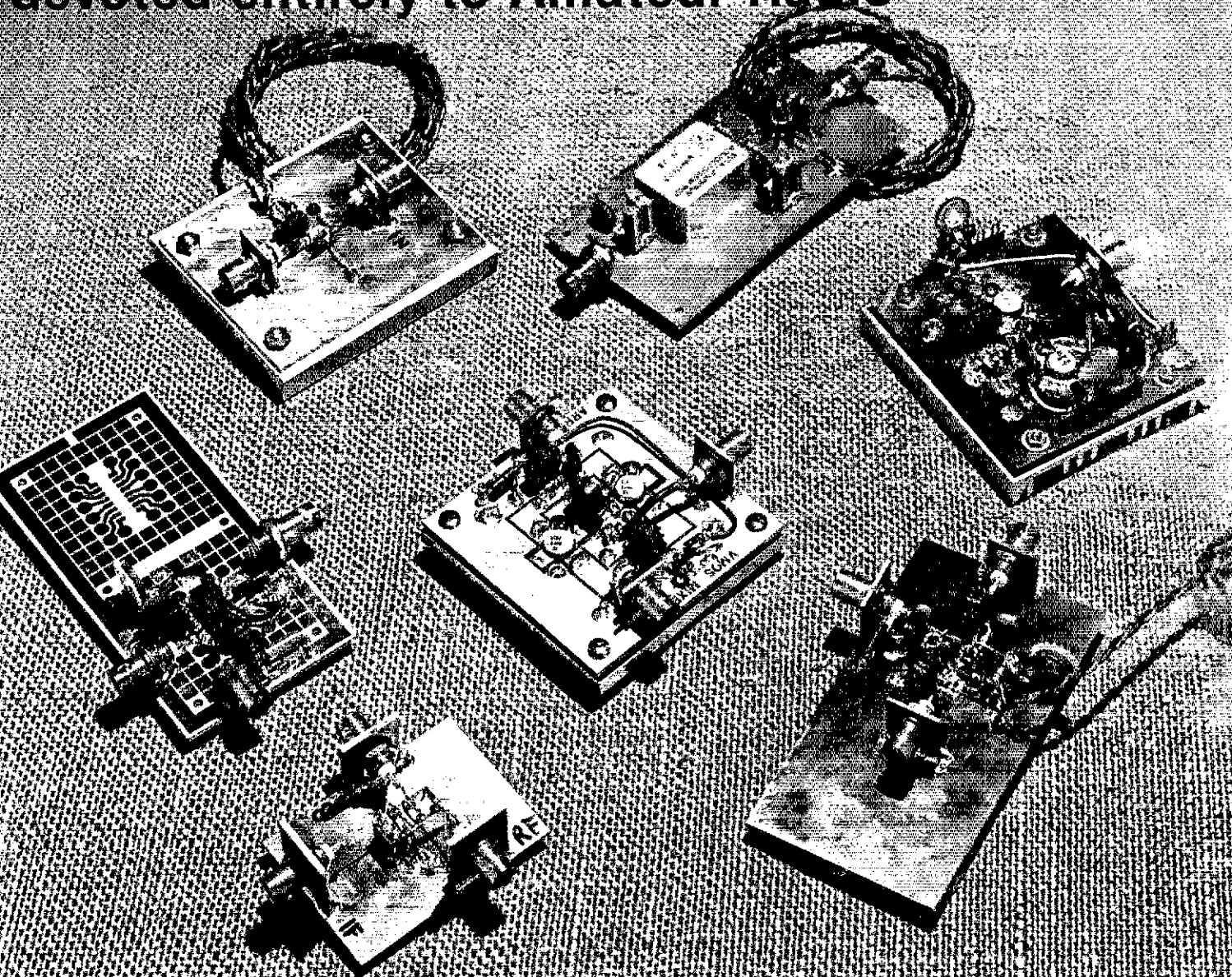


# QST

January 1981 \$2.50

devoted entirely to Amateur Radio



High Dynamic Range  
Mixers

Page 19



# tempo does it again



## THE WORLD'S FIRST 440 MHz SYNTHESIZED HAND HELD RADIO

Tempo was the first with a synthesized hand held for amateur use, first with a 220 MHz synthesized hand held, first with a 5 watt output synthesized hand held...and once again first in the 440 MHz range with the S-4, a fully synthesized hand held radio. Not only does Tempo offer the broadest line of synthesized hand holds, but its standards of reliability are unsurpassed...reliability proven through millions of hours of operation. No other hand held has been so

thoroughly field tested, is so simple to operate or offers so much value. The Tempo S-4 offers the opportunity to get on 440 MHz from where ever you may be. With the addition of a touch tone pad and matching power amplifier its versatility is also unsurpassed.

The S-4...\$349.00  
With 12 button touch tone pad...\$399.00  
With 16 button touch tone pad...\$419.00  
S-40 matching 40 watt output  
13.8 VDC power amplifier...\$149.00



### Tempo S-1

The first and most thoroughly field tested hand held synthesized radio available today. Many thousands are now in use and the letters of praise still pour in. The S-1 is the most simple radio to operate and is built to provide years of dependable service. Despite its light weight and small size it is built to withstand rough handling and hard use. Its heavy duty battery pack allows more operating time between charges and its new lower price makes it even more affordable.



### Tempo S-5

Offers the same field proven reliability, features and specifications as the S-1 except that the S-5 provides a big 5 watt output (or 1 watt low power operation). They both have external microphone capability and can be operated with matching solid state power amplifiers (30 watt or 80 watt output). Allows your hand held to double as a powerful mobile or base radio.

S-30...\$89.00\* S-80...\$149.00\*

\*For use with S-1 and S-5



### Tempo S-2

With an S-2 in your car or pocket you can use 220 MHz repeaters throughout the U.S. It offers all the advanced engineering, premium quality components and features of the S-1 and S-5. The S-2 offers 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 this is the perfect way to get started. With the addition of the S-20 Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a

220 MHz station, the S-2 will add tremendous versatility.  
Price...\$349.00 (With touch tone pad installed...\$399.00)  
S-20...\$89.00

### Specifications:

Frequency Coverage: 440 to 449.995 MHz  
Channel Spacing: 30 KHz minimum  
Power Requirements: 9.6 VDC  
Current Drain: 17 ma-standby 400 ma-transmit (1 amp high power)  
Antenna Impedance: 50 ohms  
Sensitivity: Better than .5 microvolts nominal for 20 db  
Supplied Accessories: Rubber flex antenna 450 ma ni-cad battery pack, charger and earphone  
RF output Power: Nominal 3 watts high or 1 watt low power  
Repeater Offset: ± 5 MHz

### Optional Accessories for all models

12 button touch tone pad (not installed): \$39 • 16 button touch tone pad (not installed): \$48 • Tone burst generator: \$29.95  
• CTCSS sub-audible tone control: \$29.95 • Leather holster: \$20 • Cigarette lighter plug mobile charging unit: \$6

### TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal... give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	\$209
10W	130W	130A10	\$189
30W	130W	130A30	\$199
2W	80W	80A02	\$169
10W	80W	80A10	\$149
30W	80W	80A30	\$159
2W	50W	50A02	\$129
2W	30W	30A02	\$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.



# Henry Radio

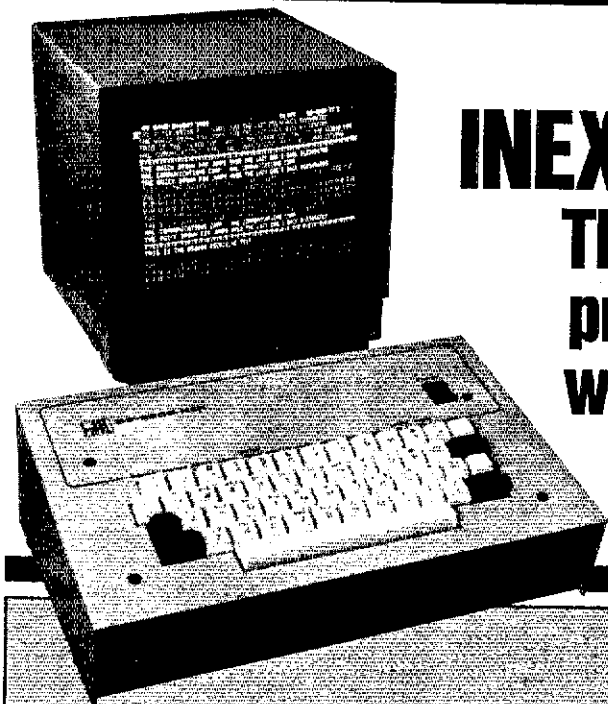
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931 N. Euclid, Anaheim, CA 92801 (714) 772-9200  
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For all states except California.  
Calif. residents please call collect on our regular numbers.

Prices subject to change without notice.

Please note, as of Dec. 1, 1980 we will occupy our new world headquarters building with a new Los Angeles address and phone number.



# INEXPENSIVELY SUPERIOR

The DS2000 KSR is the lowest priced RTTY terminal available with these advanced features:

345

- TX/RX operation on Baudot and ASCII RTTY plus Morse Code (Morse RX optional)
- Integrated keyboard and video generator allows editing of transmit text
- Full 24 line by 72 characters per line display
- Bright/dim display of characters differentiates between TX and RX display
- Morse receive option may be added at any time
- Separate CW identification key for RTTY operation
- Status line on top of screen shows terminal operating conditions
- Pretype transmit message into 255 character buffer; edit before transmitting
- 2 programmable "Here Is" messages
- Word-wrap-around prevents word splitting at end of display line
- Word mode allows editing of text to be transmitted
- Quick Brown Fox and RYRY test message keys
- Small size metal cabinet gives effective RFI shielding from transmitters
- Loop compatible RTTY connections and plus or minus CW key connections
- 110 and 300 baud ASCII
- 45, 50, 57, 74, 100 baud Baudot
- 1-175 wpm Morse transmit
- 1-175 wpm optional Morse receive
- 120/240 v, 50/60 Hz power
- Internal CW side-tone
- UnShift On Space for Baudot
- Keyboard Operated Switch
- SYNC idle for RTTY
- One year warranty

## NEW YEAR'S SALE

DS 2000... \$395

CALL US FOR DETAILS

*Write or give us a call. We'll be glad to send you our new RTTY catalog.*



HAL COMMUNICATIONS CORP.  
Box 365

DS2000 KSR.....	\$499.00
-----------------	----------

# "Simply the best!"

... That's not just a tag line that is what people are actually saying about ICOM's new family of ham units.

ICOM is the leader in computer digital technology applied to amateur radio... giving better reliability and ease of operation.

Below, you see four of our popular base units: IC-451A, IC-720, IC-551D and IC-251A.

When you buy ICOM, you buy a system that is... Simply the Best!



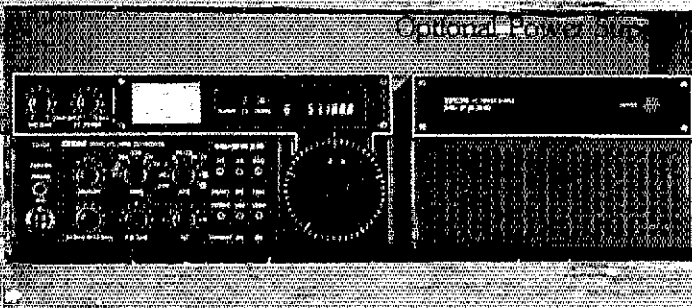
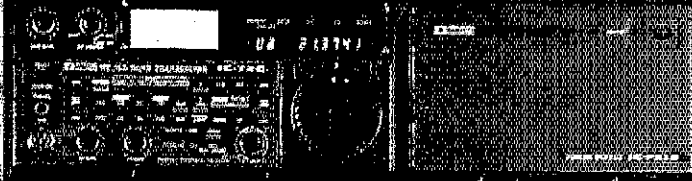
## ICOM

For the Professional Amateur



The IC-451A is the newest ICOM member. Perfect for OSCAR, DX and local rag chewing. Covers 480-4200 MHz. 450 MHz. 100W. 200W. SSB/FM/CW.

The IC-720 is the most compact ham transceiver when it came out. It has general coverage, receive all mode, state of the art, bandpass state of the art, circuitry. Dual VFO's. WARC frequency coverage. Very compact.



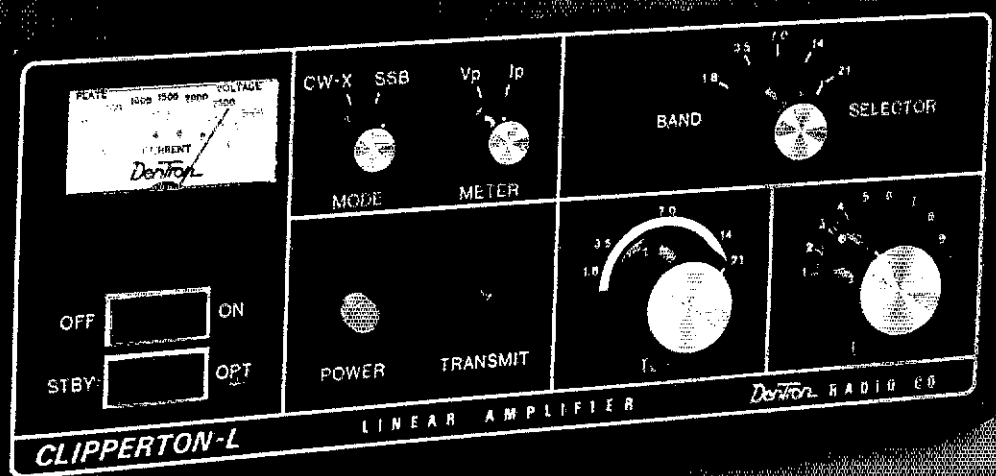
The IC-251A is still the best 2-meter all-mode transceiver on the market.

The IC-551D brings 6 meters to life! 80 watts to really punch out. Dual VFO's. SSB/CW (optional).



# The best amplifier value just got better....

## Clipperton-L, now with tuned input.



Clipperton-L is a 100% transistorized, 50-watt linear amplifier. Designed together with the Clipperton-L Tuner to set up a complete amateur radio station. Clipperton-L Tuner - 30-100 MHz SSB transceiver.

If you're like most of us, you'd like a more sophisticated radio. Here the Clipperton Linear Amplifier from Dentron gives you the thrill of a DXpedition.

The Clipperton-L was inspired by the famous DXpedition in which 3000 A-2500's were used. We built the Clipperton with rugged, economical, 572 B4 triodes to provide a full 2KW PEP on SSB and 1KW CW. It's built through 160 meters. With unique like-to-to power selector for equal efficiency at 1.0-2.5KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in A.C. and an improved whisper-quiet cooling system, the excitement of creating a pile-up can be yours.

Clipperton-L suggested price \$699.50.

**Dentron**  
Radio Co., Inc.  
1505 Commerce Drive  
Stow, Ohio 44224  
(216) 888-4071  
Telex: 366496

Dedicated  
to making amateur radio  
more fun.

# A3

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 1/8" - 1 1/2" x 14'
Elements/Longest	1 1/8" - 1/2" x 27'9"
Wind Sfc. area	5.6 Feet <sup>2</sup>
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1 1/4" min. 2" max.
Material	6063-T832 Seamless aluminum
Fasteners	Zinc Plated Steel
Telescope Method	Taper tubing with full circle clamps

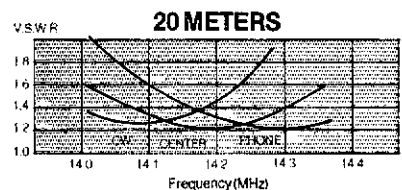
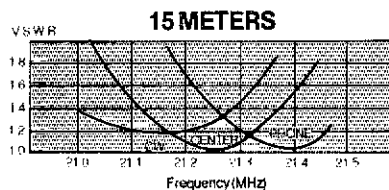
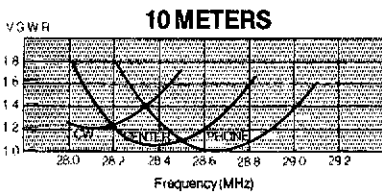
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## The full power, full performance 20-15-10 meter beam.

Enjoy the thrill of working rare DX with excellent A3 forward gain. Increase the pleasure of your daily contacts with A3 interference reducing front to back ratio. Use your linear amplifier with confidence in our new A3 high power traps.

Make friends of your neighbors with A3 compact dimensions, low profile, and small turn radius. Satisfy your budget with A3 economy pricing.

The Cushcraft engineering team has again created that unique combination of quality materials, easy assembly and high performance with A3, the three band beam for the eighties.



A LEADER FOR OVER 30 YEARS



**The Antenna Company**

48 Perimeter Road, P.O. Box 4680  
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## TS-830S

"Top-notch"... VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

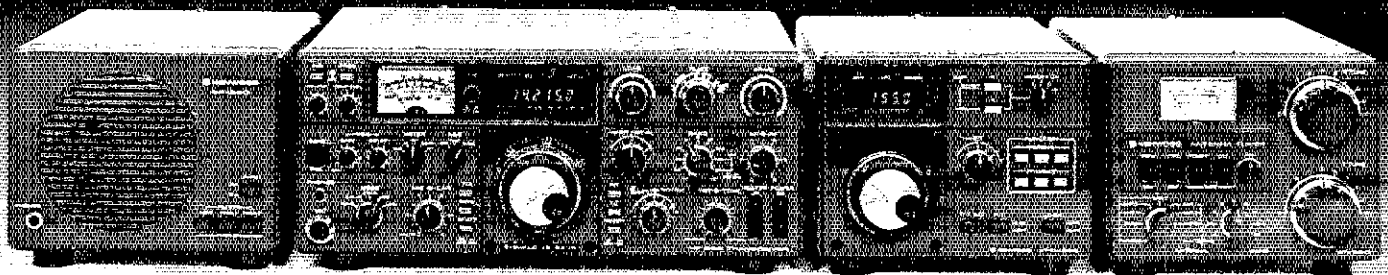
### TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter pass-band width.

