner!**  
The new Fanon Slimline 6-HLU gives you six channels of crystal controlled excitement. Unique Automatic Peak Tuning Circuit adjusts the receiver front end for maximum sensitivity across the entire UHF band. Individual channel lockout switches. Frequency range 30-50, 146-175 and 450-512 MHz. Size 2 1/4 x 6 1/4 x 1 1/2. Includes rubber ducky antenna.

## NEW! Fanon Slimline 6-HL

List price \$149.95/CE price \$99.00  
**6-Channel performance at 4-channel cost!**  
Frequency range: 30-50, 146-175 MHz. If you don't need the UHF band, get this model and save money. Same high performance and features as the model HLU without the UHF band. Order crystal certificates for each channel.

## FANON SCANNER ACCESSORIES

CHB-6 AC Adapter/Battery Charger ..... \$15.00  
CAT-6 Carrying case for Fanon w/Beit Clip ..... \$15.00  
AUC-3 Auto lighter adaptor/Battery Charger ..... \$15.00  
SCMA-6 Mobile adaptor/amplifier/charger ..... \$49.00

## OTHER SCANNER ACCESSORIES

SP50 AC Adapter ..... \$12.00  
SP51 Battery Charger ..... \$12.00  
SP57 Carrying Case for Bearcat 2-4 only ..... \$15.00  
SP58 Carrying Case for Bearcat 4-6 ThinScan™ ..... \$15.00  
FB-E Frequency Directory for Eastern U.S. .... \$15.00  
FB-W Frequency Directory for Western U.S. .... \$15.00  
B-31.2 V AA Ni-Cad's for Four-Six (Pack of 4) ..... \$15.00  
B-41.2 V AAA Ni-Cad's for ThinScan™ and Fanon™ ..... \$15.00  
B-5 Replacement memory battery for Bearcat 210 ..... \$5.00  
B-61.5 V AA Alkaline battery (Pack of 4) ..... \$3.00  
B-71.5 V AAA Alkaline battery (Pack of 4) ..... \$3.00  
A-135cc Crystal certificate ..... \$4.00  
Add \$3.00 shipping for all accessories ordered at the same time.

## INCREASED PERFORMANCE ANTENNAS

If you want the utmost in performance from your scanner, it is essential that you use an external antenna. We have six base and mobile antennas specifically designed for receiving all bands. Order #A60 is a magnet mount mobile antenna. Order #A61 is a gutter clip mobile antenna. Order #A62 is a trunk-lip mobile antenna. Order #A63 is a 1/2 inch hole mount. Order #A64 is a 3/8 inch snap-in mount, and #A70 is an all band base station antenna. All antennas are \$30.00 and \$3.00 for UPS shipping in the continental United States.

## TEST ANY SCANNER FREE

Test any scanner purchased from Communications Electronics™ for 31 days before you decide to keep it. If for any reason you are not completely satisfied, return it in original condition with all parts in 31 days, for a prompt refund (less shipping/handling charges and rebate credits).

## Regency® K500

List price \$419.00/CE price \$279.00  
**40 Channel • Synthesized • Service Search Digital count • Weather with tone alert Search/Store • Priority Channel • AC/DC**  
Frequency range: 30-50, 144-174, 440-512 MHz. The new Regency Touch K500 is an advanced synthesized scanner with many new features.

## OTHER REGENCY® SCANNERS

Aircraft Touch 720-A ..... \$239.00  
Touch K100 ..... \$199.00  
NEW! Touch M100 ..... \$199.00  
E-108 ..... \$119.00  
R-108 ..... \$99.00  
R-804 ..... \$89.00

## World Scanner Association™

The WORLD SCANNER ASSOCIATION is sponsored as a public service by Communications Electronics.™ When you join, you'll receive a quarterly newsletter with scanner news and features. You'll also get a wallet I.D. card, an Official Personalized WSA Membership Certificate, and the latest FCC news affecting monitoring such as frequency allocations. FREE classified ads for members so you can contact other scanner owners when you want to sell or buy a scanner. FREE membership in the WSA Buyer's Co-op. Your Co-op membership will allow you to get special discounts on scanners and scanner related products. Since the WSA Buyer's Co-op gives you group purchasing power, you can easily pay for your membership dues the first time you make a Co-op purchase. WSA is your united voice to governmental and public service agencies as well as scanner manufacturers. You'll get inside information on the latest scanner products before the general public. Since WSA is not affiliated with any scanner manufacturer, you can rely on accurate product reports. You get all this for only \$12.00 annual dues! And if you join before June 30, 1980, CE will pay \$2.00 of the cost of your first year's dues as a "charter member". You can charge your "charter membership" on Visa or Master Charge so join now! Add \$5.00 for foreign memberships. Allow 6-10 weeks to receive membership material.

## BUY WITH CONFIDENCE

To get the fastest delivery from CE of any scanner, send or phone your order directly to our Scanner Distribution Center. Be sure to calculate your price using the CE prices in this ad. Michigan residents please add 4% sales tax. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 30 billing. All sales are subject to availability. All sales on accessories are final. Prices and specifications are subject to change without notice. Out of stock items will be placed on backorder automatically unless CE is instructed differently. International orders are invited with a \$10.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Non-certified and foreign checks require four weeks bank clearance.

Mail orders to: Communications Electronics,™ Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add \$5.00 per scanner for U.P.S. ground shipping, \$9.00 for faster U.P.S. air shipping or \$30.00 for overnight delivery to most major U.S. cities via Federal Express or Airborne Air Freight. If you have a Master Charge or Visa card, you may call anytime and place a credit card order. Order toll free 800-521-4414. If you are outside the U.S. or in Michigan, dial 313-994-4444. You may also order via TWX 810-223-2400. Dealer inquiries invited. All order lines at Communications Electronics™ are staffed 24 hours.

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‡ Regency is a federally registered trademark of Regency Electronics Inc.

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# COMMUNICATIONS ELECTRONICS™

554 Phoenix □ Box 1002 □ Ann Arbor, Michigan 48106 U.S.A.  
Call TOLL-FREE (800) 521-4414 or outside U.S.A. (313) 994-4444

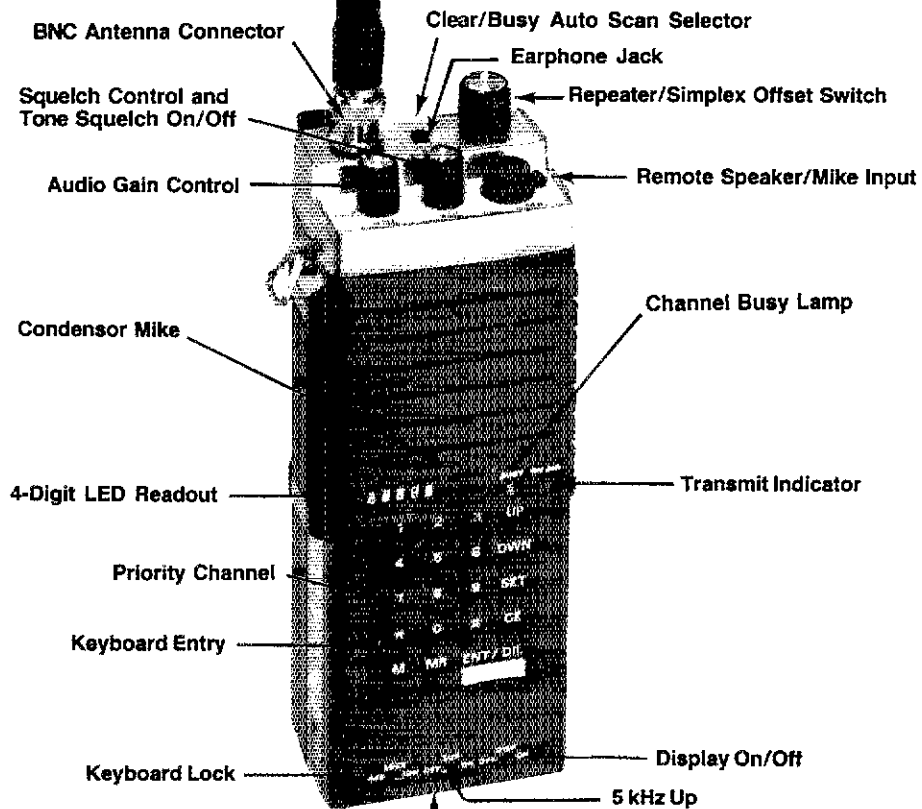
## We're first with the best.™

# Tomorrow's Technology—Here Today

## 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
- $\pm$  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<sup>®</sup>) 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  
 $\pm$  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 superheterodyne intermediate frequencies.  
 1st IF = 10.7 MHz  
 2nd IF = 455 kHz  
**Sensitivity:** 0.32  $\mu$ V for 20 dB quieting  
**Selectivity:**  $\pm$  7.5 kHz at 60 dB down  
**Audio Output:** 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

Hi-Low Power Switch  
(Bottom of Case)

#### TRANSMITTER

**Power Output:** 2.5 watts minimum / 200 mW  
**Deviation:**  $\pm$  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

**YAESU**  
The radio.





**SPRING**

*Bargain Fling*

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**KENWOOD SPRING SPECIAL**

**THE TS-180S**

**SPECIAL:**

**OUR CASH PRICE ON THE TS-180S WITH DFC IS UNPRINTABLE, BUT ONE THING WE CAN TELL YOU... YOU WILL RECEIVE A FREE YK-88SSB FILTER WORTH \$59.95**

**CALL FOR OUR LOW QUOTE TODAY. YOU WON'T BE SORRY YOU CALLED!**



TS-120S \$699.95

**ORDER YOUR NEW...**

TR-9000 \$499.95  
TR-7800 \$399.95

**KENWOOD TR-2400**

2 METER PROGRAMMABLE  
H.T. WITH NICADS, CHARGER  
AND RUBBER ANTENNA

**\$395.00**

Write or Call for Catalog

No Sales Tax in Montana.

MODEL	DESCRIPTION	LIST PRICE
TS-180S	W/DFC TRANSCEIVER	\$1149.95
PS-30	POWER SUPPLY	139.00
TS-120S	TRANSCEIVER	629.95
TS-520S	TRANSCEIVER	849.00
TS-520SE	TRANSCEIVER	629.95
TS-820S	TRANSCEIVER	1299.00
TS-820	TRANSCEIVER	869.00
TL-922A	AMPLIFIER	1199.00
R-1000	RECEIVER	495.00
TR-7625	2 M. TRANSCEIVER	425.00
TR-7600	2 M. TRANSCEIVER	375.00
TS-700SP	2 M. TRANSCEIVER	799.00
TR-8300	450 Mhz. TRANSCEIVER	369.00
R-820	RECEIVER	1099.00
TS-600	6 M. TRANSCEIVER	799.00
TR-2400	2 M. PORTABLE	395.00
SM-220	MONITOR SCOPE	349.00
BS-5	PAN ADAPTER/TS-520	75.00
BS-8	PAN ADAPTER/TS-820S	75.00
DG-5	DIGITAL DISPLAY	199.00

ALL ITEMS F.O.B. BILLINGS, MONTANA  
CERTIFIED CHECK, M.O. OR SHIPPED COD UPS.

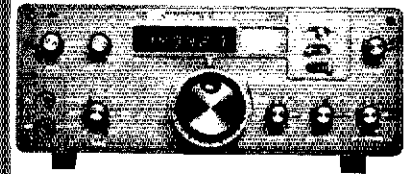
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by **TEN-TEC**



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REQUIRE ONLY A  
PLUG-IN CRYSTAL  
WHEN THEY OPEN  
FOR USE.

**FULL BREAK-IN CW**

**AND NOTCH FILTER  
ARE STANDARD.**

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ACCESSORIES AVAILABLE FOR  
THE DELTA ... AND ALL THIS  
IN A NEW

**SMALL PACKAGE!**

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MD.: 301-792-0600

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# WHY PAY

## FULL PRICE FOR AN 80 - 10 METER VERTICAL...

- ... if you can use only 1/3 of it on 10?
- ... or only 1/2 of it on 20?
- ... or only 3/4 of it on 40?

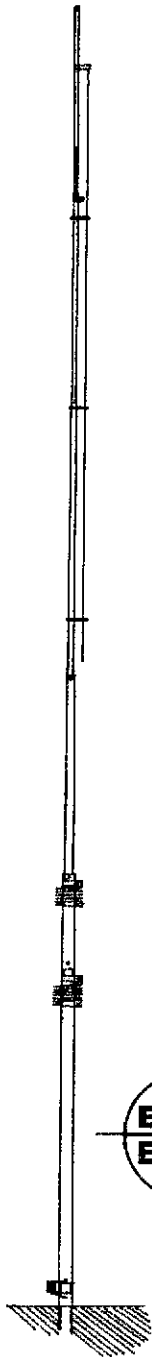
Only Butternut's new HF5V-III lets you use the entire 26-foot radiator on 80, 40, 20 and 10 meters (plus a full unloaded quarter-wavelength on 15) for higher radiation resistance, better efficiency and greater VSWR bandwidth than conventional multi-trap designs of comparable size.

The HF5V-III uses only two high-Q L-C circuits (not traps) and one practically lossless linear decoupler for completely automatic and low VSWR resonance (typically below 1.5:1) on 80 through 10 meters, inclusive.

And for completely automatic operation on 160 through 10 meters, simply install the TBR-160 M unit at the base of the HF5V-III! (What other vertical offers you a "top band" option plus simultaneous resonances on 80 through 10 meters?)

For further information, including complete specifications on the HF5V-III and other Butternut antenna products, ask for our latest free catalog. If you've already "gone vertical" and are happy with your present system, ask for one anyway -- there's a lot of information in it about vertical antennas in general, ground and radial systems, plus helpful tips on installing any vertical on rooftops, on mobile homes, etc.

An export/DXpedition version suitable for surface parcel post shipment outside the USA -- or as "hand luggage" -- is available



## BUTTERNUT ELECTRONICS COMPANY

Route 1 Lake Crystal, Mn. 56055 Phone: (507) 947-3126



LTN 3910 kHz 6:30 P.M. Dy 606 68 N5EK  
 LSN 3703 kHz 7:30 P.M. M-F 85 30 WB5LBR  
 LRN 3587.5 kHz 6:30 P.M. Sun 22 22 N5RB  
 LEN 3910 kHz 8:00 P.M. Sun WB5TPG  
 Traffic: W5GHP 212, N5HB 669, W5JZP 87, W5MI 81,  
 K5TY 80, W55LB 69, W5VMY 61, W55MU 41, N5BFV  
 38, N5EK 37, W5YL 36, WA4US/b 16, W55EAL 11,  
 W55GJB 10, W55FLM 7, W55KT 6  
**MISSISSIPPI:** SCM, E. Ed Robinson, W5XT -- SEC:  
 W55FXA Jackson area hams have made great ad-  
 vances with cooperation and support of Red Cross with  
 new club station in Red Cross building. It's spearheaded  
 by A50 and too many others to mention. Rigs are work-  
 ing hf and 2-meter including tri-band beam. W55DKO  
 upgraded from Novice to Tech, W55OVF now KC5K with  
 upgrade to Extra Looking forward to Senatobia  
 Hamfest June '78 with info fax to W55GWD Also  
 welcome KA5GMU and KA5HOP both new Novices.  
 W55DCY now KB5MZ, CAND (W55KLV) sess 62 QTC  
 572 with DRN5 rep by MS station 100% N5AMK, DRN5  
 (W55NKD) sess 31 QTC 395, with MS rep 100% by  
 KA5AFI N5AMK, K5DMD, W55EDT, N5JG, W55OPT  
 W55HAS, W55JWD, W55PSP, CG5HN (AG5G) sess 31,  
 QNI 2815, QTC 156, MSBN (K5MK) sess 31, QNI 2632  
 QTC 99, MTN (K5OAF) sess 31, QNI 123, QTC 55, MN  
 (W55OPT) sess 31, QNI 654, QTC 10, RACES (N5AMK)  
 sess 5, QNI 235, QTC 0, JCARCEN (KB5W) sess 21, QNI  
 570, QTC 8, Capital AEN (KA5AGD) sess 5, QNI 124, QTC  
 10, Traffic: N5AMK 129, K5OAF 110, W55FHA 89,  
 W55EDT 57, W55SNB 30, KA5AFI 20, W55XT 15, W55EYM  
 2, N5XA 1.  
**TENNESSEE:** SCM, Earl Leonard, KB4G -- SEC:  
 W4NZW, STM, W4SJV. Let me tell you about our attempt  
 to establish a Public Relations Net (PR) on or about 3980  
 kHz, 0945Z Monday through Friday. The purpose is to ex-  
 change up to the minute info on weather conditions  
 across the state via local two-meter nets, each sending a  
 delegate to the PR net. The delegates will exchange in-  
 formation, thereby each will have a complete weather  
 summary from across the state. He then calls his local  
 TV and radio stations and gives them this weather  
 report. They are not obligated to use it but in times of  
 high winds and rainy seasons it has proven to be  
 valuable to the general public. The TV and radio stations  
 usually indicate that the information was provided by  
 Amateur Radio operators as a public service, thus giving  
 Amateur Radio some much needed publicity. I would  
 like to encourage everyone to join in the effort by help-  
 ing in local nets and making way for the PR net. Appoint-  
 ments: W4FLUR has been assigned Statewide VHF  
 Emergency Net Coordinator. Net summaries: Phone  
 nets, 218 sess, 7828 QNI, 822 QTC, CW nets, 79 sess, 612  
 QNI, 239 QTC, W4ACNY again makes BPL Congrats.  
 Traffic: W4ACNY 674, AF4T 202, W44BK 167, W44JY  
 166, W44PRF 133, W44SIG 100, K44JW 73, W44MR 67,  
 W44ZS 65, W44NJR 60, W44LEH 59, W44VWV 52,  
 K44WOP 34, W44CGK 28, K44X 28, W44MPD 25, K44C 15,  
 N44VY 13, W44TYV 13, W44VJW 10, K44MC 9, W44PO 4,  
 W44EWH 4, W44YPO 4.

**GREAT LAKES DIVISION**  
**MICHIGAN:** SCM, James R. Seeley, W88MT -- Asst  
 SCM: W4DHB, SEC: W4BEFK, STM: W88YR, NMS:  
 NBABA, W88BH, W4DHB, K8LNE, KBKMO, W88LRT,  
 AF8V, W88YDZ.  
 Net Freq Time/Day QNI QTC Sess. Mgr.  
 QMN\* 3663 1800/Dv 1389 518 93 NBABA  
 2200  
 MITN\* 3963 1900 Dy 611 272 31 W88LRT  
 GLETN 3932 2100 Dy 1199 181 31 W88BSE  
 MNN\* 3722 1730/Dy 718 150 62 W88BHE  
 2000  
 UPN\* 3922 1700 Dy 883 120 36 W4DHB  
 MACS\* 3953 1100 Dy 790 112 31 K8LNE  
 BR 3930 1730 M/S 622 48 36 W88H  
 W55BN 3935 1900 Dy 812 37 31 W88VAI  
 MEN 3930 0900 Su 202 2 5 W88H  
 MATW\*\* 3953 1600 Su 89 0 5 W88YR  
 VHF Activity 1115 26 5 AF8V  
 16 reports  
 \*NTS Section nets. \*\*MI Amateur Traffic Workshop. All  
 times local. Field appointments: ECs: W88EJ, Wayne  
 Co., W88MCS, Oceana Co., OOI K8NKB, OTS WA8TAO,  
 Silent Keys: W88APV, W88RWO, W88KJ, W88MFK,  
 W88GB, CQ Reports: W88GQJ, K44H, K88O, W88G,  
 W88RN, W88RLO, QRS Reports: W88YA, K88Q,  
 W88RN. I note the fine efforts of K8KM, W88PM and  
 AF8V who originated 120 messages for Genesee/Lapeer  
 Red Cross to chapters in 50 states and all Canadian pro-  
 vinces. This annual effort by Flint area Amateurs during  
 Red Cross month serves to remind us of our formal  
 agreement with Red Cross and demonstrates to the  
 chapters that Amateurs do indeed provide communica-  
 tions. FB, gang! I am reinstating the policy of making  
 NM appointments for the three QMN air managers. As  
 anyone who has had the job knows, it requires real  
 management and a lot of detail work, and they deserve  
 all the recognition and thanks we can give. Current  
 managers are W88PM, W88YR and W88YR. Traffic:  
 (Man) AF8V 431, W88MTD 297, W88KXZ 284, KBKMO  
 287, W88VPW 221, W88PIM 210, W88LRT 195, W88YR  
 161, W88LZN 143, K88MX 137, K88V 134, W88AO 124,  
 N88IK 112, NBABA 97, W88GQJ 97, W88BHE 88,  
 W4DHB 84, W88YDZ 81, W88HX 76, W88SKM 70,  
 K8LNE 68, W88SYA 65, W88YO 63, W88ITT 61, W88WZF  
 57, W88HPZ 52, W88ZIY 48, W88RJM 45, W88CJP 42,  
 W88FIB 42, W88VAI 40, W88ZNS 40, W88NKA 36,  
 K88XV 34, W88WQJ 34, W88BSE 31, W88NKT 31,  
 W88CIV 31, W88WYO 31, W88BY 30, W88IXZ 29,  
 W88RND 28, W88JX 27, W88H 25, K88EPK 22,  
 W88RCS 21, W88OYI 21, K88O 20, K88DYI  
 19, W88OEP 18, W88GA 17, K88B 14, W88ROK 14,  
 K88CP 13, K88PE 12, W88VZ 11, W88ZKI 9, K88ED 9,  
 W88VVL 9, W88ORO 6, K88B 7, W88DT 7, W88OF 7,  
 W88NCD 7, K88CK 6, K88FK 6, K88GC 6, W88XD 6,  
 N88E 6, N88AC 5, W88AGC 4, W88FZ 4, W88BNN 4,  
 W88IEK 4, W88ITA 4, A88A 3, W88HSN 3, K88BZ 3,  
 W88FZ 2, K88GMJ 2, W88NJO 2, AC8W 2, W88OU 1,  
 K88XV (Jan) K88XV 47.

**OHIO:** SCM, Harold C. Chapman, W88JW -- Asst  
 SCM: W88MOK, AF8O, SEC: K8AN, NMS: K8AAZ,  
 W88KBW, W88KWD, W88QMC, W88PUH, W88HGW. Net  
 reports:  
 Net QNI QTC Sess. Time/Local. Freq  
 BN 617 297 62 8:45/10 P.M. 3.577  
 BNR 182 51 31 6 P.M. 3.605  
 ONN 145 44 29 6:30 P.M. 3.708  
 OSN 311 166 31 6:10 P.M. 3.577  
 OSSBN 2930 698 93 10:30AM/4:15 & 6:45 P.M. 3.9725  
 06mN 341 46 31 9 P.M. 50.160

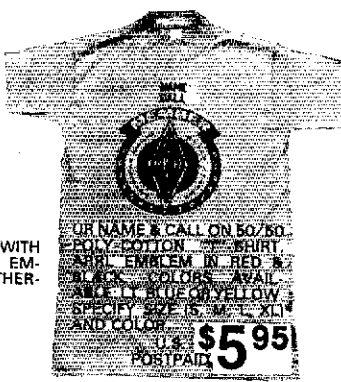
## Tell The World You're A "HAM"



WHITE POLY FRONT PANEL, SOLID BILL, MESH BACK AND SIDE PANELS. AVAILABLE IN ROYAL BLUE WITH RED LETTERS OR RED WITH BLUE LETTERS.

**CAP AND SHIRT \$10.95**

POSTPAID S.C. RES. ADD 4%



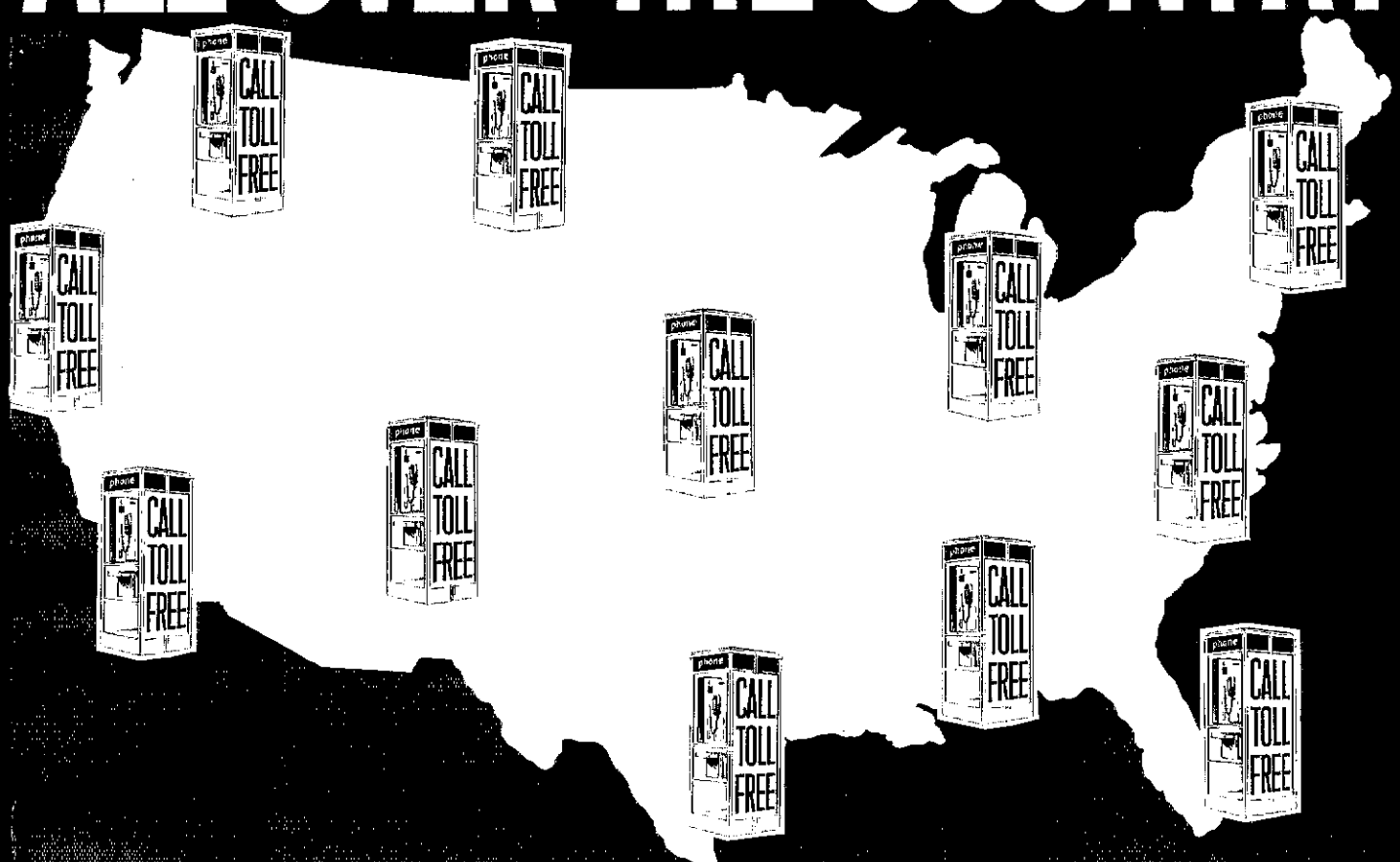
ALUMINUM PLATE, WHITE ENAMEL WITH AMATEUR RADIO OPERATOR IN RED EMBOSSED LETTERS. YOUR CALL IN WEATHER-PROOF BLUE VINYL LETTERS.

OR NAME & CALL ON 80/160 POLY-COTTON SHIRT. ABB EMBLEM IN RED & BLACK COLORS. AVAIL. IN ROYAL BLUE OR YELLOW. SPECIFY SIZE IS, M, L, XL AND COLOR. U.S. POSTPAID \$5.95



**\$4.95** U.S. POSTPAID  
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# HAM RADIO CENTER HAS BRANCH STORES ALL OVER THE COUNTRY



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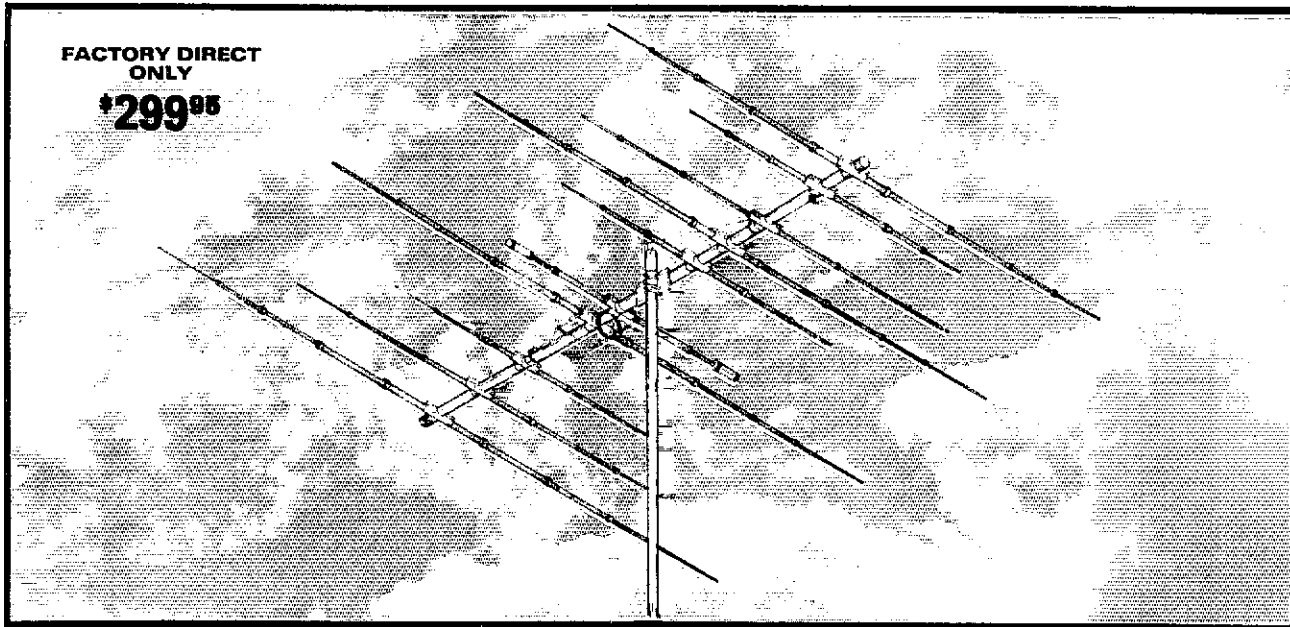
# WILSON SYSTEMS, INC. PRESENTS

## THE NEW SYSTEM 40 TRIBANDER

3 MONOBAND ANTENNAS IN ONE — EACH WITH FULL MONOBAND PERFORMANCE

FACTORY DIRECT  
ONLY

**\$299<sup>95</sup>**

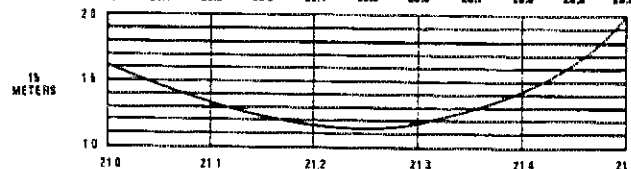
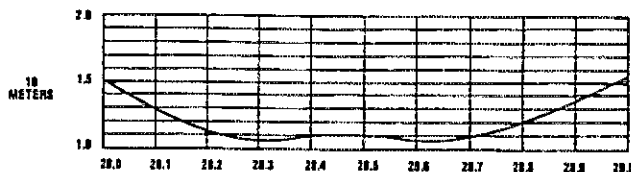
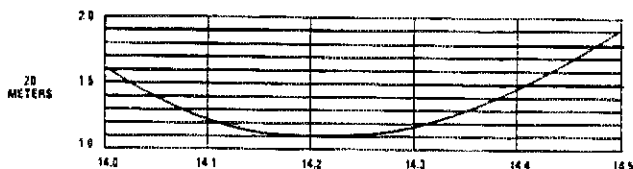


### A NEW CONCEPT IN ANTENNA DESIGN USING A 26 FT. BOOM

- FOR THE SERIOUS DXer WHO WANTS MONOBANDERS ON 10-15-20
- FOUR FULL SIZE 20 MTR ELEMENTS
- THREE WIDE SPACED 15 MTR ELEMENTS
- FOUR WIDE SPACED 10 MTR ELEMENTS
- ONLY ONE FEED LINE REQUIRED
- DESIGNED WITH NO INTERACTIONS BETWEEN ELEMENTS
- ALL DRIVEN ELEMENTS AND DIRECTOR ELEMENTS ARE INSULATED FROM BOOM
- ALL PARASITIC ELEMENTS ARE FULL SIZE
- BROADBAND — NO SEPARATE SETTINGS REQUIRED FOR PHONE OR CW
- SAME QUALITY HARDWARE AS USED IN ALL WILSON ANTENNAS

#### SPECIFICATIONS

Max. Pwr. Input .....	Legal Limit	Longest Element .....	36'
VSWR @ Res .....	1.2:1	Turning Radius .....	22' 6"
Impedance .....	50 ohm	Surface Area .....	12.1 sq. ft.
Feed Method ..	Coax Balun Supplied	Wind Loading @ 80 mph ..	309 lbs.
Matching Method ..	Modified Beta	Assem. Weight .....	75 lbs.
F/B Ratio .....		Shipping Weight .....	84 lbs.



AVAILABLE ONLY  
FACTORY DIRECT  
CALL

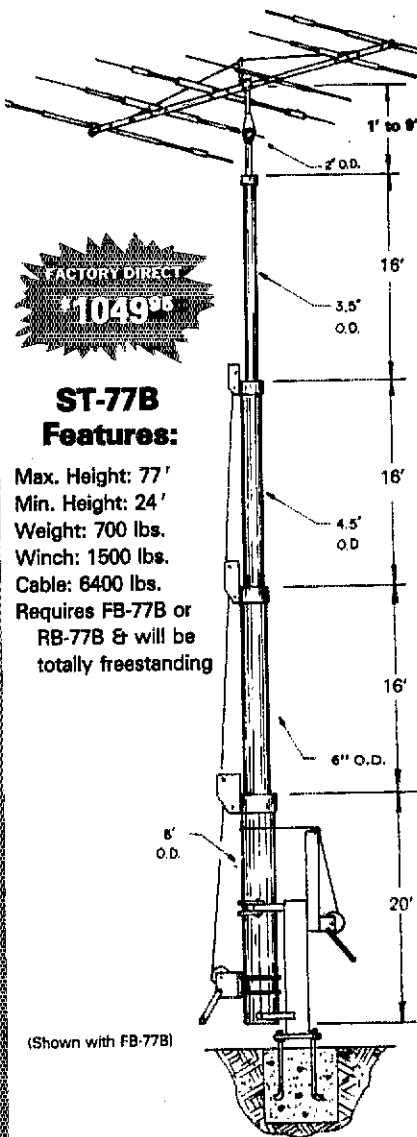
**1-800-634-6898 TOLL FREE**

**W S I WILSON**  
SYSTEMS, INC.

4286 S. Polaris Las Vegas, Nevada 89103  
PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

# WILSON SYSTEMS TOWERS

— IN STOCK —



**FACTORY DIRECT**  
**\$1049<sup>95</sup>**

## ST-77B Features:

Max. Height: 77'  
Min. Height: 24'  
Weight: 700 lbs.  
Winch: 1500 lbs.  
Cable: 6400 lbs.  
Requires FB-77B or RB-77B & will be totally freestanding

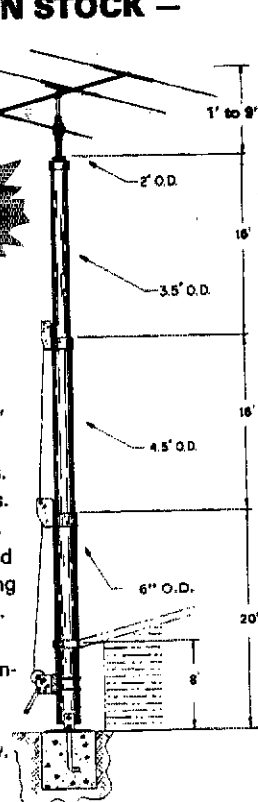
(Shown with FB-77B)

**IN STOCK**

**FACTORY DIRECT**  
**\$589<sup>95</sup>**

## MT-61B Features:

Max. Height: 61'  
Min. Height: 23'  
Weight: 450 lbs.  
Winch: 1200 lbs.  
Cable: 4200 lbs.  
No Guys required when mounting against house.  
For completely freestanding installation, use RB-61B or FB-61B below.



WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	18	Square Footage Based on 50 MPH Wind
	77	12	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

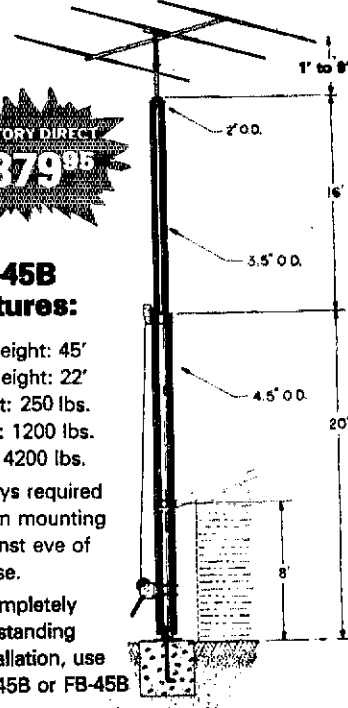
**FACTORY DIRECT**  
**\$379<sup>95</sup>**

## TT-45B Features:

Max Height: 45'  
Min. Height: 22'  
Weight: 250 lbs.  
Winch: 1200 lbs.  
Cable: 4200 lbs.

No Guys required when mounting against eve of house.

For completely freestanding installation, use RB-45B or FB-45B below.



BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4 1/2'
RB-45B	30" x 30"	4 1/2'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5 1/2'
RB-61B	3' x 3'	5 1/2'
ST-77B	See Below	Bases
FB-77B	3 1/2' x 3 1/2'	6'
RB-77B	3 1/2' x 3 1/2'	6'

Wilson Systems uses a new high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3 1/2" .095; 4 1/2" & 6" .125, 8" .134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

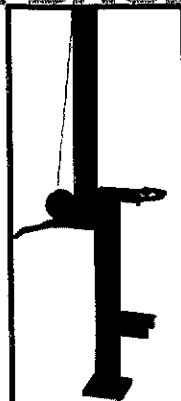
The ST-77B can not be mounted against the house and must be used with the tilt-over base FB-77B or RB-77B shown below.

## 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.

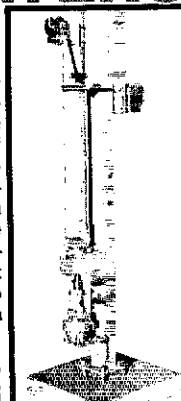
**FB-45B . . 112 lbs. . . \$174.94**  
**FB-61B . . 169 lbs. . . \$249.95**  
**FB-77B . . 250 lbs. . . \$359.95**



### 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.

**RB-45B . 144 lbs. . \$239.95**  
**RB-61B . 229 lbs. . \$324.95**  
**RB-77B . 300 lbs. . \$489.95**



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

**ORDER  
FACTORY DIRECT  
1-800-634-6898**

**W S I WILSON  
SYSTEMS, INC.**

4286 S. Polaris Ave. Las Vegas, Nevada 89103

## SYSTEM 33

**\$159<sup>95</sup>**

**FACTORY DIRECT ONLY**

**IN STOCK**

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 excels 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.

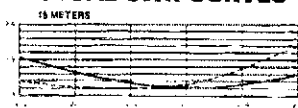
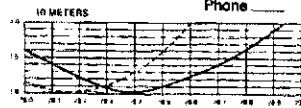
### SPECIFICATIONS

Band MHz.....14-21-28  
Max. power input... Legal limit  
Gain (dbd).... CALL FACTORY  
VSWR at resonance..... 1.3:1  
Impedance..... 50 ohms  
F/B ratio..... CALL FACTORY

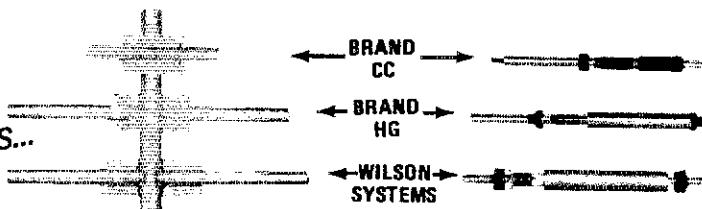
Boom (O.D. x length) 2" x 14'4"  
No. elements..... 3  
Longest element..... 27'4"  
Turning radius..... 15'9"  
Max. mast diameter... 2" O.D.  
Surface area..... 5.7 sq. ft.

Wind load @ 80 mph... 114 lbs  
Assembled Wt..... 37 lbs  
Shipping Wt..... 42 lbs  
Direct 52 ohm feed  
no balun required  
Max wind survival... 100 mph

### ACTUAL SWR CURVES



**COMPARE THE SY33 WITH OTHERS...**



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.

## ADD 40 METERS TO YOUR TRI-BAND WITH THE NEW 33-6 MK

— IN STOCK —

**\$54<sup>95</sup>**

Now you can have the capabilities of 40-meter operation on the **SYSTEM 36** and **SYSTEM 33**. Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth. The 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line.

The 33-6 MK adds approximately 15' to the driven element of your tri-bander, increasing the tuning radius by 5' 6". This addition will offer a rotatable dipole at the same height of your beam.

**WILSON SYSTEMS, INC.**

4286 S. Polaris Ave., Las Vegas, Nevada 89103  
Prices and specifications subject to change without notice

**ORDER FACTORY DIRECT**  
1-800-634-6898

**\$54<sup>95</sup>**

## 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 are 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 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

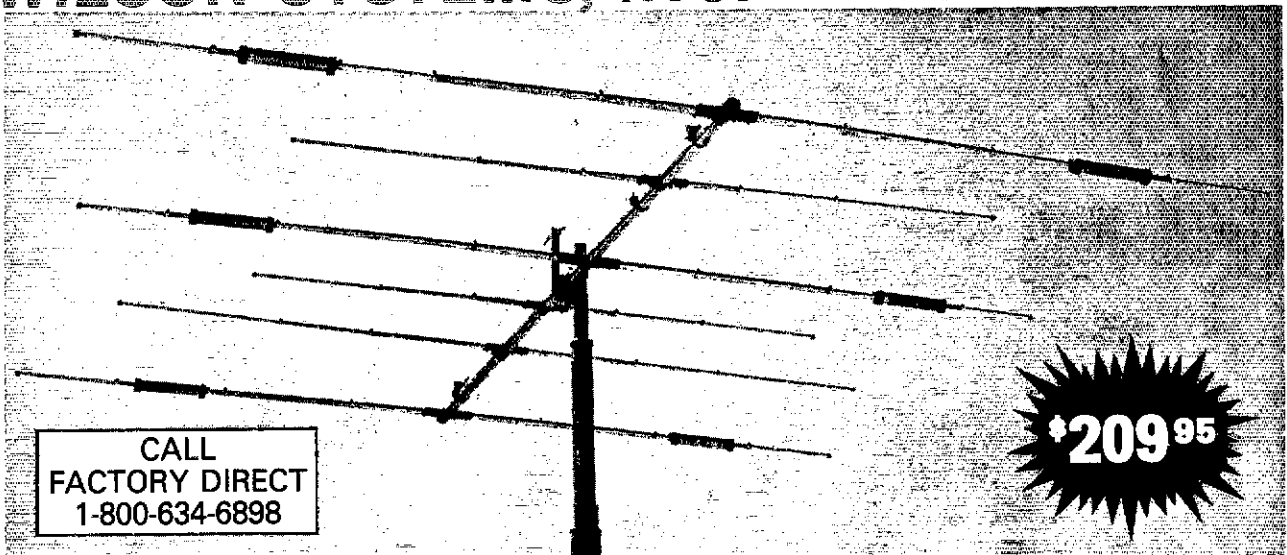
**GR-1**

**\$13<sup>95</sup>**

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150' of #12 aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

# WILSON SYSTEMS, INC.

# SYSTEM 36

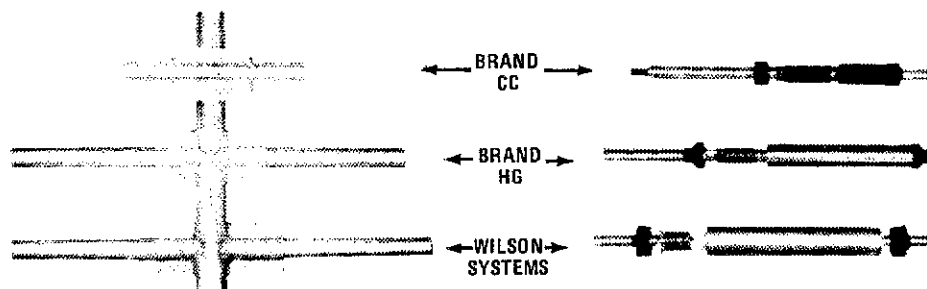


CALL  
FACTORY DIRECT  
1-800-634-6898

**\$209.95**

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.

## Compare the SY-36 with others . . .



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.

### SPECIFICATIONS

Band MGz . . . . . 14-21-28  
 Maximum power input . . . . . Legal Limit  
 Gain (dBd) . . . . . CALL FACTORY  
 VSWR @ resonance . . . . . 1.3:1  
 Impedance . . . . . 50 ohm  
 F/B Ratio . . . . . CALL FACTORY

Boom (O.D. x Length) . . . . . 2" x 24' 2 1/4"  
 No. of Elements . . . . . 6  
 Longest Element . . . . . 28' 2 1/4"  
 Turning Radius . . . . . 18' 6"  
 Maximum Mast Diameter . . . . . 2"  
 Surface Area . . . . . 8.6 sq. ft.

Matching Method . . . . . Beta  
 Wind Loading @ 80 mph . . . . . 215 lbs.  
 Maximum Wind Survival . . . . . 100 mph  
 Feed Method . . . . . Coaxial Balun (supplied)  
 Assembled Weight (approx.) . . . . . 53 lbs.  
 Shipping Weight (approx.) . . . . . 62 lbs.

WILSON SYSTEMS, INC. - 4286 S. Polaris  
Las Vegas, NV - (702) 739-7401

## FACTORY DIRECT ORDER BLANK

Toll-Free Order Number  
**1-800-634-6898**

WILSON SYSTEMS ANTENNAS			
Qty.	Model	Description	Price
	SY40	10 Ele. Tribander for 10, 15, 20 Mtrs.	299.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	209.95
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	159.95
	33-6 MK	40 Mtr. Mod Kit for SY33 & SY36	54.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	54.95
	GR-1	Ground Radials for WV-1A	13.95
	M-520A	5 Elements on 20 Mtrs.	234.95
	M-420A	4 Elements on 20 Mtrs.	164.95
	M-515A	5 Elements on 15 Mtrs.	134.95
	M-415A	4 Elements on 15 Mtrs.	89.95
	M-510A	5 Elements on 10 Mtrs.	89.95
	M-410A	4 Elements on 10 Mtrs.	74.95
ACCESSORIES			
	T-X	Tail Twister Rotor	269.95
	HD-73	Alliance Heavy Duty Rotor	109.95
	RC-8C	8/C Rotor Cable	.12/FT.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable, 38 strand center conductor, 11 gauge	.21/FT.

WILSON SYSTEMS TOWERS			
Qty.	Model	Description	Price
	TT-45B	Freestanding 45' Tubular Tower	379.95
	RB-45B	Rotating Base for TT-45B w/tilt over feature	239.95
	FB-45B	Fixed Base for TT-45B w/tilt over feature	174.95
	MT-61B	Freestanding 61' Tubular Tower	589.95
	RB-61B	Rotating Base for MT-61B w/tilt over feature	324.95
	FB-61B	Fixed Base for MT-61B w/tilt over feature	249.95
	ST-77B	Freestanding 77' Tubular Tower	1049.95
	RB-77B	Rotating Base for ST-77B w/tilt over feature	489.95
	FB-77B	Fixed Base for ST-77B w/tilt over feature	359.95

Prices Effective June 1-30, 1980 Nevada Residents Add Sales Tax  
 Ship C.O.D.  Check enclosed  Charge to VISA  MasterCharge

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

Bank No. \_\_\_\_\_ Signature \_\_\_\_\_

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

Prices and specifications subject to change without notice.

### NOTE:

On Coaxial and Rotor Cable, minimum order is 100' and 50' multiples.  
 Prices and specifications subject to change without notice.  
 Ninety (90) Day Limited Warranty - All Products FOB Las Vegas, Nevada



# THE NEW AEA MORSEMATIC! 37 FANTASTIC FEATURES!

The amazing AEA MorseMatic. Whether you are a contest, serious VHF DXer, learning code for the first time, studying for a marine radio operator's ticket, or simply a CW enthusiast, you can now own the finest electronic Morse keyer ever built and program it to your specific needs. Count these features!

1. Two custom designed microcomputer chips. 2. Two wpm to 99 wpm in one wpm increments. 3. Selectable dot and/or dash memory.

4. MorseMatic is a memory keyer. 5. 500 Morse character memory (optional to 2,000 characters) 6. Unique "Soft-Partitioning"™ to eliminate wasted memory space. 7. Use entire memory for one message or divide memory in up to ten messages. 8. Message loading begins with first character sent. 9. Easy to load memory. Choice of automatic mode for perfect format or real-time mode for individualizing messages. 10. Special editing mode for memory load correction. 11. Load memory in automatic keyer mode or semi-automatic "bug" mode (garbage in/perfection out). 12. Low power memory hold. 13. Memory limit indicator lights when 20 characters are left in memory. Monitor tone changes when memory overflows.

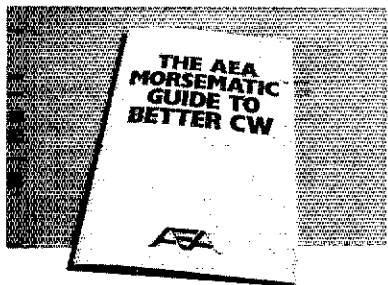
14. MorseMatic is a Morse trainer. 15. Computer generated Morse trainer. Incorporates ten repeatable (answers available) and one random starting position. 16. Programmable speed-up of code rate from beginning to end of practice session. 17. Select "slow code" or "fast (Farnsworth) code" method. 18. Select five character code groups or random group lengths. 19. Selectable, unselectable, uncommon characters for advanced radio operator training. 20. Use trainer mode to key transmitter for on-air practice.

21. MorseMatic is a beacon. 22. Unique beacon mode for beacons: moonbounce, scatter or tropospheric DX scheduling. 23. Computers set message code speed to fit programmed transmitting window.

24. MorseMatic has serial number. 25. Automatic serial number sequencing for sweepstakes and other contests. 01 - 9999 (even beacon mode). 26. Serial number placement at any point within message. 27. Serial number repetition within same message. 28. Easy serial number repeat in next message.

29. Operates with all popular paddles. 30. Easy to learn and use keypad control for all features. 31. Plug in IC's. 32. Independently selectable dot and/or dash weighting. 33. Can be used to key transmitter for tuning. 34. Transmitter keying output for grid block, cathode or transistor circuits. 35. Operates off 8 to 16 volts DC. 36. Fully tested and 96 hour burn-in. 37. Introductory price only \$199.95.

The MorseMatic is also available strictly as a non-memory keyer for only \$79.95 (introductory price). For your free MorseMatic booklet explaining these and more features, or for information about ordering a MorseMatic, write or call Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Phone 206/775-7373. (Dealer inquiries invited.)



# AEA

**Brings you the breakthroughs!**

How many of the latest Novice classes have been completed? Is your group urging the students to give traffic handling a try? If not, why? Many of the Novices later become some of the better traffic handlers because they haven't found it necessary to overcome some bad habits they might have picked up in other activities. PLEASE urge them to check in (QNN) the Ohio Novice Net (ONN) on 3708 kHz at 6:30 P.M. daily. Any other grade license classes should advise their students of Ohio Slow Net (OSN), Buckeye Net (BN) and Ohio Single Sideband Net (OSSBN), times and frequencies listed above. New blood is always welcome and necessary to fill some of the area voids within the section. Let's attempt to recruit as many new people as possible for all public service aspects of the hobby! The formation of the Clark County Amateur Radio Association by combining the Springfield ARC and the Western Ohio Repeater Association appears to be bearing fruit. Their schedule seems loaded with programs and public service activities. Officers: K8GRD, pres.; K8WQE, vice pres.; K8AACH, secy.; W8UOR, treas. Have you ever given thought to what a directed net is? Try listening to a cw net for a good example! A directed is just that — no station transmits unless invited or asked (directed) to by the Net Control Station. If you participate in a phone net PLEASE refrain from making comments or offering relays or bits of information unless the NCS asks for such. In most cases you only create confusion or add to it with such "off the wall" transmissions. Keep in mind that the NCS is just that — Net CONTROL Station. If he needs your help he will ask for it. Special congrats to W8BKF for his second month of perfect attendance on OSN. Appointments: EC: W83FNB/Auglaize W88HFZ/Summit W8DNEE/Marion Wvāndot W88TQ/Lucas. OO: W8IQG, W8NJ, ex-W8JEY is now a

Local Nets	QNI	OTC	Sess.
BRTN	380	123	31
COARES	111	9	4
HRCN	64	2	4
LCARES	177	32	13
BARA	41	1	3
TSRAC	679	159	24
VWCEN	54	5	5

Traffic: K8AAZ 530, W8BKWD 496, W8PMJ 311, W8ENI 163, W8AGMT 157, K8OZ 156, W8UPD 154, W8BKBW 137, K8AN 133, W8OZK 115, N8CW 114, W8GGX 111, W88HGH 109, W88SRC 108, W88UBR 105, K8NCV 101, W8MOK 79, W8BKF 78, W88WTS 78, K8FE 77, W88YTD 70, W88SIO 69, W8BPE 61, W88MEK 60, W88OZM 59, W88IGW 58, W88OYO 58, W81P 56, W88DUE 47, W88PUU 46, W88QMP 45, W88WQ 43, W88R 42, N8AKS 39, W88PID 37, W81ZE 36, K3RC 36, W8OEM 35, W8HYA 33, W88DYW 30, W88CIJ 29, W88YGV 29, W88DTG 28, W88TH 27, K8BKV 26, W88TRK 26, W88LPP 24, W88UW 24, W88YTO 23, K8CKY 21, W88MRL 21, K8BLQ 20, K8JA 19, AB8P 19, K8DL 18, W8BHL 16, AF8A 15, N8JR 15, W8MGA 15, W88PYV 14, W88ROO 14, W88SSJ 14, W88QHV 13, W88DMF 12, W88OXN 12, W88ICL 11, W88NJ 11, W88TPX 11, W88M 10, W88MAZ 10, W88TSX 10, W88NHV 9, W88PMW 9, W88QAC 9, W88VZX 9, W88AWM 8, K88DJZ 8, N2MA 7, W88PIY 7, K88NL 6, W88DLX 6, W88WFF 6, W88WNH 6, W88PH 5, W88BOV 4, W88NTR 3, W88OHU 3, W88DY 1, W88OTO 1.

### HUDSON DIVISION

**EASTERN NEW YORK:** SCM, Guy L. O'finger, K2AV — SEC: W82VUK STM: W225PL ASCM: W82VUK W82KDC W22T NM: W2W5S K82JG W82CQH W82ZCM W82EAG. Nets: NYPON 5 P.M. 3913. ESS (slow) 6 P.M. 3590. NYSPTEN 6 P.M. 3925. NYS 7 P.M. 10 P.M. 3677. CDN (Troy) 8:30 P.M. 3494. HVN (Beacon) 7:30 P.M. M-F 3797. SDN (White Plains) 9:30 P.M. S/TW 6606. MWFF 154015. Congrats to SenecaCovd ARA who celebrated its 50th birthday with big bash at the Willows featuring dancing, QRM (1?!) & the incredible John Leslie from WGY. Uster RACES out to help with the floods Mar. 21. Nice job by W2MU W2EWW WA2M8B K2HWP K2HA K2L. Thanks info from W2XL who managed to be out of town & miss it all. Think half of hamdom was on 2M for the Nationwide March of Dimes Superwalk. July 26 will be the ENY Hamfest at Rheinbeck Fairgrounds. Keep the date open & look to see you all there. Regretfully accepted the resignation of W2CS as long-time NYS mgr, who steps aside in favor of W2OJ. Many thanks for a job well done. You will always be one of my favorite traffic handlers. N2BDY W2YJR WA25PL W25ZL W2EAG W2ZCM WA2EOW Traffic WA25PL 1107, W2EAG 241, WA2EOW 191, W2ZCM 141, W2EUL 107, W25Z 105, W2YJR 91, W2BWW 88, N2JK 60, W2SON 42, KA2AOQ 41, WA2CJY 35, K82JG 34, W2XL 24, N2BDW 22, KD25 21, W2IQK 19, K2HNN 13, N2EF 9.

**NEW YORK CITY — LONG ISLAND:** SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Stephen H. Bloom, W82BD Ass't/NYC: Dwight Ernest KA2CNN STM: W82BNY.

Net	Time/Day	Freq.	Mgr.
NLI*	1900 Dy	3630	W82BNY
NLI*	2200 Dy	3630	W82BNY
N8PN*	1815 Dy	3928	W82HIC
SAVTN*	3030 M-F	147.915/315	W82BDW
ESS	1800 Dy	3590	W2W5S

\*Denotes NTS section net. Congrats to following new appointees: WA2SEL WB2KGT WA2MEE N2BGR W2AHV and WB2TQC as OTS and WB2KCT as OES. EC reports received this month from WA2SUB and K2MZ. WA2SEL has new 75-meter antenna and putting big signal into nets. NLI welcomes new member WB2TQC and returning members W2LPA WB2KH and K2EM. The third issue of the Parrot, our section's traffic newsletter, released. Really excellent job done on this by K2HD. If you are not receiving your copy, you can get one by checking into any of our section nets. Congrats to K2ZHP on upgrade to General and to KA2LEX, grandson of WB2EUL on new Novice. Great South Bay Radio Club reports K2IZ giving presentation on Field Day at May meeting. MAARC reports over 100 members at meeting in March to see slide presentation by W2TDO and N2KA on DXpedition to Greece. New officers for this club are: WA2ZLB, pres.; W82UMG, vice pres.; N2APK, secy.; K2EY, corres. secy. Communications for Smithtown 12 mile foot race Mar. 9 were provided by W82HTW KA2BSY KA2GKC KA2GFA WB2OQV and K2T5N. The following are Red Cross emergency frequencies in Suffolk County: Smithtown 146.52, Babylon 146.49, Brookhaven 147.54, Huntington 147.21, Islip 147.51. As you can see, I haven't been getting much news. This is your column. Let me see this column become a creative writing exercise for the writer! Traffic: WA2UWA 212, KA2CNN 173, K2GCE 146, W2AHV



# GET ON PHASE THREE FOR MUCH LESS THAN YOU THINK!

## These Low Cost SSB TRANSMITTING CONVERTERS

Let you use inexpensive recycled 10M or 2M SSB exciters on UHF & VHF!

- Linear Converters for SSB, CW, FM, etc.
- A fraction of the price of other units; no need to spend \$300 - \$400!
- Use with any exciter; works with input levels as low as 1 mW.
- Use low power tap on exciter or simple resistor attenuator pad (instructions included).
- Link osc with RX converter for transceive.



HAMTRONICS DOES IT AGAIN!

### NEW XV4 UHF KIT - ONLY \$99.95

28-30 MHz in, 435-437 MHz out; 1W p.e.p. on ssb, up to 1½W on CW or FM. Has second oscillator for other ranges. Atten. supplied for 1 to 500 mW input, use external attenuator for higher levels.

Extra crystal for 432-434 MHz range ..... \$5.95  
XV4 Wired and tested ..... \$149.95



### XV2 VHF KIT - ONLY \$69.95

2W p.e.p. output with as little as 1 mW input. Use simple external attenuator. Many freq. ranges available.

MODEL	INPUT (MHz)	OUTPUT (MHz)
XV2-1	28-30	50-52
XV2-2	28-30	220-222
XV2-4	28-30	144-146
XV2-5	28-29 (27-27.4 CB)	145-146(144-144.4)
XV2-7	144-146	50-52
XV2 Wired and tested ..... \$109.95		



### XV28 2M ADAPTER KIT - \$24.95

Converts any 2M exciter to provide the 10M signal required to drive above 220 or 435 MHz units.

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VHF KIT \$34.95  
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MODEL	RF RANGE	OUTPUT RANGE
CA28	28-32 MHz	144-148 MHz
CA50	50-52	28-30
CA50-2	50-54	144-148
CA144	144-146	28-30
CA145	145-147	28-30
or	144-144.4	27-27.4 (CB)
CA146	146-148	28-30
CA220	220-222	28-30
CA220-2	220-224	144-148
CA110 (less xtal)	Any 2MHz of Aircraft Band	28-28 or 28-30
Kit less xtal ..... \$29.95		

UHF KIT \$34.95  
UHF Wired \$44.95



MODEL	RF RANGE	OUTPUT RANGE
C432-2	432-434	28-30
C432-5	435-437	28-30
C432-4	432-436	144-148
Kit less xtal ..... \$29.95		

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- Double tuned circuits for spurious suppression
- Easy to align with built-in test aids



T50-50	6-chan, 6M, 2W Kit	\$44.95
T50-150	6-chan, 2M, 2W Kit	\$44.95
T50-220	6-chan, 220 MHz, 2W Kit	\$44.95
T450	1-chan, 450 MHz, ¾W Kit	\$44.95

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LPA2-15	6M, 2M, 220; 15 to 20W	\$59.95
LPA2-30	6M, 2m; 25 to 30W	\$89.95
LPA2-40	220 MHz; 30 to 40W	\$119.95
LPA2-45	6M, 2M; 40 to 45W	\$119.95
LPA4-10	430MHz; 10 to 14W	\$79.95
LPA4-30	430MHz; 25 to 30W	\$119.95

See catalog for complete specifications

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P9 Kit \$12.95  
P14 Wired \$21.95  
Specify band when ordering



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P8 Kit \$10.95  
Specify band when ordering



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P15 Kit \$18.95  
P35 Wired \$27.95

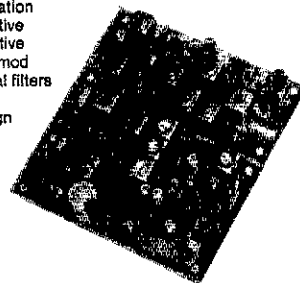


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- More selective
- Low cross mod
- Uses crystal filters
- Smaller
- Easy to align



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\* Specify band: 10M, 6M, 2M, or 220 MHz. May also be used for adjacent commercial bands. Use 2M version for 137 MHz WX satellites.