- Notch filter (high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (Six digits, fluorescent tubes), analog subdial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

### OPTIONAL ACCESSORIES:

- SP-230 external speaker with selectable audio filters.
- VFO-230 external digital VFO with 20-Hz steps, five memories, digital display.
- AT-230 antenna tuner/SWR and power meter/antenna switch; 160-10 meters, including three new bands.
- YG-455C (500-Hz) and YG-455CN (250-Hz) CW filters for 455-kHz IF.
- YK-88C (500-Hz) and YK-88CN (270-Hz) CW filters for 8.83-MHz IF. (VFOs for TS-830S, TS-130 Series, and TS-120S are compatible with all three series of transceivers.)



SP-230

TS-830S

VFO-230

AT-230

## TS-130S/V

"Small wonder"... processor, N/W switch, IF shift, DFC option

The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3.5 to 29.7 MHz, including the three new bands.

### TS-130 SERIES FEATURES:

- 80-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.

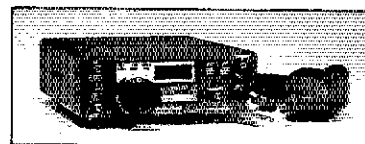
- TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands.
- Built-in speech processor.
- Narrow/wide filter selection on both CW (500 Hz or 270 Hz) and SSB (1.8 kHz) with optional filters.

- Automatic selection of side-band mode (LSB on 40 meters and below, and USB on 30 meters and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

### OPTIONAL ACCESSORIES:

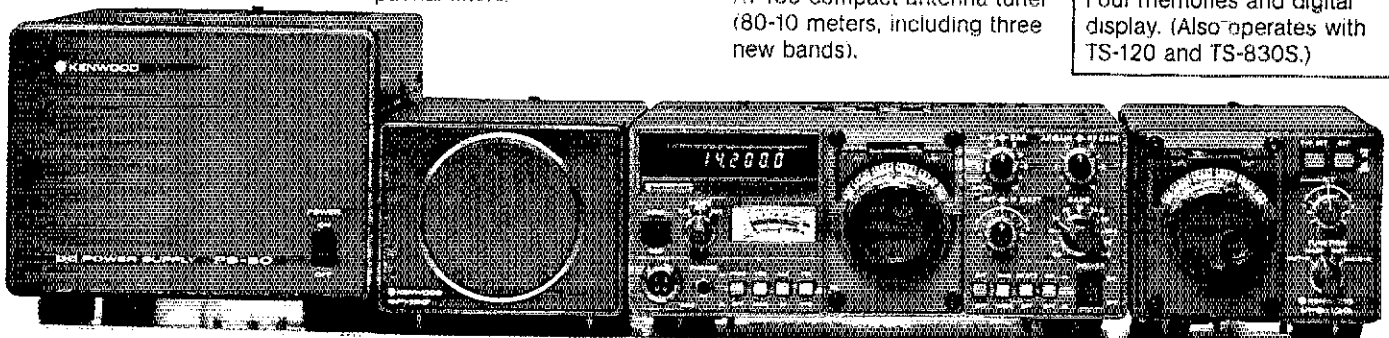
- PS-30 base-station power supply.
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80-10 meters, including three new bands).

- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.



### Optional DFC-230 Digital Frequency Controller

Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Four memories and digital display. (Also operates with TS-120 and TS-830S.)



PS-30

SP-120

TS-130S

VFO-120

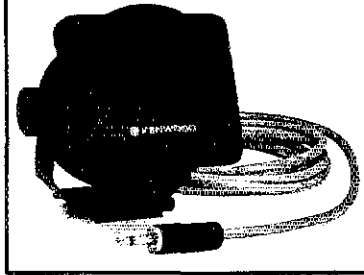




## SP-40

Compact, high-quality mobile speaker

- Matches all HF, VHF, and UHF radios for mobile operation.
- Only 2-11/16 inches wide by 2-1/2 inches high by 2-1/8 inches deep.
- 4-ohm input impedance.
- Handles 3 watts of audio.
- Mounting bracket with ferrite magnet. Adhesive-backed steel plate supplied for mounting virtually anywhere.



- Repeater REVERSE switch.
- Selectable power output. 25 W (HI)/15 W (LOW).
- LED S/R/F bar meter.
- TONE switch to actuate subaudible tone module (not Kenwood-supplied).

**OPTIONAL ACCESSORIES:**

- KPS-7 fixed-station power supply.

## TR-7800

**"Easy selection"...15 memories/offset recall, scan, priority, DTMF (Touch-Tone®)**

Frequency selection with the TR-7800 2-meter FM mobile transceiver is easier than ever. The rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-tone® encoder.

**TR-7800 FEATURES:**

- 15 multifunction memory channels, selected with a

rotary switch. M1-M13... memorize frequency and offset ( $\pm 600$  kHz or simplex). M14... memorize transmit and receive frequencies independently for nonstandard offset. M0... priority channel, with simplex,  $\pm 600$  kHz, or nonstandard offset.

- Internal backup for all memories, by installing four AA NiCd batteries (not Kenwood-

supplied) in battery holder.

- Priority channel (memory "0") and priority alert.
- Covers 143,900-148,995 MHz, in 5-kHz or 10-kHz steps.
- Built-in autopatch DTMF (Touch-Tone®) encoder.
- Front-panel keyboard for selecting frequency, transmit offset, and autopatch encoder tones, programming memories, and controlling scan.
- Automatic scan of entire band (5-kHz or 10-kHz steps) and memories.
- Manual scan of band and memories, with UP/DOWN microphone (standard),

## TR-8400

**"Go synthesized on 440 MHz FM"... 5 memories, memory/band scan**

The TR-8400 synthesized 70-cm VHF FM mobile transceiver covers 140.5-150 MHz in 25-kHz steps and includes five memories, automatic memory and band scan, UP/DOWN manual scan, and two VFOs.

**TR-8400 FEATURES:**

- Synthesized coverage of 140.5-150 MHz in 25-kHz steps.

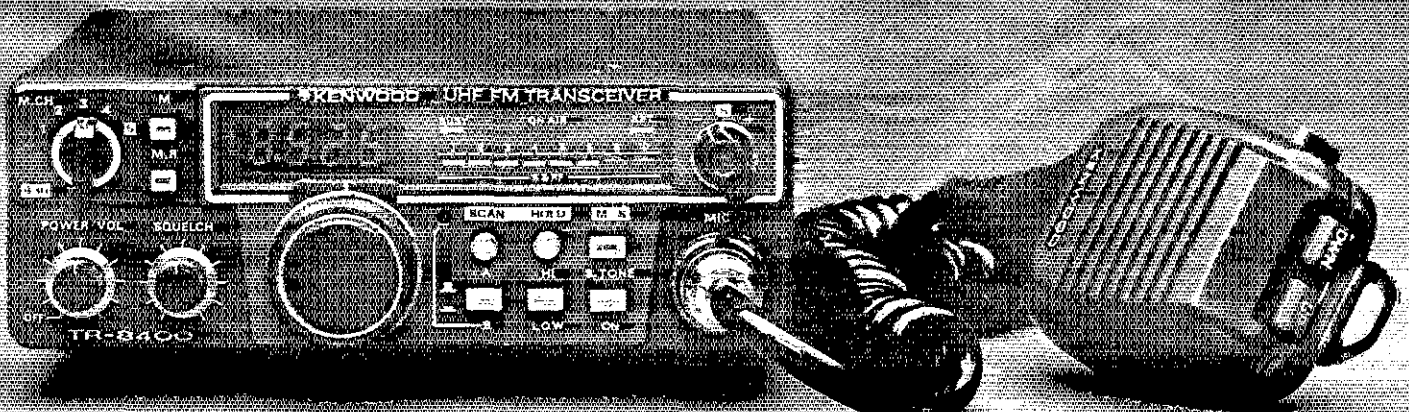
- Five memories and memory backup terminal on rear panel.
- Two VFOs.
- Offset switch for  $\pm 5$  MHz transmit offset and simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.

- Automatic scan of memories and of 440-450 MHz band (in 25-kHz steps). Locks on busy channel and resumes when signal disappears. HOLD or mic PTT button cancels scan.
- Up/down manual band scan in 25-kHz steps with UP/DOWN microphone supplied with TR-8400.
- Only 3-3/4 inches wide, 2 inches high, and 7-5/8 inches deep. Weighs only 3.75 pounds.

- TONE switch to activate sub-tone device (not Kenwood-supplied). DTMF (Touch-Tone) terminal on rear panel.
- Four-dot frequency display and S/R/F bar meter. Other LEDs indicate BUSY, ON AIR, and REPEATER operation.
- HI/LOW (10 W/15 W) RF output power switch.

**OPTIONAL ACCESSORIES:**

- KPS-7 fixed-station power supply.
- SES-10 compact mobile speaker.



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

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## A New Year's Resolution

The average radio amateur spends about six hours a week on Amateur Radio activities. That's a bit more than 300 hours per year, or to put it another way, roughly 120,000,000 hours per year for all North American hams put together. That's a tremendous collective investment of time and energy in an activity that by definition is not income-producing, and it must make us feel good or we simply wouldn't do it.

On the other hand, if we look critically at some of the things we do, they are simply devices to kill time. Time is a very precious resource; once lost, it can never be regained. Once in a while it's good to spend some of it thinking of ways to improve our use of time. Otherwise it's easy to fall into a rut, and simply to do things in a certain pattern by force of habit. Perhaps by breaking out of that pattern we can gain even more satisfaction from Amateur Radio without sacrificing our other commitments to family, community and job.

Let's take DX chasing as an example. The desire to add to one's DXCC total is understandable, as is the desire to chat with an old or a potential new friend overseas. Neither of these falls into the "killing time" category; they both have rational objectives. Less easy to understand are the pileups that greet stations in countries that are on the air all the time, where people seem to be attracted not so much by the station at the other end as by the pileup itself. Hardly anyone in the pile needs the contact for DXCC or some other award, no one has anything particularly profound or meaningful to say to the operator at the other end, and at this point in history no one should need to be reassured that his equipment is capable of spanning the globe. Amateurs were making two-way contacts across the Atlantic 57 years ago; what's the attraction in repeating the experiment *ad infinitum*? It's not as if our rigs needed the exercise.

Why do we do it? A partial answer is the competitive urge that all humans seem to possess in varying degrees. We want to be first, or best, or loudest. And there's nothing wrong with that. To the contrary, harnessing that competitive urge, and making it productive, has brought mankind untold benefits over the centuries. But the key word is *productive*. Is it productive to spend our limited time doing the same things, over and over again? If the DX example is not a shoe that fits you, think about how the principle applies to your own Amateur Radio operating. Frankly, most of us *are* in a rut, and the thoughtful ones will realize and admit it. We need to get out of that rut, and on to new and exciting challenges.

What can be new and exciting in Amateur Radio, 57 years after the bridging of the Atlantic? *Plenty*. For most of us, the spectrum above 450 MHz is uncharted wilderness. Some Italian amateurs, however, have worked 470 miles

(757 km) on 10 GHz (10,000 MHz) running 10 *milliwatts* of transmitter power. Microwave Associates is sponsoring awards for the first two-way contact over 1000 km on 10 GHz, and over 250 km on 24 GHz. It seems to us that a small percentage of that 120 million hours ought to be devoted to the pursuit of those awards — and why not by you, or your club? If you have been following "The New Frontier" column, you know that amateur microwave gear is not that difficult to build or to work with.

Another area that is ripe for some pioneering work is digital communications. In theory, it is possible to handle the entire message load of the National Traffic System through a nationwide system of digital data repeaters — all operating on a single uhf channel no wider than a standard fm voice channel. K9OX showed us that at Dayton, a couple of years ago. There are practical and legal hurdles to be gotten over, and obviously we are not proposing to eliminate NTS; the point is that technology is bringing a powerful new tool for public service communications within our grasp. Will we take advantage of it? That depends on our ability to bring the people with the technical know-how together with the people who are interested in its practical application to our communications requirements. If it's time for your repeater group to explore new fields, why not look in this direction?

Another example is coherent cw, where the signal-to-noise ratio is improved dramatically by eliminating time and frequency as unknowns, and by applying advanced detection techniques. The 1981 *Handbook* describes ccw as "an idea whose time has come," and gives an outline of the principles involved.

Finally, vhf single-sideband is stirring some interest in commercial land mobile circles — several years after its use by amateurs became commonplace. If we amateurs can demonstrate the feasibility of repeater operation using single-sideband, we will have made a significant contribution to spectrum conservation.

Yes, the opportunities for pioneering achievement still exist in Amateur Radio. To take advantage of them, we have to get out of our rut and tackle new projects with the same zest we have the old. That's our suggested New Year's Resolution: in the coming year, to try something new in Amateur Radio. Not necessarily something that's never been done before; that's asking a lot. We'll settle for something that is new *for you*. Set a challenging but realistic objective; involve your friends or members of your club, if possible; document your work, so you can share it with others and help them learn from your experiences. If you do, 1981 will be a banner year for you. If we all do, 1981 will be a banner year for Amateur Radio! — David Sumner, K1ZZ

# League Lines...

Just before the deadline for this issue, word came that SM7BAE had become the first station outside the U.S. to contact all 50 states on the 2-meter band. A late-November QSO with KØALL in North Dakota clinched the coveted prize for Kjell.

FCC has formally proposed a complete rewrite in "plain language" of the Amateur Rules. This complete overhaul, PR Docket 80-729, would also change the title of Part 97 to "The Amateur Telecommunications Services" and incorporate all known documented and existing FCC policies concerning the implementation of the rules. Details are in this month's "Happenings."

Yugoslavia and the United States have entered into an Amateur Radio reciprocal operating agreement. Requests for information on how U.S. amateurs visiting Yugoslavia may obtain operating permission may be sent to Savez Radio-Amatera Jugoslavije, P.O. Box 48, 11001 Belgrade, Yugoslavia.

A technical symposium will be held at the Capitol Hilton, Washington, DC, April 6, 1981, as one activity of the IEEE Vehicular Technology Society's Annual Convention. Papers from amateurs are invited; mobile topics are preferred but others will be considered gratefully. A letter of intent mentioning the topic should be sent in January to Paul Rinaldo, W4RI, 1524 Springdale Ave., McLean, VA 22101.

Effective January 1, 1981, the official traffic station appointment shall be known as "official relay station." This action was voted upon favorably by the ARRL field organization and approved by the executive committee. Details will appear on page 85 of this issue.

Do you still hold an unexpired secondary station call sign that you prefer to your primary station call sign? If you want to keep your secondary call you must file a form 610 to make it your primary station call sign before it expires. League hq. has learned of sad instances where hams have lost their highly valued 1X2 call signs because they were secondary call signs which had expired. FCC allows no grace period for an expired secondary call.

FCC used to assign secondary call signs for stations at locations other than the primary station location. Most of these call signs have gone the way of the dinosaur, but some hams still have them. However, once the license term runs out on a secondary call sign, it is lost. Secondary licenses cannot be renewed or modified, and unless a secondary call sign is requested as a primary call sign, it is lost.

Attention Hamfest/Convention organizers: Avoid scheduling conflicts. Major exhibitors who want to exhibit at major ARRL conventions don't normally have the staff to handle more than one major convention per weekend. Check with ARRL hq., where dates can be recorded for up to two years in advance.

The FCC has begun distribution of the August 1980 version of the FCC form 610. The new version is easier to use and covers all types of requests involving primary station and operator licenses. Details to follow in February QST.

Special Event Amateur Radio Station W9MEP will be operating from Tampico, Illinois, birthplace of Ronald Reagan, on Inauguration Day. Amateurs contacting W9MEP from 1700 UTC on January 20 to 0600 UTC January 21 will receive a commemorative certificate from the Sterling-Rock Falls Amateur Radio Society; please send a business-sized self-addressed stamped envelope. The station will be operating 80 through 10 meters phone in the low end of the General portion. Send your s.a.s.e. to Edward Fisher, K9APD, 506 Seventh Ave., Sterling, IL 61081.

Happy New Year! If you'd like to know what's in store for 1981, turn to the Operating Events and Conventions listing on page 48. Page 47 has the latest license renewal information, along with U.S. frequency and mode allocations. Cut out the page on the dashed line if you'd like to keep it handy throughout the year.

# Low-Cost Conversion of the Robot 400 to Color

Take an existing Robot 400, add another memory board and a simple encoder and you've got color SSTV!

By Dr. Don C. Miller,\* W9NTP



These "full-color" SSTV pictures were made by transmitting and receiving only two colors on 20 meters. Jack Berman, W1BGW, is the originator of two of these pictures while Ken Carpenter, WD5BRG, sent the picture of our colorfully feathered friend. Don Miller, W9NTP, supplied the photos of the pictures received at his station.

Over the years, I've experimented with many systems for transmitting color slow-scan television (SSTV). Several successful methods may be utilized, but many are too complicated for the average SSTVer to contemplate. It is for this reason that the conversion of a commercial scan converter was undertaken.

Color video is a complicated entity and has technical limitations even in fast-scan NTSC (National Television Systems Committee) systems. Slowed-down versions of the NTSC system are feasible and experimenters such as Mike Tallent, W6MXV, have spent considerable time working on them. After all areas were explored, it was decided that the best place to start in color SSTV was one which

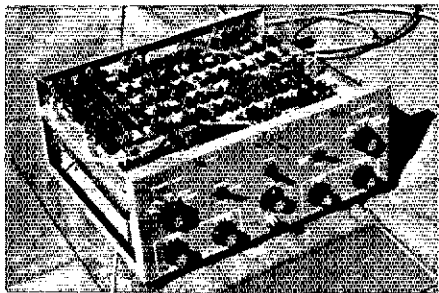
would get as many stations operational as easily as possible.