R85( ) UHF FM Receiver Kits, triple conversion, include C432 UHF Front End Module. Add \$20 to above prices. (Add selectivity letter to model number.)

A13-45A 6 Channel Adapter for receivers ..... \$13.95  
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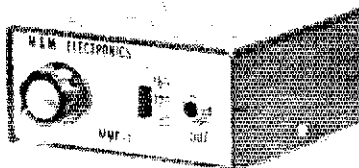
2 Watt Audio Amplifier  
Power Requirements:  
Int.: 2-9 V transistor batteries  
Ext.: 12-18 vdc. @300 ma.  
Cabinet Size: 4" w x 4" d x 2" h  
Color: Silver with black vinyl top.  
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116, W2GKZ 80, WB2DCJ 64, KA2DBW/T 48, W2MLC 48, WB2BNY 32, WB2IDP 29, WB2KCT 27, WA2SEL 26, N2BGR/T 18, W2DBQ 14, N2NT 1.

**NORTHERN NEW JERSEY:** SCM: Robert Neukomm, WA2MVQ — SEC: WB2VUF, STM: W2XD, NMs: K2VX, KB2HM, W2PSU, WB2RMI, W2TCA, W2UEZ & WA2CUW.  
Net Freq. Time/Days Sess QNT QSP  
NJN/e 3695 7 P. M. Dy 31 608 217  
NJN/l 3695 10 P. M. Dy 31 362 125  
NJSN 3735 6:30 P. M. Dy 31 251 36  
NJVN 4949 10:30 P. Dy 32 277 139  
NJPN 3950 6:00 P. Dy 36 650 305

UCEN 085/685 7:30 P. Dy 31 271 83  
OBTTN 7212 Dy 31 285 120  
NJRTRY 147.51 Dy 31

KB2HM now Extra! KA2CHM KA2HOG & KA2HOH to General. KB2HM was awarded the first annual Old Bridge Memorial award for her efforts in traffic. WA2PIP back reporting into NJN after a long time away and reports WAS on cw together with 95 on cw towards DXCC. WB2KNS has a new home in Neptune and operational on all bands, also Army Mars. K2ZF reports having problems with ri and pacemaker. A meeting was held on 3/15/80 at Bell Labs, Holmdel, to discuss a proposed statewide vht net. Comments on net to be solicited from all traffickers. WB2VDW reports that Chatham Twp H S is planning a Bike-A-Thon on Apr 12 with hams in the area to handle the communications. A new local traffic net is active, experimentally on 147.30 out and its name is the Northwest NJVN. Morris County Red Cross has a new facility repeater that reaches 3-Land. The National Red Cross has a mobile video terminal that can be used for high speed cw work. The plan is to fly such units to disaster areas. Ramapo ARC earned 459 points during the last SET. Notes from Sussex County ARC OSC: K2BPP on his 2nd North Pole DXpedition. Listen for the 220 MHz State RACES Network. Look for "Ratt Races" in June on the Delaware. The Sussex County ARC's 2nd annual hamfest is planned for Sat. Sept. 8th at the County Fair Grounds in Augusta off Rte 206. The club plans to enter FD from the c. d. center. Tri-County Radio Assn. reports their flea market will be held at Strling 9-4 on May 4th. Ramapo Forty-Niner reports a successful transmitter hunt was held March 23rd with WB2VZW and WB2LPB 1st place. The Ramapo "gang" have an active computer group. The Ramapo Mountain ARC has scheduled their annual "Spring Fling" for May 17th. W2XD has been appointed an Assistant Director for K2SJO. BARA has their second edition BARA Communicator and it is really nice. The "Gang" is getting BARA Jackets. Listen for the new amateur club from Belleville in upcoming FD. Looking forward to receiving your FD messages and hope all the clubs report to me but most especially "you all" have a good time at Field Day! Traffic: (Mar) W2RQ 431, W2UEZ 372, W2COB 265, N2BC 229, AG2R 214, K2VX 197, WA2MIF 147, W2XD 140, WB2KLF 132, W2TCA 126, WB2RMI 125, AF2L 120, WA2MVQ 120, W2SO 98, WB2TOM 94, KB2HM 91, N2CR 89, KA2GQ 79, WA2OVE 77, N2IC 45, W5DTR/2 37, K2YV 35, KA2SOH 33, WA2DPK/2 27, N2BNE 25, WA2QWR 24, W2UJ 24, W2ZEP 24, N2NS 20, KA2EEQ 18, WA2PIP 18, KA2CY2 13, W2UC 11, WB2AU 10, W2CU 10, W2NKD 6, WB2WBW/T 6, WB2YGT 5. (Feb) WA2PIP 17.

### MIDWEST DIVISION

IOWA: SCM: Max R. Otto, W0LFF — SEC: W0IYW, DEC: W0AVW, K0CY. The 3900 Club and Sooland Repeater Assn co-sponsored a banquet 4th Hamboree mainly because of the efforts of K0AAR, W0FZO, W0GOK, W0DHP, W0PDX, W0SIZ, K0TFI and W0YQV. W0BKT built a Heathkit SB200 with the help of his 4 year old daughter. He is color blind so was in charge of color codes. The Great Plains ARC at Hazleton has doubled the membership since September. Iowa Great Lakes ARC officers: W0FO, pres.; W0W0E, vice pres.; W0QID, secy/treas. Muscatine Club received a weather course from the Weather Bureau in person. Congrats for upgrades: N0BLI for Tech; N0APC, KA0ADN, WD0AXH, KA0CND, KA0JFW for General; WD0AFM for Advanced; W0BJAK and K0RF0 for Extra. New equipment: W0BEC has Yaesu PC8-2000, K0ARO has Robot 400, W0BTEM has TS-820S and WD0FOY has Yaesu 820B. WD0AMA, WD0ENR and WD0ALY gave Amateur Radio good PR by making tapes for broadcast stations in the Mt. Pleasant area. Iowa 100% on NIS: TEN due to AIGO, W0YLS, W0SS, AF0R, W0UPF, KA0X, K0GP, W0PYD, N0SM, K0EVH and W0TILJ. 100% on DTHN due to WA0AUX and W0TGD. W0EIT busy rebuilding his secondary frequency standard 1 kHz to 1 MHz. Due to inflation a FD message to me is worth 100 points.

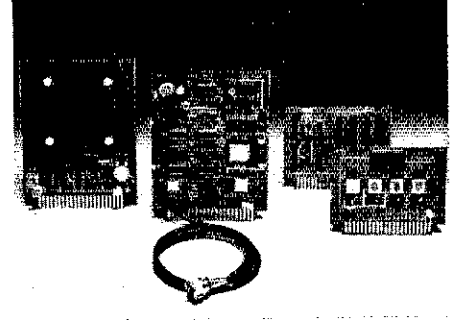
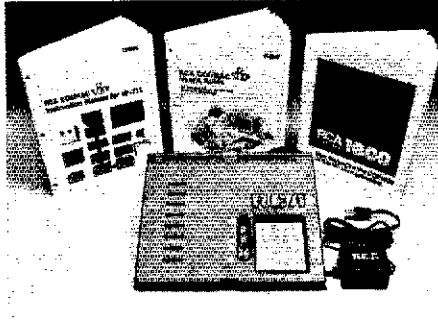
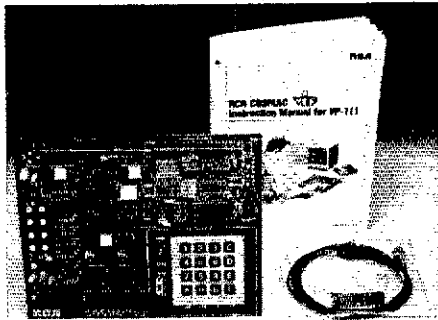
Net	Freq.	Time/Days	QNT	QTC	Sess
Iowa 75m	3970	1730 M-S	1286	94	26
Iowa 75m	3970	2300 M-S	990	45	26
Tall Corn	3560	2330 Dy	289	129	62

Iowa Code 3713 2:59 M-W-F 6T R 13  
Traffic: WA0AUX 390, W0SS 124, W0PYD 120, AIGO 92, W0YLS 80, AE0R 83, KA0X 78, K0GP 38, W0LF 29, W0UPF 27, W0NSS 15, W0AVW 13, W0DHP 12, W0BW 11, W0MCCX 8

KANSAS: SCM: Robert M. Summers, K0BXF — SEC: W0KL. He also reports that many stations in Kansas participated in NWS "SKYWARN 80" on March 25. Guess it is time to find the safe spot in the basement and clean it up again. 13 ECs reported for the month, with 892 ARES members signed up. IF YOU ARE NOT REGISTERED with the ARES in our state, drop your EC or W0KL or myself a note and information will be sent to you. W0FAC reports lots of DX available on the 75-meter band as well as ten if you haven't noticed. Hiwatha repeater back in full operation again after identifier problems. CW, SNOWMAN, W0AM says Goodland may never be found under the big late snows. Net activity: CSTN QNT 1347, QTC 76, OKS QNT 384, QTC 149, KWN QNT 994, QTC 565, K5BN QNT 1330, QTC 111, KPN QNT 337, QTC 12. Several new ECs will be appearing in the next month or two. If you happen to be interested in an EC spot in the future, drop your SCM or SEC a line. Traffic: W0OYH 116, K0FZ 107, W0HI 94, W0ACG 90, W0F 88, W0FIR 86, K0BFX 69, W0LBB 68, W0BGR 51, N0ABA 50, W0AM 48, W0CHJ 46, W0BPB 45, W0HYE 41, W0P 29, W0KL 22, W0FDJ 19, W0HYE 14, N0IN 14, W0BFA 4

MISSOURI: SCM: L. G. Wilson, K0RWL — Assl SCM: Joe Flowers, W0OTF. Congrats to W0NRY, W0TGO and KA0BCW on their new cw. K0UJ, K0BX and K0CB respectively. AG0C is sporting a new 15-120. Congrats to WA0FCR upon his retirement after more than 40 years at the Missouri State Chest Hospital.

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- VP-585** Keypad Interface Board—Interfaces two VP-580 Auxiliary Keypads to VP-111/711 ..... \$ 15
- VP-560** EPROM Board—Interfaces two 2716 EPROMs to VP-111/711 .. \$ 34

- VP-565** EPROM Programmer Board—Programs 2716 EPROMs. With software ..... \$ 99
  - VP-575** Expansion Board—Provides 4 buffered and one unbuffered expansion sockets ..... \$ 59
  - VP-576** Two-Board Expander—Allows use of 2 Accessory Boards in either I/O or Expansion Socket ..... \$ 20
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  - VP-701** Floating point BASIC for VP-711 on cassette. Requires 16K Bytes RAM (avail. 7/80) ..... \$ 49
  - VP-710** Game Manual—Listing for 16 exciting games ..... \$ 10
  - VP-720** Game Manual-II—More games .. \$ 15
- ASCII keyboards.**
- VP-601** Keyboard—128-character ASCII encoded alphanumeric 8-bit parallel output ..... \$ 99
  - VP-606** Keyboard—Same as VP-601. Asynchronous serial output .... \$ 99
  - VP-611** Keyboard—Same as VP-601 plus 16-key numeric keypad ..... \$ 89
  - VP-616** Keyboard—Same as VP-606 plus 16-key numeric keypad ..... \$119
  - VP-620** Cable—Connects VP-601/611 to VP-111/711 ..... \$ 20
  - VP-623** Cable—Unterminated for VP-601/611 ..... \$ 20
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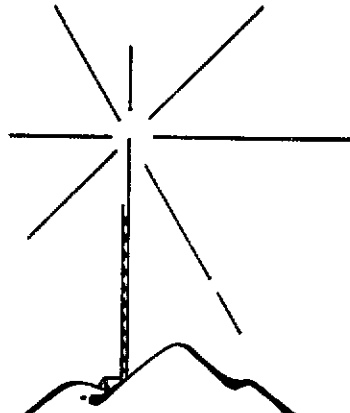
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About 40 persons are at the halfway point in the PHD Novice Class and from all reports are doing well and looking forward to the day they can take their tests. Several members of the Kansas City DX Club have recently returned from their DXpedition to VP1A during the ARRL DX Fone Contest. They are claiming several thousand contest QSOs and are full of stories about their trip. ABØ and KØRWL operated the multi-single category during the ARRL CW and Fone Contests respectively. Scores were 967K and 1.02 million.

MON	157	9 8	NEMOE	134	3
MON 2	133	5 8	ACE	32	2
MOSSBN	845	6 5	TNT	58	11
HBN	386	4 2	MEOW	576	51

Our deepest sympathy goes to WBØVXV on the passing of his wife Rita and to the families and friends of KØJFF and WBØJC who joined the ranks of the Silent Keys. Congrats to the following new licensees: Novice: KAØS GQZ GWA GWB GWM GWN GWT GXB GXC GXF GXZ GXD GXR through GXZ GYA through GYE GYL GYX GZA GZL GZT GZW GXZ HAA through HAE HAG HAJ HAC HAP HAU HAY HBA HBI HBJ HBO through HBU HBX HBY HCH HCJ HCU HDB HDO HDS HDX through HDZ HEA and HEB Tech: NØs BMK BMY BNQ, General: NØBNA Traffic: WØBMA 332, KØDNK 216, WØUD 134, WØBV 92, WØOTF 66, KØSI 66, KAØE 37, KAØP 10, KØRWL 10, WBØNIE 8.

**NEBRASKA:** SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. WBØEVS reports the 160-mtr WX Net is closed for the summer. A big thanks goes out to all who make the net successful, and hope to hear you next November on the 160 WX Net, congrats to NØAIH and the AK-Sar-Ben ARC for the newly rebuilt emergency generator. KØDG reports its a beaut of a machine and will supply codes of emergency and Field Day power for years to come! The Omaha boys were successful in getting material and labor donations to see the project through. FBI The Pine Ridge ARC report they received a Motorola base station from KDUH-TV, they want to place it into repeater service. Hope to hear it on soon. The Lincoln ARC reports member WBØYYE and XYL who were recently trained in Red Cross Advanced First Aid saved his neighbor's life in a recent heart attack episode! The skills really paid off. Upgrades reported KØBDKO to General, WØØGN to Technician.

Net	QNI	QTC
160 Weather	679	0
Cornhusker	1084	20
Nebr. Storm	1324	47
Platte Valley 2mtr	78	2
PM Net	271	33
QCWA	74	0
Western Nebr Net	639	58
WØEUT 72, WØVYX 42, WBØGMO 15, WØHTA 11, WØNIK 6, WAØOGX 6, WØWZR 2, WØØCG 1, WAØLOY 1.		

## NEW ENGLAND DIVISION

**CONNECTICUT:** SCM, Stan Horzema, WA1LOU — SEC: W1SY, STM: WB1AIU, NMs: K1EC K1ER WB1CFF WA1ELA WA1LOU.

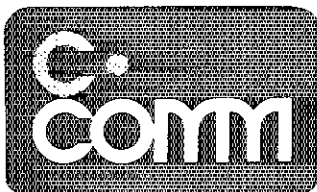
Net	Freq.	EDST	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	62	369	348
CPN	3965	1900 M-S 1000 Su	31	161	343

**NENN** 3720 1815 Dy  
Nutmeg 28/88 2130 Dy 31 95 366  
RASON 13/73 2100 MWFSu 18 20 95  
WESCON 78/18 2030 Dy 31 101 450  
Hi QNI: CPN WB2PJJ CN WB1FZX WA1ZXT K1AGE Nutmeg W1EFW, Bill Pace, W1ID, steps down as SCM this month for health reasons. He promises to stay active on all the bands. W1WP made BPL for the third time. . . a medallion will be sent his way soon. WB1FZX received a grant from the state education department to fund a ham station at the Bethel Middle School. . . on the air now! WA1ZXT and WB1FZX gave an ARES presentation to the New Milford Board of Selectmen. . . they were very interested in what ham radio had to offer. SARA members manned a message booth at the Chamber Home Show. Now is the time to do that antenna work that needs to be done. . . fix the problems created by old man winter or do that work you kept putting off last fall! Happy Field Day to all participants. Traffic: W1WP 411, WB1CFF 337, K1GF 196, WB2PJJ 181, WB8DGR 90, W1DFT 73, K1AOE 70, WB1FZX 70, WA1ZXT 46, W1BDN 45, K1ICMX 45, K1XA 44, WA1WQG 38, WA1LOU 34, W1GVT 33, W1KV 30, WB1EFJ 27, W1QV 5, K1EUD 4, N1CC 2, W1CUH 2.

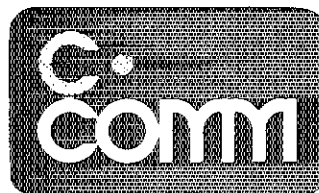
**EASTERN MASSACHUSETTS:** SCM, Rick Beebe, K1PAD — STM: WA1TBY, SEC: WA1BLG, ASCM: WA9NEW. OES rpts from W1XA AE1X W1EGE. OBS reports from W1XA K1UR. EC report from W1XA. OO reports from W1BGW W1NF K1LWI W1UI W1EGE W1HL. OVS reports from W1GXT W1JR.

Net	Mgr.	Freq.	Time/LOC/Dy	QNI	QTC
EMRI	WA1VAB	3.658	1920/Dy	458	289
EMRIPN	W1FJ1	3.898	1730/Dy	334	167
EM2MN	WA1FE	90/30	2000/MWF	81	47
EM2MN	WA1FE	145.8	2000/TTH	--	--
NEEPEN	K1BZD	3.945	0830/Su	60	7
HHTN	K1BSO	04/64	2230/Dy	533	187
RAIN/2	N1AMF	01/61	1800/Dy	283	283
RAIN	N1AMF	01/61	1800/Dy	60	60

We lost Frank Baker, W1ALP, to the Silent Keys in March. As anyone who has read this column for anytime must know, he was our SCM for 39 years. This is an achievement that will never be matched in the future. He has been nominated for the Hall of Fame and will be voted on at the July Board meeting. Let us support this nomination by letting our Directors know about the outstanding service he put in. Write a letter today. Names and addresses are in the front of QST. Old Crystal Ten Club members W1MDH W1MBA W1GAG W1EED W1EYZ W1OKB had a reunion. They were forerunner of Quannapowitt Club; 1979 repeater group had a dinner party in Malden; Massachusetts club member KA1AIM upgraded to Adv and then to Extra, congrats! Sturdy Memorial Hosp Club operated in the 10-meter contest with over 116,000 points; Mitre-Bedford Club had Dr. Emanuel Landman of Lincoln Labs speak on the application of solar power to Amateur Radio; Wellesley Club had K1FB speak on the use of new generation of ham gear especially solid state gear; Foxboro Company Club handled comm for the Foxtrotters 25 Km road race; RAIN Net and ham radio has been getting some great PR from ch 4 TV on their weather forecasts in the evening as they monitor the net. Also the RAIN Net on 01/61 has a clone on the Norwell repeater also at 6 P.M.; W1BGW got unexpected but pleasant visit from W2KPK who he had not seen since Ft Mon-



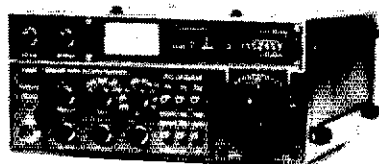
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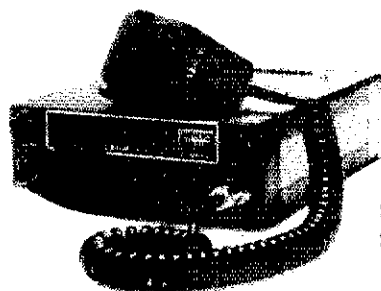
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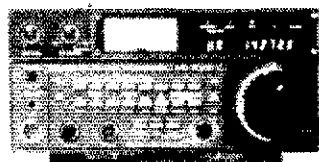
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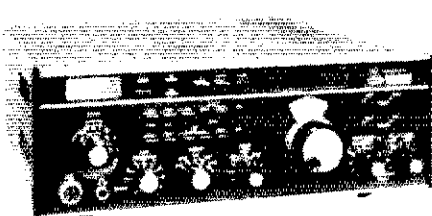


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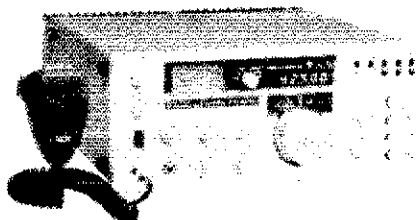
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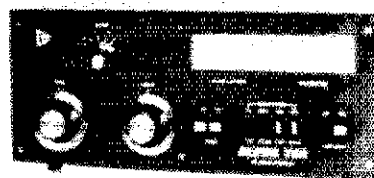
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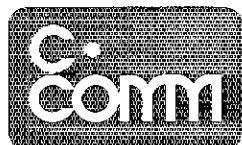


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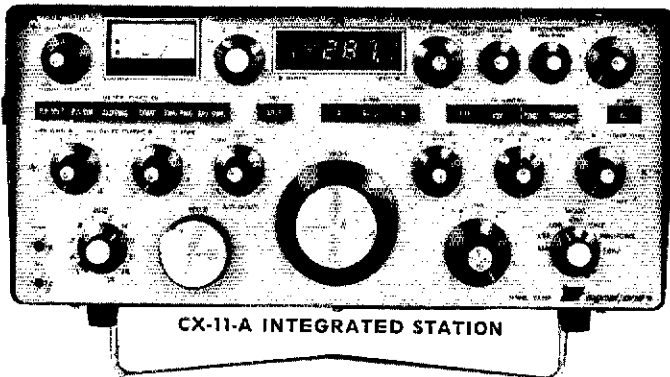
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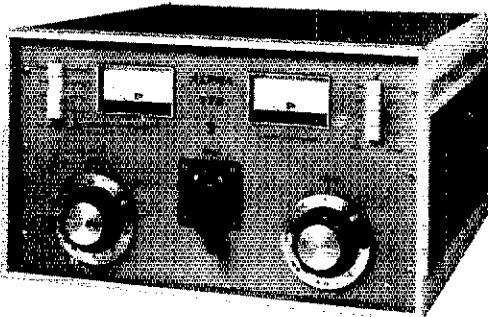
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# PAYNE RADIO

mouth in 1942; We are happy to welcome K4YX back to East Mass after a stint in Rebel country. She is a past RM in Eastern Mass "welcome back." W1NF had Old Timers gathering with K2NP W1UAQ and W1AJK; W1NF also celebrated his 78th year, as a ham, wow!!; The spill of Itrichloro-sulfate in Somerville brought Amateurs out to work with c.d. and Red Cross. Some of the active stations were WA1IC, W1ATQV, K1LBT, WA1V5Y, WA1V5Y, KA1AOC, WA11DA, RA1BML, AB1Z, WB1TPV, WB1FY and others. Traffic: (Mar) WA1TBY 320, WA1VAB 318, K1BA 285, K1GN 215, WB1DXR 188, KA1BJY 152, KA1CC 151, K1BSQ 148, KH6JNQ 108, W1ATX 119, W1DMH 74, KA1HG 62, N1CW 52, WB1EZX 50, WA1YWK 49, W1FJJ 41, KA1CGP 39, K4YX 36, W1CE 35, WB1ANT 27, W1PEX 26, WB1TPY 26, AF1Z 24, WA1ZQT 24, K1BZD 22, WA1FNM 18, W1PL 18, WA2ORV 15, WA9NEW 13, WA1FE 12, W1MJ 11, W1XA 9, W1AEC 6, N1EE 4, W1FJ 4. (Feb) W1CE 12, W1MJ 5.

MAINE: SCM, Ed. Bristow, WA1MUX — New EC: KA1EO, Hancock Cty. New officers: AARC: WA4JJJ, pres.; WB1DXM, vice pres.; K1TVT, secy.; WB1DXL, treas. AARC's 3rd birthday 4/18/80, congrats, PSHR: W1RWG (also in Feb) AF1WB1BYR, Sessions/UTC — Feb: SGN 281/048/195; PTN 23/29/82; Mar: SGN 26/07/134; PTN 31/290/126; MPSN 2/102/14; SPSN 2/09/712; MSN 13/66/11; AEN 4/45/0 Traffic: (Mar) W1KX 139, W1BYR 127, W1RWG 107, W1ISO 80, W1HDC 66, WA4UJJ1 68, AF1L 62, NSYX1 50, WA1MUX 32, W1GKJ 18, WA1JZP 18, W1AAM 17, KA1EO 17, W1BMX 12, WA1JHT 12, KA1AYC 11, W1XOC 8, WA12JL 8, WA1YNZ 7, WA1JCN 6, W1CTR 4, KA1EKT 4. (Feb) W1RWG 100, W1HDC 59, K1GUP 21, WA1JCN 12, W1XOC 8.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SVX — SEC: K1RSC, STM: W1TN, NMs: W1NH & WB1HFI. Endorsements: K1GQ & AF1 OTS. WB1CTE & W6BED/1, EC: W1NH, OO Congrats to new Extra WB1HFI plus Advanced WB1ASY & WB1GXM, VHFer W1EJ worked KH6IAA for 80 MHz WA5 #238. He says that was the HI heard since 1954. W1HGG received the Port City ARC certificate; KA1BBI Net control on New England Novice Net. New Novices are welcome. WB1FXK received WANE award #300. W1EJ needs Africa for WAC on 8. W1N1JE has new Icon IC255. W1OMZ preparing auto patch for 73 Machine, KA1BXN & KA1CGT now General Class. Seen on WYans W1TAM & WA1PSI. K1NBN now lives in York, ME. W1UN has new 10-meter beam. WA1WNM net control for the Sea Coast Net Sundays at 10 A.M. K1DGM gave out rare Coos County contacts during the NH OSO Party. Congrats to the Nashua ARG for another excellent demonstration of Amateur Radio at the mall. Get ready for the black flies, Mosquitoes & Field Day. Traffic: W1TN 225, WB1HFI 97, K1OSM 91, W1MXX 50, W1YMH 34, WA1YAZ 29, W1ALM 24, WB1DSW 23, WB1HGO 18, WA1PEL 17, KA1BBI 16, K1UOX 6.

RHODE ISLAND: SCM, J. Titterton, W1EOF — SEC: K1DT, STM: N1RI. Congrats to our latest upgraders: WA1POH WB1FSS and WA1ZOZ to Advanced; WA1PWA to General. KA1FE serving as NCS for EMRI Phone Net. RI OSO Party will be on Aug 16 & 17 this year. All clubs are firing up for another big Field Day. We are still looking for more folks for the traffic handling community. The hardest to come by are cw operators, but if you do not like cw, there is a lot of traffic being handled on phone nets. If you are interested, contact this station-all are welcome. RIEM 2 Mr. TIC Net reports sess 21, ONI 218, TIC 68, thanks to KA1AJS acting mgr. Summer is on us, but ham radio has lots to offer in the warm weather also. Take part in Field Day with your own club. Traffic: W1EOF 104, KA1FE 68, KA1BTU 54, WA1VTZ 19, N1RI 14, K1GOW 6, AE1S 6.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. I've had a few inquiries as to why not more info in this column. Low input makes low output. Appreciate info from those concerned. Millie - last month's RFD report fell by the wayside. AE1T received his 5BWAS plaque that explains where he has been! It is nice to hear new stations calling into our nets - we have room for many more. Real good way to get to know your fellow hams. VT SSB 3/30/82; GMN 2/6/82/85; Garner 26468/40; VTPN 5/86/87; VT RFD 5/85/86. W1ZS has another term as SCM. We are searching for a STM. Anyone interested or anyone with suggestions for this appointment, please let me know. Briefly, the STM is the Assistant SCM for traffic handling - coordinating the tic activities of all our traffic nets. Traffic: K1QBQ 116, N1ARI 52, W1RNA 13, AE1T 5, WA1YEH.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — Sec: W1JP, STM: W1TM. ASCMs K1BE W1BVR, NMs: WA1MJE, W1UD, W1UPH. The CW Traffic Training Net, WMTN on 3562 at 6:30 doing very well tnx to W1TM, with commendable tic activity despite slow speed and 30 min. duration. The SECs promotional work gaining momentum especially via the six ARES repeaters that meet Sun 9 A.M. in simultaneous liaison with WMTN on 3937. A round of applause to W1UPH K1NWE W1HOD for the weather cover of Holyoke's St. Pat parade with observers on 3937 relayed to the Mt. Tom repeaters on 52 simplex. A magnificent display of efficient cooperation among the radio clubs, various modes, ARES, NTS, mobile units, HT's, all contributing to our commitment to PICON (public interest convenience or necessity). Another noteworthy communications service by No. Worc: ARES for the 10K Meter Road Race in Leominster QNS: W1UD K1JHC W1JTL WB1GJC K1ZDX KA1ACH W1QUL W1HFN. New General in Gardner: KA1DNZ. Traffic: W1TM 284, W1UD 261, K1SEH 209, WA1MJE 192, W1KK 30, W1YWK 80, WA1OPN 35, W1FC 34, W1BVR 29, W1ZPB 20, K1JUV 17, WB1HIH 14, W1YI 10, W1GOP 8.

NORTHWESTERN DIVISION  
ALASKA: SCM, Fred S. Wegner, K17HFM — ASCMs: K17AG, K17BG, SEC: K17EWQ, STM: K17P, NMs: Snipers Net, K17HPU Bush Net, AL7O SeaSaw Net K17JFT; Anchorage ARES Net, K17EW. March saw the largest Iditarod Trail race ever. Congrats to K17O & K17UI for a fine management job. Kudos to all who helped. AL7G will long be remembered in McGrath/Boom-Boom! K17RT & K17JZ were among the merrymakers on Front St in Nome. April Fool's Day big wind was no fooling, worst disaster since the '64 quake, no injuries but millions in property damage. Many East Anchorage hams busy rebuilding antennas & homes. Would like to hear from all who want an Alaska OSO party (AK work the world) the Alaska DX Assn may sponsor. Anc ARC planning big FD this year (hilltop). Look for K17AA on all bands. VHF gang planning new repeaters in Hope and Homer this year, possible link-up with Kodiak.