## Which Color System To Use?

Color TV pictures can be produced in a variety of ways. The most natural colors can be reproduced if three sources of video are provided whose images have been subjected to three filters which pass different spectral frequencies. Commercial color TV encoders encode these three simultaneous signals into a luminance signal (called the Y signal) and at least two color difference signals. Color pictures can also be produced using only two sources of video which have been derived from scenes viewed through two different spectral filters (filters different from those used in the three-color system). I have

color system. However, other considerations must be taken into account when assembling an SSTV station.

In many demonstrations of TV systems I've seen, the real problem of video transmission has not been addressed. Of course, color can be transmitted over three cables or over a radio propagation path using a bandwidth three times that of a black-and-white TV signal. For amateur use, cables are obviously out of the question and the wider transmission bandwidth is not permitted by FCC regulation, so some other method must be found. This leaves only two other possibilities. The first, quadrature modulation, is the most acceptable, but has not been sufficiently explored technically to produce a



The modified Robot 400. A second memory board has been mounted inside the scan converter. The toggle switch is mounted in the area formerly occupied by the Robot label. Portions of the NTSC encoder board (available from the author) and another memory board are also shown.

that of time multiplexing. In the early days of TV, field-sequential TV almost made it to our living rooms. Remember the CBS system? It was found that this system could be used for color SSTV since there is no problem with flicker and storage, for the images can be provided by means of digital memories. The price paid for using this transmission method is that more *time* is required, but bandwidth is conserved.

#### Where Do I Get A Color SSTV Camera?

In order to be practical, a system must not be too costly. The time-multiplexing system makes it possible to use a simple color camera exhibiting perfect registration and a high video signal-to-noise ratio with low light levels. Later, I'll discuss recent developments that make it possible to use a commercial color camera for color SSTV. The lowered prices on out-of-date, striped vidicon cameras now make this a desirable economic choice.

We start with an operating black-and-white Robot 400 SSTV system. The cost of converting the black-and-white camera is negligible. Two color filters are required. Cyan and magenta are best, but the color SSTVer should plan on experimenting with various color filters. Do not buy expensive filters unless you are a color expert. Inexpensive filters can be made from Christmas decoration material. A second memory board is obtained and installed in the Robot 400. The filters are alternately held in front of the camera lens while the two images are separately loaded and stored into the two memories of the converted Robot 400 digital scan converter. (Those who feel manual operation is too primitive can employ a color wheel.) A cyan picture is transmitted by holding the proper filter in front of the camera and pushing the "snatch" button. This picture can now be transmitted in the next 8 seconds. A magenta picture is then similarly stored and transmitted. (Such a system was demonstrated several years ago at the

Dayton Hamvention and created a sensation.) The total time of transmission is 16 seconds. (You can easily design a system in which the entire content of the two memories can be read out automatically, one field at a time). Practical considerations dictate that several transmissions of each color be made when using our crowded hf bands. This two-color system is not claimed to be superior to a three-color system, but the time of transmission is minimized and it is accomplished simply by modifying an existing piece of popular commercial equipment. Two additional memories cannot be placed into the cabinet of the Robot 400, but nothing should prevent the reader from adding one board inside and another outboard for future experimentation with the more-complicated quadrature or line-sequential system now under development.

#### Additional Memory Board Installation

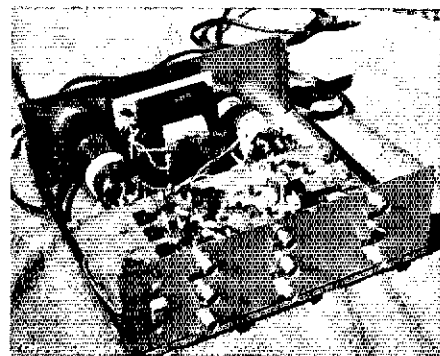
Performing this modification on a new unit will void the manufacturer's warranty. It will not hurt the resale value, however, because the connections are made either to the IC pins on top of the board or to the underside on the solder pads. If it is ever desired to restore the Robot 400 to its former appearance, it can be done in a few minutes without any scars. A modified '400 is shown in the photograph.

Step-by-step instructions for the procedure are not given here. The board, complete wiring diagrams, and other details are available at cost from the author.<sup>1</sup> Readers in foreign countries may find it practical to write for the negative artwork.

It is necessary that the reader understand the principle of the addition of the second memory. A block diagram is shown in Fig. 1. The timing circuitry of the Robot 400 remains unaltered. All that has been done is to add a complete 8-K (65,536 bit) memory that is multiplexed with the original memory in the scan converter. Examination of the original schematic diagram of the memory will show that certain designations such as CHIP ENABLE, CHIP SELECT, DATA IN and WRITE are the important inputs to the memory. The outputs need be multiplexed so that each memory can be fed through the slow-scan fm oscillator. In order to make sure that the loading is not exceeded, the inputs to the two memories were isolated by buffers. Input data is fed to both memories in parallel and the WRITE lines are provided with a separate driver so that the multiplexing function can be performed easily without fear of loading problems.

If desired, the new fast scan output of the added memory board can be brought out to an output jack installed on the back panel of the Robot. Several output jacks

<sup>1</sup>Notes appear on page 13.



A completed NTSC color encoder. It features both a composite video output and an rf output for attachment to the antenna terminals of any color television set.

already present are rarely used, so it is possible to modify and use one of these without making any additional holes in the back panel.

Removing the Robot label from the front panel exposes two holes. These are used to mount a red and a green LED indicator. A small switch is mounted between these two LEDs. The operator loads the picture into the memory of choice by toggling this switch. The slow-scan information outputs through an analog IC switch under transmit conditions. Again, the position of the small switch between the red and green LEDs determines which color is being transmitted through the internal 4066 analog switch.

#### Monitors and an Encoder

When I first designed this modification, the system operated with three memories. It immediately became apparent that some method of viewing the color image would be needed — an RGB (red, green, blue) monitor. For those of you not familiar with this type of color monitor, it is one which has direct inputs to each of the three color guns. What is stored in each of the memories is fed directly to the correct gun. The only other alternative is to build an NTSC encoder to permit display on an NTSC monitor.

Again, a problem of economics comes up; both the RGB and NTSC monitors are expensive. The encoded monitor is more obtainable now since fast-scan video tape recorders (VTRs) are generally available, but a closer look will show that most home-type VTRs output rf to an existing television set tuned to a particular TV channel. Fortunately, the 1889 IC has become available and that seems to solve all the problems. Fig. 2 is a schematic diagram of an NTSC encoder which was inspired by another circuit.<sup>2</sup> This encoder has three inputs. Each input is clamped to the black level and fed to the encoder chip. It is not necessary to have clamping for the scan converter (Robot

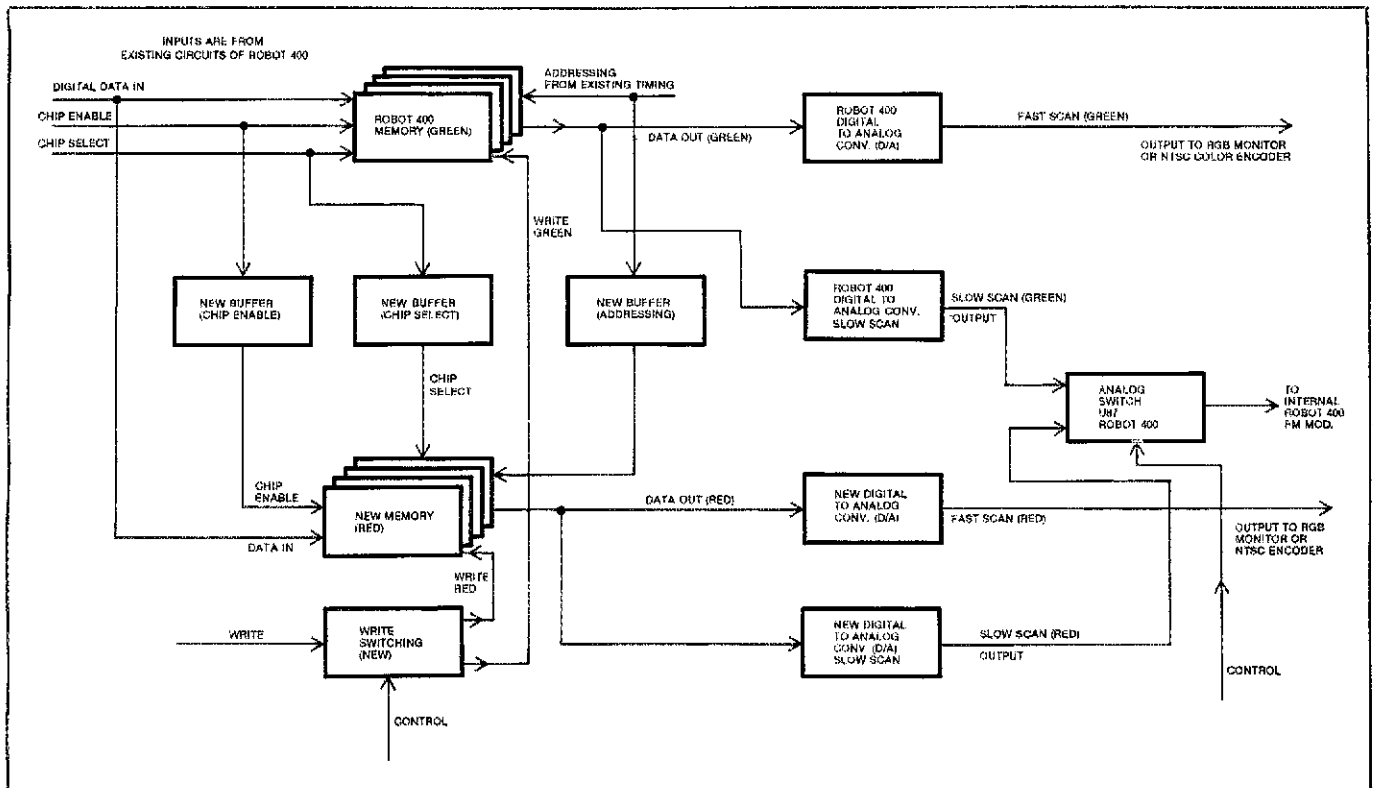


Fig. 1 — A block diagram of the Robot 400 two-color SSTV conversion.

conversion), but if inputs from three black-and-white cameras for color or overlays are to be used, it is necessary to ensure that the black levels are equal. I recommend that the clamping be retained.

The encoder board is placed in a separate box; it isn't needed if an existing TV set is modified for RGB inputs. An inside view of the encoder is shown in the photograph.

The NTSC system requires that each of the three signals supplied have a ratio of 0.59/0.3/0.11 to give the proper color fidelity; the resistors in the encoder perform this task. The output of the 1889 IC is either a video signal or a modulated rf signal at a television channel frequency chosen by the constructor (usually channel 2 or 3).<sup>3</sup>

The foregoing assumes that the encoder will have three inputs to encode. Our Robot 400 conversion has only two outputs. I found that the color blue is not very important in a TV picture. In some cases, it can be added as "dc." Experiments have been conducted combining some red and green and using this for the blue signal; the encoder board performs that function.

Much of the accuracy of color reproduction depends upon the filters used at the transmitting station as well as the adjustment of the receiving station color receiver circuitry. No standardized levels

yet exist among color SSTVers. Remember how the spacecraft pictures of Mars were standardized by sending back a picture of the American flag on part of the spacecraft? This same method is used by SSTV operators. Pick a subject that has colors familiar to the receiving operator and include this as a part of your overall picture. You'll be surprised at the accuracy of the reproduction.

### Summary

The future still holds the possibility of many improvements. With the availability of fast-scan color cameras, it is now possible to feed the output of your color camera into a color TV receiver through an rf encoder and modify the TV set to have RGB outputs. These three outputs can be connected to two or three memory scan converters. This provides "frozen" color SSTV shots. With the filter method, only still subjects may be used because of the time delay encountered between the filter positioning when loading the memories.

The 16- or 24-second transmission time is the one remaining problem. This may be solved by remembering that only the Y, or luminance, channel need have high resolution in any system, fast- or slow-scan TV. With the two-memory conversion just described, one memory can be loaded with the 128 × 128-line resolution

luminance signal and the other memory with a 64- × 128- or 128- × 64-line color picture of the R-Y and B-Y information. This makes the difference colors only half the resolution of the luminance channel. The receiver can accept the two transmissions and demultiplex them over a 16-second interval for a three-color image or the sender can encode them into a quadrature system not unlike the 3.58 MHz system used for fast scan. The frequencies would be scaled down for slow-scan transmission. This last system would provide three-color SSTV in an 8-second time frame.

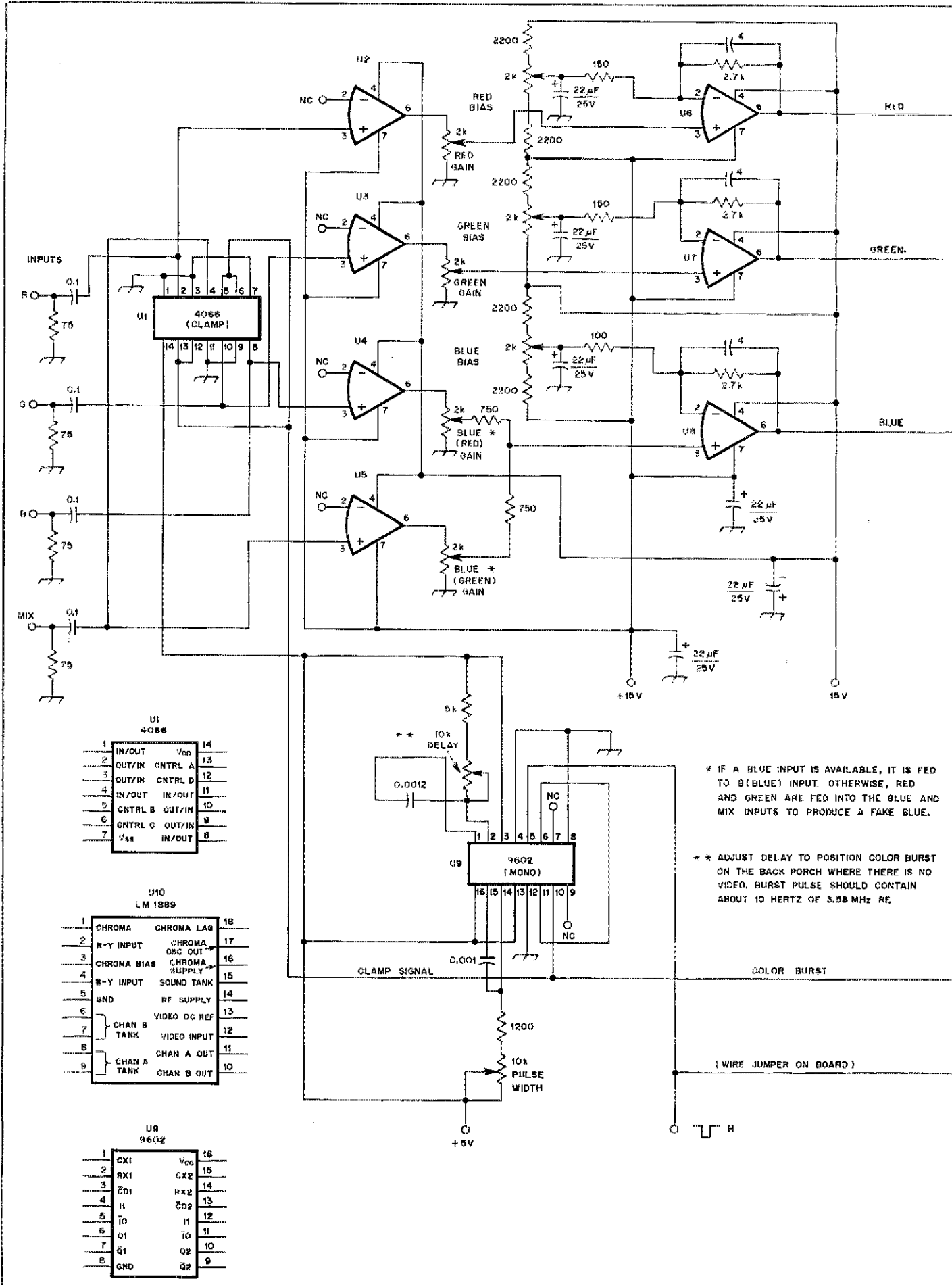
I regularly operate the SSTV net that meets each Saturday on 14.230 MHz at 1800 UTC. Call in and start looking at the transmissions of *color* SSTV!

### Notes

<sup>1</sup>[Editor's Note: The ARRL and *QST* in no way warrant this offer.]

<sup>2</sup>Trotter and Matic, "Signal Encoder Generates Composite Color," *Electronic Design Notes*, August 20, 1978.

<sup>3</sup>[Editor's Note: A device which produces a video-modulated, radio-frequency carrier on frequencies allocated for television broadcasting is defined in §15.4(m) as a Class I TV device, and requires FCC type approval before it can be used. Type-approval procedures are described in Subpart J of Part 2 of the FCC rules. Technical specifications for a Class I TV device are given in §§15.401 to 15.423 of the rules. An alternative to type approval might be obtaining Special Temporary Authority for operation in a unique type of station under §15.2(b) of the rules. Docket 79-244 proposes to relax these requirements.]



**U1  
4066**

1	IN/OUT	V <sub>DD</sub>	14
2	OUT/IN	CNTRL A	13
3	OUT/IN	CNTRL D	12
4	IN/OUT	IN/OUT	11
5	CNTRL B	OUT/IN	10
6	CNTRL C	OUT/IN	9
7	V <sub>SS</sub>	IN/OUT	8

**U10  
LM 1889**

1	CHROMA	CHROMA LAG	18
2	R-Y INPUT	CHROMA	17
3	CHROMA BIAS	OSC OUT	16
4	R-Y INPUT	CHROMA SUPPLY	15
5	⊘ND	SOUND TANK	14
6	⊘ND	RF SUPPLY	13
7	CHAN B TANK	VIDEO DC REF	12
8	CHAN A TANK	VIDEO INPUT	11
9	CHAN A TANK	CHAN A OUT	10
		CHAN B OUT	

**U9  
9602**

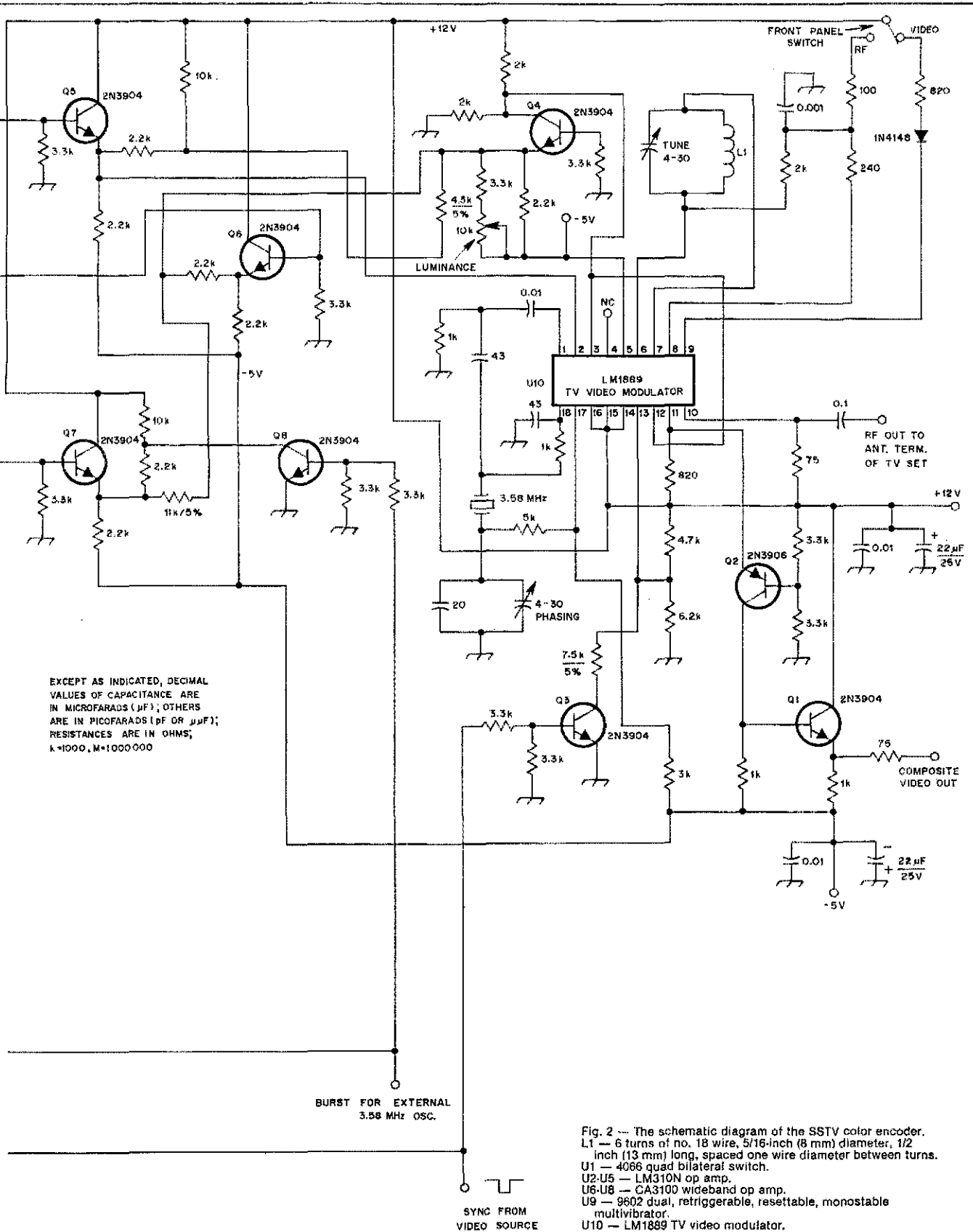
1	CX1	V <sub>CC</sub>	16
2	RX1	CX2	15
3	⊘D1	CX2	14
4	⊘1	⊘D2	13
5	⊘0	⊘1	12
6	⊘1	⊘0	11
7	⊘1	⊘2	10
8	GND	⊘2	9

\* IF A BLUE INPUT IS AVAILABLE, IT IS FED TO B (BLUE) INPUT. OTHERWISE, RED AND GREEN ARE FED INTO THE BLUE AND MIX INPUTS TO PRODUCE A FAKE BLUE.

\*\* ADJUST DELAY TO POSITION COLOR BURST ON THE BACK PORCH WHERE THERE IS NO VIDEO. BURST PULSE SHOULD CONTAIN ABOUT 10 HERTZ OF 3.58 MHz RF.

[ WIRE JUMPER ON BOARD ]





# Heat Sinks†

Buying an air conditioner for your solid-state rig? Perhaps all you need is a correctly sized heat sink. At last, heat-sink design theory revealed!

By G. C. Oxley,\* G8MW

The rating of all electrical equipment is determined by its working temperature. If the apparatus gets too hot then insulation may catch fire or melt, conductors expand and semiconductor junctions can be destroyed. In the specific case of semiconductors the device is usually kept cool by using a heat sink. Keeping the temperature of semiconductor devices within the specified limits is also important because their operating characteristics alter with changes in temperature. This is particularly important with Zener diodes, Class B amplifiers and temperature-limited voltage regulators.

The heat sink loses heat to its surroundings by convection, radiation and conduction. Mounting the heat sink vertically, so as to give as good a flow of air as possible, will help the convection of heat. The larger the volume of metal, the more heat it will absorb; but the most important factor is the surface area of the heat sink. This area can be increased by adding "radiating" fins. When natural convection takes place the rate of heat loss in a constant-temperature enclosure is proportional to  $\theta^{1.2}$  where  $\theta$  is the temperature excess over the surroundings. Loss of heat by radiation can be enhanced by painting the heat sink matte black or by anodizing.

A rough comparison of the ability of some metals to conduct heat is given in Table 1. When cost and ease of working are considered, aluminum comes out best; but copper, zinc and brass can all be used,

and these metals are easily soldered (plumbers' solder). The working temperature of the device and the power that it needs to dissipate must be known before a heat sink can be designed. Considerations of cost, weight and space will require the size of the heat sink to be kept to a minimum.

The opposition to a body losing heat is called its thermal resistance. This is usually denoted by  $\theta$  and is expressed in  $^{\circ}\text{C}/\text{watt}$ .

Rectifier diodes, large Zener diodes and transistors dealing with more than about 0.5 W are often provided with heat sinks in order to achieve a higher power output. A rule-of-thumb value for the working temperature of silicon junctions is approximately  $150^{\circ}\text{C}$ , and for germanium junctions  $75^{\circ}\text{C}$ .

The rating of rectifier diodes is often

Table 1

## Heat Conductivity of Some Metals

Silver (Ag)	100	Brass	25
Copper (Cu)	80	Iron (Fe)	15
Aluminum (Al)	40	Lead (Pb)	8
Zinc (Zn)	30		

related to the temperature of the stud (bolt)  $T_s$ . Fig. 1 shows that the output current of this diode must be halved if the temperature  $T_s$  rises from  $50^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ .

## Examples Using Diodes and Voltage Regulators

A rectifier diode has a forward voltage drop of 1 V when delivering a current of 5 A. The stud temperature must not exceed  $80^{\circ}\text{C}$  when the rectifier is dissipating 5 W. Let the air (ambient) temperature

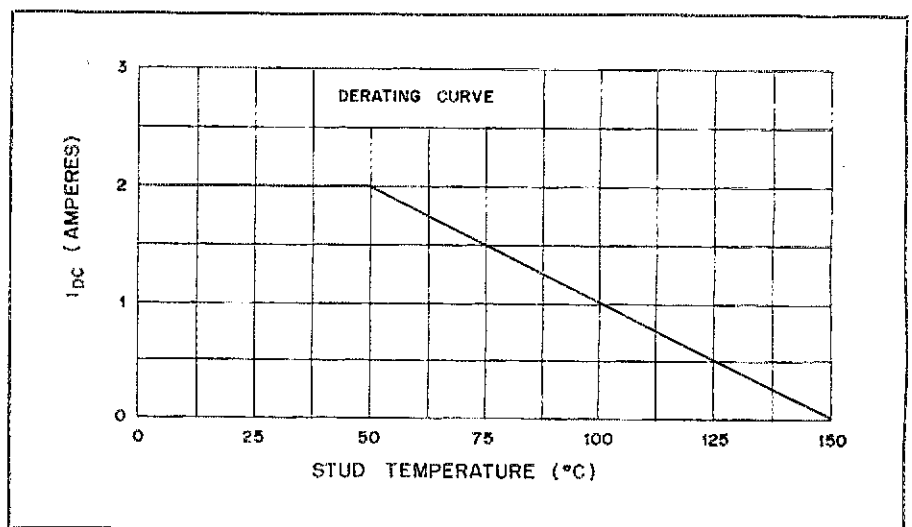


Fig. 1 — Diode rating related to stud temperature.

\*Osterwald, Littlemoor, Ashover, Chesterfield, Derbyshire, England

†Adapted from an article of the same title in *Radio Communication* (RSGB), December 1978.

\*References appear on page 18.

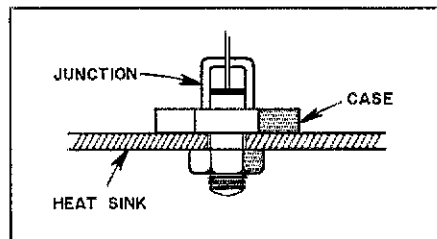
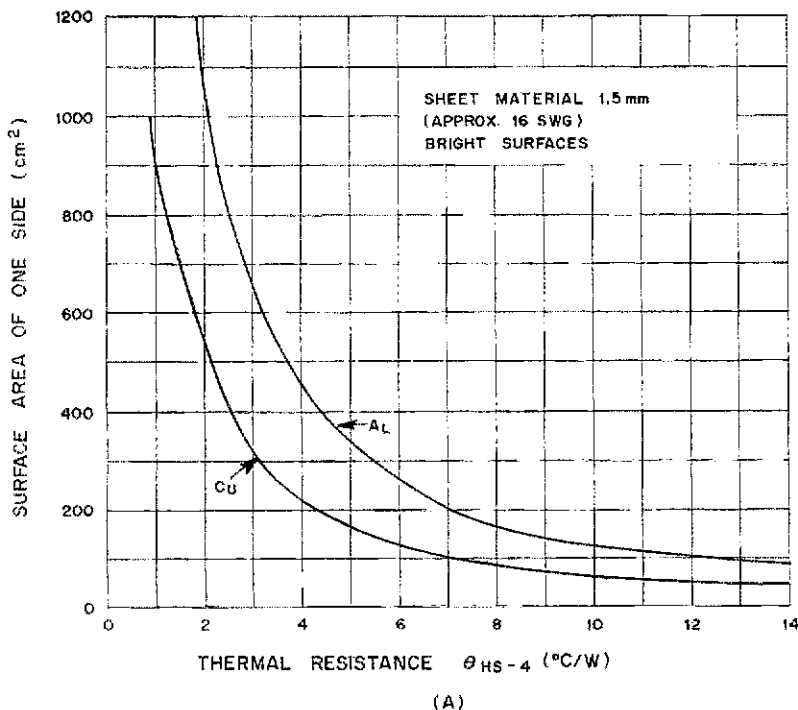


Fig. 3 — Diode rectifier mounted on heat sink.

inside the rectifier compartment be  $T_A = 50^\circ \text{C}$ , then

$$\frac{T_s - T_A}{P_D} = \frac{80^\circ - 50^\circ}{5W} = 6^\circ \text{C/W}$$

From the curves, Fig. 2, an aluminum heat sink would need to be approximately 260 cm<sup>2</sup> in area of one side. The dimensions of a square heat sink would be  $\sqrt{(260/2)}$  by  $\sqrt{(260/2)} = \sqrt{130}$  by  $\sqrt{130}$ , and a 12-cm by 12-cm piece of 1.5-mm aluminum sheet would be suitable. Painting the sheet with matte black paint would give an added safety margin of about 20 percent.

Manufacturers often draw heat-sink characteristics on logarithmic graph paper, the result being nearly a straight line. Fig. 2A shows the rapid increase in area needed as the thermal resistance falls below 5° C/W or so, while Fig. 2B shows that the area and material become of less importance above 30° C/W.

Fig. 3 shows a diode rectifier mounted on a heat sink. Heat must be conducted away from the junction to the case, and this path has a thermal resistance of  $\theta_{J-C}$ ° C/W. From the case to the heat sink the resistance is  $\theta_{C-H}$ , and from the heat sink to the surroundings  $\theta_{HS-A}$ . Adding these together:

$$\theta_{J-A} = \theta_{J-C} + \theta_{C-HS} + \theta_{HS-A}$$

The same conditions apply also to transistors and voltage regulators. Compact and cheap voltage regulators are now available, and best results are obtained by using adequate heat sinks.

For a regulator required to supply 3 A at 12 V, the input voltage will be about 14.5 V, but to allow for ac line voltage variations, and transformer and rectifier tolerances, this input may reach 17 V. At maximum output the regulator must dissipate  $5 \times 3 = 15 \text{ W}$ . If  $T_A = 50^\circ \text{C}$  and  $T_j = 150^\circ \text{C}$ :

$$\theta_{J-A} = \frac{150^\circ - 50^\circ}{15W} = 6.7^\circ \text{C/W}$$

$$\theta_{J-C} + \theta_{C-HS} + \theta_{HS-A} = 6.7^\circ \text{C/W}$$

$$\theta_{HS-A} = 6.7 - \theta_{J-C} - \theta_{C-HS}^\circ \text{C/W}$$

The manufacturer of one such regulator gives the value of  $\theta_{J-C}$  as 3° C/W. A figure for the value of  $\theta_{C-HS}$  can range from 0.1° C/W to 0.5° C/W, depending

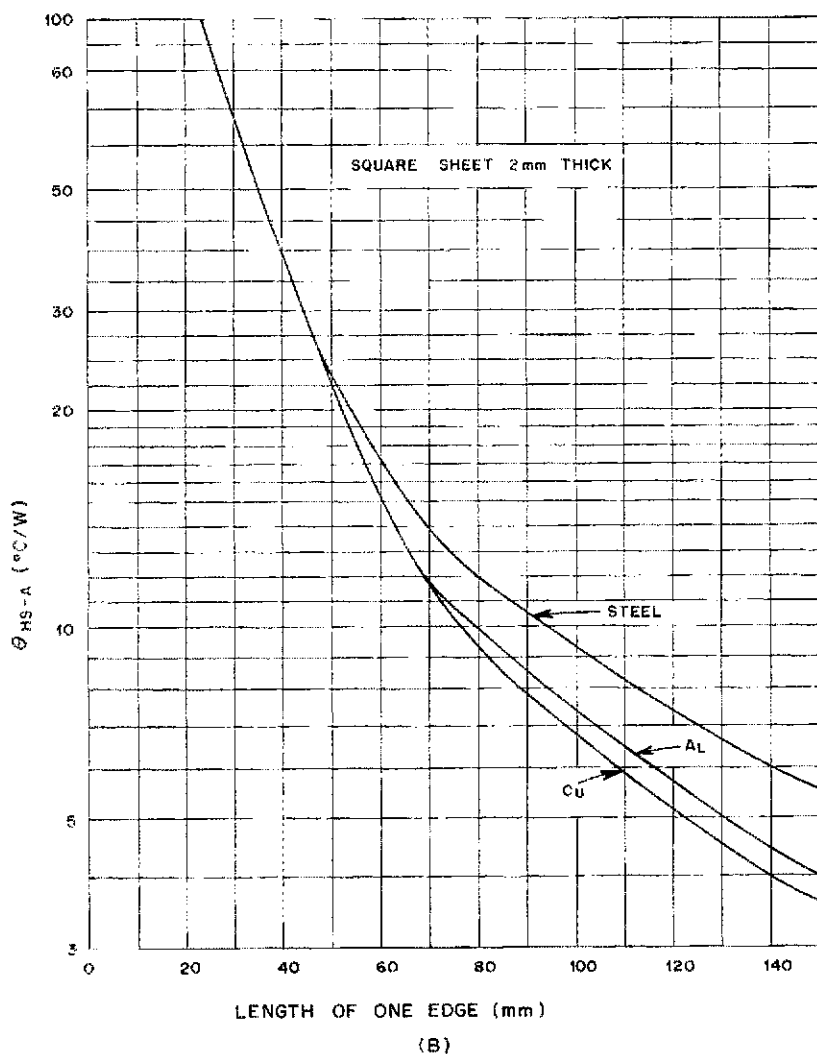


Fig. 2 — At A, thermal resistance related to surface area. At B, graph showing reduced importance of area and material at higher thermal resistance.