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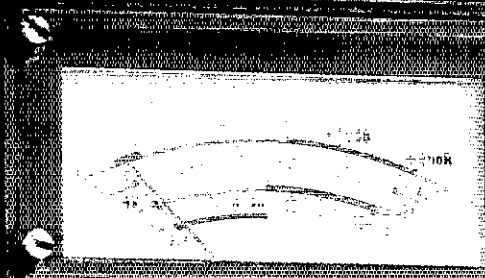
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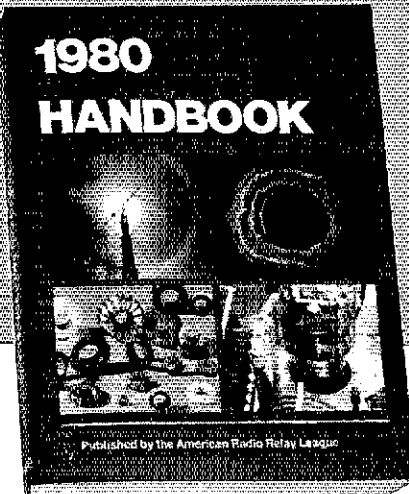
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Seasaw Net	127	21	15
IMM: K7AA 816, KL7BZ 146, KL7P 123, KL7VX 48, KL7L 43, KL7RF 27, KL7JFT 21, KL7O 16, AL7O 12, WB4HON 10, KL7JL 4 (Feb), KL7P 373, KL7BZ 68, KL7USA 62, KL7RF 46, KL7L 38, KL7O 32, KL7VX 28, KL7IPV 16, KL7JFT 16, AL7O 14, KL7JLR (Jan), KL7RF 202, KL7P 61, KL7BZ 45, AL7O 38, KL7VX 34, KL7USA 32, KL7L 12, KL7O 12, KL7AF 8, KL7JFT 7, WB4HON 4			

**IDAHO:SCM, Lem Allen, W7JMH — CLUB NEWS:** The Kootenai Club Bunny Hunts have started again, and a healthy program of public service is outlined. Meetings are on the 2nd Monday each month at WWP Auditorium, 501 E. Lakeside, Coeur D'Alene — Dew drop in! PEOPLE AND THINGS: Our Kudos to KA7ESS, who upgraded from Novice to Advanced in 10 months! N7AOW recently returned from Germany. KA7FOV visiting in Eugene, talks with daughters KA7JIO in Dexter and KL7IVV, who is visiting her Dad W7JMH in Boise. If you think this is confusing, try listening to their chatter on 40 meter Novice band! W7IGK is back in Boise for a spell — as is WB7PFG home from a visit and W7HPH back in Star — welcome home, fellas! Former Boislian KB7IF and family visiting relatives in Boise during vacation from work in Seattle

Net	Time	Sess.	ONI	Rep'd:
FARM	3935 ssb	7:00 P Dy	31	1611 47
CD	3990 ssb	8:10 A M-F	21	732 30
IMN	3635 cw	8:00 P M-F	21	211 80

(Other net reports not in time)

Dust off your emergency gear and pull-pull and try them out in preparation for the next BLAZE on Memorial Day and other summer Fun Fests! Traffic: W7GHT 194, AC7P 78, K7VJ 74, N7APG 49, W7JMH 48, W7ASA 16

**MONTANA: SCM, Robert Leo, W7LR —** Many ask for info on MT 2 mtr repeaters. Here are some. Send me any corrections. 0106 K7LK Red Lodge; WB7EXJ Cut Bank; 0406 WA7JYU Sweetgrass; 0170 K7NM Bowery Pk; 1373 N7AMN Highwoods; 1676 W7GT Helena; W7AAR Kalispell; WA7GVT Glendive; 1979 W7RAL Anaconda; WB7UOI Zortman; 2382 WB7ANC Steamboat; WH7AIL Cut Bank; 2585 K7CCZ Helena. More next month.

**KATEA OVS Bozeman, has usual good VHF report:** Mar 29th 6-Mtr OSOs Aurora 0325Z with VE6, 7, W7, KA7DLC 12 OSCAR countries, Gallatin ARC furnished 2 & 75 contacts for Yellowstone snowmobile race. N7ANR & WB7WVY slogged thru snow to 10,000 ft Steamboat rpt for repairs. W7DB sends OBS bulletins. QD report from W7L8K, W7DK reports Have autopatch UT/61 WB7CXR, new Novices KA7S GHO GRP: Have ARES Net 3191 Thurs. 02Z. Silent Keys, W7LNU, ex-K7DGR K7KXB (Idaho but spend many MT hams). Miles City rpt solid st & at better QTH. N7CZ broken leg but improving. Anaconda-Livingston 2-mtr cw on 144.1 Present RACOM (VHF committee) officers: WA7IAL, pres. K7GQL, vice pres: W7WYG, secytreas. MT Sect. Net 7:40 Sun 9:30 A.M. WB7UTJ net Feb. 19 QNL 18 QTC WB7UTJ net Mar. 186 QNL 13 QTC WA7GVT won LYARC cw contest, N7RMR #2, Hamfest Woll Pt. June 14, 15. Butte ARC had 34th annual 7.3 MHz contest on 2nd of Feb. Days: IMN: QNL 211, QTC 80; MTN: 1335 QNL, QTC 76; W7TGU made BPL with QTC 428! W7TGU reports lots good DX. Traffic: (Mar) W7TGU 428, W7D80 61, W7NEG 11, WB7UOA 8, W7DR 4, KA4DOV 2, W7JMX 2, W7LR 2 (Feb) KB7BI 73, WB7UTJ 18, N7AMZ 6.

**OREGON: SCM, Dale T. Justice, K7WWR —** RFC K7OLN Section Nets

Net	Time/Days	Freq	ONI	QTC	Mgr.
BFL	0045Z Dy	3906			WB7POU
OSN	0130Z Dy	3587	112	81	WB7OFI
PAXARES	0230Z Dy	147 32	655	34	K7AWWR
WCN	0200Z Dy	3707	400	163	K7ZIG
1676	0200Z Dy	146 76	683	139	W7L8B
QARES	0600Z	3993 5	475	127	W7HLF
	0200Z Dy				

**JCARES** 147.06 170 21 W7VSE  
 The Eugene Hamfest will be held July 19th and 20th at the National Guard Armory as before. Contact KA7ALZ. Hoodview ARC will have their annual campout at Ft. Stevens State Park. New General is KA7EO. W7LH achieved his Extra. April 1 WA7GFE and K7WWR used Happy Flyers type DF gear to assist in a search for a downed plane in the Mt. Adams (SW Washington state) area. This was the first field test of the gear and it proved very accurate in spite of not being able to fly over the target (the mountain being too high). More activity with this gear is planned. Txs to W7D80 for use of this plane Traffic: (Mar) W7VSE 184, WA7HS 278, KA7TS 188, W7HKE 149, W7LNE 29, W7LT 28, K7SGU 23, K7QPV 16, K7WWR 15, WB7OJL 12 (Feb) W7HLF 48, W7DAN 7 (Jan) W7DAN 15.

**WASHINGTON: SCM, Bob Klepper, W7IEU —** 31M: W7DZX, SEC: WA7RWK. Nets reporting are: NTN QNL 2456, QTC 101; WARTS QNL 3332, QTC 175; NWSSB QNL 753, QTC 57; WSN QNL 558, QTC 183; PSTS QNL 121, QTC 56; SNOOD ARES QNL 42, QTC 0. District Emergency Coordinator (DEC) appointments were made and went into effect April 1. Their districts are: #1, WA7KGT, Clallam; #2, W7VSE, Grays Harbor; #3, Jefferson; #4, Mason; #5, K7SH, Clark; #6, Cowitz; #7, Lewis; #8, Pacific; #9, Skamania; #10, W7BQW, Island; #11, San Juan; #12, Skagit; #13, Snohomish; #14, Whatcom; #15, Pierce; #16, Kitsap; #17, Kits; #18, W7ASB, Chelan; #19, Douglas; #20, Okanogan; #21, W7GMC, Kittitas; #22, Yakima; #23, K7BOD, Benton; #24, Franklin; #25, Walla Walla; #26, W7FGC, Ferry; #27, Lincoln; #28, Pend Oreille; #29, Spokane; #30, Stevens; #31, W7DRD, Adams; #32, Asotin; #33, Columbia; #34, Garfield; #35, Whitman. Contact any of the above if you're interested in ARES and can't find your local EC. Did you know the licensee of a repeater is personally responsible for anything that goes through his repeater? Some repeater owners get jittery at what goes through, so please watch how you use them. Thanks to K7ER, Editor of WVDX Clubs Tolem Tabloid, for this information that appeared in the paper. W7D80 made Extra-qualified for DXCC, got a new FT101-2D, and what's best! W7LUP received a golden certificate award from CWVA for 54 years as an amateur. W7BCS DXing on high frequencies and teaching YL to become an amateur. WB7GC has 6-meter Ringo up and works good into the Spokane Rptr. Sorry to report that WA7HOH has become a SK. The Radio Club of Tacoma gave such a good performance in doing the Royal Order of the Wood Hoop at the NW Division convention, they have been asked to do it again at SEANARC '80. N7AEN W7KOH have upgraded. Cascade ARC put on a successful display at the City of Everett's "Recreation Resource Weekend" Lower Columbia ARA station W7OG has received confirmation

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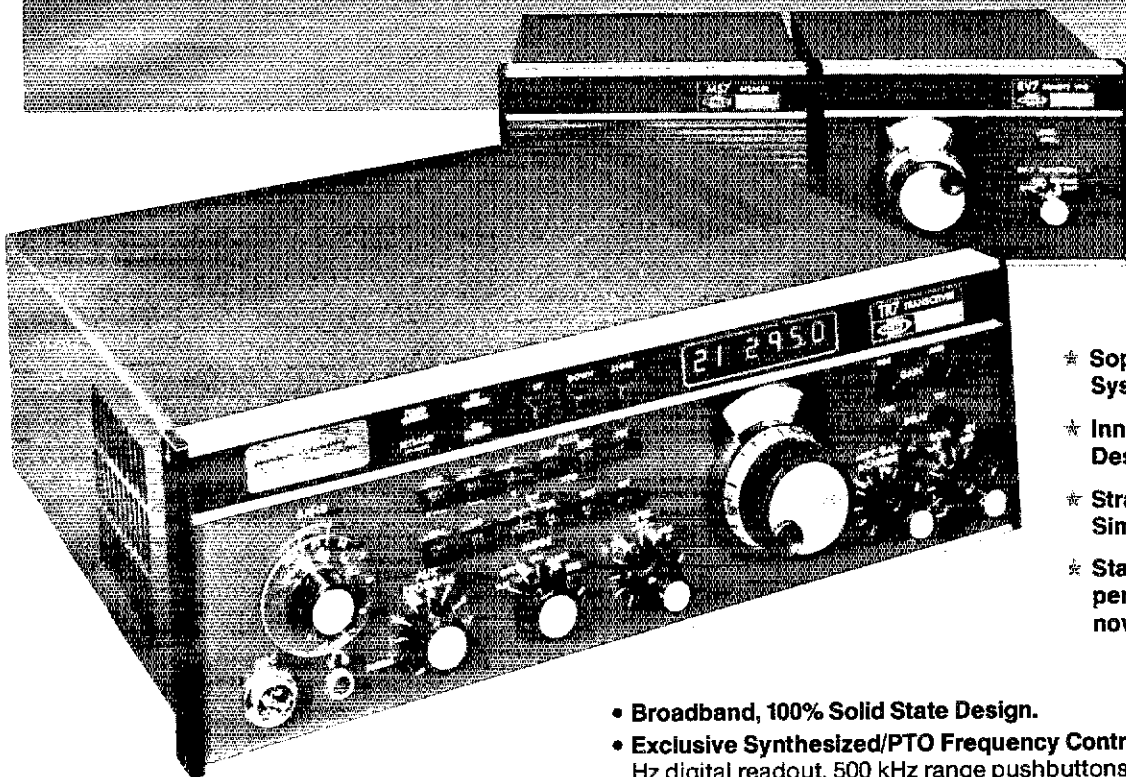
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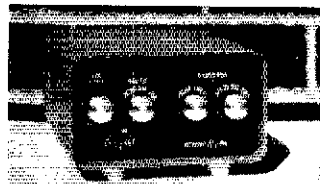
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for working all 50 states. N7BHB is new EC for Lincoln County. Does anyone know what happened to 5N9? It has been reported to me that it has gone off the air. Members of WWDX Club are wondering if someone is using disappearing ink when it comes to mentioning their club in certain magazines! WA7YCM's code classes going fine has had reports from as far away as El Paso, TX. Don't forget Wenchatch Hamfest June 7 and if you're not going out on FD you might be interested in the Tri-Cities Hamfest June 28, 29 Traffic: W7DXZ 664, WB7WOW 607, WB7TQF 524, KL7JEB 276, W7LUP 256, N7AF2 201, K7GXZ 175, K7CTP 128, W7IEU 94, WA7BUD 50, W7LZ 84, N7AJ 80, WB7FBP 40, W7GB 40, WA7RD 25, WB7CFH 20, W7L 20, W7APS 15, WB7QWC 14, WA7EDO 13, WB7OAS 12, WBUN 8, W7RCS 4, W7ERH 4, N7RV 2.

### PACIFIC DIVISION

EAST BAY: SCM, Bob Vallo, W6RGG — Asst SCMs: K6UWR W6ZF V2AQVW6, SEC: WB6KOU PSHR for MAR: W6OA W6JXK, Section Ous K6ARE N6NE N6OP very active WA6JVZ hopes to have a 450 repeater up soon. Lake County ARS had 32 at their March joint on 146.125/147.780. WA6BIO now up on the West Bay Area. EB Section SE plans are complete and the exercise will take place 15 April under the direction of SEC WB6KOU and all ECs. Livermore AR Club planning a construction project, investigating a club generator for emergencies, and will soon be "honoring" members with their Klutz of Month award. South Bay ARA is getting ready for Field Day. Their FD committee is jointly chaired by KA6BJB and WD6GKN. Mount Diablo ARC is also working on FD plans. Chairman, W6EEN, says they will enter class 7A from atop Mt Diablo with 5 el yagis for 10, 15, 20; 4 el & 2 el yagis for 40; 2 el Delta Loop on 80, and long-boom yagis on 6, 2, 1, 10 and 34 meters. Watch out for it! Traffic: (Mar) W6UKX 319, W6G 40, WB6UZX 41, K6UGS 17, KA6ERF 16, (Feb) WB6JUZ 26.

PACIFIC: SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ, STM: W6KON. Looks like good Field Day plans this year, again. Seems like windrain the first full day with many hams antennas down. KH6HGG KH6IPN and AH6C - all in VA now send Aloha to their KH6 friends. KH6IPQ going great guns on OSCAR. Now for Phase III. Honolulu ARC is having very good programs this year under prexy KH6WM. KH6GDR got to go to Fresno Int'l DX Conv. This year again. He's also sports a new 7-m box. KH6N rebuilding from Jan. Storm. He's working on some micro-proc control software with KH6GMP. Spoke with ex-KH6GKD recently who passed 73 to all. Traffic: KH6JJP 78, KH6H 12.

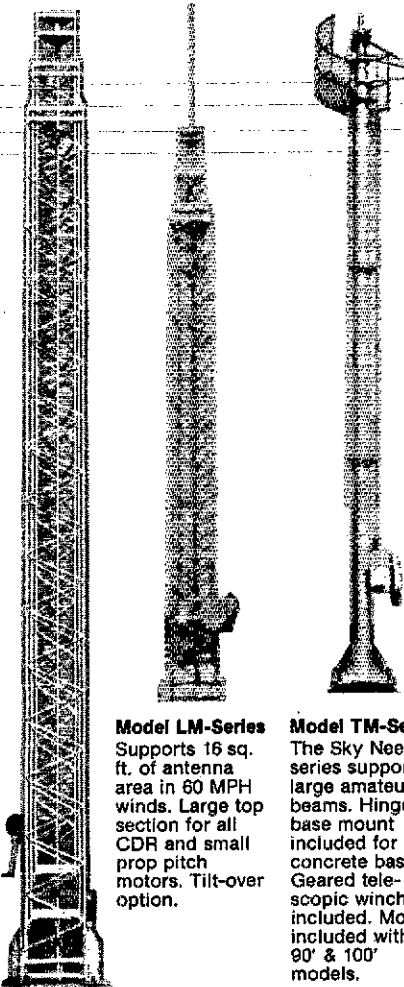
SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: W6GGFJ, ASCM, A6T (W6NJU), W6ZM, Pacific Division Director, was the speaker at the meeting of the Yuba/Sutter ARC. WB6GJF presented a talk on emergency preparedness at the meeting of the Golden Empire ARS. The GEARS provided communications for the Bidwell Marathon. With sadness I note the death of K6SJH. W6GO and K6HHD have been busy computerizing DX QSL info. W6HNL has a new tempo S1. High winds damaged N6JV's quad. K6QIF's tower developed a small tilt. The Northern California Net (NTS) meets each evening at 7 P.M. on 3630 kHz. A slow speed session meets at 8:30 P.M. NON-VHF meets at 7:30 P.M. on 145.417/44.81. All are welcome. Traffic: W6DEF 18.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: W6ZFK, STM: K6TP. If you apply for PSRR, use Station Activity Report revised 280, which contains the proper points data. WA6WIT is new FRS, replacing WB6EUG, who I thank for past service. SFRC had very successful auction, with auctioneer WA6PYN. Many good reports heard from new Advanced class licensees regarding KL7HP study guide. Congrats to WA6ACX W6DXW N6AUP N6BLN W6GCKP and K6ANP on Advanced. KA6ISV on General and KA6ILU on Technician. SFRC and SCRA active in public service events. New directors of FWRA are W6RNL WA6ICB W6GGH W66SXJ W66MYF W66TFX and WA6ZLA. K9AT new dir. of SFRC. WA6PDR new Treas. and WB6IQ new dir. of K6GWE/6, W6SZV a Silent Key. Traffic: (Mar) W6RNL 242, K6TP 119, W6IP 24, WA6QXV 6, (Feb) WB6AMP 282, K6TP 89, WA6QXV 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YV, Asst SCMs W6TFP WA6YAK WA6HIN. New officers of C2AC are: WB6TWC, pres.; W66FIP, vice pres.; W66JIF, secy.; WA6JL, Treas. Amateur Radio clubs in the SJV have been performing public service by assisting with bike-a-thons and walk-a-thons. NCN: ONI 1948, QTC 627, N6AMA is K9YBM again. KA6JQM and KA6IDC are Novices WA6IYY is General. W6AQJ W6D6RX W66FHH KA6AWL WA6ZAZ W66NAO K6BV1 N6BL1 WA6LJW W6DFHC and WA6PFE made Advanced. K6IU is Extra. W6JPU has retired and has an Azden PCS 2000. WA65Y1 has a new tower. K6QZL has 4 First Class Radiotelegraph license. W6DBJK has a S-1 WA6NIF has a TR2400A. K6CZO has a TR 7625. W6BAGJ and W66EXC are W66XFC. W66XFC needs two QSL cards for DXCC Honor Roll. All affiliated clubs of SJV are reminded of the section award for competition in FD, SS, and VHF-SS. There are 11 months until the 1981 ARRL Pacific Division Convention and 39th Annual Fresno Hamfest May 16-18, 1981. Traffic: N6AWH 185, WB7ITP 23, K6RAU 12, W6DDP 10, WA6YAB 10, W66FRS 8, WA6JDB 8, K9YBM 7.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6LZE. Congrats to the SLAC Amateur Radio Club on becoming an ARRL Affiliated Club. KB5ML getting into the swing of traffic handling on NCN. W6OII keeping busy with phone net tic. EC W6ASH reports SPECS net has a telephone mobilization tree for 80 members. W6PPI back on net after 13 years, also busy with Silicon Valley Emergency Net. WB6VWK busy with DX. W6YBV W6KJ and W6ALC all busy with tic handling. Silicon Valley Emer. Comm Systems also came up with a telephone tree. Gablian ARC preparing for Field Day and recruited W66EKO and WA5CUIY as new members. W6JINN discussed OSCAR Phase 3 at the San Lorenzo Valley Repeater Club, and they now have battery backup power for WR6AOK, SLVRC and the Santa Cruz club had a joint breakfast meeting. FARS is planning an all out attempt at winning during Field Day. N6BJA is a new FARS member. W6OLO spoke to the Memorex ARC on the early days of OSCAR. WB65W made a trip to VK6-Land. KA6DIR has been working CW DX. N6OM gave a brief rundown of his Mini DXpedition to Fiji and Tonga, complete with color slides. A talk on how to check deviation on 2-mtr rigs was given to LERA ARC by W6TUU, also they welcome new members

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KG6JAO and W6JHZ. WB6WLL and KB6IH passed Extra Class exam. LERA ARC has a new ant tower and planning Field Day in Morgan Hill. New Advanced class ops are: WD6FMC WA6HKP N6BSU and WA6OCV. New member of SCCARC is KA6IRV. SMRC had W6VAL speak on WIND POWER as a power source for electrical equipment. New editors for the NCN RELAY are WA6NMQ and KA6TB. The first issue was FBI W6ZM presented WA6AFT with the Cover Plaque from July '79. OST for his article in that issue. Congrats. SCCARA Flea Market on June 8 in San Jose. PAARA speaker was W6CFZ and spoke on construction techniques. PAARA welcomed new members as follows: WD4DQ WB6GY1 WA6HC WA6ZS K6JBR and W6JTH. G.S. Ladd Pioneer RC had a big luncheon bash in San Mateo. W6PDD keeping busy with odd jobs around the house. G6LPRC had highest chapter score in the 15th annual pioneer OSO Party. CCRG has voted to take a leading role in the light to eliminate malicious interference. All clubs and individuals should aid in this battle! Traffic: W6YBV 185, W6KZJ 99, KB6ML 51, W6AUC 42, W6RFF 37, W60L 24, W6ASH 8.

## ROANOKE DIVISION

**NORTH CAROLINA:** SCM, Bill Parris, AA4R — Asst SCM: N4UE, STM: K4VHT. Congrats to WA4MVI for achieving WAG on 2 meters via FME, this goes nicely with his 2-meter WAS too. K4FIB reports having a nice time in the Caribbean, and discovering a female radio-ops aboard one of the ships... care to name the ship for us? Alamance ARC (Burlington) demonstrated Amateur Radio to a Scout Troop in Mebane. Raleigh ARS provided communications for the Greater Raleigh 10K Roadrace in driving rain while the Charlotte ARC again furnished communications for the March of Dimes Walkathon. K4MQG is on the speaking circuit presenting a talk on the recent Jordan visit to the Rowan ARS (Salisbury). New Editor of the Ham Chatter, BARG (Greenville) is WD4EIO, WD4ENB, EG for High Point, has active ARS group in operation with a simulated exercise having been conducted in April. WA4CEH now operating portable in American Samoa. KH8 Congrats to KC4AM for achieving BPL this month. New appointments include KV4I (EC Guilford), WD4ENB (EC Randolph), WD4CFZ & KA4DNL (OES), and N4UE (OTS). Field Day never has hit all the clubs again this year... looks like everyone is going to be out this year again; what plans does your club have? Listen on vhf/uhf during the weekend of June 14-15, big plans here too. Traffic: (Mar) KC4AM 616, W4DYN 46, WD4ENB 320, AR4S 352, KF4R 215, WB4VZ 188, K4VHT 107, W4FON 97, K4WV 87, WD4CFZ 62, WA4IHG 57, N4AET 56, K4DHX 56, WA4OJU 54, W4EAT 51, AA4R 51, W4HKB 50, K4MC 50, KB4IZ 48, WB4CYN 46, N4BWO 40, K4TPK 38, WA4UCD 37, KR4OV 37, WD4CNR 36, W4VTP 35, W4AGY 34, KC4M 30, K4FIB 30, WB4CES 28, WA4OBR 28, WD4AIE 24, W4MHN 24, K4NLK 24, WD4NAO 22, WA4UTC 20, W4OCZ 16, WD4AHZ 15, N4ARY 12, W4EHF 11, WD4FGH 11, WD4KPK 10, WD4ENB 9, WB6OTS 9, WB4RDT 8, WA4PID 7, KA4DNL 6, WD4CNS 3, WD4FJM 2. (Feb) WD4FJM 30.

**SOUTH CAROLINA:** SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDC, SFC: WD4HFX, STM: W4ANK. Congrats to the following upgrades: K4SWF, KA4ISJ, K4APW, N4AG, WD4ZED, N4CBO, W4OYV, New FCs: W4FMZ, N4WR, WB8TC, T. Banks — all who attended to SC Section meeting at the Charlotte address. The SC ARS Net meets every Sun night after SC SSBN. Won't you join us? The North Augusta-Belvedere ARC provided comm for 10K race in Edgetield, and Grantville. The Anderson Red Cross Comm group operated on 2, 10, 15, 20 & 40 meters from 1st aid site in Pendleton. Check-ins/traffic: SC SSBN 1777/198, Blue Ridge 2-M Net (Feb) 646/25 825/31; Anderson 2M net (Feb) 467/27, 468/28; CN 630/334; Lancaster County 2-M Net 189/14; Western Carolina Emerg. Net 209/3; Newberry County ARS Net (Feb) District 5 ARS Net 37/0; Laurens County 2-M net (Feb) 43/0; Trident ARS Net 75/0; York County ARS Net 8/0; Traffic: W4RIZ 158, WB4HJ 11 300, WAANK 173, WD4AWN 165, W4DAW 95, W4NTO 92, W4FVY 67, W4NOL 50, WB4UDC 63, W4FMZ 36, K4FRX 39, WB4MXW 35, AF4E 22, W4MTK 22, N4BPK 20, KA4EP 19, K4VIA 18, K4LYU 15, WD4BUM 14, WA4VYS 13, WD4HFX 12, WA4JWS 8, KC4AD 7, WA4JWC 7, KB4CO 5, W4DRF 6, WD4EDM 5, N4EE 5, WD4DOL 3, WA4SJS 3 (Feb) WD4PPM 30, WB4MXW 27, WA4SJS 9.

**VIRGINIA:** SCM, Rick Genter, K4BKK — ASCMs: Buddy Smith, W4YE & Bill Farone, N4NK, STM: W4SQO, ASTM: WA4STO, SFC: N4HU, Chief OVS: N4CD, Chief OO: W4HU.

Net	kHz	Time-PM	Sess	ONI	OTC	Mgr.
VNTN	3907	noon	31	187	445	N4LE
VSRN	3947	6	31	180	236	WA4S10
VSN	3680	6:30	30	97	293	WB4KSG
VN-E	3680	7	31	226	522	WB4FLJ
VN-L	3680	10	31	210	345	WB4FLY
VLN	3947	10:15	28	192	606	WA4YIU

Warm weather is here and it's time to mow the grass, fix that antenna and set up a traffic display at your local shopping mall. W4JK is busy with his ICG sked and the Intercon Net. W4NWM met with the Chesterfield Co. Explorer Scouts. N9ASX now Extra and waiting for a new call. K4DHB practicing up for Sam Morse Day on Apr. 25! W4KFC still busy with club appearances. EC, K4BAY reports that Alexandria ARS is installing a 2-meter antenna at Jefferson-Mem. Hospital. Look for the treas. for the new No. va. chapter of QCIWA. Look for the interview of AF4O in May issue of Ham Radio Horizons. WA4NTP to be a new QSL bureau mgr. ARS statewide drew great praise again for the superb job done during the snow blizzard on March 1st and 2nd. We have truly put together a fine organization. Thanks qand! DEC, WB4UHC, is getting his district ready to help with "civic duties" in Newport News and Norfolk. WA4STO reports that his "spare time" is being spent with RTTY. NM, N4NK, again requests all on RTTY, auto. Morse, etc., check in to the VA Specialized Communications Net on 8017.5 kHz on Sun at 2000 UTC. Traffic: (Mar) KB4N 542, WB4PNY 501, WA4SQ 359, WA4STO 385, K4KNP 365, WA4JJ 349, WA4JK 310, WB4FL1 293, N4NK 217, K4BKK 188, KB8JA 173, W4NWM 156, N4AZJ 139, K4AXF 117, N9ASX 103, W3BHN 100, WD4EUV 95, K4LM 89, WB4ZWT 89, W4UO 83, AA4CK 74, W4CEU 73, KA4BOK 60, WA4YIU 59, K4EJ 55, N4BJX 48, WB4UHC 48, W3BBQ 42, N4LE 42, N4ABM 39, N4IF 37, WA4QWC 37, KB4OF 36, N4CIR 35, K4W4 34, WA4RTS 33, WB4ODZ 32, W4QKN 31, WD4FTK 29, W4IAZ 29, N4VO 29, WB4SHK 28, KA4GBL 23, W4LXB 23, K4VVK 22, WB4ZNB 21, W4SUS 19, KA4ETG 18, WB4RWY 18, W4KKE 17, KB4QG 17, WB4DQZ 16, K4DHB 15, WA1VH 14, WB4MAE 13, WD4MGF 13, N4ATT 12, WB4KIT 10.

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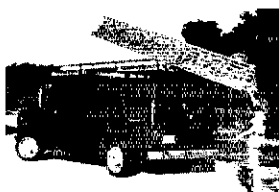
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- 15 MV Sensitivity at 250 MHz Typ.



**1.2 GHz Only \$199.95**

5612 KIT

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10 MHz Proportional Oven

• 2 PPM 10° to 40° C Time Base

• 1 Hz Resolution to 50 MHz.

• External 10 MHz Inputs outputs.

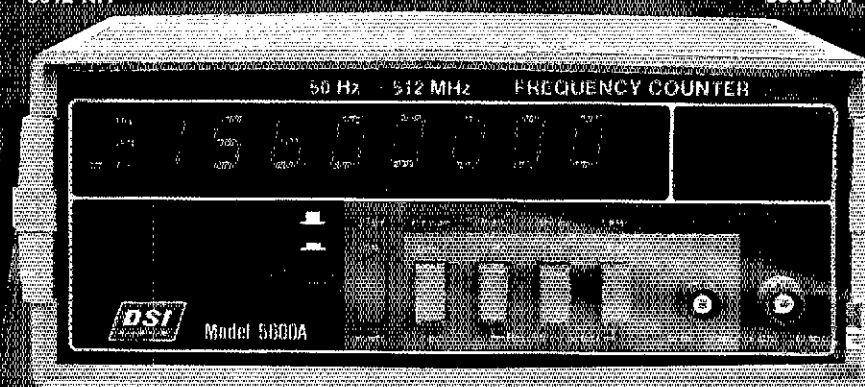
• 9 Bright .5 inch LED Read-outs.

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• Kits 95% Factory Assembled.

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Whether you select a 5510 or 5500 kit, 95% of the assembly completed by DSI, or select a factory wired and calibrated frequency counter, we guarantee you will solve all those difficult bench or field problems from measuring audio signals to checking a 5612 MHz cell radio or mobile 50 MHz cell phone. The trouble shooting signal in a TV or FM radio etc. The 5800 kit is for the 50 MHz and accuracy to meet any FCC and mobile broadcast RF or telecommunications requirements. DSI offers a 10 HR rechargeable battery pack (BA56) option and an audio multiplier (AM56) which will allow you to resolve a 17,1000 Hz signal in only ten seconds or 17,100 Hz signal in one second. DSI 5600 series offers just the right instrument for all your communication, RF, TV servicing and industrial testing needs.