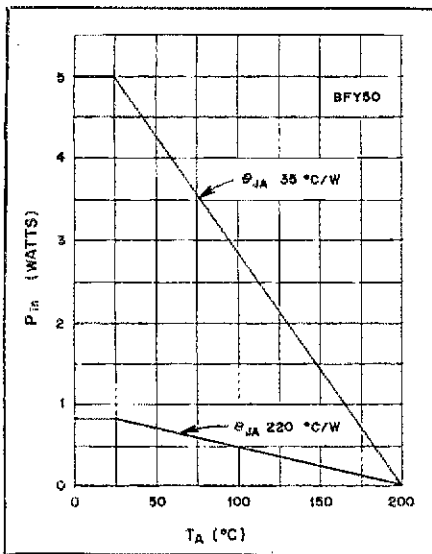


Fig. 4 — Derating curves of a BFY50.

on whether an insulating washer and bushings are used and upon good surface contact, aided by a thermal compound such as silicone grease. If a figure of  $0.3^{\circ}\text{C/W}$  is chosen:

$$\theta_{\text{HS-A}} = 6.7 - 3 - 0.3 = 3.4^{\circ}\text{C/W.}$$

From Fig. 2, an aluminum plate approximately 17-cm square would be suitable as a heat sink.

### Examples Using Transistors

*BFY50 [equivalent to 2N1613 — Ed.]:* If the temperature of the case can be kept below  $100^{\circ}\text{C}$  then the power dissipated can be 2.86 W.  $\theta_{\text{J-A}}$  is quoted as  $220^{\circ}\text{C/W}$ .

$$P_D = \frac{T_J - T_A}{\theta_{\text{J-A}}} = \frac{220^{\circ} - 25^{\circ}}{220^{\circ}\text{C/W}}$$

$$= \frac{175}{220} = 0.8\text{W}$$

This is the power which a BFY50 will handle in surroundings having a temperature not exceeding  $25^{\circ}\text{C}$ . The derating curves are given in Fig. 4. Let the power dissipated be 2 W.

$$\theta_{\text{HS-A}} = \frac{200^{\circ} - 50^{\circ}}{2\text{W}} - \theta_{\text{J-C}} - \theta_{\text{C-HS}}$$

$$= 75 - 35 - 1 = 39^{\circ}\text{C/W}$$

Because this transistor has a TO-5 can, a rather higher figure is chosen for  $\theta_{\text{C-HS}}$ . Note case is connected to collector.

*BLY85, vhf transistor [equivalent to 2N5589 — Ed.]:* Let  $P_D = 5\text{W}$

$$\theta_{\text{J-A}} = \frac{150^{\circ} - 50^{\circ}}{5\text{W}} = 20^{\circ}\text{C/W}$$

$$\theta_{\text{HS-A}} = 20 - \theta_{\text{J-C}} - \theta_{\text{C-HS}}$$

$$= 20 - 12.5 - 0.5 = 7^{\circ}\text{C/W.}$$

The data sheet gives  $R_{\text{th(J-mb)}}$  instead of  $\theta_{\text{J-C}}$ . The term "mounting base" is used instead of "case." The torque applied to the nut on the fixing stud is quoted as between  $7.5\text{ kg/cm}$  and  $8.5\text{ kg/cm}$ . Tight, but not too tight.

### Practical Considerations

A typical manufactured heat sink is shown in cross section in Fig. 5. Data supplied by the manufacturer indicates that a 100-mm length has a thermal resistance of  $2.1^{\circ}\text{C/W}$ , with the fins vertical in free air. For a length of 100 mm the performance is shown in the graphs of Fig. 6. For a dissipation of 25 W with  $T_{\text{HS}} - T_A = 50^{\circ}\text{C}$ ,

$$\theta_{\text{HS-A}} = \frac{50}{25} = 2^{\circ}\text{C/W.}$$

Care should be taken to make sure that the surface of the heat sink is as smooth and flat as possible. Apply the correct fixing pressure to the securing nuts and bolts, and use a thermal conducting grease. When no insulating washers are needed use bolts or screws which fill the fixing holes and use flat washers under the nuts. If the heat sink must be mounted horizontally its size should be increased by a factor of 1.3.

### Home-Made Heat Sinks

Details are given in the handbooks. Copper-clad board can be used; if clad on both sides, the copper should be bonded. Transistors with TO-5 cans are best sunk into an 8.5-mm diameter hole drilled into the sink. Aluminum or brass vanes from old tuning capacitors, as well as discarded aluminum sole-plates of smoothing irons, can be adapted.

The writer wishes to thank Marston Excelsior Ltd., STC, Texas Instruments, Lambda Electronics and Mullard for technical information.

### References

- Hall, "How to Solve Transistor Heat Sink Problems," *Ham Radio*, January 1974.
- Kennedy, "Low-power Transistor Transmitter," *Wireless World*, October 1968.

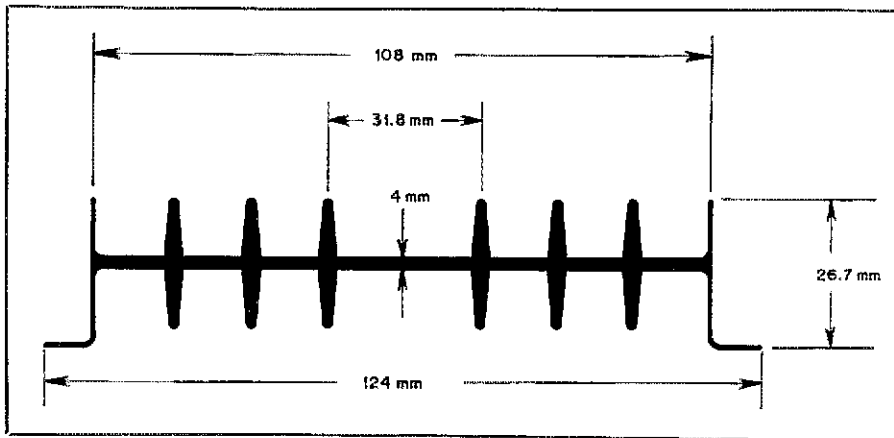


Fig. 5 — Cross-section of a manufactured heat sink.

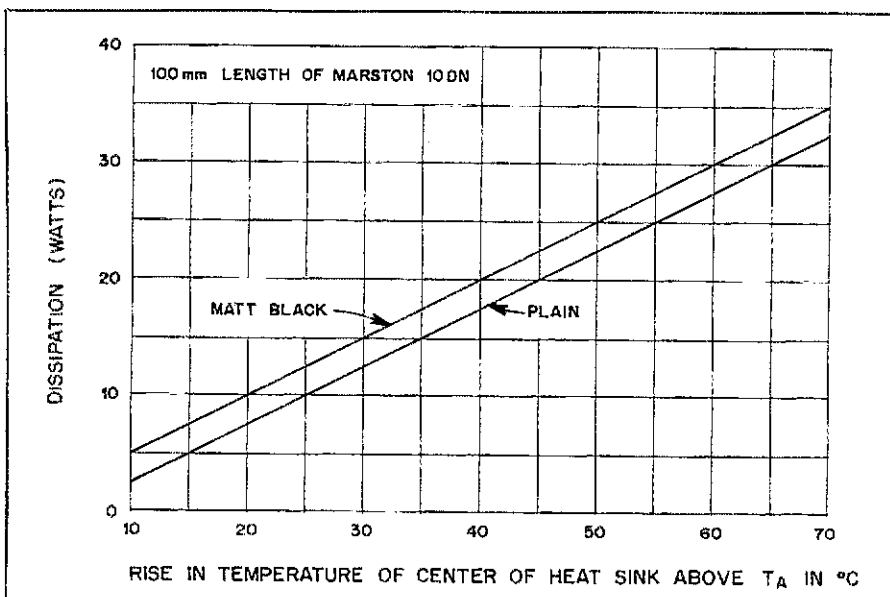
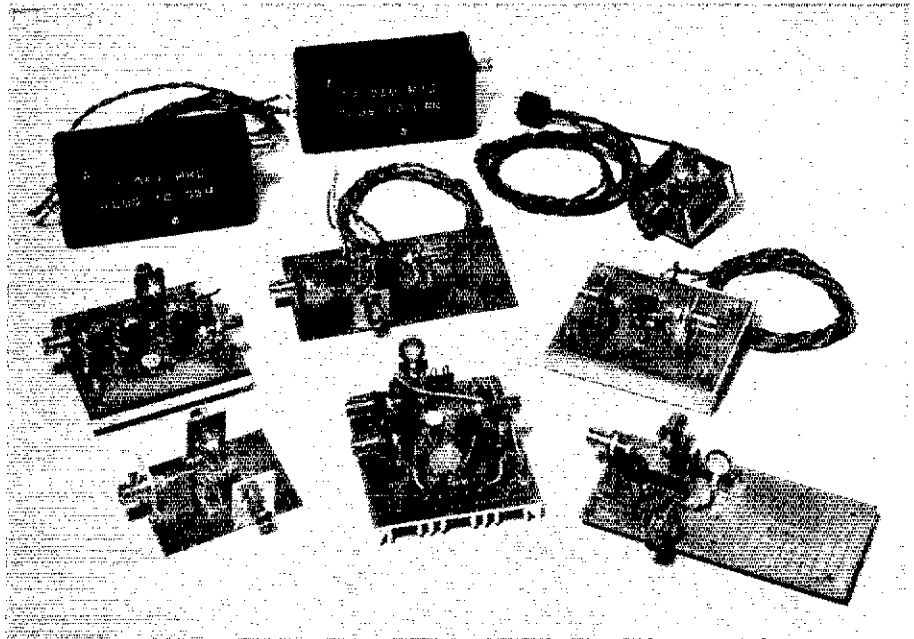


Fig. 6 — Performance graph of a manufactured heat sink, 100-mm length.

# Modern Receiver Mixers for High Dynamic Range



The VMP4 VMOS offers a new approach to mixer design. For quality communications equipment it provides improved port-to-port isolation and relatively high immunity to strong in-band and out-of-band signals.

By Doug DeMaw,\* W1FB and George Collins,\*\* ADØW

Designers and users of modern communications receivers and transmitters are necessarily interested in high dynamic range and port-to-port isolation in the mixer stages of the equipment. A quality communications receiver for medium- or high-frequency band use will exhibit high dynamic range in order to provide relative immunity to strong in-band or out-of-band signals. Furthermore, the system should be relatively free of spurious responses that cause "birdies" across the receiver tuning range.

Acknowledging the importance of gain distribution and noise figure in the early stages of a receiver, we concentrate, therefore, on the mixer performance. In a typical quality design of the day we try to ensure a "crunch-proof" status for the rf amplifier, mixer and post-mixer amplifier. For the most part, this requires that each of those stages be capable of handling a substantial amount of signal power without gain compression or undue IMD

products being generated. It is not unusual to find a VMOS power FET or a large CATV (cable television) type of bipolar transistor being used as an rf amplifier ahead of the mixer. A VMP4 VMOS device or a 2N5109 bipolar transistor can be used to obtain high dynamic performance in an rf amplifier. The same or similar devices are often used as post-mixer broadband amplifiers in high-performance communications receivers.<sup>1,2</sup>

Our objective is to select a mixer that has sufficient port-to-port isolation to minimize the effects of LO energy appearing in the mixer output. Similarly, the signal energy should be well suppressed at the remaining ports of the mixer. Furthermore, if the mixer requires a high level of LO power to provide optimum performance, difficulty may be encountered in keeping the LO energy isolated from the other circuits in the receiver. Our choice, therefore, must be one that involves a minimum amount of trade-offs while en-

suring good mixer performance.<sup>3</sup>

## Mixer Options

The choice between passive and active mixers in a given design should be based on performance objectives, with consideration of the circuitry that precedes and follows the mixer. A singly or doubly balanced mixer is preferable to a single-ended mixer in the interest of isolation between the ports. The doubly balanced version will afford the best performance in that respect.

The active mixer will yield conversion gains of less than unity to as great as 20 dB, depending upon how it is used. Perhaps the least acceptable of the better mixer options is a pair of small-signal, dual-gate MOSFETs of the 40673 family. Many communications receivers use such devices in a broadband, singly balanced arrangement. Although this may be cost-effective to the manufacturer, high dynamic range will be hard to achieve without a sacrifice in noise figure at the higher frequencies. If an rf amplifier is used to improve the noise performance, care must be taken to keep the gain only

\*Senior Technical Editor, ARRL  
\*\*Laboratory Supervisor

<sup>1</sup>References appear on page 23.

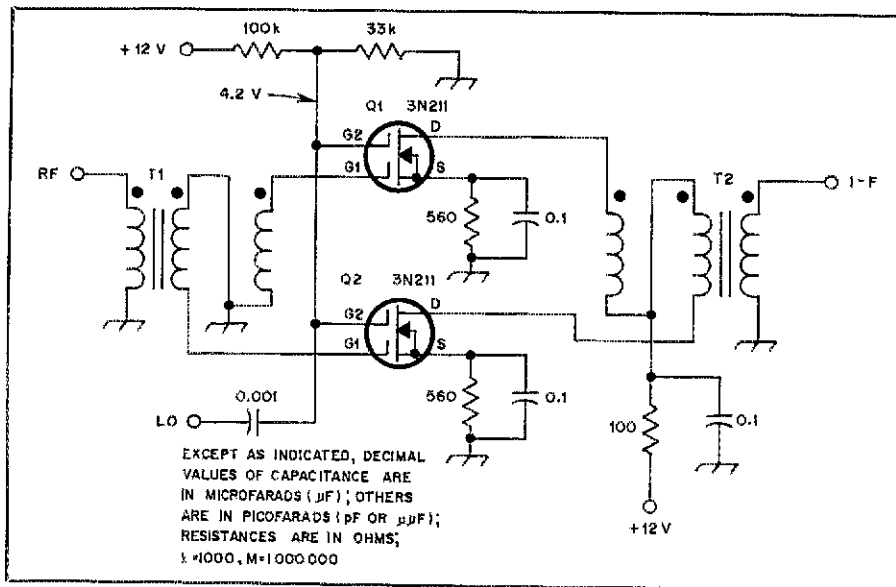


Fig. 1 — Reference mixer that uses small-signal dual-gate MOSFETs in a broadband, singly balanced setup. Conversion gain is  $-5$  dB because of the low terminal impedances and broadbanding. With an LO injection of 8 volts pk-pk and an input signal level of  $-10$  dBm PEP, the third-order output intercept is  $+17$  dBm. Gate bias and LO injection has been optimized. Narrowbanding and careful impedance matching would yield conversion gains up to  $+15$  dB.

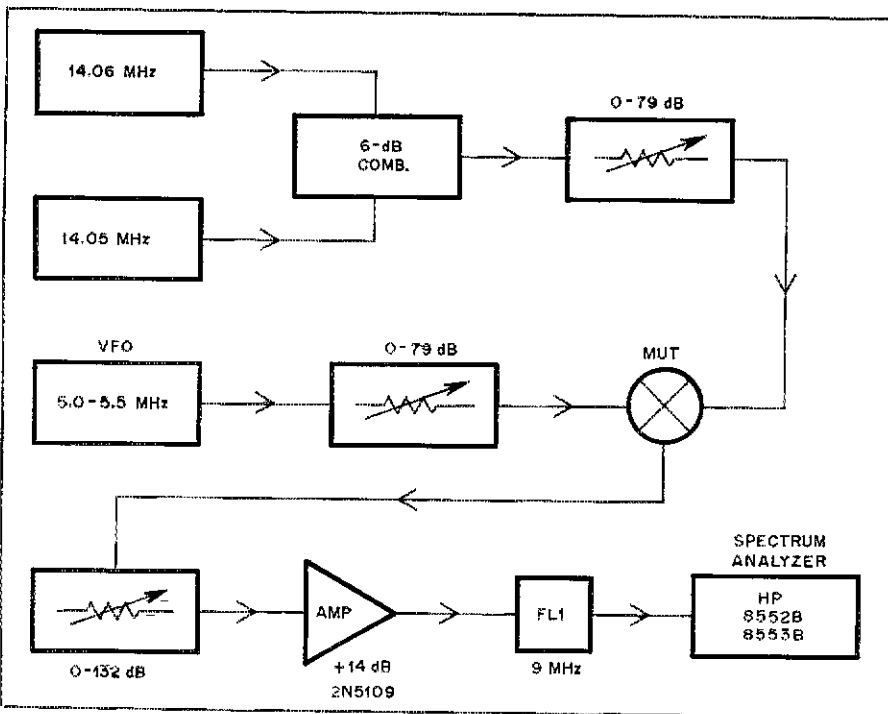


Fig. 2 — Block diagram of the test fixture used in evaluating the mixers treated in this article.

high enough to ensure the desired receiver noise figure. Too much gain will cause the mixer to collapse in the presence of strong signals. Most receivers that use small-signal FETs in a singly balanced scheme (Fig. 1), and with a MOSFET rf amplifier ahead of the mixer, exhibit an IMD characteristic of 80 to 85 dB if the design has been done with care. A gain compression of 1 dB occurs between 115 and 125 dB on the average, referenced to the receiver MDS (minimum discernible

signal). A receiver with these characteristics might be entirely acceptable in some signal environments. But much greater dynamic range is necessary in high signal-density locations, such as shipboard and in large communications centers where transmitters are operating on several frequencies simultaneously.

Active mixers can be valuable in terms of conversion gain, with narrow-band types yielding the higher gain figures. The usual trade-off between bandwidth and

gain must be accepted when using broadband mixers. The amount of conversion gain desired will depend on the filter losses before and after the mixer, and the available overall gain after the mixer.

Passive mixers of the diode-ring, doubly balanced variety are capable of excellent dynamic range and port-to-port signal isolation. The shortfall is, of course, fairly high LO power requirements ( $+7$  to  $15$  dBm) and a conversion loss on the order of 8 dB. It is almost mandatory to employ an rf amplifier ahead of the diode-ring mixer to provide a low noise figure. A diplexer may be used after the mixer to ensure a 50-ohm termination at all frequencies, thereby aiding the IMD characteristic.<sup>4</sup> If the i-f filter has a high insertion loss (10 dB for most mechanical filters), a post-mixer, large-signal amplifier is worthwhile. It can be terminated by a 50-ohm pad of specified attenuation to ensure a constant load and to protect the i-f filter from damage when very high signal levels are present at the receiver input.