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Model	Price	Frequency Range Typ	Accuracy Ovens Multiplicator	Sensitivity Typ			Number of Counts	Power Requirement	Size (H x W x D)
				100-250 MHz	250-250 MHz	250-500 MHz			
5800A Kit	\$189.95	50 Hz - 500 MHz	Proportional Oven 2 PPM 10° - 40° C	10-25mv	10-15mv	15-30mv	9	1.5 VAC or 2-2-14.5 VDC	7 1/2" x 8 1/2" x 3 1/2"
5612 Kit	\$189.95	50 Hz - 1.2 GHz	Proportional Oven 2 PPM 10° - 40° C	10-25mv	10-15mv	15-30mv	9	1.5 VAC or 2-2-14.5 VDC	7 1/2" x 8 1/2" x 3 1/2"
5500 Wired	\$109.95	50 Hz - 512 MHz	TCXO 1 PPM 10° - 40° C	10-25mv	15-25mv	25-75mv	8	1.5 VAC or 2-2-14.5 VDC or NiCAD PAK	7 1/2" x 8 1/2" x 3 1/2"
5510 Wired	\$139.95	50 Hz - 1 GHz	TCXO 1 PPM 10° - 40° C	10-25mv	15-25mv	25-75mv	8	1.5 VAC or 2-2-14.5 VDC or NiCAD PAK	7 1/2" x 8 1/2" x 3 1/2"

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Prices and/or specifications subject to change without notice or obligation

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Prices effective  
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5510 Wired \$139.95

5500 Wired \$109.95

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5512 Kit \$199.95

5612 Wired \$239.95

5600A Kit \$169.95

5600A Wired \$199.95

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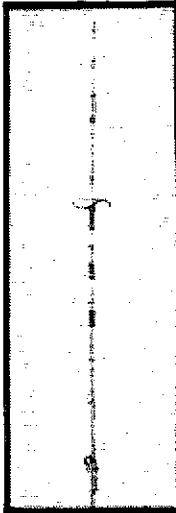
10 Hr. Bat. Pack \$29.95

AM56 Audio Multiplier \$24.95





### ATV-5



**ATV-5**  
This trapped vertical antenna system has been engineered for low band operation on 80m-10m. The high Q traps are carefully optimized for wide operating bandwidth. 7.1 SWR bandwidth with 50 ohm feedline is approximately 1 MHz on 80m more than 600 kHz on 10m and 20m. 100 kHz on 40m, and 25 kHz on 30m. Instructions are provided for alternate operation in your preferred part of the band. CW or SSB. Built-in coaxial connector is IACS PL-259. Nominal height, 293 inches. Rated at 2500 watts PEP on all bands.

### Two Meter Boomers

Whether you have the space for the 3A 32-19 or the compact 22B Boomer, 2m Boomers are your best choice. They feature trigon reflectors for wide-band performance, 2m and 2.2m patterns. All structural hardware and heavy gauge heat treated aluminum are used throughout. Whatever your choice of frequency, the Boomer will tell you exactly how far you can see. The 22B is 144.5-146.5 MHz. The 3A is 144.0-146.0 MHz. The 3A is 144.0-146.0 MHz. The 3A is 144.0-146.0 MHz.

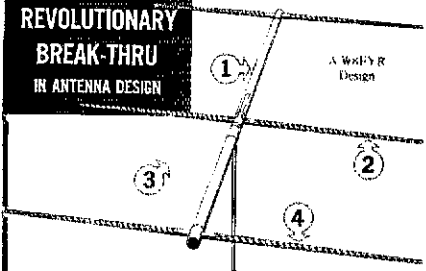
### Six Meter Boomers

The new 6m Yagi is designed for the low end of the band. The 6m Boomer has Cushcraft's special attention to detail. The Boomer's balanced feed with balun, and extra heavy duty mechanical construction. The detail behind its superior performance and light weight is special element design and boom length.

### Specifications

Model	22B	214B	214-3	22FB	617-6B
Frequency Range (MHz)	144.0-146.0	144.0-146.0	144.5-146.5	144.0-146.0	50.0-54.0
Element Length (ft)	24.4	24.1	24.7	24.1	24.0
Element Spacing (ft)	7.4	7.4	7.4	7.4	NA
Element Diameter (in)	1.2	1.2	1.2	1.2	1.2
Element Weight (lb)	5.0	5.0	5.0	5.0	5.0
Element Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Element Finish	12	12	12	12	12
Element Color	22	15	15	22	22
Element Diameter (in)	1.2	1.2	1.2	1.2	1.2
Element Weight (lb)	5.0	5.0	5.0	5.0	5.0
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Element Diameter (in)	1.2	1.2	1.2	1.2	1.2
Element Weight (lb)	5.0	5.0	5.0	5.0	5.0
Element Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
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HELICOIDAL BEAMS**

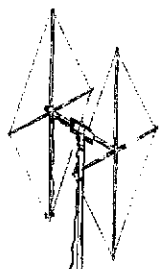
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- 1 ALL FIBERGLASS ELEMENTS & BOOM
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2 Element 20M - 17 lbs. \$249.99  
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- \* STRONGER AND LIGHTER THAN ALUMINUM.
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Special Instruction Manual on Kirk's "Super Quads" — \$2.75

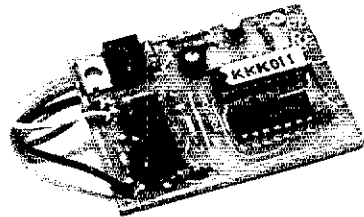
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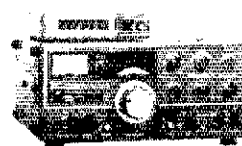
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WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8OEW STM: KC8C, NMS: K8MHR WB8FZ WB8LDY KD8G. WV was well represented at division convention in Charlotte in March with at least 25 WV hams in attendance. WB8AV passed his Extra at Charlotte. Congrats. WB8AKQ is now KD8G — nice move. WB8SNO achieved USA — CA on 20-M ssb 1990 Jackson Co. Hamfest will be held at Cedar Lakes (Ripley) Aug. 10. Contact WB8SNO for details. Bluebird Hamfest will be Aug. 24 at Brush Fork Army Camp. Details — contact WD4RPT. WV hams assisted National Weather Service during tornado watch.

Net	Freq.	Time	Ck-In	Tfc	Sess.
Hillbilly	14290	1700 Su	217	64	5
WV Phone	3990	2200 Dy	813	136	31
Phone-MD	3990	1600 Dy	295	37	31
CW	3567	2200 Dy	205	61	31
Novice	3730	1715 Dy	30	4	14

Traffic: K8BC 123, WB8AKQ 110, WB8LDY 66, WB8ZA 50, WB8FZ 38, WB8CK 32, WB8Y 24, K8BET 22, K8MHR 21, WB8MJE 20, W4KFC 19, WB8BDIC 16, WB8DY 15, WB8JWX 10, K8JRT 10, WB8E 10, WB8AZ 9, WB8JGN 9, K8QEW 9, N8AJC 8, K8TW 8, WD8EAV 7, W8BAJN 5, K8JQ 5, WB8UDY 5.

**ROCKY MOUNTAIN DIVISION**

COLORADO: SCM, Robert W. Poirer, K0DJ — SEC: W0ACD STM: W0MCL, NM: AD0A W00AIT K0CNV W0HE W0HXB W0ZQG. New licensees: K0HHY K0HHZ K0HIA, all Novices. Upgrades: K0BLU, Advanced; and K0GRB, General. Congrats to All Weather Net growing by leaps and bounds. Newest member is WD8SSB in Sugar City, TN; manager AD0A being transferred to PA in May and was forced to resign. New manager will be W7LYA in Story, WY. Hopefully the transfer will not be for too long. SEC, W0ACD, and this writer attended a meeting of District 10 ARES. That district will be restructured to include Weld County which was previously included in District 12. All ECs are strongly urged to gear up for possible spring floods which are forecast to hit the front range. Additionally, emergency groups should contact W0ACD concerning their respective groups and disaster plans. Net tlc: CWN 31 sess, QNI 258, QTC 389, QNF 978, Columbine 31 sess, QNI 1550, QTC 108, Informals 214, QNF 1134, Hi-Neon 31 sess, QNI 1309, QTC 113, Informals 317, QNF 1284. Traffic: (Man) W00HUZ 174, W00HUZ 1533, W00ZQY 1486, W00MTA 244, W0EJD 196, W00AIT 151, W0LAE 137, N0BLU 108, AD0A 94, K0DJ 88, W0RE 86, W00YNP 64, W0GO 58, W0HXB 54, W0MCL 47, W0GW 10, K0CI 4, (F-eb) W00AIT 176, W0HXB 84, W0ZQG 74, K0CI 7. (Jan) K0BFG 52.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR, NMS W5AHH K5KPS. Southwest Net (W5) meets daily on 3585 kHz, at 2000 local time and handled 192 msgs with 253 stations reporting in. New Mexico Roadrunner Net (NMRN) meets daily on 3939 kHz at 1800 local and handled 184 msgs with 1140 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 92 msgs with 796 checkins. Yucca Mir. handles 8 msgs with 251 checkins. W5MKF is a SK and will be rising. FB newsletters from the Mesilla Valley RC, Socorro ARA and the Gila ARC. Enjoyed the meeting with the Pecos valley ARC in Hoswell. Glad to see such a good turnout. Traffic: W5DAD 284, K5GL 250, N5NG 237, W5UW 166, W5ENI 143, W5JOV 116, W5AMIY 18.

UTAH: SCM, Royce Henningson, K7QEO — SEC: W87FCB, STM: W7OCX, KA7FZU and W87VWA earned net certificates for the Utah Code Net. W87RZO earned a net certificate for the Beehive UT Net. A statewide meeting of ECs and interested amateurs was held in Salt Lake City on March 22 under the direction of W87FCB the SEC. Twenty five amateurs from all over the state attended. K7QEO acted as moderator. W87ZBO talked about operations and made the Salt Lake amateur communications truck available for inspection. WA7ARK talked about DF equipment for locating downed aircraft and then put on a demonstration. W7OCX talked about traffic handling. K7FY, of the State Office of Emergency Services, provided a meeting place and talked about the states emergency organization. Traffic: K7HLR 275, N0AHA 111, WA7MEL 79, WA7JRC 49, W7OCX 9.

WYOMING: SCM, Chester C. Stanwaty, W7SDA — Asst SCM: K7IKO, SEC: W87FIN, STM: W87SGG, NMG: W87NHR WA7WFC W7LYA, KA7FKI appointed OIS. N7ABC appointed EC for Sweetwater Co. WA7BP0 received WAS no. 31170 and DXCC no. 9853 with 131 confirmed. W7HHI vacationing in WA state. K7SLM in CA. W87FK on trip to NY. W87PLU on K7HJ and W87PCP now KAT1. W87WQ and W87WGR have new TS120. Congrats to new Generals KA7DRF Cheyenne, KA7DRB Hudson, W87QIL Sheridan and KA7CCZ of Cokeville. Also to new Advanced KA7FLE Green River. WA7PFJ reports 26 sess, 680 QNI, 10 QTC for Jackalope Net. W87NHR reports 21 sess, 702 QNI, 15 QTC for Wyo. Cowboy Net. Traffic: W7YWW 442, W7LYA 323, WA7GYO 193, K7KSA 80, KA7FKI 14, W87SGG 12, W7SOT 8.

**SOUTHEASTERN DIVISION**

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The month of March brought plenty rain, and floods throughout much of the state. All AL nets were in emergency service. A list of stations that participated in this severe weather is too long to list in this column. You know you helped and everyone is thankful for another Amateur Radio helping out in emergencies. The Governor of this state says he will proclaim Amateur Radio Week the week of May 11 thru 18th ending at close of Birminghamfest 80 in Birmingham. More on that next month. Remember North AL Hamfest August 17th, at Van Braun Civic Center in Huntsville. New members BARC: W4D4PNI K44BL and K44K. New members in Tuskegee ARC are KA4NOY KA4NOZ WA4YCM. Twin base ARC will provide communications for golf tournament in April, their 2nd year for this helpful cause. All our ARCs in state from time to time provide radio contact for all kinds of worthwhile projects, Walk a thon, March of Dimes, etc. We feel we give a good service to the community. AENJ reports 29 sess, 556 QNI. AEND reported 156 QNI. AL was 100% to DRN5 with WA4JDH W4CKS WA4RAJ KA4IVO WB4BRG WA4ZP KA4BUI K4RY. AENR 38 QNI, 7 sess. Thanks N4MD for doing a good job as manager of AENB. New Net Manager.

# Announcing the Heathkit VF-7401 2-meter FM Digital Scanning Transceiver



**LED indicates 5 kHz position.**

**The 0 kHz/5 kHz Switch** gives you an effective choice of 800/2-meter channels in 5 kHz steps.

**Dim/Bright Switch** for bright illumination of frequency read-out and meter for daytime, and lower intensity for safe mobile operation at night.

**The Manual/Scan Switch** lets you choose your frequency manually, or have the VF-7401 find an active channel for you.

**Lock/Latch Switch.** In Scan Latch mode, a channel latch-up signal inhibits scan circuits when signal is detected, and the 7401 stays on that frequency. If it detects a 4-8 second break in received signal, scanning resumes. In the Scan-Lock mode, once the receiver scans to a signal, it remains on that channel until reset.

**Optional Micoder II Microphone/Auto Patch Encoder** lets you phone through repeaters with auto patch input. Draws power from the 7401, so no mike battery is necessary.

**The Squelch Control** also functions as the receiver's sensitivity control to stop scanning only upon reception of "full-queting" signals, skipping the weak ones.

**The 100 kHz Selector button** controls the VF-7401's tuning in 100 kHz increments. The 7401's 1 MHz Selector button lets you choose any 1 MHz segment of the 2-meter band.

**The 10 kHz Selector** advances in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes the 100 kHz readout to advance by one digit. Depress once to resume scan function.

## More features that make the VF-7401 the 2-meter rig that belongs in your shack and vehicle

No more searching through repeater guides while mobiling in unfamiliar territory - your new Heathkit VF-7401 will find the active channels for you. It will even alert you to band openings. You're going to enjoy building your VF-7401... and you're going to love using it. The VF-7401, the ultimate 2-meter rig... from the more than 200 Hams at Heath.

- Adjustable, 15-watt (nominal), solid-state, narrow-band FM Transceiver. Fully synthesized digital circuitry provides full-band coverage without need for added crystals.

- All-new, state-of-the-art circuits provide the exciting, exclusive features of 1 MHz bandwidth scanning, and Scan Lock/Latch capability on 2-meters.
- A receiver hotter than Heath's HW-2036A features dual-gate MOSFET front-end to minimize overload and adjacent-channel interference.
- "Power-up" on a pre-programmed frequency of your own choice, such as your favorite repeater.
- Convenient detachable mike using 4-pin connector.
- Power to the Micoder II Microphone (if used) eliminates need for a battery.
- Sturdy SO-239 rear-panel antenna jack.
- Chassis-mounted power and external speaker plugs.
- Improved synthesizer, eliminating need for panel mounted sync lock light.
- Tuning for Power Amplifier and output power level adjustment is accessible without removing case.
- Capability of mobile or base operation (with Model VFA-7401-1 AC Power Supply - 13.8 V at 4A nominal, transmit).



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This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.



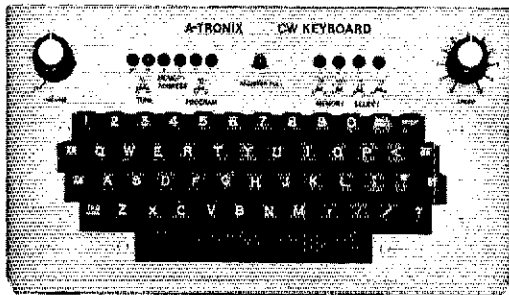
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AENB, WA4JDH. Still need NCS and stations to report in AENB/AEND are CW nets, so check in. We would like to have you participate. Traffic: WA4JDH 741, WA4COT 580, WA4CK5 131, KA4OZ 58, WA4JPK 45, KA4UMB 36, WA4DHI 26, WA4UP 25, WA4BU 21, KB4V1 19, AA4J 13, WA4RAJ 12, K4JOE 10, WA4BU1 10, WA4YCM 10, KA4EWD 4, WB4TV 4.

GEORGIA: SCM, Eddy Kosnubucki, K4JNL. ASGM: K4VHC, SEC: K4SWJ, ASEC: WB4HXE, STM: WA3NAZ/4 NMs: WD4ADV (ARES), K4DMK (GCN), W4GH (GA TFC), W4HON (VHF), W4WXA (GSSN), WA4ZHC (RTTY), WB4ZOJ (GTN), WB4ZVX (GSSBN).

Net	Freq	Time (All EDT)
GCN	3995	0700 M/S 0800 Sun
GTN	7118	1815 Dy
GSSN	3585	1900 & 2200 Dy
GSSBN	1975	1830 Dy
ARES	3923	1700 Sun
GA TFC (A)	7243	1200 Dy
GA TFC (B)	3957	1815 Dy
GERN (RTTY)	3620	2000 Fri

By mutual agreement of RTTY ops, net has been moved to Fridays. Also 7085 has been chosen for daytime state emergencies. WA4JAO now General. Warner Robins 440 machine on 444.50 in 449.50 out. KA4DNN now N4DAJ. Newnan 1979 machine now at State Patrol Hq. Coverage has greatly increased. Field Day is this month, all plans should be firm up by now. N. F. Georgia ARC (Athens) provided communications for 20 mile March of Dimes Walk. FB way to show the public what Amateur Radio can do. W4WXA now 4RN net. EAN, WA4ZHC did an excellent job explaining our hobby and our capabilities to the elected officials of his community via a newspaper feature. Through the fine efforts of K4SWJ, WB4HXE and WA4PZD, our ARES & NWS programs are a reality & they will conduct another seminar at the Atlanta Hamvention. Please attend this meeting because the information you will receive one day might help save lives. See you in Atlanta. Traffic: W4WXA 270, WB4ZOJ 133, WA3NAZ/4 128, W4GH 80, WD4ADV 52, N4UZ 50, WA4ZHC 43, W4ELO 35, K4BAI 27, K4JNL 27, K4V1 25, WA4YCM 14, W4HON 14, K4PIK 6, K4HBI 3, WA4PZD 2.

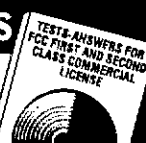
NORTHERN FLORIDA: SCM, Fred Marchman, AA4FG — SEC: AA4FC, STM: N4WA, NM: WD4PK, KU4AO N4WA. New appts: K4IVD as EC Santa Rosa County; KA4GJ as QTS, QER, OBS. Sorry to report W4EQZ now a Silent Key. Marion County now NCS capital of N. FL with W4UEA, WA4HHC, WD4IED, WD4RJ all NCS on NFPN. Well, yours truly needed a rescue when driving to Jax and trouble developed in the rear end of one of Detroit's not-so-better ideas. A call on the Sanford repeater brought help, thanks to WA4EGJ and WB4CGW. New Zephyrhills area club (ZAARC) now formed and very active. WB4AOG is pres. New QCWA Halifax Chapter for Volusia and Flagler Counties: N4CUB acting chmn. and applications from W4MGO. Sky HBU AFIC (Citrus Co.) 1980 officers: W4RFB, pres.; W4RFB, vice pres.; W4W5, secy/treas. Novice class now underway with instructors W4WL, WD4PJS, W4AWVY, W4AJRC. Bulletin is SHARC Tales. Recent DBARA public service events include Boy Scout hike, Motorcycle Race, Hobie Cat Regatta, HSA Sprint Race. WB4HAO received W4SDR Amateur of the Year award. WD4HF received PARC Amateur of the Year Award. Congrats to both. Ft. Walton Beach Swapfest biggest ever with perfect wx. WD4PK was lucky winner of Omni-D. PFFTT ARC Pensacola Fraternity for Two Twenty. Let's hear it for Two Twenty! KF4J is EAN Alt Rep, also working on new quad. Ten new calls received following Novice class by GCARF with 4 more in process. Twelve 610s sent from Beaches ARS Novice course by course director W4NKA. New 146.37/97 Perry repeater doing FB job in filling what has hole in section repeater coverage. Upgrades reported: Extra, W4BNZY; Adv., W3UBA, WD4HNY; Gen., N4AXN, N4CPB, KA4DCF. I'd sure appreciate a radiogram from any N. FL ham who upgrades, telling new license class. Also, a radiogram on any new license classes started, with instructors' calls Traffic: (Mar) WD4HF 504, WD4HO 418, WA4CHI 365, WB4TZR 250, N4WA 234, N4PL 203, AA4FG 178, W4FZX 173, W4KIX 139, KU4O 135, WD4DNC 111, KF4U 110, W4UJ 103, WD4PK 97, K4FNS 85, WB4FJ 81, LB4T 81, N4BZU 75, W4MGO 73, WD4NY 69, W4SHJ 57, W4SHJ 57, W4LPM 35, K4PYM 34, WB4DTS 32, WA2GIN/4 25, W4MVG 14, WA4ZTS 15, WB4ADL 13, WB4WOO 6, K4IKY 4. (Feb) N4WA 201.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGG, SEC: AA4WJ, STM: K4TH. New appointments this month: WB4FV NM, KA4FZ NM, WA1IOG/4 STM, AA4WJ back on the air with a Swan Astro 150. Kenwood TR2400 on order. W3VR and W3CUL lament tower ordered 6 months ago has not arrived. WD4LWT has ARES emergency shelter assignment at Ridgeway Mobile Home Park. Hobe Sound, W4JM had 2 trees removed for tower installation. Congrats to W4ROA who received his DXCC certificate. N4KE reports W1NJM relieved him April 8 on summer TCC shed. Recent QCD bulletin suggests possible elimination of QVS appointment. Our section has shown little interest in QVS in recent years with only 4 appointments in effect and none of these stations making QD-97 reports recently. I believe the QVS could be eliminated without any trauma. What do you think? QCD also suggests we should perhaps reorganize the OBS system with a Chief OBS in each section to organize the OBS schedules to provide better coverage of the section and to foster information exchange among OBS to ensure correct reception of bulletins. What do you think? All members should note the item in April QSI calling for nominations for SCM Southern Florida Section for the 2-year term beginning October 1, 1990. Congratulations to WB4CNC for coordination of a "Weather Watch System" using repeaters covering Pinellas, Pasco, Hillsborough, Manatee and Sarasota Counties in cooperation with the National Weather Service Center at Ruskin, Fla. The system grew out of the Weather Watch Net established by K4SCL last Fall on the SPARC repeater, Pinellas City, meeting at 8 P.M. each Thursday. The System goes on the alert when severe weather threatens. Traffic: W3CUL 3434, W4MEE 1113, W3VFR 786, W44PK 673, W4LX 568, K4TH 536, K4SCL 529, W4FIC 355, WB4PB 351, WB4FV 324, KA4FZ 278, K4ZK 256, W4NFK 237, WD4CUL 217, W44WYG 16D, W4IRA 137, W4GPI 123, N4ET 98, N4KE 86, W4UJO 87, W4WYU 86, W4WYR 79, WD4AWN 78, W4DVO 77, W4KMN 42, KB4O 42, W4RFO 40, AA4WJ 29, WB4KYE 27, W44PKE 26, WB4FV 25, N4APE 22, WA1IOG/4 21, WB4NCH 20, W4SMK 15, W4AZJ 12, KA4BBA 10, W4KGG 9, WD4LWT 8, WB4SNX 8, KA4LNA 6, WB4GXV 3, W44HKP 3.

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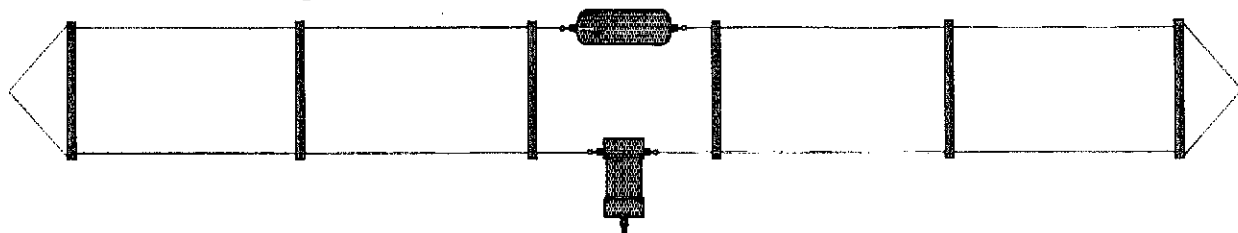
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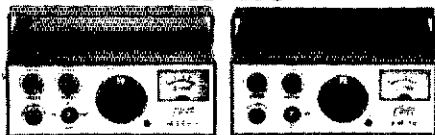
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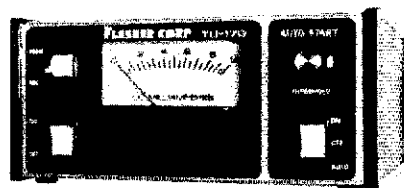
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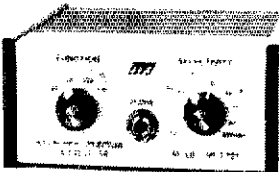


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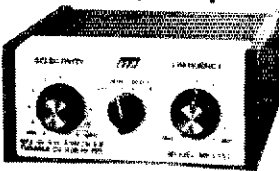
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**WEST INDIES:** SCM, Julio Negroni, KP4CV -- The West Indies Section has a Section Traffic Manager KP4EY assumed these duties and is very busy in the organization of WB (West Indies New) and liaisons with ARN and other systems of the NTS. WBINS will start as scheduled May 1st and will be operational at 6:30 AST Daily on 3710 kHz. NCS will be KP4EMX (Wed), KP4FHC (Mon) and KP4KD (Sat) NCS will control speed at 10 wpm. This is a slow speed net for everybody -- Extra Class to Novice -- is invited. Benito will receive traffic for the West Indies Section and is accepting traffic from the section to any point in the NTS. KP4DGT who is the OPS is doing likewise in the phone nets. Acting in response to HQ request, a Committee on Malicious interference has been formed and is very active at present. The committee is composed of KP4EO, chm. KP4EME, KP4KC, KP4CL, KP4FHC, WB4JA, KP4EMX, Ex Officio members are KP4DEM and KP4CY. The most offensive kind of malicious interference has been observed in the PHAHC Net and it is hoped that a cure will be found very soon. All of the above are QOs. Traffic: KP4FEY 6, 3, 8, 1, 18, 1.

### SOUTHWESTERN DIVISION

**ARIZONA:** SCM, W. L. Haskell, AC7D -- SEC: N7EH, TAB, Tucson Assn for the Blind, is operational again, Inv to WB7FAT, K7JKM, KA7BFI, KA7BZQ, WB7TWM KA7FMG and K7WIP. Code and theory is being taught. The following TAB members have their Novice tickets: W6SGNN, KA7J, KA7FZB, several others awaiting FCC action. Congrats, this is truly the spirit of Amateur Radio. New OO and OVS, Tucson area is WB7BJX. In Mar QST, pg 9, malicious interference, by W1RU solicits comments from all. Discuss in your club mtgs and/or submit suggestions to: W0BWJ, ARRL Chairman, 1070 Locust St., Denver, CO 80220. Lets give ARRL a hand on this most important matter. The Tucson TRA 22:42 rpt is now located at TV station KVOA with ant's at abt 170 ft. TRA provided communications support for the Shrine Circus in Mar; WA7HKI chaired. The first maroon license plate seen by your SCM was WB7TWS on his orange truck. 220 rpts on the air in Tucson. WB7TWS 222 3494, WB7OMM 223 34224, 94, cross linked with W7KT on 147.9939. "Bridgeway Consumer Net" 4030 kHz, LSB (Emergency Operations) is looking for members. Contact Dept of Army and AF, Nat. Guard, 5636 E. McDowell Rd, Phnx, AZ 85008. KA7DPR upgraded to Adv. Congrats! AC7V, SARC is working as a ships R.O. Trainee. SARC had their yearly "Lost Dutchman" togetherness in the Superstition Mts. Visitors from different parts of AZ attended. Easter egg hunt was enjoyed by the children. Good time was had by all. W7WGW, ARCA, Rep. and Freq. Coord. rpts that AZ now has 70 Coord rpts operating. ARCA, periodically puts out new Repeater Directory for AZ. If your club is not a member of ARCA, suggest you consider same! Very worthwhile! Net, Mgr. 3670 W. WAGS/ARES, Pima Cty. 3995 kHz, Sun, 1545Z, also 147.300 Sat 2000Z. Net Mgr. Freq. Time 4N1 31G. A-10 WA7KOE 3992 0230Z 1127 168. SWN K6SL 3585 0300Z 253 192. Cactus W7UQQ 3915 M-F 0100Z 1093 133 S-S 2330Z.

Traffic: W7EP 175, K7MC 128, K7NTG 127, WA7KOE 69, K7UXB 44, W7LVB 38, W7WEB 25, K7NMO 15, K7JZM 14, AC7D 13, W7LBW 10, W7ME 8, WB7NJY 6, WA7NXL 3, W7DQS 1.

**LOS ANGELES:** SCM, Perry Masterson, KD6G -- Another month has gone by and it is time to report to the section on the activities reported to me. For your information, only the information received by the 8th of the month is reported as reports after the 8th are mailed no later than the month W6NAZ still maintains the MARS traffic and performs the PRA for our area. K5DY6 has put up a new Wilson System 33 Tri-Band Beam. Reports working lots of DX. I am glad to hear that W6INH is getting along well. His traffic count doesn't seem to show the effects of a very sore finger. K6EA is reporting a nice traffic count as well as heading for the midwest for the summer months. N6NQ recently joined the Ferbird ARC, the club for hams who are employees of General Motors. K6CL has retired and is looking forward to increased activity on the ham bands. N6HE is off the air due to no time. He is BITTY receiver capability now. KA6AKL earned WAS as a Novice. Nice going. Will be looking for DXCC now. W6RIQ is still the 10-meter am king. Traffic: K6EA 208, W6INH 171, K6OWA 105, K6BGT 91, WA6LVO 88, K8INK 82, W6BYD 78, N6PZ 74, K6BFC 59, N6NQ 54, K6DY6 35, K6CL 18, W6BRO 16, WA6OCM 14.

**SAN DIEGO:** SCM, Arthur H. Smith, W6INI -- STM: N6GW, SEC: W6INI, Asst SEC: N6RD, NM: WA6UJZ, LG: San Diego County: W6GCS (Southern), W6BHF (Northern), W6GCG (Eastern), W6INI (Central), EC Imperial County: W6JHG. S D Rpt Assn meets at the North Park Recreation Center, 4044 Idaho St on 2nd Thur at 1930 S. D County RACES now under the supervision of the Sheriff with W6APP as coordinator. ARE's holds monthly breakfast meetings on second Sat at the Normal Heights United Methodist Church, 4650 Mansfield. Breakfast 0800-0830, meeting at 0900. All amateurs, family, friends are most welcome. ARE's needs old Thomas Bros maps to make up route maps for Red Flag Patrol. Contact any EC (above) or bring to breakfast. Upgraded: N6ALEX and N6APA in Advanced. WA6ZKC reports No. County Tlc Net held 30 sess in Mar. with 49 msgs handled. This net, sponsored by the Palomar ARC, is a good way to break into formal message handling. It meets nightly on 146 1373 Palomar rpt at 2000. Traffic: (Map) W6SPV, W6O N6AT 103, W6BRO 81, N6RD 80, K6BWA 75, W6BML 63, WA6SKU 33, W7WIM 22, WA6UJE 11, WB7SUA 8, W6BFTY 6, WA6COE 1 (Feb) N6AWC 38.

**SANTA BARBARA:** SCM, D. Paul Gagnon, N6MA -- AJ6Y and W6BENI each took trips to Europe while P29FW was a guest of W6BUA. W6WBY is an AMSAT bulletin station on OSCAR A48B but up a tower twice for the ARRL DX contest. Fortunately there were no injuries. W6BNS put up a KT-34. W6BPGX completed DXCC-CW. W6BDMJ completed WAS on Six. WA6IJZ has completed his vhf contact station with an F1-721. Conejo Valley ARC Fd chairman is W6BHG: W6BCHI spoke on repeater systems and the club toured the Goldstone tracking station. W6SUN spoke at Simi Settlers ARC on propagation. N6IC presented the Clipperton DXpedition report. W6BAP and W6BEP are active members. W6BAP were active from two stations in the DX contest. Santa Barbara Club Novice class has 22 members this term. Many section hams are on the move. W6SUN to No. CA, WA6GUT to Grass Valley, WA6ATE to Hollywood, K6YX to NC and

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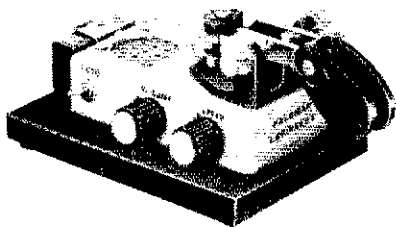
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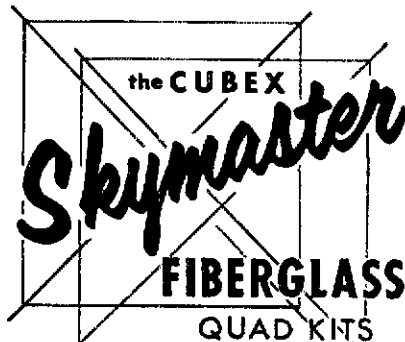
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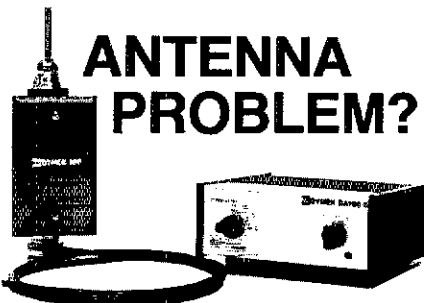
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K6BPY to No. CA. The Santa Barbara North County AVERT exercise was successful with the section ARES net activated. N6BPB is now Extra and KA6ENP is now No. CA. We regret to report that WB6RHZ is a Silent Key. WA6UEO is trying to establish a standard for computer transmission on the air. Contact him in Oxnard. W6POU, Bob Dyruff, will be your SCM effective 1 July. His petition was the only one filed in the nominations. K6FI is Cambria checkin on SCN and is teaming with K6DZT for city emergency communications. PSRs: K6DZT 15, K6YD 60, N6MA 24. Traffic: Y6YD 94, W6BTRP 76, N6YH 44, K6DZT 37, N6MA 18.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: A5EC SEC: N5WB, STM: W5VMP, NMS: AASJ A5E1. Our feature club of the month is the Plano Amateur Radio Klub, of Plano, TX. The FB newsletter, "The Parking Ticket," includes a calendar of coming events, line tech articles, ARES news and views, the club minutes, and a few general interest articles. The current officers are: W5FZM, pres.; W5TUI, vice pres.; W5HDM, secy.; W5FERD, treas.; W5SKTC, editor; W5PRE, act. dir.; AC5Y, pub.; W5LSR, comm. dir. The "klub" is involved in numerous public service activities throughout the year, and sports one of the finest ARES units in the country, under the direction of K5MWQ/EC. A special monthly activity is a transmitter hunt every third Sunday of the month. Also, a pizza party is scheduled each month. The "klub" meets on the second Wednesday of each month in the community room of the First Nat'l Bank, @ Ave. K and 14th St. Programs feature everything from tech talks to mountain climbing demos for our sponsors. The 147.7818 repeater/W5AJG: a fine new machine with a closed autopatch, which is optional with klub membership. For more info, write PARK: P.O. Box 435, Plano, TX 75074. W5YK received his QCWA "Golden Anniversary" award for 50 years as ham. DFW Metro Tic Net for March/QNI 320, QTC 94, in 30 sess. TSN(Texas Sig Net) for March/QNI 237, QTC 57, in 24 sess. Mark your calendar, and send in your registration now, for the West Gulf Division Convention, in conjunction with Hamcon '80, in Dallas, June 6, 7, & 8, 1980. This will be Big D's biggest ham radio event ever. Do not miss it! Pre-reg deadline is May 23. Nice QVS spot for K5UGM; he needs four more states for ant. W5AS, CO reg. for the K9MX and K2SCL/5, PSHR; (Public Service Honor Roll): W5WID W5SJIYI W5BLAT W5SEUE W5SHH KA5FAS AJ5F W5VMP N5BT W5HMR and AA5J. Traffic: W5TI 241, N5BT 205, AA5J 165, W5DEUE 90, W5VMP 87, KA5FAS 68, W5HMR 68, K5MC 66, N5AWG 60, W5WID 58, W5SJIYI 56, W5BKM 51, AJ5F 50, W5AIIJ 45, W5B1 41, K5QKM 41, W5SKCZ 36, W5AOFD 36, W5C7Z 32, W5ERT 32, AE5T 27, K5PC 19, W5SYK 17, W5DSIH 16, W5YK 8, W5TAH 5, W5AKZA 2, W5AZNZ 2.

OKLAHOMA: SCM, Leonard Hollar, WA5F5N — March was a very good month for Oklahoma. 33 stations sent traffic reports, while only 4 reported their PSHR activities (2 CBS and 1 each, CO and QVS. WA5RKU and W5DDB new QTC appointments. ASJ, a new CO, W5RB has code class going at Red Cross. Antenna parties at Ardmore and Okla. City Red Cross, also at KB5EK's. W5NKC and W5TFX both in hospital. We hope they are back on air soon. Hugo working on 2-M links to west, south and east. Woodward working with S. Central Kansas for Skymark. Woodward new repeater on 7212 with another in the mill yet. Enid working on 220 machine. March activity totals look very good especially in the deliveries. Glad to see so many new stations reporting their activities. W5TWY has been very busy giving Skymark seminars all over the state to amateurs, c.d. and other groups. We thank him and all the others who participated and helped with the program. Ailus provided emergency power during a large fire. 1rcumseh had an excellent drill with c.d. Traffic: K5JGZ 340, W5BNKC 274, W5BNKD 222, KF5A 215, W5REC 197, W5HB 168, K5OWK 160, K5CXP 86, WA5OUV 61, WA5RKU 60, W5SDYI 54, W5FSN 54, W5UYH 51, W5VXU 51, K5BEK 49, W5SELG 49, W5S1DB 48, WA5HSU 47, W5SYG 44, W5CAY 38, W5EAY 36, W5S1GO 29, W5SEC 27, W5AS 26, W5VOR 26, W5VLW 18, W5EYB 17, W5LSW 17, W5SIR 8, W5FKL 4, W5HGH 4, W5SOV 4, W5JJ 4. SOUTHERN TEXAS: SCM, Roger Caday, N5FN — Asst SCM/STM: N5TC, SEC: AK5N. Brenham ARC operated special event sta W5STR/5 on Texas Independence Day from Washington-on-the-Brazos. W5BCIT reports addition of a 4-watt-meter to his sta. W5YDD is about ready for RTTY operation using TRS-80, M80, and IU170. K5RVF says Jefferson City ham's supplied communications for MOD Marathon. W5H5N now filling NCS slot for TEX. W5KLV, W5SHN and W5YDD keeping STX 100% on CAND. WA5KRI very involved with International Radio Hosts. K5M reporting lots of activity on CGGH Net. WA4EJU/5 upgraded to Advanced and AISE completed WAS on 80 Mtrs. Info from W5EPI says TCARS moving to 2407 Parker Rd., Houston. New Novices from TCARS are KA5HRK KA5HIA and KA5HLZ. New officers for Matagorda City ARC are W5BFB, pres.; W5WTM, vice pres.; W5U5U, secy.; N5BEA, treas. Upgrades: K5OUJ to General and W5BFB, KA5BWT, W5WYL to Advanced. Lots of activity in Georgetown area and Williamson City ARC reported in their recent newsletter. Brazosport ARC supplied communications for MOD Walkathon. K5DG says ARES activity on the upswing in the Valley. Johnson Space Center ARC moving to new shack. W5SRV of late adding DXing to his many other ham activities. W5E5 Bulletin has interesting story about sleuthing done to locate unintentional 2-Mtr interference recently. Traffic: (Mar) W5KLV 470, W5YDD 281, W5MM1 159, K5HZR 153, N5TC 135, K5STC 126, W5BGE 74, K5CM 67, K5PE 66, W5SRV 53, K5GM 46, K5QEW 42, W5FGY 36, W5SYRW 35, W5BCIT 34, N5FN 30, K5BNK 26, W5SIR 21, W5DOR 18, W5SGKH 16, W5STAY 16, AK5M 14, AF5X 13, W5H5N 12, W5EJF 6, W5SPD 4, K5RVF 2 (Feb) K5PE 51.

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SCAN CONTROLS	1 three pos. non-micro miniature toggle switch (off scan, lock)	2 mini toggle switches mounted on rig	2 mini toggle switches mounted on rig. LOCK switch may be mounted on mic.	2 mini toggle switches on rig	1 mini toggle switch on mic or rig	2 mini toggle switches on rig.	1 mini toggle switch on mic or rig.		
LOCATION OF SCANNER IN RIG	On transmitter board	On top of receiver circuitry	Behind frequency selector board	Mounts on top PLL frequency divider section	Under PLL compartment (just behind frequency selector board)	Mounts along bottom left-hand frame	Mounts just in front of PA compartment	Mounts on frame vertically next to PLL board	
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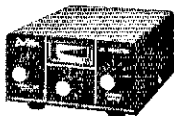
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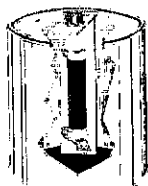
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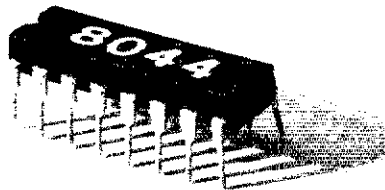
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6.715R	7.00R
6.13T	7.63T
6.73R	7.03R
6.145T	7.66T
6.745R	7.06R
6.16T	7.69T
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6.855R	7.84T
6.28T	7.84R
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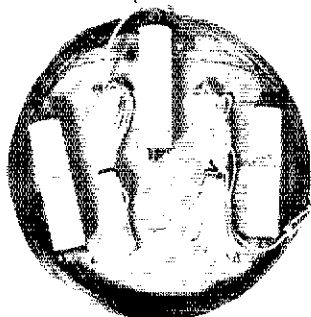


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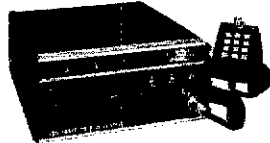
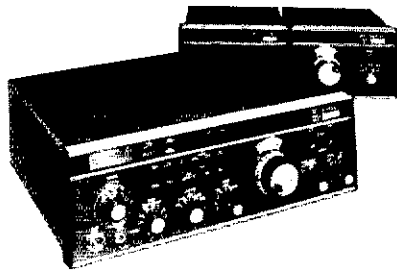
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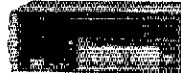

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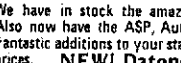
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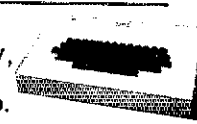
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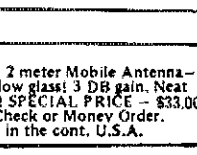
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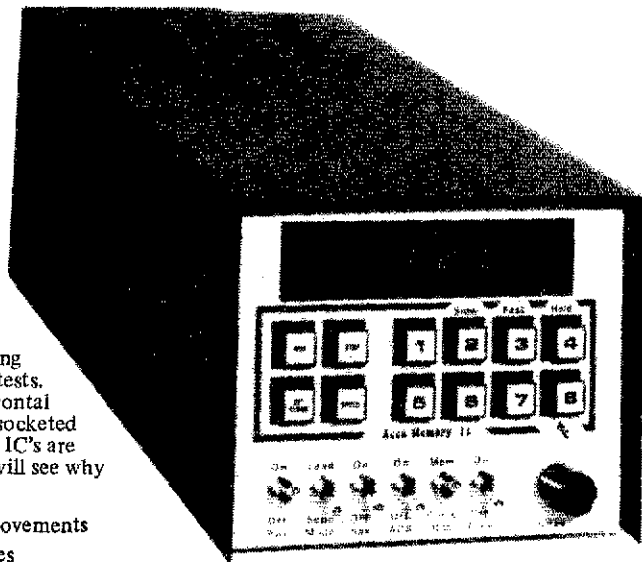
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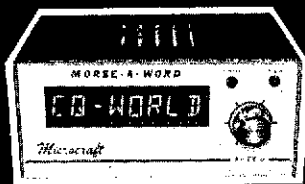


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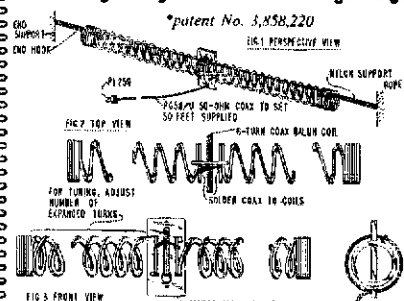


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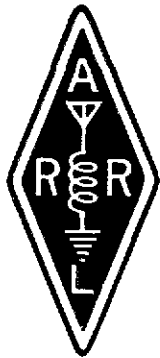
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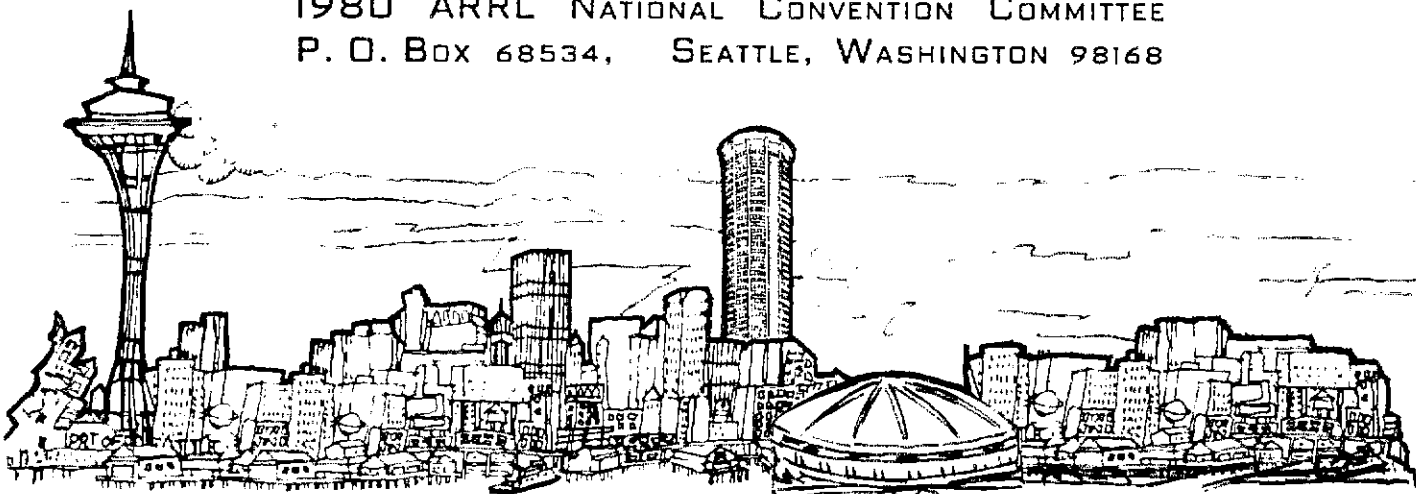
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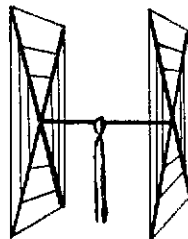
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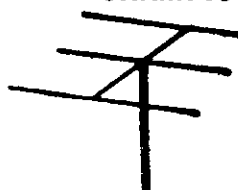
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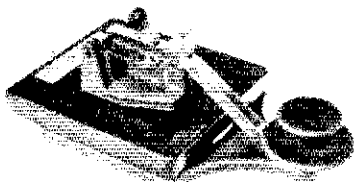
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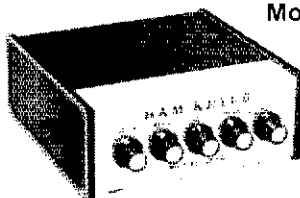
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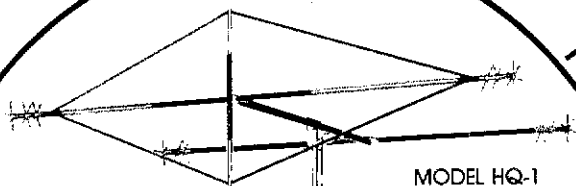
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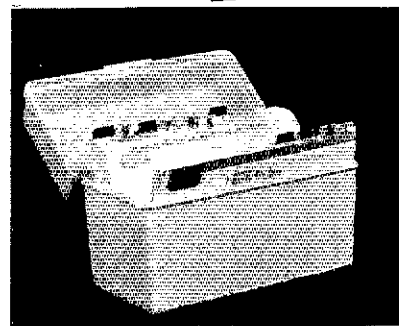
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- WING SPAN-11 FT.
- BOOM-54 INCHES LONG
- WIND AREA-1.5 SQ. FT.
- 1200 WATTS P.E.P. INPUT TO FINAL
- FEED LINE-50 OHMS
- EACH BAND FREQUENCY ADJUSTABLE

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DO YOU HAVE TROUBLE FINDING U.S. CALLS IN YOUR LOG?

Without A Date It Can Be Very Frustrating. HAM-PUTER SOLVES THAT EASY & FAST! IN 5 SECONDS OR LESS, YOU HAVE THE OPERATORS NAME, STATE, LOG PAGE & QSL STATUS OF ANY U.S. CALL THAT'S RECORDED IN YOUR LOG.

OVER 30,000 U.S. CALLS can be recorded on the HAM-PUTER (Canadian Set Available Also).

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132 MYLAR TABED CARDS (tabs are color coded for each of the 10 areas), 5" X 8" FILE BOX (plastic), FELT TIP PENS (one each red and black), CORRECTION FLUID (one bottle), FULL INSTRUCTIONS on recording your CALLS on the HAM-PUTER.

U.S. HAM-PUTER \$42.50 postpaid in U.S./Canadian HAM-PUTER \$5.50 postpaid (no box, pens or fluid)/U.S. & Canadian HAM-PUTER \$47.00/Michigan residents add 4% sales tax.

UNIVERSAL CARDS @ .20 each, (these are for extra space if needed and can be used in any of the areas, or positions).

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SATISFACTION GUARANTEED or return (unused) for FULL REFUND in 30 days.

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**\$225**

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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 85 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" x 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.

The publisher of QST will couch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

## 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.

**PROFESSIONAL** CW operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

**CQ and QST** 1950-1978 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues all others 30 cents each including USA shipping. Send s.a.s.e. chronological order and payment to W6LS, 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

**RADIO EXPO '80** Sept. 6 & 7 Lake County Fairgrounds, Rt. 45 & 120 between Chicago and Milwaukee. Commercial exhibits, huge flea market, seminars, ladies programs. Advanced tickets \$2, \$3 at gate. Send \$2, for each and s.a.s.e. to P. O. Box 1532, Evanston, IL 60204. Call for information 312-B-S-T-E-X-P-O.

**DELTA** Convention, Tri-State Hamfest, Senatobia, MS. June 7-8. Flea mkt dealers, distributors. Write P. O. Box 2, Hernando, MS. 38632 Phone 601-368-9531. Ray W5VBV.

**COLORADO's** Superfest II June 7, 1980, Weld County Exhibition Building, Greeley, Colorado. Satellite TV demonstration, Commercial exhibits, State-of-the-art amateur exhibits, Auction, talks, code contest. Free swap table with entry fee. Contact Gus Fox, W0EE, Box 895, Greeley, Colorado 80632.

**VACATION** in the beautiful Pacific Northwest and enjoy the 26th National ARRL Convention, SEANARC '80, in Seattle, Wa., July 25-27, 1980. The theme 'World Friendship Through Amateur Radio' headlines a featured program of seminars, tours, ladies programs, displays, forums and major equipment exhibits. Roy Neal, K6DUE, is the featured banquet speaker. Not enough room to list everything so get program and registration details from — 1980 ARRL National Convention, P.O. Box 88534, Seattle, WA. 98168.

**BLUEFIELD** Hamfest '80, Sunday, August 24th. New location!

**KENTUCKY HAM-O-RAMA** June 1, Burlington Kentucky, Boone County Fairgrounds, flea market, exhibits, awards throughout the day. Major award, Kenwood TS-120 or \$500, your choice. Admission \$4., children under twelve free. You do not have to be present to receive major award. For tickets and information write NKARC, PO Box 257, Erlanger, KY 41018.

**GRP A.R.C.** International invites you to join its membership providing you operate low power. Write Joseph Szempias, W8JKB, 2359 Woodford Street Toledo, OH, 43605.

**CENTRAL** Michigan Amateur Repeater Association Sixth Annual Swap & Shop in Midland, Michigan, June 21st at the Midland County Fairgrounds. Computer demonstrations, many awards! Talk-in: 146.73 WR8ARB and 146.52 simplex. Tickets & Info, s.a.s.e. to: R. L. Wert, W8QOI, 309 E. Gordonville Rd., R 12, Midland, Michigan, 48640.

**CONNECTICUT:** The Southcentral Connecticut Amateur Radio Association (SCARA) will hold its first annual edition of Super Scarafest '80 on August 16 and 17 at the North Haven Ramada Inn. The two-day show will feature exhibits, a giant outdoor flea market, and on Sunday, an all-day auction as well. Awards throughout the two-day show including a solid-state low-band transceiver, a syn-

# hy-gain®

## DX'ER, CONTESTER, or RAG-CHEWER

With the sunspot cycle nearing its peak, and traffic on 10, 15 and 20 meters at an all-time high, you need a tri-band beam that really delivers. You'll find that there are more Hy-Gain Tri-Banders on the air than any other brand, and that says a lot! All of Hy-Gain's Tri-Banders feature separate High-Q, high-efficiency traps that ensure maximum F/B ratio and gain and minimum VSWR on ALL THREE bands. Hy-Gain's "no-compromise" construction features; taper-swaged 6063-T832 thick-wall aluminum tubing for maximum strength and minimum wind resistance; a rugged boom-to-mast bracket that adjusts from 1/4" to 2 1/2"; heavy gauge, machine formed, element-to-boom brackets that won't allow the elements to twist on the boom; and improved element compression clamps that allow greater tightening ability and easier readjustment. Hy-Gain's unique Beta-Match is factory pre-tuned to ensure minimum VSWR and maximum gain on all three bands. All Hy-Gain beams are fed with 52 ohm coaxial cable and deliver less than 1.5:1 VSWR at resonance. Write for full details today!

### Hy-Gain has the right Tri-Bander for you!

Antenna shown is:  
**TH6DXX**  
6-Element  
Tri-Band Beam

Other Tri-Banders in the Hy-Gain line:  
**TH5DX**  
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Tri-Band Beam

**TH3MK3**  
3-Element  
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Tower shown is  
The NEW Hy-Gain  
**HG-52SS**  
Self Supporting  
Crank-Up Tower

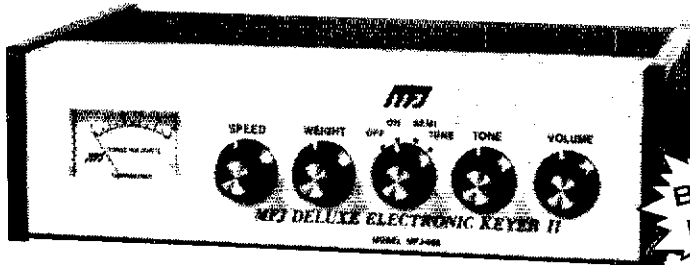
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DEPARTMENT Q-23

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# NEW MFJ Deluxe Keyer has Speed Readout

Socket for external Curtis memory, random code generator, keyboard. Uses Curtis 8044 IC. Gives you dot-dash memories, weight, speed, volume, tone controls, speaker. Sends iambic, automatic, semi-automatic, manual. Reliable solid state keying, RF proof.



**Speed Readout Meter**  
lets you read to 50 WPM.  
Socket for Curtis memory,  
random code generator, keyboard.

# \$79<sup>95</sup>

**BRAND NEW**

The new MFJ-408 Deluxe Electronic Keyer II is based on the proven Curtis 8044 IC keyer chip. **Speed readout meter** lets you read sending speed to 50 WPM. **Socket** (optional cable with plug, \$3.00) lets you use external Curtis memory, random code generator, keyboard (available from Curtis Electro Devices).

**Sends iambic, automatic, semi-automatic, manual.** Use squeeze, single lever or straight key, **iambic operation** with squeeze key. Dot-dash insertion. **Semi-automatic "bug" operation** provides automatic dots and manual dashes.

**Dot-dash memory**, self-completing dots and dashes, jam-proof spacing, instant start. **RF proof.**

**Ultra-reliable solid-state keying:** grid block, cathode, solid state transmitters (-300 V, 10 ma. max, +300 V, 100 ma. max).

All controls are on front panel: speed, weight, tone volume, function switch. Smooth linear speed control. 8 to 50 WPM.

**Weight control** adjusts dot-dash space ratio; makes your signal distinctive to penetrate QRM.

**Tone control.** Room filling volume. Built-in speaker. Ideal for classroom teaching.

**Function switch** selects off, on, semi-automatic/manual, tune. Tune keys transmitter for tuning.

**Completely portable.** Operates up to a year on 4 C-cells. 2.5 mm phone jack for external power (6 to 9 VDC). Optional AC adapter \$7.95.

**Eggshell white, walnut sides.** 8x2x6 inches.

**Stereo phone jack** for key, phono jack outputs.

**OPTIONAL BENCHER IAMBIC PADDLE.** Dot and dash pad-

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**Order from MFJ and try it -- no obligation.** If not delighted, return it within 30 days for refund (less shipping). **One year unconditional guarantee.**

**Order today.** Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for \$79.95 plus \$3.00 shipping for MFJ-408 keyer and/or \$39.95 plus \$3.00 shipping for Bencher paddle.

**CALL TOLL FREE ... 800-647-1800**

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**MFJ ENTERPRISES, INC.**

BOX 494, MISSISSIPPI STATE, MS 39762



Model 250-0046-001

## NYE VIKING Automatic Phone Patch FCC approved!

Type acceptance registration under Part 68 of the FCC Regulations allows direct connection to telephone lines!\*

The new Nye Viking Models 250-0046-001 and 003 furnish hams with the very finest of interface connections with telephone lines\* available! Each comes complete with 7' connector cord and quick connector plug and has new, telephone company approved circuitry to protect company equipment and telephone lines. This eliminates the need (and cost) of a telephone company-supplied coupling device.

The Nye Viking Model -001, without speaker, provides connection to your own external speaker. Model -003 has built-in speaker, and is designed for use with most transceiver installations.

Model 250-0046-001 \$45.50

Model 250-0046-003 \$55.50

\*Phone Patches may not legally be connected to party, or pay phone, lines. Certification applies only to lines in U.S.A.



Available at leading dealers throughout the U.S.A. or Call 1-800-426-2742.

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thesized two-meter HT, a microcomputer system and a 600 MHz frequency counter. Want to know more? Look further down this column!

**ILLINOIS:** Fox River Radio League hamfest. Sunday August 24. Kane County Fairgrounds, St. Charles, IL. Free flea market-inside display area, tables \$10 and \$3. Discounts available. Contact Gary Senesac KA9ADP, 926 Brilla Lane, Batavia, IL, 60510. Tickets: \$1.50 advance — \$2. gate. Contact Jerry Frieders W9ZGP, 1501 Molitor Rd., Aurora, IL 60505.

**CANTON, Ohio** — 6th Annual Hall of Fame Hamfest, July 20. Bigger and better facilities at the Nimishillen Grange near Louisville, Ohio just east of Canton on Route 62. Mobile check-in on 5/2/52, 19/79, 72/12. Call W8ALB. \$2.50 advance \$3. at gate. Contact WA8SHP, 10877 Hazelview Ave., Alliance OH 44801.

**SUPER Scarafest '80:** A giant Amateur Radio and computer festival can be found at exit 12 off I-91. All hams in New England will be receiving direct mail info in May. Pre-registration (before July 1) will be \$4 and \$5 at the door. Send inquiries to P. O. Box 5265 Hamden, CT 06518 or call Jeff Wayne, K1YLV at 203-281-6038. Talk-in on 146.01/61. Watch the August issue of QST for our half-page ad with more details of this major ham and computer meet!

**GOOD times at the Pines.** 1980 Hudson Division Convention. The Pines Hotel, South Fallsburg, NY, November 7, 8 & 9. Full program, exhibits, flea market, free entertainment and dancing at night. Advance registration \$5. with s.a.s.e. to Mike Troy, WA2TYV, 70 Ridge Street, Rye, NY 10580. \$6.50 at the door. Ask for hotel registration info. Room rates including all meals, banquets, per person double occupancy per night from \$38.50 to \$49.50.

#### 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 9648, Austin TX 78766

\$2.95 per hundred (1000 price). Fast service. Quality QSLs since 1934. Satisfaction guaranteed or money back. Send 30c postage for catalogue. VP5QED Press, Box 1523, Boca Raton, FL 33432.

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**DISTINCTIVE QSL's** — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

**QSL's, 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.

**QSLs** — Variety, value, quality, custom, samples and catalog 45c. Alkanprint, Box 3494, Scottsdale AZ 85257.

**QSLs** — The KØAAB collection plus many new custom designs. Send No. 10, 28c, s.a.s.e. for free samples and prices. Mary WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

**BE SURPRISED** — Get a variety of cards — 100 for \$7.00 or 200 for \$11.00. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

**QSLs by W7HUL,** Samples 50c. 8511 19th Ave. N.W., Seattle, WA 98117.

**FREE samples** — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

**RUBBER stamps** \$3.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

**QSL cards** — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

**QSLs & rubber stamps.** All top quality merchandise. QSL samples and stamp catalog 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

**EMBROIDERED emblems,** custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

**QSLs samples and catalog 50c.** Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

**CLUB Call pins:** 3 lines, 1-1/4, \$1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner 2041 Linden St., Ridgewood NY 11227.