It is apparent from the foregoing discussion that a lot of decision making is necessary when deciding what mixer to use. Whatever the choice is, high dynamic range should be the criterion. This can be achieved with passive or active mixers. The remainder of this article addresses various mixers and their performance characteristics. The laboratory test procedure used by the authors is also discussed.

#### Mixer Evaluation Method

Two-tone tests of the various mixers were performed with a signal separation of 10 kHz at 14.050 and 14.060 MHz. A  $+8$  dBm output level was available from each spectrally clean, crystal-controlled generator. A 6-dB combiner followed the two generators. Output from the combiner was routed through a Tektronix 2701 attenuator (0 to 79 dB), then to the mixer under test (MUT).

LO power was generated by a Frio-Kenwood 5-MHz VFO, to which filtering and additional amplification was added. The LO source delivered  $+16$  dBm. A second Tektronix 2701 attenuator was connected between the LO source and the MUT LO port.

I-f output from the mixers was routed through an HP 355C/D attenuator (0 to 132 dB) to a broadband class A 2N5109  $+14$ -dB amplifier which had a  $+40$  dBm output intercept. A 2.4-kHz bandwidth KVG 4-pole crystal-lattice filter with an IL (insertion loss) of  $-5$  dB followed the post-mixer amplifier. Output from the filter was supplied to an HP 8553/8552B spectrum analyzer through a 500- to 50-ohm matching transformer. Other broadband transformers were used to provide a proper interface between the test modules and MUTs. Those transformers are not shown in the test-setup block

diagram of Fig. 2. A 7-pole, T-section Chebychev low-pass filter was used at the output of the 2N3866 broadband post-LO amplifier to ensure that all LO harmonics were 70 dB or greater below peak LO output.

### Plessey SL6440C IC Mixer

A recent product to the IC market is the Plessey SL6440C programmable high-level mixer. It is advertised as having a +30 dBm output intercept point and a +15 dBm compression point (1 dB). The internal circuit of the IC had not been revealed at the time this article was written, but it is presumed that the inner workings are not too unlike those of the Motorola MC1496G, with the exception of greater dissipation capability for the SL6440C. The manufacturer rates the mixer as having a -1 dB (typical) conversion gain when the IC is terminated in 50 ohms. In our tests a 200-ohm termination was used at the input and output of the IC, yielding a conversion gain on the order of +8 dB maximum.

Fig. 3 contains the circuit of the SL6440C as it was configured for laboratory analysis. R1 was used to adjust the quiescent current of the mixer. Table 1 shows the test results at various LO and signal-input levels. The spectral displays of Fig. 4 show the LO and LO harmonics to i-f-port isolation (A). With 0 dBm of LO input power the isolation was 29 dB. The 2f LO isolation was measured at -72 dB.

Spectral photograph B of Fig. 4 shows the rf port to i-f port isolation as being 48 dB when the LO level was 0 dBm and the rf-input level was -10 dBm, PEP. Photograph C is the two-tone output of the mixer. Table 2 contains data on conversion gain, intercept numbers and port isolation with various  $I_p$  amounts. These data were compiled with an LO injection of 0 dBm and an rf input of -5 dBm.

One might conclude from the foregoing test results that the Plessey SL6440C is indeed a worthy device which is capable of providing high dynamic range without conversion loss. The  $I_p$  values used in these tests were the maximum safe levels

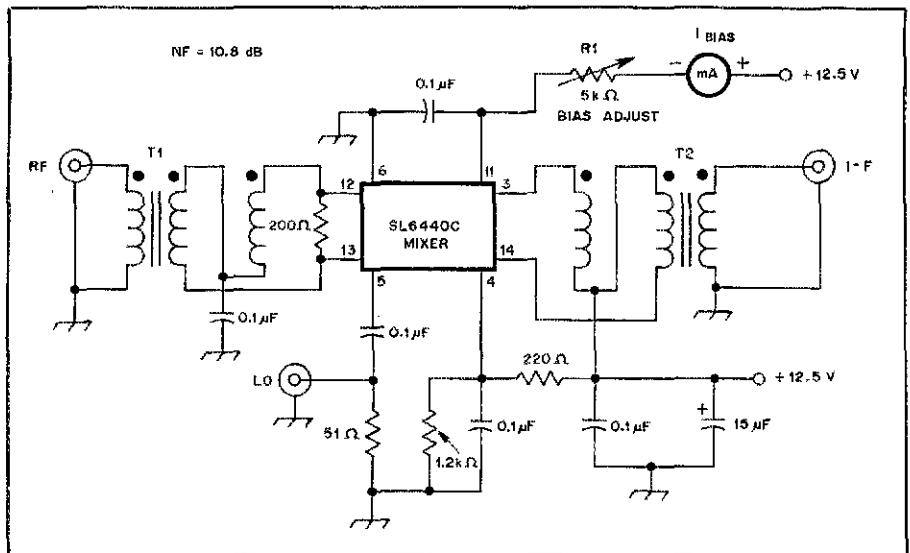


Fig. 3 — Test circuit for the Plessey SL6440C mixer IC.

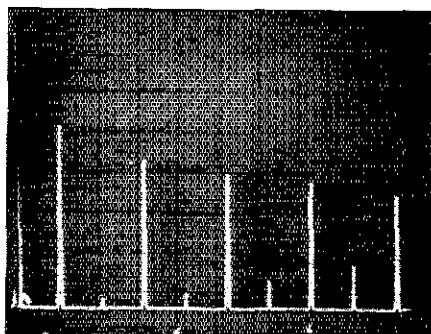
**Table 1**  
Test Results at Various LO and Signal-Input Levels

LO Level (dBm)	Input Level (PEP, dBm)	Third-Order Output Intercept (PEP, dBm)	Conversion Gain (dB)
0	+3	24	7
0	0	29	8
0	-5	31	8
0	-10	31	8
0	-15	29	8
-3	+3	25	7
-3	+1	28	8
-3	0	29	8
-3	-5	30	8
-3	-10	31	8
-3	-15	30	8
-10	+2	23	7
-10	0	29	8
-10	-5	31	8
-10	-10	31	8
-10	-15	29	8
-15	+2	25	7
-15	0	29	8
-15	-5	31	8
-15	-10	31	8
-15	-10	31	8
-15	-15	29	8

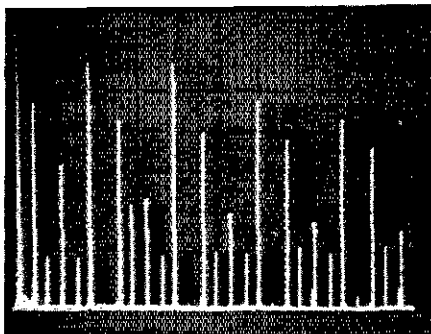
**Table 2**  
Data on Conversion Gain, Intercept Numbers and Port Isolation

$I_p$ Current (Pin 11, mA)	Conversion Gain (dB)	Third Order Output Intercept (dBm)	LO-to-RF Isolation (dB)
5.0	5.5	18	27
5.5	6.0	19	27
6.0	6.5	20	27
6.5	7.0	21	27
7.0	7.0	22	27
7.5	7.0	23	27
8.0	7.0	24	27
8.5	7.0	25	27
9.0	7.5	26	27
9.5	7.5	26	27
10.0	7.5	27	27
10.5	7.5	28	27
11.0	7.5	28	27
11.5	8.0	29	27
12.0	8.0	29	28
12.5	8.0	30	28
13.0	8.0	31	28
13.5	8.0	31	28

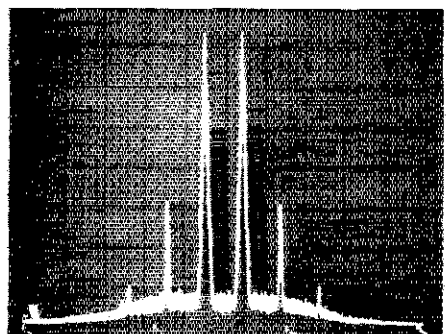
LO input = 0 dBm. Rf input = dBm



(A)



(B)



(C)

Fig. 4 — Spectrophotograph A shows the LO suppression at the i-f port of the SL6440C with no rf signal applied. LO injection is 0 dBm. Center frequency is 25 MHz, bandwidth is 100 kHz, vertical scale is 10 dB/div, and horizontal scale is 5 MHz/div. Display B shows the output spectrum with 0 dBm of LO power and -10 dBm of rf signal applied to the mixer. Analyzer bandwidth in this example is 30 kHz. Two-tone output is displayed at C with the vertical scale being 10 dB/div, and the horizontal scale at 10 kHz/div. Center frequency is 9 MHz and bandwidth is 0.3 kHz.

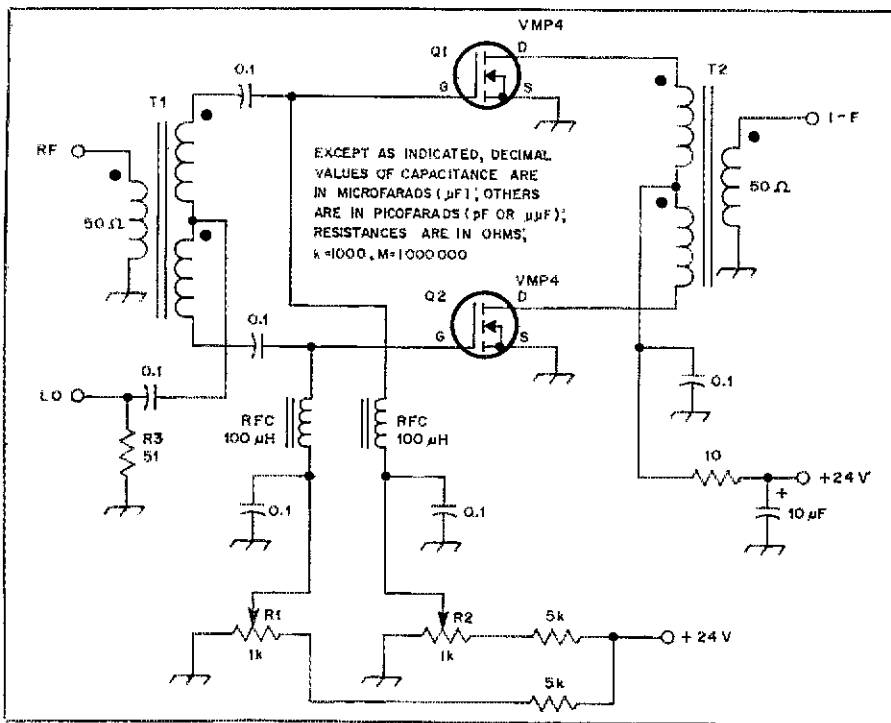


Fig. 5 — Circuit for the VMOS power FETs in a singly balanced arrangement. Split dc feed to the gates was used to provide dynamic balance.

of dc current without heat sinking the IC. A package limitation of 1.2 watts is specified for temperatures up to 25° C, with derating set at 8 mW/° C above 25° C. Maximum program current is 50 mA.

#### Singly Balanced VMOS Power FET Mixer

The VMOS power FET has characteristics that suggest its ability to perform well in a high-level balanced mixer circuit. For this reason it was included in the mixer evaluation program to determine how it would compare to other high-level mixers. A pair of VMP4 vhf devices was selected for testing in a singly balanced mixer. Other VMOS devices, such as the VN66AK, should offer nearly comparable hf-band performance at lower cost. The VMP4s were chosen mainly because they could be adapted easily to heat sinking, owing to the strip line package format.

Fig. 5 contains the test circuit used by the authors. The rf and LO signals were applied to the gates of the FETs, permitting the sources to be grounded. Earlier tests of the same FETs in a circuit recommended by a manufacturer (rf signal injected on the sources and LO injection on the gates) yielded substantially degraded mixer performance. Instability was also manifest when the forward gate voltage was increased beyond 1.9. Stability could not be obtained without excessive resistive loading of the broadband transformers, so the circuit was abandoned in favor of the one in Fig. 5. Bias controls R1 and R2 were included to help establish dynamic balance of Q1 and Q2. R3 was added to establish a known impedance at the LO injection point during laboratory analysis. Without the resistor, the port impedance is in excess of 500 ohms.

Table 3 shows the results obtained with

Table 3  
Results with Various Levels of Gate Voltage and Drain Currents

LO (dBm)	Rf Input (dBm)	Gain (dB)	$I_p$ (mA)	Gate Volts	Thrd O.I. (dBm)
+16	+8	15	75	1.0	42.5
+16	+5	15	63	1.0	43.5
+16	+2	15	56	1.0	44.0
+16	-1	15	54	1.0	44.0
+16	-4	15	52	1.0	45.0
+16	-7	15	52	1.0	*
+16	+8	16	115	1.5	42.0
+16	+5	16	105	1.5	44.0
+16	+2	16	100	1.5	45.0
+16	-1	16	97	1.5	45.0
+16	-4	16	96	1.5	44.5
+16	-7	16	96	1.5	*
+16	+8	16	180	2.0	39.0
+16	+5	17	170	2.0	42.5
+16	+2	17	165	2.0	43.0
+16	-1	18	160	2.0	44.5
+16	-4	18	160	2.0	43.0
+16	-7	18	160	2.0	43.0

\*IMD products below measurement system noise floor.

\*All signal levels referenced to PEP.

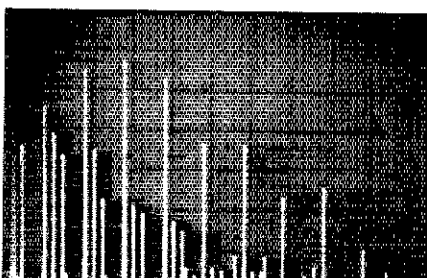
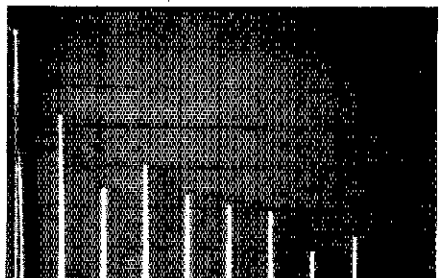
\*Total current.

\*Both gates at same voltage.

various levels of gate voltage, rf-signal input and quiescent drain currents. LO injection was maintained at +16 dBm. It can be seen that a variety of operating conditions yielded good output intercepts. The resultant conversion gain is somewhat higher than is desired for most receiver applications. If this circuit is used it will probably require inclusion of an attenuator pad after the mixer to tailor the effective gain to a suitable level for the stages that follow the mixer.

As one would suspect, port isolation follows the format that is common to singly balanced mixers. With the circuit of Fig. 5 the isolation was 38 dB when R1 and R2 were adjusted for best suppression of the output responses. This condition was realized when one gate had 2 volts and the other had 1.85 volts. Fig. 6 shows the spectral output of the mixer under a balanced condition. Photograph A shows the LO isolation and photograph B illustrates the LO and rf isolation.

The authors have concluded that VMOS power-FET mixers are worth considering when high dynamic range is desired (without concern for the high values of quiescent drain current in a 24- to 28-volt dc type of system). It follows that a quad of power FETs in a doubly balanced mixer circuit would offer improved performance over that provided by the mixer in Fig. 5.





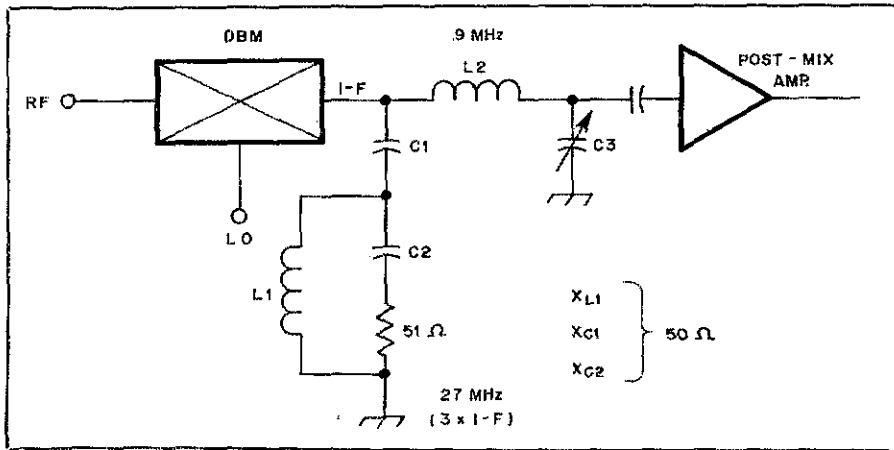


Fig. 7 — Method for adding a diplexer to the output of a diode-ring mixer to enhance the IMD performance. The high-pass network is terminated in 51 ohms and is designed for  $3 \times$  i-f. An L network provides an impedance match between the mixer output (50 ohms) and the input of the post-mixer amplifier.

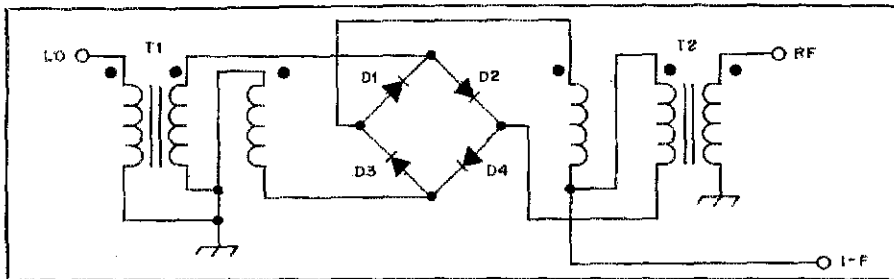


Fig. 8 — Diagram of the SRA-1H diode-ring, high-level mixer used in the performance tests.