**QSLs** — handcrafted one or two color, several designs available. Samples 35c, postage stamps accepted. Old Craftsmen Print Shop, 111 Hoffman St., Torrington, CT 06790.

**DESK plates** 2 x 8, gold anodized stand. Large call letters; ARRL emblems, first name. Black, blue, red,

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## 18HT The World's Finest Multiband Vertical

The 18HT "Hy-Tower" is the only full size, automatic band-switching vertical antenna for 80 thru 10 meters on the market today! It features a unique stub decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) appears on all bands. As a result, the VSWR is less than 1.5:1 at resonance 80 thru 10 meters.

#### Typical 2:1 VSWR Bandwidths are:

- 700 kHz on 10 meters
- 300 kHz (or better) on 15, 20, and 40 meters
- 250 kHz on 80 meters

With the addition of a base loading coil, the 18HT also provides exceptional 160 meter performance!

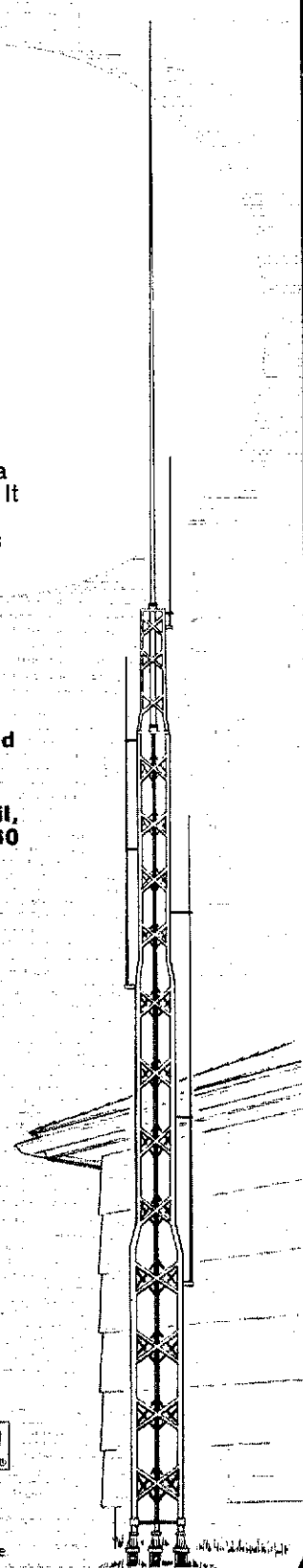
Many 18HT's have been in service for 15 years or more and they still deliver "original spec" performance. This enviable record is the result of Hy-Gain's no-compromise attitude toward materials and construction. The 18HT is complete with a 24 foot galvanized tower that supports the entire system without guys in winds up to 75 mph. The top section consists of dependable 6063-T832 taper swaged aluminum tubing that extends the antenna to an overall height of 50 feet. A special hinged base allows complete assembly on the ground and permits easy raising and lowering. Hy-Gain offers a wide selection of vertical antennas as well as a complete line of beams and crank-up towers. Write for detailed information today!

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The world's highest auto suspension bridge spans the Royal Gorge . . . 1053 feet above the turbulent waters of the Arkansas River at Cañon City, Colorado. *There's nothing else like it!*

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**ALPHA 77Dx** incorporates extra-heavy-duty components and modern, user-oriented engineering. It carries the industry's only **TWO YEAR WARRANTY** in licensed amateur service. If you'll accept only the finest quality and superlative performance, the **ALPHA 77Dx** "Ultimate Linear" is your clear choice.

Contact your dealer or ETO for detailed information on the entire **ALPHA** line of superb linears.



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walnut. \$7.50 Frey's Engraving, 275 85th, Stone Harbor, NJ 08247.

ENJOY the summer. See you in September QST with more colorful QSLs. Specialty Printing, Box 361, Duquesne, PA. 15110. Samples 50c.

CALL-PLATES: 2 x 8" laminated plastic — red, black or walnut. White characters. \$2.50. K2KJ, Engravomatic, 37 Zeek Road, Morris Plains, NJ 07950.

QSL samples and catalog 75c. Name tags. Rubber stamps. Budget Print, 130 Lincoln Highway, New Haven, IN 46774.

RUBBER stamps, 4 lines \$3.00 or 4 lines with ARRL emblem \$3.50, postpaid, 0 available. Julian, Box 43121, Louisville, KY 40243.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From \$213. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, N.Y. 11778 516-744-6260.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

QSLs — 1,000 for \$12.50. Wayne Carroll, 705 Audubon Circle, Belvedere, SC, 29841.

QSLs — No stock designs! Your art or ours, photos; originals. 50c (refundable) for samples, details. Certified Communications, 4138 S. Ferris, Frenont, MI 49412.

#### General

WANTED: Hallicrafters SR2000, Gonset G66, Swan MB40. DL8VTA Jan Harbeck, Pastorat Stellau, D-2211 Wrist, FRG

ANY medium-powered cw-transmitter — even defective — will be appreciated by retired Novice on low pension. Please mail offers to B. G. Berling, Box 132, Nakusp, B.C. V0G 1R0 Canada.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick, WA 99336.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids, S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310 W4NYF. Buy parts, late machines.

SERVICE by W9YKA. Professional grade lab, FCC 1st class license. Amateur and industrial ssb-im equipment. Repairs, calibration, modifications, consultation. Reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 6 issues \$2 Ham Trader Yellow Sheets, Wheaton, IL 60187.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1-8th St., Pelham NY 10803.

ARCOS — Amateur Radio Component Service. VHF/UHF high power amplifier kits, parts and accessories. High voltage power supplies. Proven performance in world-wide use. Dowkey, Eimac, Bird, KLM. Sase for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

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MANUALS for most ham-gear made 1937/1970. Send 25c coin for 16 page "Manual Catalog" postpaid. H. I. Inc., Box Q864, Council Bluffs, IA 51502

COLLINS repair and alignment, \$75. Former Collins engineer, First Radiotelephone, Extra, calibration laboratory, K1MAN 207-495-2215.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806.

PREPARE for new FCC amateur exams. There is no substitute for POSI-CHECK. Completely revised and rewritten to cover new FCC syllabi issued in January anticipating the new exams. Each packet contains copy of FCC syllabus for that class, Rules and Regulations which apply, multiple-choice questions and diagrams covering each point of the syllabus, IBM sheets for self-testing, keyed answers with explanations. Novice \$5.50, General \$6.95, Advanced \$7.75, Extra \$7.95. Prices include first class mailing U.S.A. Same day service. Include check or money order with order. POSI-CHECK, P.O. Box 3564, Urbandale Station, Des Moines, IA 50322.

WANTED: Hallicrafters receivers, transmitters, parts, accessories, manuals for private collection. Chuck Dachis, W5E0G, 4500 Russell, Austin, TX 78745.

FREE-Fascinating Electronics Idea Book — hundreds of unusual parts & surplus items unavailable in stores or catalogs anywhere. Bargain prices on everything. Write today for latest issue. ETCO Electronics, Dept. 132, Box 762, Plattsburgh, NY 12901.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio

# hy-gain®

## HG-52SS Self-Supporting Crank-Up Tower

Antenna shown  
is Hy-Gain  
**TH6DX**  
Tri-Band Beam

The Hy-Gain Model HG-52SS is a 52 foot self-supporting crank-up tower designed for antenna loads of up to 9.0 square feet in winds up to 50 mph. This all steel constructed tower is hot dip galvanized after fabrication to ASTM specifications. Features include extra-strength diamond web bracing and an improved guide system for the telescoping sections, which provides rigid, close tolerance structural support while leaving the tube ends open for complete surface galvanizing and unrestricted moisture drainage. Rotators, including the Hy-Gain 300 and CDE Tailtwister, can be mounted inside the top section on the rotor mounting plate included with the tower. The HG-52SS is easily raised and lowered by manual or optional electric winch system. A thrust bearing is available which bolts to the top section and accommodates masts up to 2 inches in diameter. The HG-52SS is easily erected on a limited area site, and can be readily retracted to a 21 foot height for service of the antenna.

Hy-Gain manufactures a complete line of Crank-Up towers from 33 to 70 feet. Write for complete details today.



Hy-Gain  
Diamond Web  
Bracing for the  
ultimate in  
structural  
strength.

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DEPARTMENT Q-25

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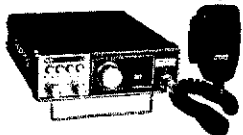
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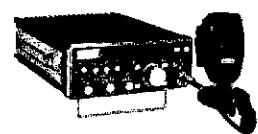
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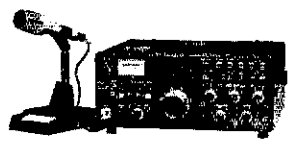
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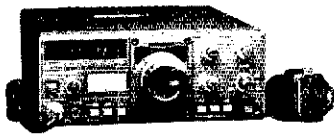
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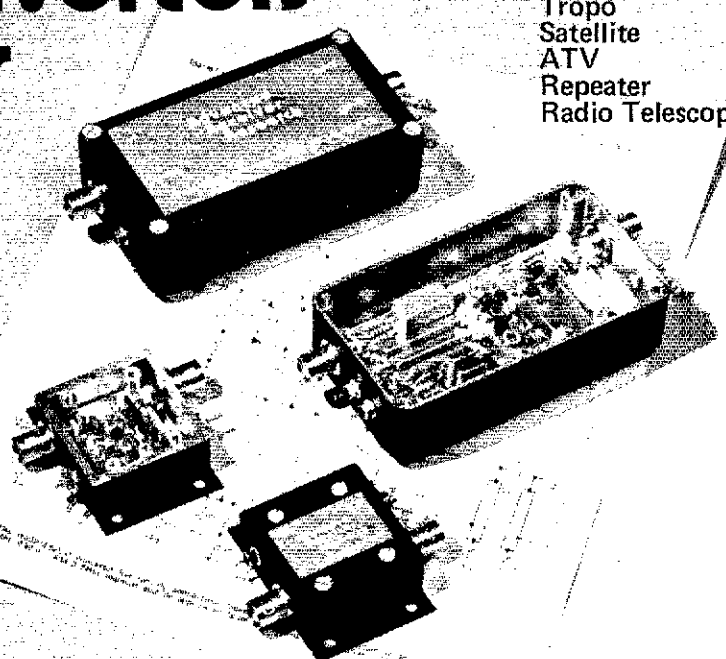
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MINT: Yaesu FT-221R/YC-221/SP-120 KLM Multi-2700, Thurber, 631 North Overbrook Drive, Fort Walton Beach, FL 32548.

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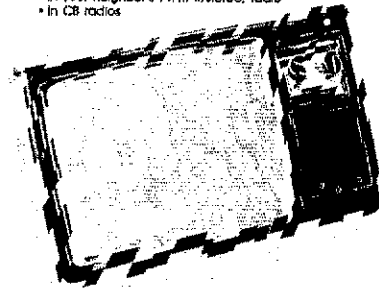
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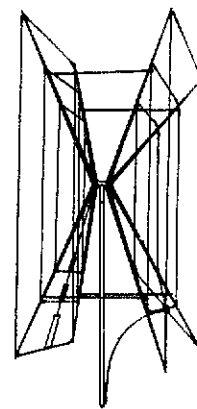
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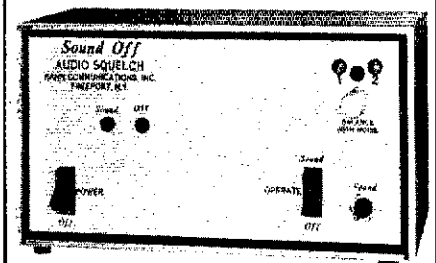
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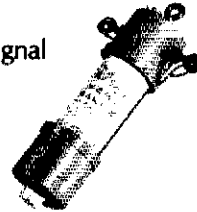


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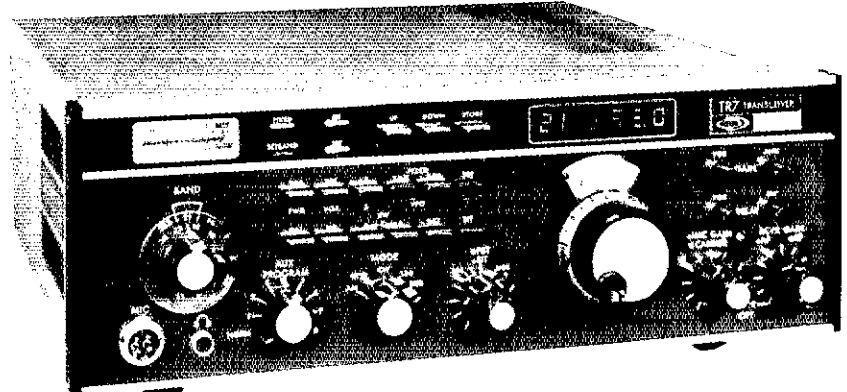
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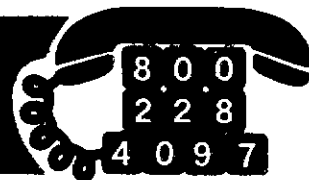
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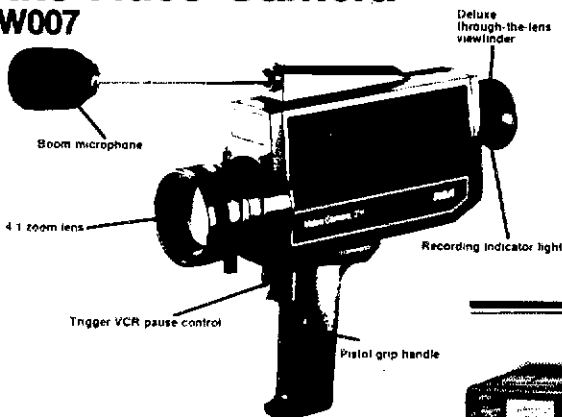
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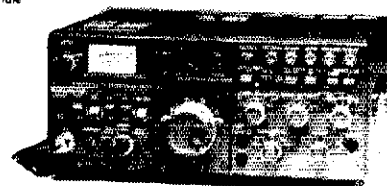
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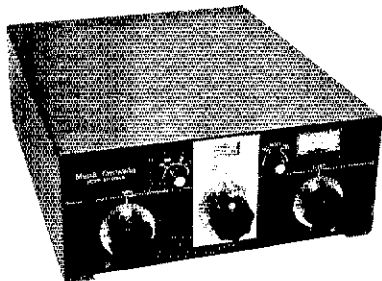
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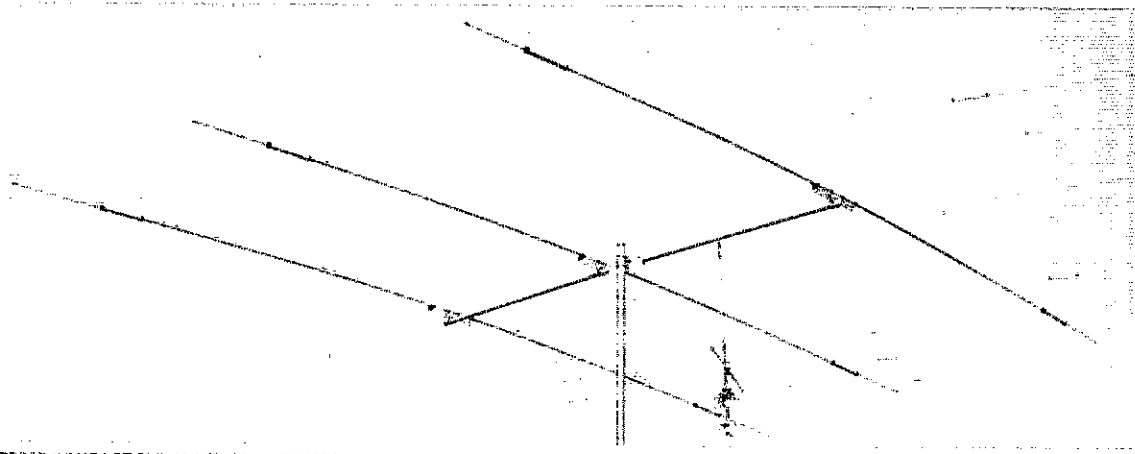
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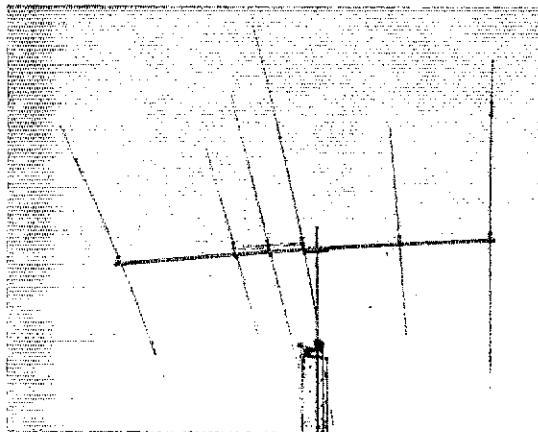
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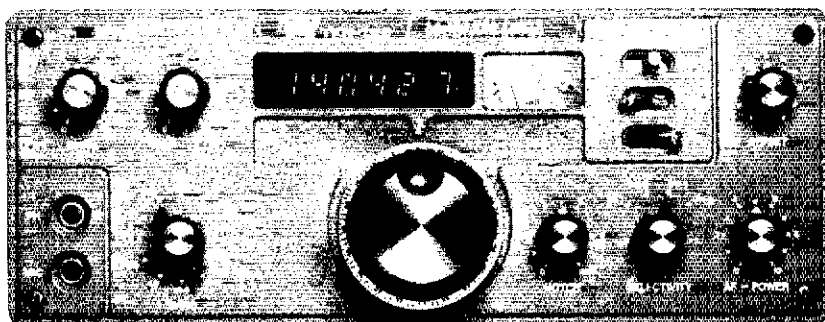
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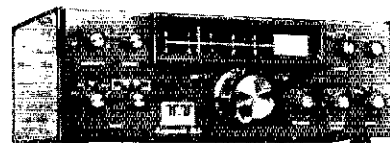


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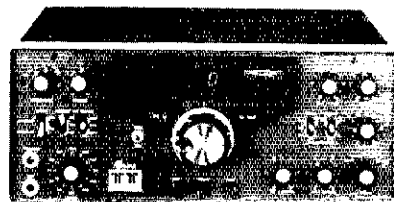
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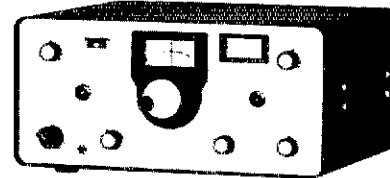
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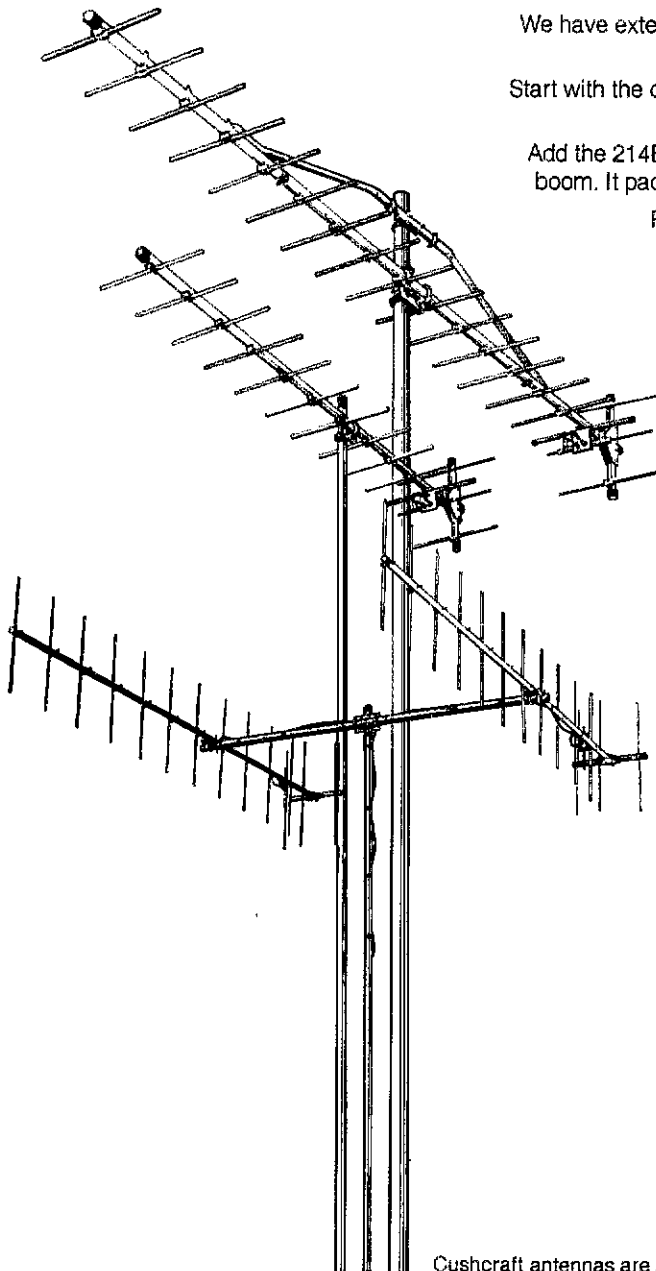
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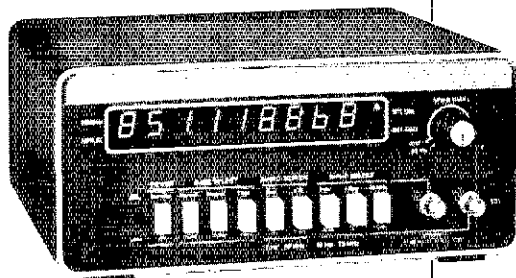
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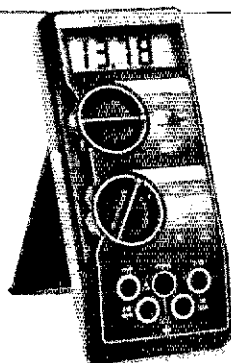
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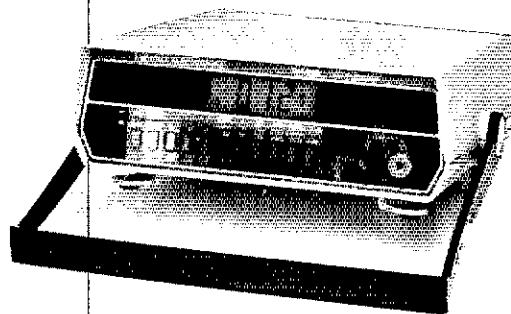
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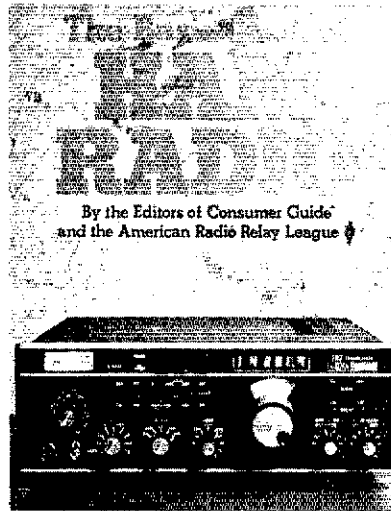
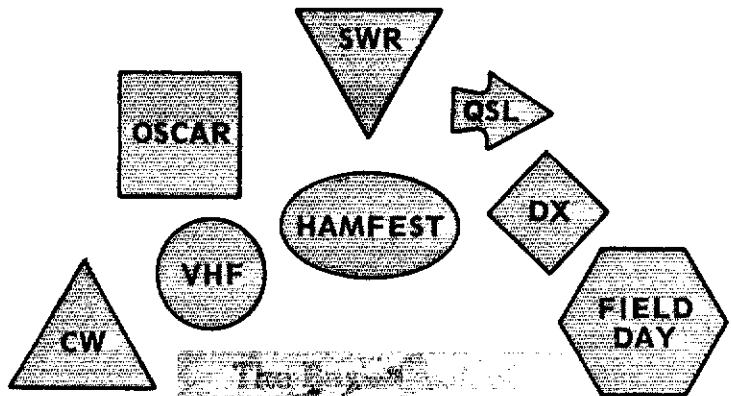
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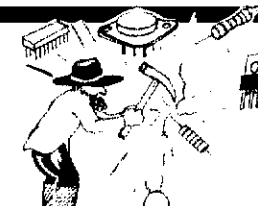
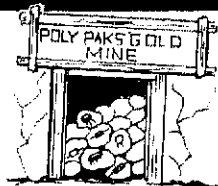
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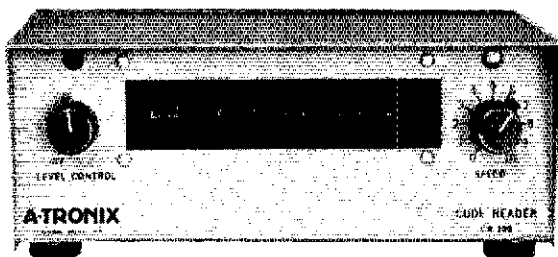
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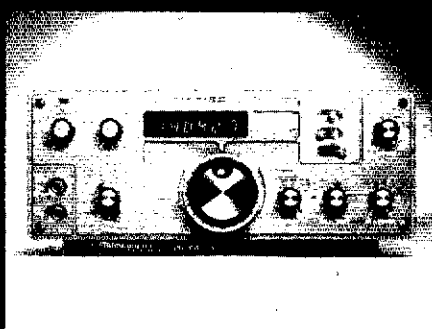
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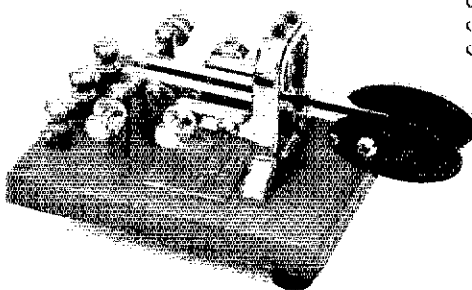
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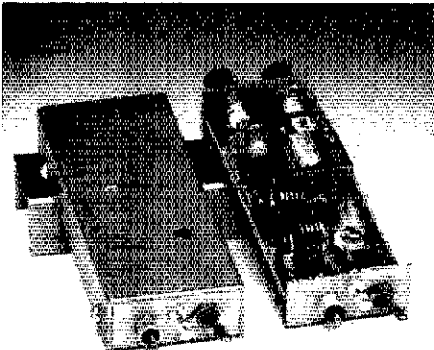
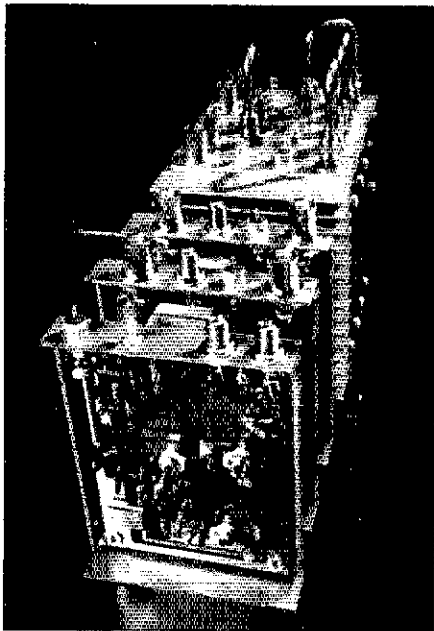
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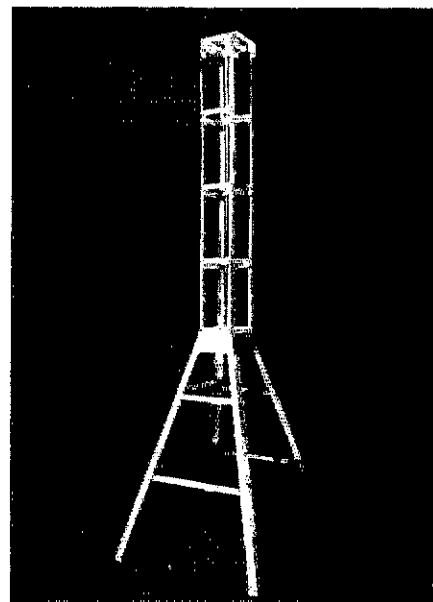
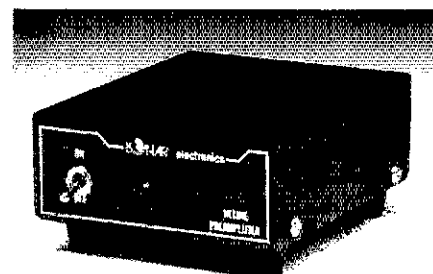
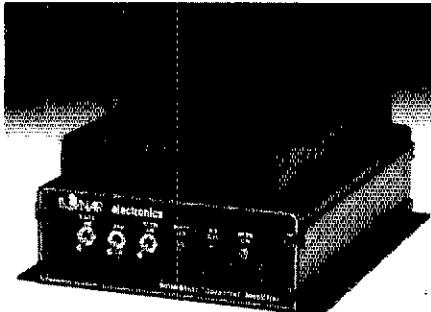
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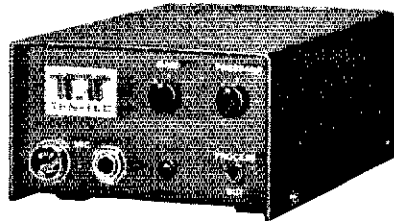
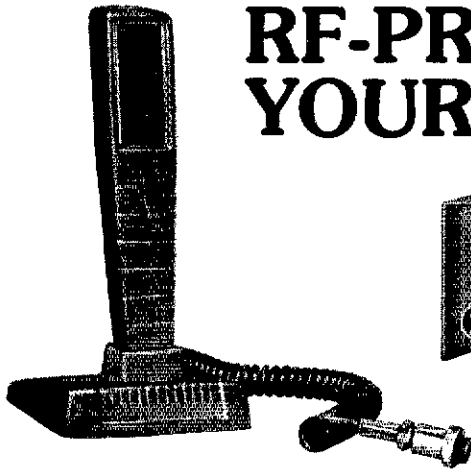
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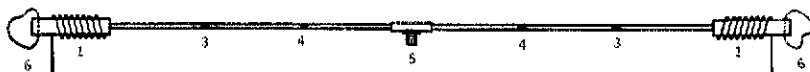
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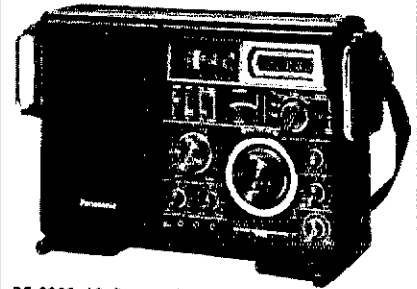
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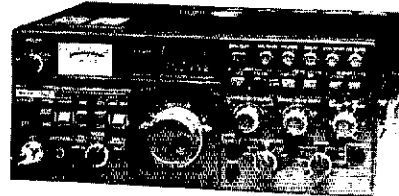
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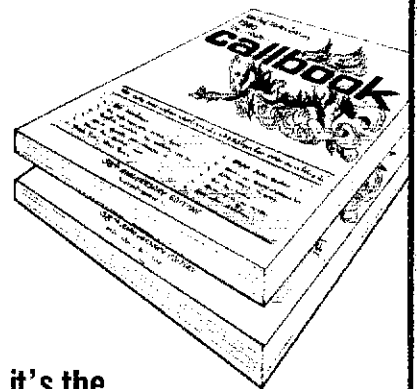
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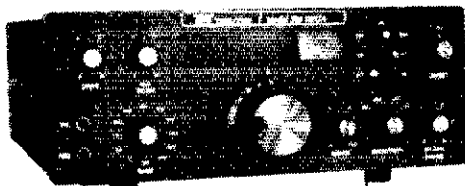


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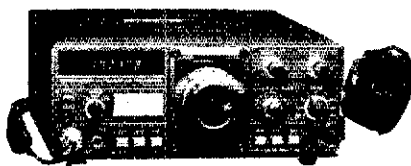
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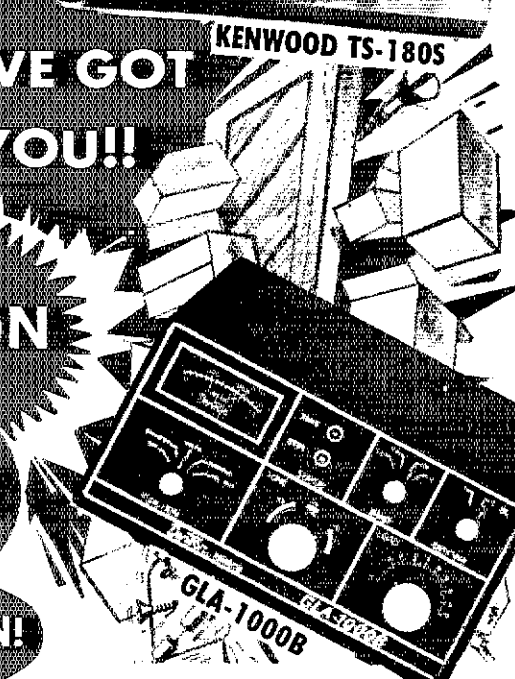
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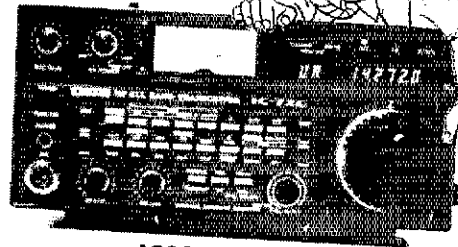
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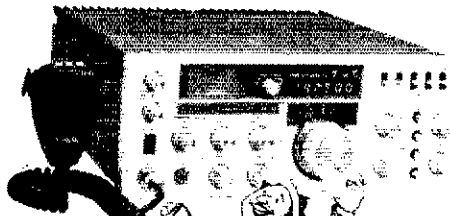
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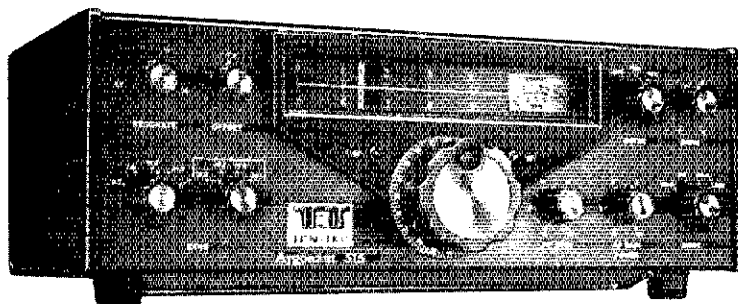
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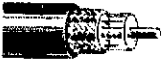

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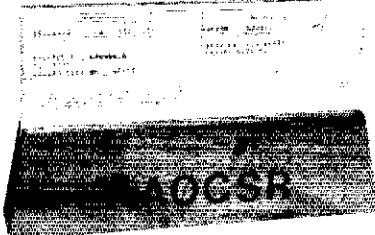
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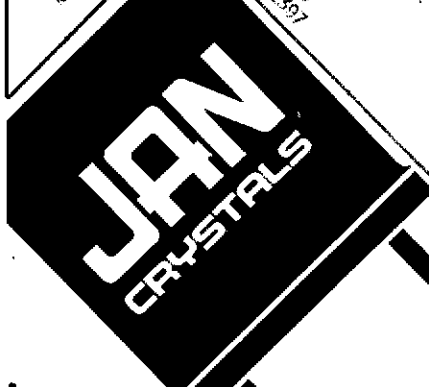
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ANTIQUA National HRO-50 general coverage receiver (50 kHz — 35 MHz), \$200. HRO-50 coils \$40. Wanted: 50-70 ft crank-up tower. WB5LDN, Rte. 2, Box 608 H, White Plains, MD., 20695, 301-645-7053.