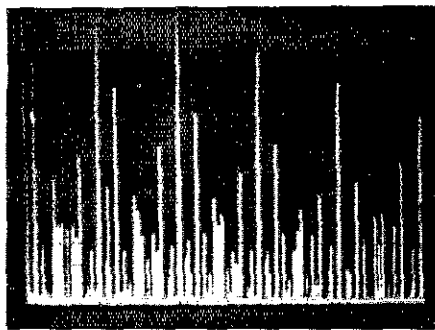


Fig. 9 — Output display of the SRA-1H high-level, diode-ring mixer with an LO power of +17 dBm and an rf signal input of +8 dBm. The large number of spurs emphasizes the importance of filtering at the mixer output.

tests included an analysis of the Mini-Circuits Lab SRA-1H DBM module. The test setup was essentially the same as for the previous mixers treated in this article. Tests were conducted with and without a diplexer connected to the mixer output. The results were essentially identical, since the test-setup terminations provided the desired 50-ohm port characteristic. In an actual receiver where absolute source-impedance levels are not always known, a diplexer of the type shown in Fig. 7 can be beneficial in providing the mixer with a 50-ohm termination at all frequencies. The high-pass branch of the diplexer is resonant at approximately three times the

i-f. Improvements of 2 to 3 dB in mixer IMD are not uncommon when a diplexer is added to a ring mixer.

Test results for the SRA-1H (Fig. 8) are listed in Table 4. The conversion-gain spread follows the predicted amount, ranging from -6 to -9 dB over an LO injection excursion of +6 to +17 dBm. A spectral display of the mixer output is shown in Fig. 9. Owing to the LO power needed for this mixer it became necessary to make one change in the test setup used for the other mixers discussed here: The 2N3866 post LO amplifier was followed by an MRF-511 CATV transistor to elevate the available LO power to +27 dBm. The second harmonic from the LO source was measured at greater than 50 dB below the peak power of the fundamental.

### Summary

The implications of the test results in this article are that large-signal devices provide high dynamic-range numbers when careful attention is given to biasing and LO levels. Certainly, a receiver is only as good as its mixer in terms of large-signal accommodation. Schottky ring mixers still offer a good compromise between dynamic range and moderate LO injection power. The penalty is in conversion loss, but a major advantage is seen in the passive feature of the diode-ring mixer, since the device does not impose dc current drain on the power supply.

Table 4

Test Results for the SRA-1H Diode-Ring High-Level Mixer

LO (dBm)	RF (dBm, PEP)	I-F (dBm, PEP)	Gain (dB)	Third-Order O.L. (dBm, PEP)
+9	+8	0	-8	+19.0
+9	+5	-2	-7	+22.0
+9	+2	-5	-7	+23.5
+9	-1	-8	-7	+24.5
+9	-4	-11	-7	+26.5
+9	-7	-14	-7	*
+12	+8	+1	-7	+25.0
+12	+5	-2	-7	+26.0
+12	+2	-5	-7	+27.0
+12	-1	-8	-7	+27.0
+12	-4	-11	-7	*
+12	-7	-14	-7	*
+15	+8	+1	-7	+30.0
+15	+5	-2	-7	+30.0
+15	+2	-4	-6	+31.0
+15	-1	-7	-6	+31.0
+15	-4	-10	-6	*
+15	-7	-13	-6	*
+17	+8	+1	-7	+33.0
+17	+5	-1	-7	+33.5
+17	+2	-4	-6	+33.0
+17	-1	-7	-6	+31.0
+17	-4	-10	-6	*
+17	-7	-13	-6	*

\*Measurement limited by post mixer/filter IMD.

The Plessey SL6440C high-level mixer IC offers the advantage of having excellent dynamic range, conversion gain and moderate dc current requirements. The LO-injection level is significantly lower than that required for a diode-ring mixer, and the package format lends itself well to the design of miniature equipment.

VMOS power FETs open the door to very high dynamic-range numbers at the cost of bulk and high dc-current requirements. LO-injection requirements are fairly high, and heat sinking of the active devices is necessary. Owing to the relatively high amplitude of the mixer-output spurs, a doubly balanced VMOS mixer would be preferable to a singly balanced version. The VMOS balanced mixer may not, in many instances, be cost-effective unless low-priced VMOS FETs are used in preference to the VMP4s specified in this article. The latter are in the \$20 price class when purchased in single-lot quantity.

Indications are that small-signal devices, such as the 40673 and 3N211, are poor choices when high dynamic range is a design criterion. They are entirely acceptable for use in many low- and medium-cost hobby and entertainment receivers where high signal levels are not a problem.

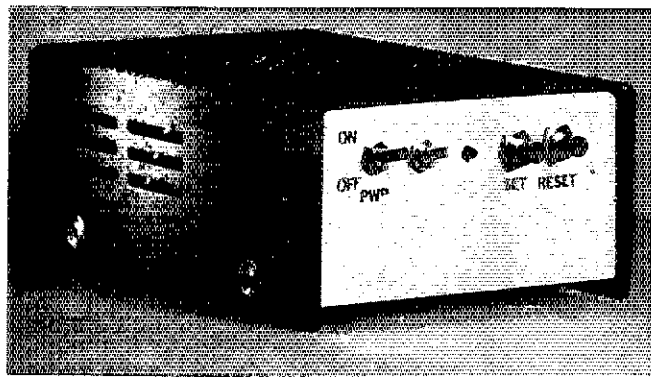
### References

- Hayward, "A Competition-Grade CW Receiver," *QST*, March and April 1974.
- DeMaw, "His Eminence, the Receiver," *QST*, June 1976.
- Elliott, "The Real World of High-Performance Receiver Design," *Session 5 Preprint*, IEEE ELECTRO/80, Boston, Massachusetts.
- Hayward and DeMaw, *Solid State Design for the Radio Amateur*, ARRL, 1977.

# The ARES Standard-Tone Alert System

This new concept of Amateur Radio alerting in times of serious emergencies offers superior performance and reliability. It's being proposed as a national standard.

By Frank Jaeger,\* WA9SQN



Several tone alert systems have been developed for use by ARES and other Amateur Radio emergency groups.<sup>1,2,3</sup> Some have been based on a single tone being transmitted to "unmute" receivers and warn of emergency situations, while others have used commonly available Touch-Tone signals that may be initiated by anyone having a tone pad.

In an attempt to find a satisfactory system to use in central Wisconsin, both approaches were developed. When they were presented to the Wisconsin Valley Radio Association (WVRA), lengthy discussion indicated both had validity. It was also noted that no standard system exists; each group uses its own method and frequency. This can be a burden on operators who monitor several frequencies.

WVRA adopted a combination of the two systems and proposed it as a national standard. Subsequently, this concept was adopted by the Rib Mountain Repeater Association and endorsed by the Wisconsin Association of Repeaters as the standard in Wisconsin. Basic information appeared in the "FM/RPT" column in December 1979 *QST*.

The ARES Standard-Tone Alert System uses a Touch-Tone zero transmission of five seconds or longer to alert monitoring stations to lower levels of urgency. Included are auto accidents, fires, car failures, weather watches and similar incidents. Decoders are to respond in three seconds with the remaining tone transmis-

sion being an audible alert signal.

Any amateur may initiate the Touch-Tone "0" alert. Rules, as such, are broadly defined to allow the user latitude. The individual must determine (or groups may set guidelines) which situations warrant the tone.

Decoders are equipped with provisions to defeat the Touch-Tone "0" portion, as some operators may not wish to listen for such calls. All operators are urged to monitor for the call when severe weather is forecast, however.

The ARES emergency tone warns of utmost urgency and should be used *only* for severe thunderstorm and tornado warnings or situations requiring the agency being served to go to its highest state of alert. The standard NOAA weather alert frequency of 1050 Hz is used. It should be initiated *only* at the direction of the District Coordinator or assistant, or an official of the agency being served. All decoders should respond.

A suggested procedure is to have ARES and other vhf nets use a Touch-Tone "0" transmission to initiate net sessions and include a test of the ARES emergency tone during the session. This not only ensures that decoders are working properly, but also accustoms listeners to the alert signals.

When it is used with a scanner, locking the receiver on the tone alert channel is advised. A call would be missed if the scanner is on another channel when the alert is sounded.

It should also be noted that the ARES Standard-Tone Alert System does not out-mode all other systems. Decoders currently in use, which are based on the NE567

IC, can easily be tuned to the 1050-Hz alert and used by operators wishing to respond only to the ARES emergency tone.

## How the Decoder Works

Although the decoder appears complex, it is not. Fig. 1 is a simplified block diagram showing logic levels needed to decode a valid tone. Figs. 2 and 3 are the schematic diagrams.

An automatic level control using a dual operational amplifier limits the audio signal applied to three NE567 tone decoders. Back-to-back diodes could be used on the input to provide hard limiting but the op amp permits a wider range of receiver output settings. A fixed value of 47 k $\Omega$  for R1 is suitable for most applications but a 50-k $\Omega$  or 100-k $\Omega$  potentiometer may be substituted and thus provide a means for varying the alc output.

Only one of the three decoders is shown in the schematic diagram. The circuits for all three are identical — they are basically the standard NE567 configurations that have been discussed in many articles. One decoder is tuned to each frequency in the unit, either 1050 Hz or the Touch-Tone "0" frequencies of 941 and 1336 Hz.

Decoder output is a digital signal, either high when off or low when a valid tone is decoded. U5A and U5B are 3-input NOR gates that select which tones will be acknowledged. U5A requires that U3 and U4 must both be low and S1 closed to decode Touch-Tone "0." U5B needs a low on U2 and S2 closed to acknowledge a 1050-Hz signal.

The decoder may be wired for constant recognition of either tone as shown in the schematic and parts diagrams. For

<sup>1</sup>Notes appear on page 27.

<sup>2</sup>Emergency Coordinator for Lincoln County, Wisconsin, Route 2, Box 134, Merrill, WI 54452

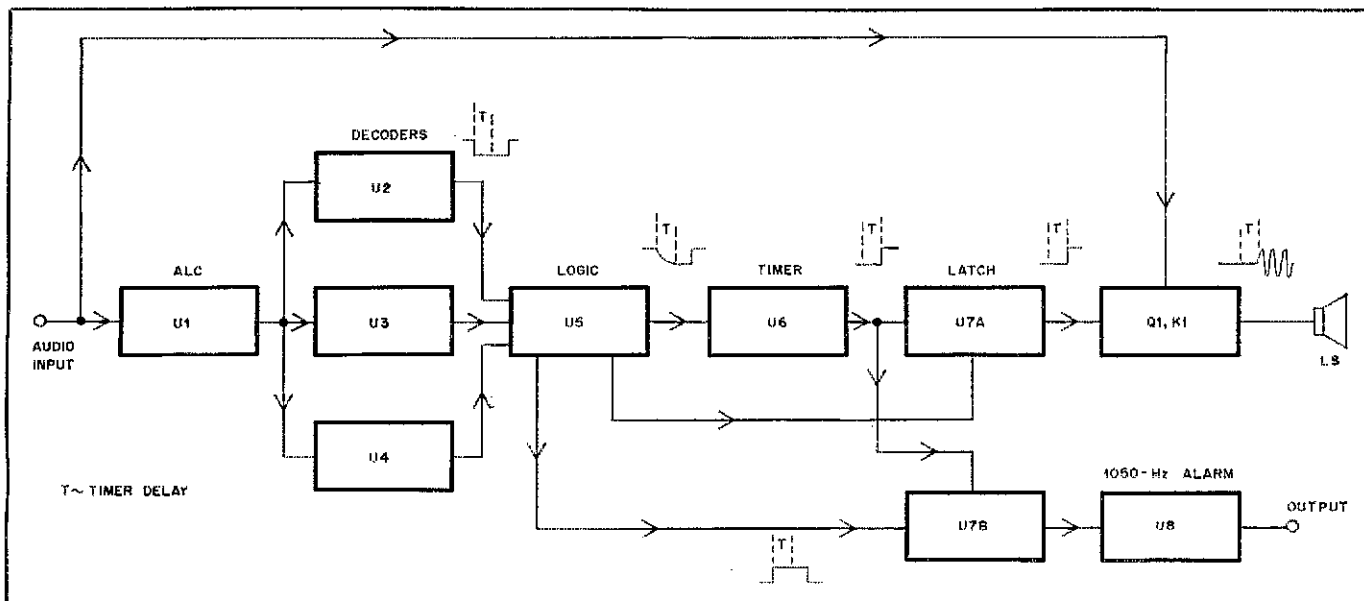


Fig. 1 — Block diagram for the ARES Standard-Tone Alert System.

decoding Touch-Tone "0," omit R5 and S1, eliminate the +5-V lead to pin 8 of U8 and ground pin 8. Similarly, R6, S2 and the lead from pin 1 of U5 to pin 8 of U3 should be omitted and pin 8 of U3 grounded for constant recognition of 1050 Hz. Since the ARES Standard-Tone Alert System depends on *all* decoders responding to the ARES emergency tone, it is recommended that decoders be wired for constant decoding of 1050 Hz.

Normally, the output of U5C, another 3-input NOR gate, is high and switches low when either tone is decoded. The voltage on the 4.7- $\mu$ F capacitor at pin 2 of the timer begins to decay through the 680-k $\Omega$  resistor. When the voltage at pin 2 reaches 1/3 of the supply voltage, the timer output at pin 3 is triggered high.

Timer reset after short tone bursts is accomplished by recharging the capacitor to two-thirds of the Vcc through D1 and the 1-k $\Omega$  resistor. That resistor limits the initial surge current which the CMOS gate must sink.

Because of internal characteristics, the NE555 time period is independent of supply voltage. Delay time is proportional to the value of the discharge resistor, about three seconds for 680 k $\Omega$ .

#### Latch Circuits

Decoder output is controlled by U7, a CD4013 dual-D flip-flop. The timer output is applied directly to both units at pins 3 and 11. Data input pin 5 is tied to U5A for Touch-Tone "0" and pin 9 is tied to U5B for the ARES emergency tone.

Both latches function identically, with Q outputs (high when triggered). These are pins 1 and 13 and inverted Q outputs at pins 2 and 12.

Reset pins 4 and 10 provide the means to override the triggered inputs manually. The set switch, S3, is applied only to U7A

and may be used to activate the receiver speaker.

#### Outputs

Several output variations have been tried but the relay shown has proven the most versatile. Driver transistors may be switched from either latch section. If the decoder speaker alone is to be keyed by either tone, the collectors of both transistors, Q1 and Q2, may be connected in parallel.

The relay may be energized in the standby (muted) mode by connecting the 39-k $\Omega$  bias resistors to pins 2 and 12. When the decoder is used with a battery receiver, this arrangement provides a fail-safe situation as the speaker will be enabled should power be lost. Alternatively, the relay may be enabled when the latch is triggered by connecting the resistors to pins 1 and 13.

Fig. 2 contains an alarm that may be triggered by the ARES emergency tone. The circuit, using an NE555 timer as an astable oscillator, is turned on by applying the Q output of U7B to the reset input of U8.

Using the configuration shown, with the relay energized during standby, the alarm will sound until manually reset or a Touch-Tone "0" signal is received. The speaker may then be enabled by pressing the SET button or by simply shutting off the decoder power.

The alarm and driver transistor may be used simultaneously. The author uses this transistor to activate a recorder to tape weather watches automatically.

#### Power Supply

Power for the ARES tone-alert decoder can be supplied by a small ac supply or from an 8- or 10-cell battery pack. Current demand is about 40 mA with the relay

energized. Fig. 3 shows a 5-volt regulator circuit which is included on the circuit board.

An ac supply is recommended, for the unit normally will not be used with portable or mobile equipment. In all but the fewest foreseeable situations, an alert will have been sounded before commercial power is lost. A 9- or 12-volt dc output battery eliminator (the type that plugs into an ac outlet) is ideal.

#### Construction Hints

While point-to-point wiring could be employed, the decoder lends itself well to circuit-board construction. Several boards have been used during development and testing, the most recent of which is shown in Fig. 4.

The layout is rather dense but the result is a compact unit that could be installed in many receivers. The unit is intended as an outboard device to be plugged into the extension-speaker jack, however. A Radio Shack no. 270-252 enclosure makes a neat package.

All polarized capacitors except the electrolytics are dipped solid tantalum to provide good stability for the decoder and timer circuits. The variable resistors are multiturn Trimpots for both stability and ease of tuning.<sup>4</sup>

#### Alignment

Two methods can be used to tune the unit. In either case the following frequencies are used:

U2: Tune R2 to 1050 Hz.  $R_A = 8.2$  k $\Omega$

U3: Tune R3 to 941 Hz.  $R_A = 9.1$  k $\Omega$

U4: Tune R4 to 1336 Hz.  $R_A = 6.8$  k $\Omega$

Tuning is easily accomplished using a frequency counter. By attaching the counter at the test points (TP), the free-running frequency of each decoder can be read and adjusted by the variable resistor.