SELL: PRO-310. Best receiver Hammarlund ever made. Superb ham, general coverage or collectors item. Excellent condition with manual. \$175. Prefer pick up. Allen Zitrin, W2ZX, 2429 Barker Ave., Bronx NY 10467 212-652-0969.

HEATH HP-13 supply \$65, Apollo 10m linear \$75, Hand-book sweep tube linear (800W) \$75. Collins F455FC60-6920 filter \$40, WA6IGU, 805-498-7251.

WANTED: Pre-1941 ham receivers and transmitting tubes, original SW-3 power supply, RME-69 speaker. Best price first letter. W4FX, 6535 Fairawn Drive, McLean, VA 22101.

ICOM IC-551 6 meter transceiver with VOX. Brand new (warranty) used less 30 days. \$380. New Cushcraft 5 el. \$40. Sony Earth Orbiter receiver \$90. Going low bands K1RRR, 203-259-7033.

ICOM-280 band scanner, installs easily wired, tested \$29.95 (Illinois \$1.57 tax) Detail ISCAN, Rt 1, Box 90A, Antioch, IL 60002.

YEN-TEC: Taking orders for the new Delta 580 nine-band transceiver, \$725. See QST for March and April for other specials still in effect. AMRAD, Inc. 716-235-7716, ask for JJ.

FOR SALE: 40 ft E-Z Way crank up/tilt over tower \$400. Hallicrafters 1000 watt linear, amplifier HT 33B, used only 100 hrs. \$500 both exclt condx. Located near Chicago, IL Call 213-820-6113 after 5 P.M., (CA).

TS-820 with separate VFO — excellent condition, \$900 including UPS shipping. W6KG, 415-525-0756.

WANTED Drake RV4C VFO in good condition. KA4EEQ 804-798-7201.

SELL: HW-7, power supply, \$75. Royal Tech R/C, eight channel, single stick, 53.5 MHz, four servos, \$150. WD5GNY, 915-655-3760.

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 Shadowland Ct., Morgan Hill, CA 95037. 408-683-0287.

QUALITY stainless hardware fastener hardware fasteners! Insulators! Lists 25¢! W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

WILL trade carpentry for ham gear. Will travel, WD6FSK, 415-864-4649.

WANTED: AM1178/GRC Trip/amp (432MC) Jennings RJ-1A vacuum relay (W6RQZ) 1330 Curtis Berkeley, CA 94702.

SWAN 14-117 DC power supply complete with cables \$70 or best offer Berl E. Damkroger, K0JPP, Box 1, Dewitt, NE 68841.

NEW 10-page list. Tubes, components, books, meters, receivers, transmitters. Antiques — modern. 30c s.a.s.e. W4BLQ, B158, Edgewater, FL 32032.

NEW Swan MK-II linear, complete with new Elmac 3-500 Z tubes. 2 kW. Late run. Never unpacked. Covers 80 through 10 meters. \$950. firm. Includes UPS, within the 48. Cashier's check and proof of ham license required. Ray Hill, W6LVK, 16963 Frank Av., Los Gatos, CA 95030. 408-356-5726.

KENWOOD R599 receiver with internal 2 meter converter and T599 transmitter recently factory overhauled. New tubes and chain drive. Manuals. Both A1 condition. Will ship. \$600. W5OMJ 4738 Denton Dr., Dallas TX 75219 Phone 214-526-8301.

ICOM IC-211 \$495 mint. Drake TR7/DR7 with all accessories \$1795 mint., Alpha 374A. WIABJ 617-244-5471.

SELL TS820 digital readout like new \$750. Jim WA4MYF 904-478-0018 or 434-5763.

FOR SALE: Dentron Clipperton L 2000 watt amplifier with original warranty; must sell because of TVI \$525. WA2YYJ, Larry, eves. 212-897-5260.

SELL-QSTs 1958, 59, 60, & 61-78 missing 2 copies. \$5.00

# New!

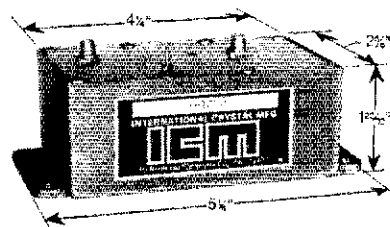
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The RF-1200 is a single stage bipolar low-noise amplifier followed by a 2-stage output filter. Ion-implanted microwave transistors and micro-stripline construction. Die-cast case.



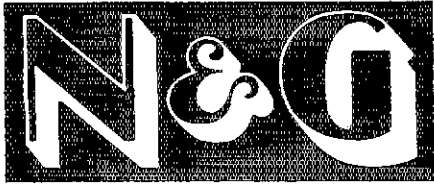
### SPECIFICATIONS

Gain .....	15 db
Noise Figure .....	2 db
Bandwidth .....	1 db 50 MHz
Tuning Range .....	1100-1300 MHz
Power Supply .....	13.5 vdc 20 MA
Connectors .....	SMA
Third Order Intercept .....	+24 dbm

PRICE \$160 1-9 QUANTITY



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10 N. Lee, Oklahoma City, Oklahoma 73102, 405-236-3741

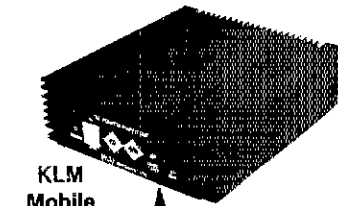


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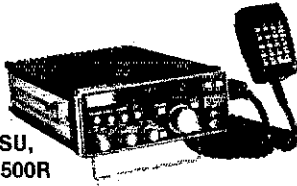
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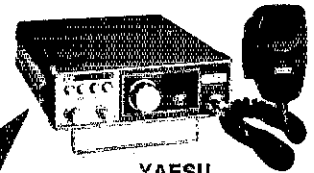
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*KLM* electronics, inc.



YAESU, CPU-2500R 25 watts.

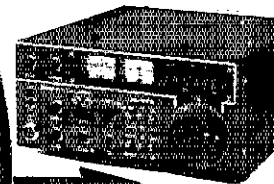
### YAESU



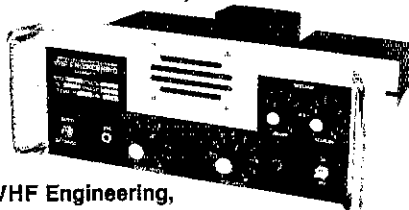
YAESU Memorizer FT-227R, Selectable power, 1-10 watts.



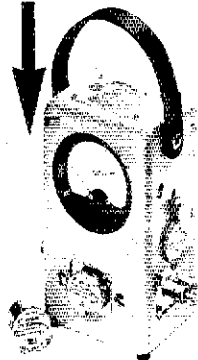
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You get the fabulous features of the FT-207R PLUS KLM's integrated 25 watt power amplifier, 5 watt audio/PA amplifier, and receive preamp ... **ALL IN ONE COMPACT PACKAGE** — a N&G exclusive!

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If you already have a Yaesu FT-207R, fine, but why not go all the way?

YAESU FT-207R \$399  
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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

Custom designed and built for N&G by KLM for use only with the Yaesu FT-207R.



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Formerly with  
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Now  
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# Dual filtering comes of age.

Kantronics' state-of-the-art **Signal Enforcer**<sup>®</sup> introduces quality and versatility to variable-frequency/variable-bandwidth dual filtering

At last, you can have the ultimate operating edge with a tunable, dual filter that looks as good inside as it does outside and operates with the precision only quality engineering can offer.

The Kantronics Signal Enforcer<sup>™</sup> takes a one-two approach to knocking out interference to CW, radioteletype, single-sideband, ASCII and AM audio signals.

## The Dual-Filter Approach

With the dual-filter approach, the Signal Enforcer can be used to maximize one signal (peaking) while it minimizes an interfering one (notching). It can also peak two frequencies at once, which is great for RTTY or ASCII signals, or it can notch two frequencies at once. The Signal Enforcer filters can even be teamed to offer a super-notch or super-peak single filter.

## No Groping in the Dark

The operator is in total control with the Signal Enforcer, choosing not only the frequencies he wants to filter (from less than 100 Hz to over 3000 Hz) but the bandwidth as well (from less than 30 Hz to over 1000 Hz).

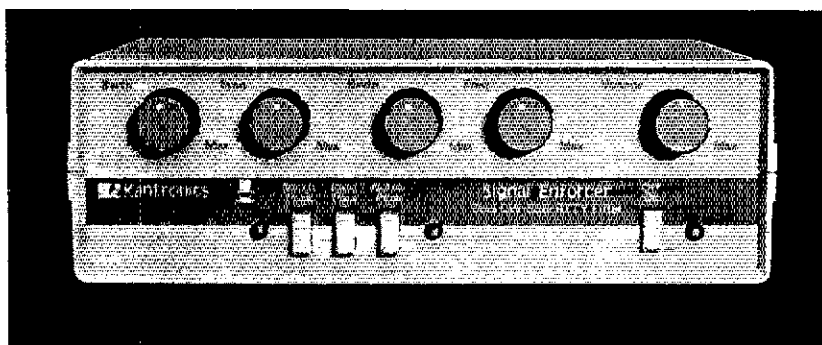
Because the Signal Enforcer is an audio filter, it works with the output of any receiver, regardless of coverage, and doesn't require internal connections.

Two tuning eyes on the Signal Enforcer front panel make locating signals for filtering easy even during crowded band conditions. The tuning eyes are LED indicators that find the heart of signals and blink with them so you know which signals you are filtering.

## You Won't Groan When You Look Inside

Once you get past the attractive tan, cream and brown case, you'll still be happy when you inspect the Signal Enforcer inside. It was designed to operate with precision.

The boards, components, engineering design and craftsmanship are all first-rate. Glass/epoxy boards, dip soldering and preci-



sion components are standard equipment. The Signal Enforcer was also designed for almost immediate turn-around should repair ever be needed. The circuits are divided by function and are replaceable with new modules by factory engineers. We don't have to make you wait while we find a problem.

## Internal Power Supply

The Signal Enforcer has its own internal power supply. It is switchable for 230 VAC or 115 VAC at anywhere between 50 to 60 Hz. A back-panel connection will accept 12 to 18 VDC as well.

## Full-Year Warranty

Kantronics is so confident of the Signal Enforcer, it backs up each unit with a 12-full-months warranty from the time of purchase. Defects due to workmanship or materials during the warranty period will be cheerfully repaired as quickly as possible at no cost to you other than the postage to send the unit in. We'll also be around to help you after your warranty expires.

## Fifteen-Day Trial

Try a Signal Enforcer from us for 15 days to see what you think. We think you'll find it one of your most valuable pieces of station equipment. Many of our over 40 authorized dealers in the United States, Canada, England, Argentina, West Germany and the Netherlands will make you this same offer. (But check with them, first!) If

you're not satisfied, send the Signal Enforcer back in perfect order and we'll return your money less shipping and handling costs.

## Specifications

**Filtering:** two identical filters, both providing peak and notch capabilities. Both filters are independently variable in frequency and bandwidth. **Modes:** The filters may be operated in parallel or cascade modes. Regardless of mode, both filters can peak or notch. **Bandwidth:** continuously variable from less than 30 Hz to over 1000 Hz. Once set, bandwidth remains constant regardless of frequency changes. **Frequency Range:** from less than 150 Hz to over 3000 Hz. **Audio Power Output:** 2 Watts maximum - variable through volume control. **Power Requirements:** 115 VAC or 230 VAC at 50 to 60 Hz or external 12-18 VDC source. **Inputs:** signal input, external DC input. **Outputs:** external speaker, external headphones, demodulator output. **Indicators:** Power, one tuning eye for each filter. **Size:** 2½" by 8" by 6". **Suggested Retail Price:** \$189.95 plus \$3.00 shipping/handling. Allow three weeks delivery from factory.

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per year or \$75, plus shipping takes all, 425 Linum, Webster Groves, MO, 63119, Ron Harder, K0RH.

WANTED — power transformer for Johnson Viking Ranger, W5MCO Victor Soens, 101 Marian Ln., Edinburg, TX 78539.

FOR SALE: Robot 400 \$800 Javelin camera CC800 and Javelin monitor VM9A both \$250. Price includes tripod W7HAW George Driver 3935 W Elm St., Phx. AZ, 85019. Call 602-939-9196.

SELL Heath SB101 including HP23AC and HP13DC supplies. Built by a Heathkit technician. Recently tubed and aligned. Absolutely perfect working condition and looks like new. \$400. Jim, WA4MYF, 904-478-0018 or 434-5763.

WANTED any condition, EICO 722 VFO call collect 606-873-3905, "Lloyd," N4DBQ or write R. Lloyd Mize, Route 6, Versailles, KY 40383.

XYL says sell! KWM2 as-is condition, working \$300. Heath SB101 with cw filter fair condition and HP23A Heath power supply \$250. Ezra K2UJU, 516-798-8056 nights. Five percent discount — you pick up. You pay shipping.

HAM shack sale — hf, vhf gear, test equipment, components. S.a.s.e., K2QHI, 504 Grace Ave., Garfield, NJ 07026.

SWAN 250C 117XC, D-104, like new \$325, 210 VFO for 250C, \$80, VHF watt-SWR meter WM-6200, \$45, or "trade" on Tempo SI, scanner, "make offer," WD4NCF 502-465-8763.

MOSLEY TA33 Ham-M rotator 37" self standing crank up/lift over tower with TG 5S Cash and carry \$300 516-621-3818 Roslyn, NY.

FOR SALE: R300 & R300A receivers good condition physically and operationally. Both meters are missing. Drake model 2-B receiver with speaker model 2 B0. Realistic DX150A receiver, Vibroplex, watt meter 1000 watts, Swan vertical antenna 10 thru 40 meters with extender 80 & 75 meters, sell half my cost. S.a.s.e. for list and prices WD5ADH 4209 McConnell, El Paso TX, 79904. Telephone 915-566-0818.

ROSS: Used specials: National NCX-5 VFO H.B. supply \$438, NCL 2000 \$695, Hallicrafters SX 146, HT 46 \$299.90, Drake mint R4B \$359, Yaesu FTDX401 \$1479, FT101B \$548, FT101E \$689, FV200 \$105, FT620B \$320, FT301S \$439, FT221 \$395, CPU 2500 RK \$349, FT625 RD \$670, Swan SS 200 and supply 117 ac \$469, 250, 117XC \$230, Kenwood TS900, PS900, \$529, R599A, 2M, \$599 \$349, TS820S, cw \$999, T. Icom IC 701, IC 701PS, 5M 2 \$990, IC 211 \$490, IC 245 SSB \$380, IC 245 \$280, Ross Distributing Co., 78 South State, Preston, ID 83263 208-852-0830 Close Monday at 2:00.

YAesu FT-221 complete with handheld mike and new Yaesu YD-844A desk mike \$410, ICOM IC-280 with remote mounting kit \$275, Sure 444 mike \$20, KLM power divider \$10, Phone Dave WD6DBO, 415-489-1372 after 4 P.M.

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DRAKE UV-3 140/220/440 fm transceiver, PS-3 power supply, both like new. \$689, K1LOZ 503-588-2698.

FOR my technical library I need a copy of 1962 ARRL Handbook. Please advise price and condition. Max Smith K6HL, P O Box 501, Alta Loma, TX 77510.

HAMMARLUND HO-110 with manual \$100 K6GPB, P O Box 3, Escalon, CA, 95320.

KENWOOD TV506 6 meter transverter. Mint. \$195. B. Carling AF4K 5131 Raywood Lane, Nashville TN 37211.

FOR SALE: RME-45 receiver. Best offer. W2HHK, 929 Riverside Drive, Pine Beach, NJ 08741.

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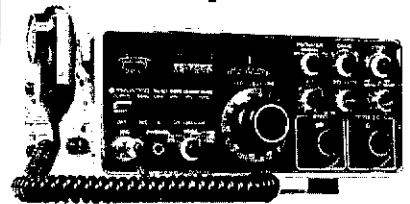
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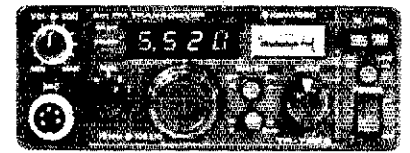
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TR-7600 2m FM transceiver. Same as TR-7625 except RF output: High, 10 watts (min); Low, 1 watt, adj. to 10. . . . . Call for Special Price.  
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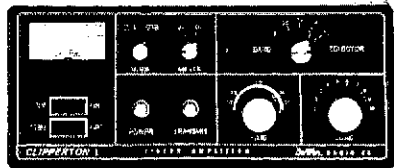
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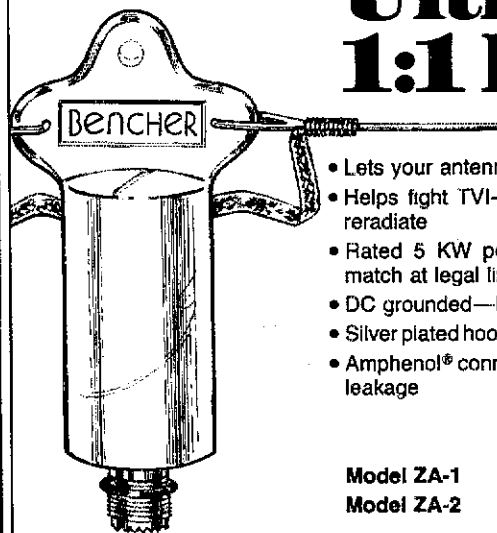
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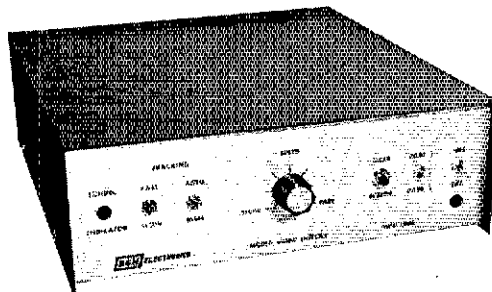
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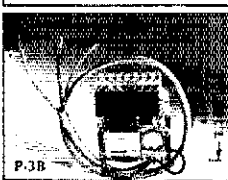
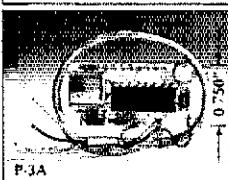
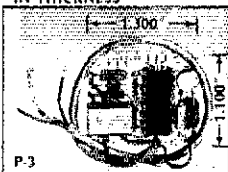
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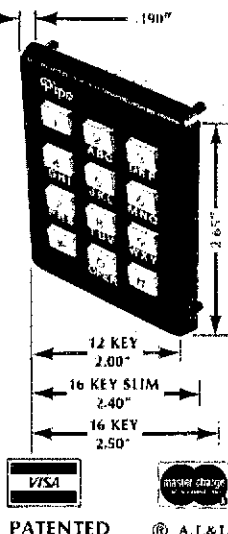
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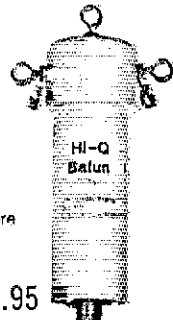
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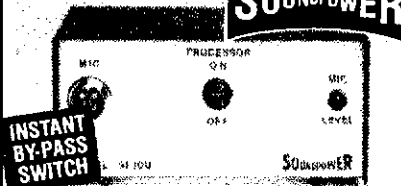
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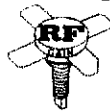
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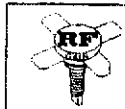
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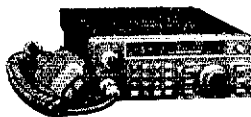
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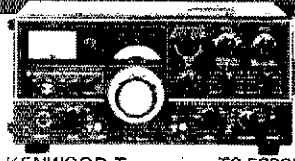
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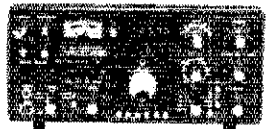
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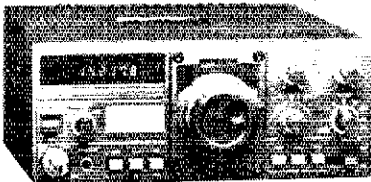
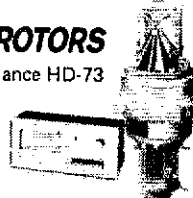
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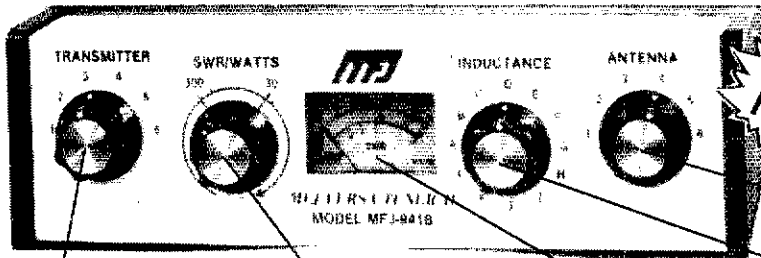
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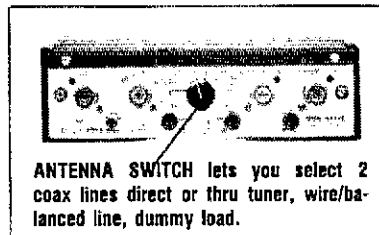
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An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

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A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

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ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire-balanced line, dummy load.

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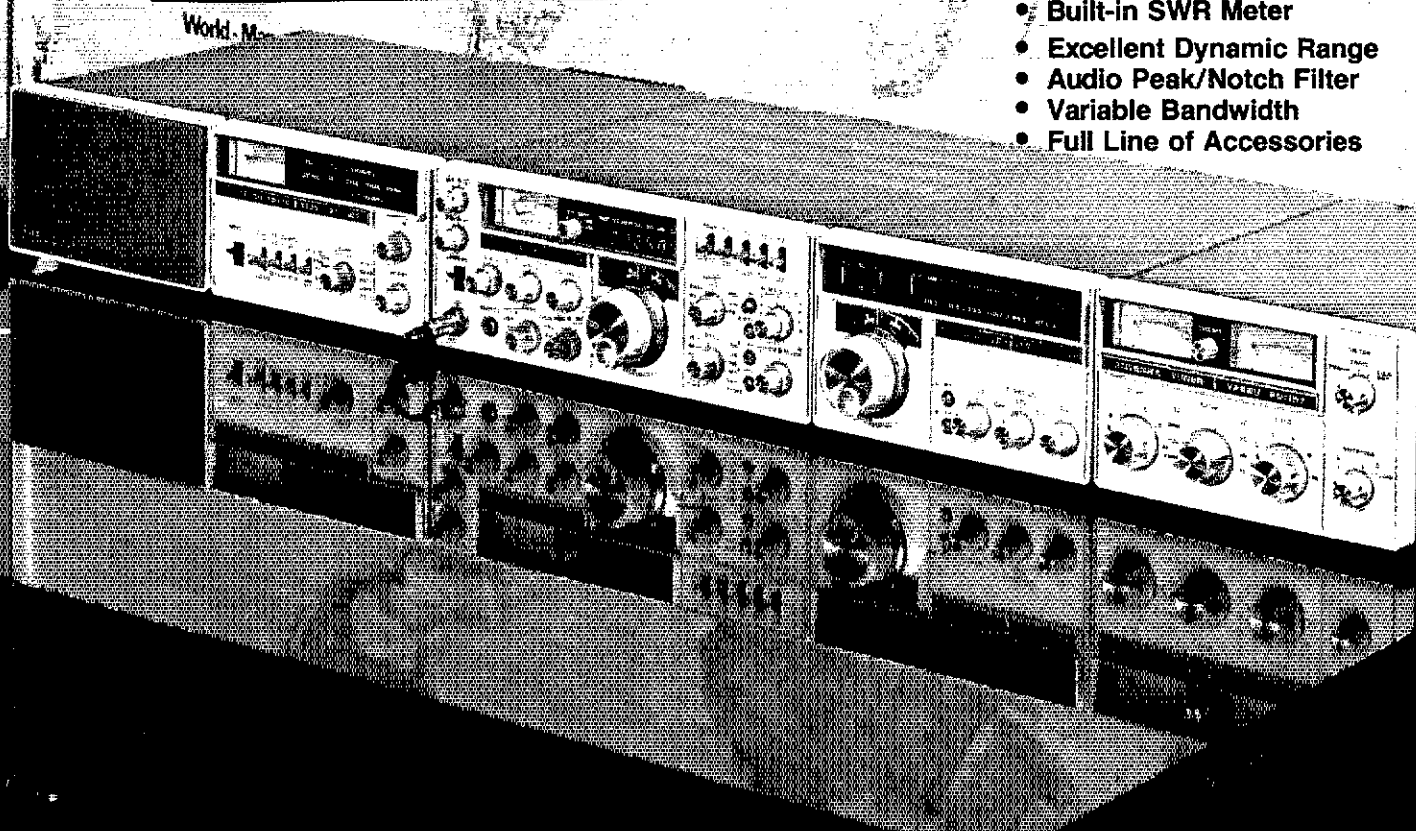
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### (Receiver Section) FT-107 TRANSCEIVER SPECIFICATIONS (Transmitter Section)

**Sensitivity:** 0.25  $\mu$ V for 10dB S/N, CW/SSB, FSK  
 1.0  $\mu$ V for 10dB S/N, AM

**Image Rejection:** 60dB except 10 meters (50dB)

**IF Rejection:** 70dB

**Selectivity:** SSB 2.4 kHz at -6dB, 4.0 kHz at -60dB.  
 CW 0.6 kHz at -6dB, 1.2 kHz at -60dB.  
 AM 6 kHz at -6dB, 12 kHz at -60dB  
 Variable IF Bandwidth

**20dB RF Attenuator**

**Peak/Notch Audio Filter**

**Audio Output:** 3 watts (4-16 ohms)

**Accessories:** FV-107 VFO (standard not synthesized)  
 FTV-107 VHF (UHF Transverter)  
 FC-107 Antenna Tuner  
 SP-107 Matching Speaker  
 FP-107 AC Power Supply

**Power Input:** 240 watts DC SSB/CW  
 80 watts DC AM/FSK

**Opposite Sideband Suppression:** Better than 50dB

**Spurious Radiation:** -50dB.

**Transmitter Bandwidth** 350-2700 hz (-6dB)

**Transmitter:** 3rd IMD -31dB neg feedback 6dB

**Transmitter Stability:** 30 hz after 10 min. warmup  
 less than 100 hz after 30 min.

**Antenna Input Impedance:** 50 ohms

**Microphone Impedance:** 500 ohms

**Power Required:** 13.5V DC at 20 amps  
 100/110/117/200/220/234V AC at 650 VA

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