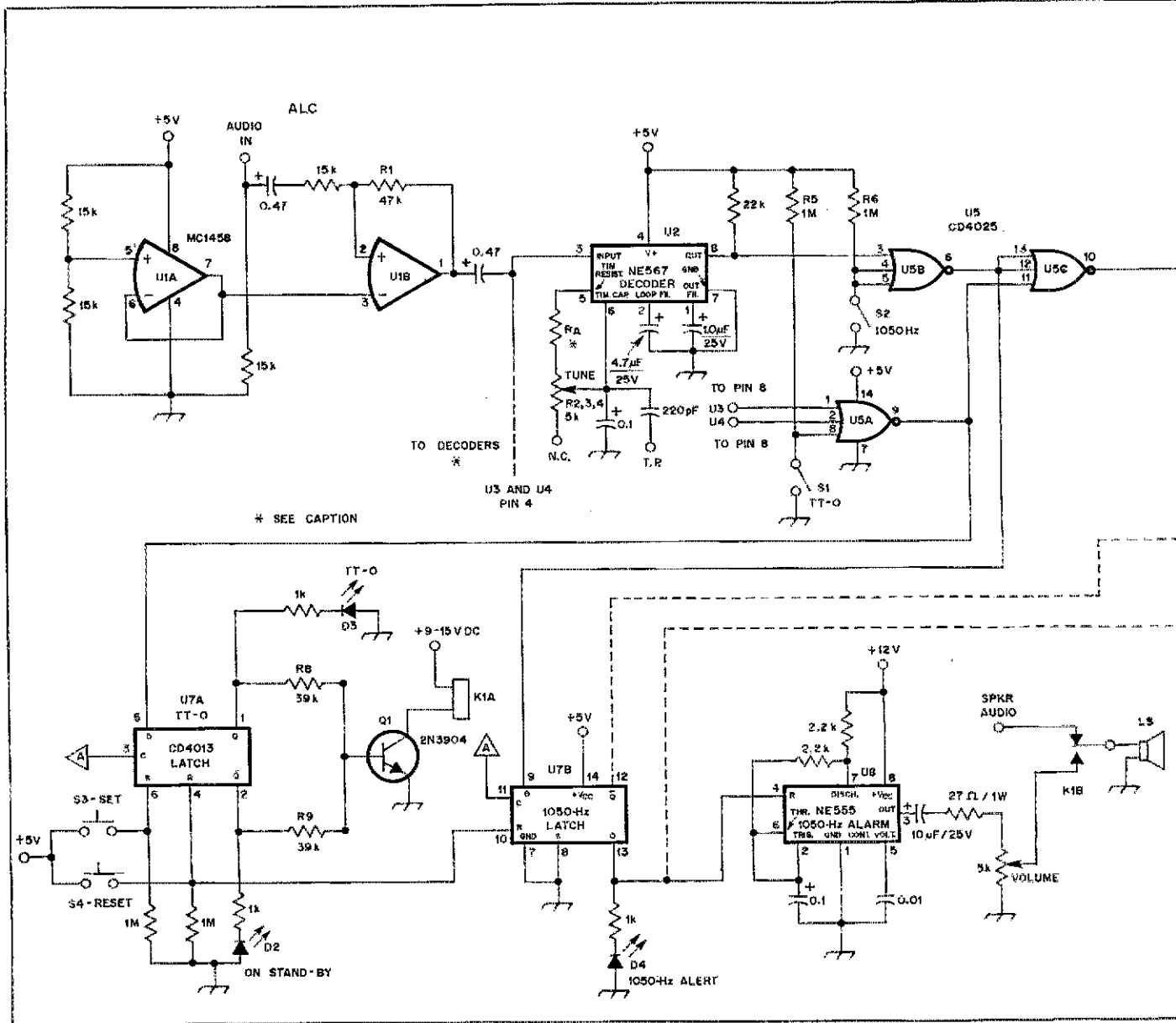


Fig. 2 — Circuit diagram for the Standard-Tone Alert System. Reliable, fail-safe operation is attained by this design. The tone alarm will sound regardless of the state of the latches. The alarm draws about 75 mA, depending on the speaker impedance. Up to 15 V dc unregulated for the alarm is acceptable. Operating voltages for K1 and K2 (Radio Shack relays no. 275-003) may be obtained from a 9- to 15-V unregulated supply. K2 and Q2, indicated by dashed lines, form an optional feature for keying an external device. Decoder circuits for U3 and U4 (omitted for drawing simplification) are identical to the decoder circuit for U2. Capacitors marked + are tantalum. All others are ceramic disc. Except as shown, resistances are 1/4 watt. A 27-ohm resistor in series with the 5-k $\Omega$  Trimpot prevents overheating the 555 (U8) in the alarm section. It may be eliminated if the supply voltage is 12 V or less.

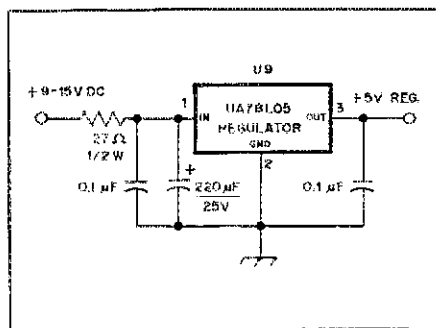


Fig. 3 — Diagram for the voltage regulator found on the circuit board. A 78L05 regulator may be used if the supply voltage is raised to between 12 and 15 V dc, the maximum  $V_{CC}$  is governed by the NE567 chips, rated at +10V.

Checking the unit against a tone pad and a good source of 1050 Hz will verify tuning.

If no counter is available, a signal source and a VOM may be used. The voltage at pin 8 of the NE567 is at or near zero when the decoder is tuned to a frequency being injected at the audio input to the decoder. The center of the voltage null must be determined by setting the Trimpot for a reading midway between the edges of the null.

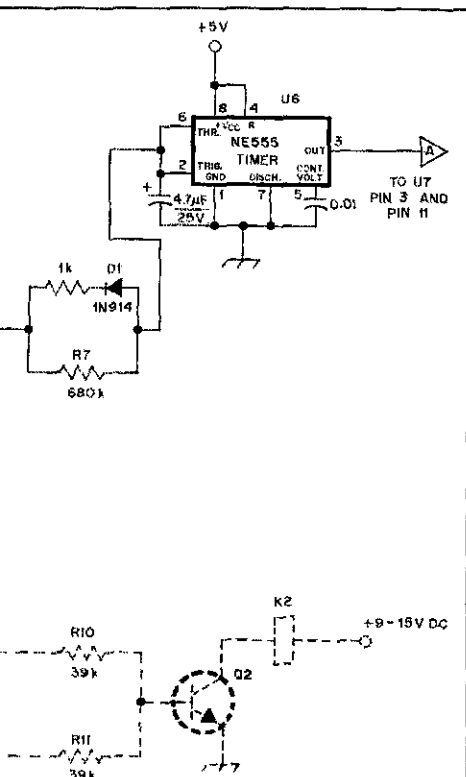
A stable source must be applied for each tone. The two Touch-Tone frequencies may be generated using a standard tone pad. Pressing two keys *simultaneously* in the bottom row will encode only 941 Hz while any two keys in the center col-

umn will yield only 1336 Hz.

### Operation

As has been suggested, general net operations or situations of lower urgency should be initiated with a Touch-Tone "0" transmission. The ARES emergency tone is reserved for severe conditions.

Once the decoder is triggered by a Touch-Tone "0" alert, subsequent transmission of the ARES emergency tone will reverse the state of the latches, switching the speaker from the receiver audio line to the alarm. Thus, the alarm will sound regardless of latch state and an operator will be alerted even when out of speaker range.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu\text{F}$ ); OTHERS ARE IN PICOFARADS ( $\text{pF}$  OR  $\mu\text{pF}$ ); RESISTANCES ARE IN OHMS; k = 1000, M = 1000 000

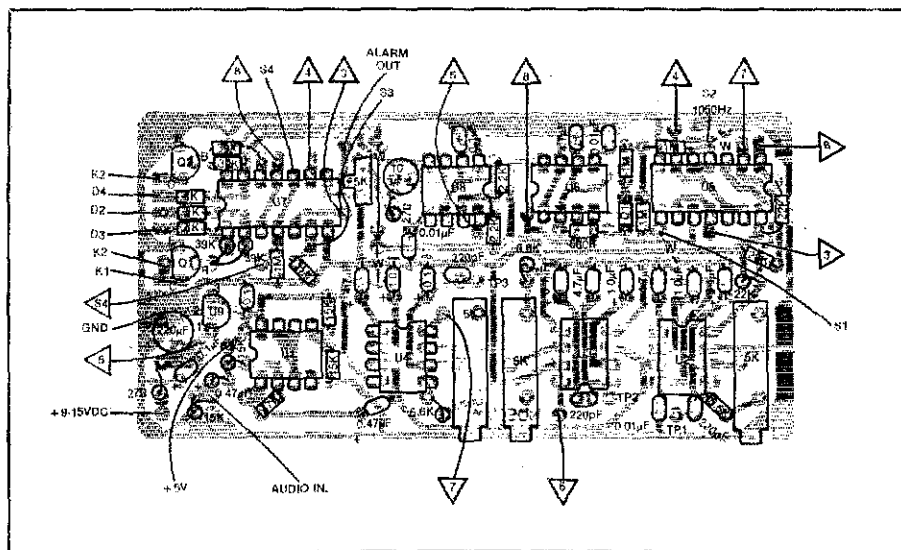


Fig. 4 — Parts placement guide for the ARES Standard-Tone Alert System. Components are placed on the non-foil side of the board; the shaded area in this view represents an X-ray view of the copper pattern. Decimal-value numbers alone represent capacitance in microfarads. Whole-number values with no units represent resistance in ohms; k = 1000. W = jumper wire. (The etching pattern appears in the "Hints and Kinks" section of this issue.)

given frequency. If the alerting tone is falsely triggered a few times, operators may shut down their receivers and thereby defeat the system. Consideration must be given to the security of the ARES emergency tone.

A simple 1050-Hz encoder can be built from an NE555 timer IC but the same simplicity also lends itself to easy duplication and possible abuse. Other than operator education, little can be done to prevent false alarms through simplex transmission. Two schemes can be employed, however, to thwart abuse through repeaters.

A 1050-Hz filter on the repeater receiver will prevent unauthorized tones from being transmitted through the machine. The actual alerting tone can then be generated at the machine and accessed through a code given only to authorized personnel.

A 1050-Hz decoder and delay would allow switching the filter into the audio circuit, thus allowing voice and short tone transmissions to pass normally. But sufficiently narrow filters can be built to eliminate the 1050-Hz tone without distorting normal audio.

A two-tone encoder can be used on repeaters with no Touch-Tone facilities. The 1050-Hz signal is paired with another tone chosen by the ARES group and given only to authorized operators. An exclusive OR circuit may be used to either disable the COR or transmitter audio when only one of the tones is decoded. A delay should also be used in this design and a filter added to remove the second tone.

The first method is preferred, as it does not rely on initiation of the ARES emergency tone on the primary repeater

frequency. Information may be obtained from the author.

### Conclusion

The ARES Standard-Tone Alert System gives versatility and security that has been sorely lacking in Amateur Radio emergency alerting. Adopted as a national standard, it also requires the operator to maintain one decoder while monitoring several systems.

By encouraging full-time monitoring of emergency frequencies, the system provides reliable call-up, particularly at times when only the outdated telephone tree would be effective. As with any system, success depends on the user. Neither tone should be transmitted without a valid reason. The responsibility is yours.

I wish to thank the members of the Wisconsin Valley Radio Association for the ARES standard-tone alert concept and the many radio amateurs in central Wisconsin who gave suggestions and support. Special thanks to Bob, WA9UTC, for the accompanying photo.

### Notes

1. Kraman, "Single-Tone Decoders" *Ham Radio*, August 1978, p. 70.
2. Paquette, "A Time Delayed Tone Decoder" *QST*, February 1977, p. 16.
3. Wetzel, "Tone-Alert Monitor" *Ham Radio*, August 1980, p. 24.
4. Kits including board-mounted parts, drilled and plated circuit boards, plus instruction booklet are available from the author for \$29.50 in single quantities. Circuit boards and quantity prices are also available. For details send an S.A.S.C. to Frank Jaeger, Route 2, Box 134, Merrill, WI 54452. The ARRL and *QST* in no way warrant this offer.

Editor's Note: Attention is called to the article "Tone-Alert Decoder," written by Harold C. Nowland, WR2XN, and Stan Briggs, W8MPD, which appears in *Ham Radio*, November 1978, pp. 64-65.

Termination of the severe condition alert may be effected by transmitting a Touch-Tone "0" for a few seconds. Alarms that have not been answered will be shut off and the speaker connected to the receiver audio line, while others will be unaffected.

Note, however, that this procedure is effective only when the Touch-Tone "0" section of the decoder has been enabled. The alarm will continue to sound if the Touch-Tone "0" section has been disabled by opening S2.

### Security for The ARES Emergency Tone

All alerting systems rely on operators who commit themselves to monitoring a

# The L-Meter

Need a better technique for measuring inductance? This unit is L-ementary but accurate.

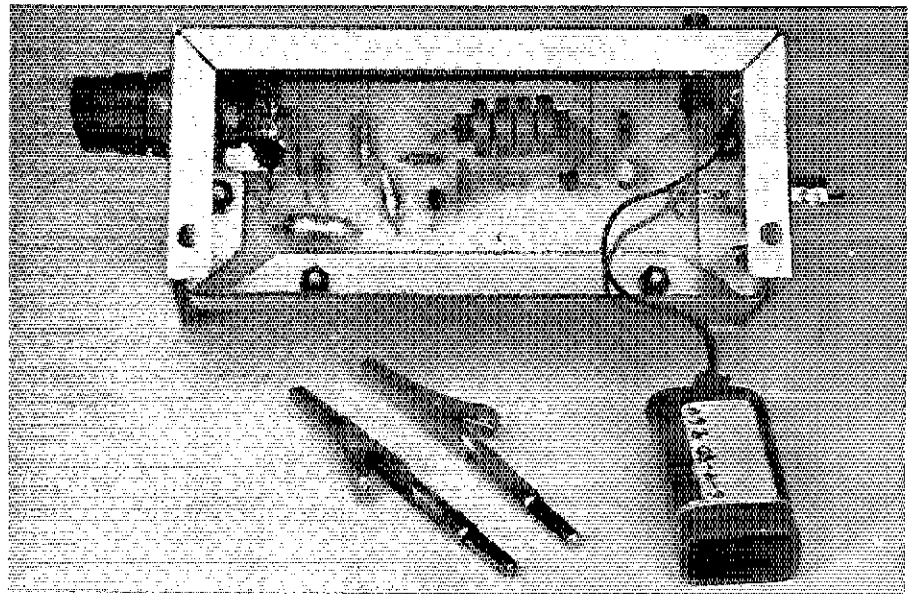
By Alf Reinertsen,\* WA2TNG

Inductance-measurement techniques using a GDO or impedance bridge are well known. But some GDOs (like mine) have poor frequency resolution and a limited range of inductance measurements. Purchasing a more accurate bridge or GDO was out of the question; it would have put a dent in my wallet. I needed a device that provided high resolution and good accuracy, was capable of measuring inductance values of 1 mH to 0.05  $\mu$ H, and was inexpensive, too.

## The "Obvious" Solution Circuit

Constructing an L-meter that satisfied my requirements seemed simple: Just put the inductor in an oscillator circuit, measure the resultant frequency and calculate the inductance. The initial circuit I tried used a Colpitts oscillator followed by a buffer stage to isolate it from the counter. However, the low-end of the measurement range was limited to 1.4  $\mu$ H. Why? After much trial and error, many trips to the book shelf and "exercising the gray matter," I learned why.

The circuit shown in Fig. 1 works just fine — if: the rf choke (L2) is larger than the largest inductor you wish to measure and the effective series resistance of the capacitor path (C1, C2, C3) is kept low. The reason for the latter is obvious if you determine the current that actually flows through the capacitive path, effectively 100 pF. At 30 MHz, the current will be 40 mA with 2.1 V present. Ceramic disc capacitors had been utilized in the original circuit and since they were used extensively in the literature I'd read, they were the last components I suspected. Upon close examination, I found they exhibited an effective series resistance of 7 ohms and created losses in the tank circuit, which



A homemade aluminum bracket secures the L-meter pc board to the inside of the enclosure. L1 may be seen at the left of the photo between the banana jacks and pc board. L2 is the rf choke in the center. R3 is hidden by the body of the choke. The battery is held in place within the other half of the box by means of a homemade aluminum clip.

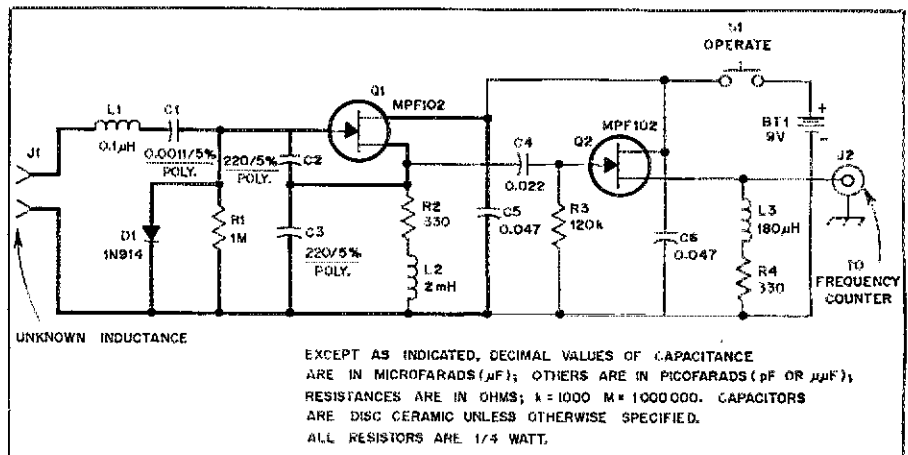


Fig. 1 — Schematic diagram of the L-meter. L1 consists of 7 turns of no. 24 enameled wire on an Amidon T-37-12 core. L2 is a pie-wound phenolic core rf choke. A dual banana jack is used at J1 while J2 is a BNC chassis-mount connector.

prevented oscillation beyond 12 MHz. The problem was resolved by using polystyrene capacitors that have an effective series resistance of less than 1 ohm at 30 MHz.

### Construction

The unit is constructed in a 3- × 5- × 2-inch (76- × 127- × 51-mm) aluminum box. A pc-board layout is shown in Fig. 2. Toroid L1 has been added to compensate for lead inductance in the circuit and keep the readout within the range of a 30-MHz frequency counter. Layout is not critical as long as the heavy leads shown in Fig. 1 are kept short and components are placed to avoid unwanted feedback. C2 and C3 determine the overall accuracy of the unit, so two 5% or 1% 220-pF capacitors should be used. Such capacitors are inexpensive. In fact, the entire unit should cost less than \$12 if you use some parts from your junk box and it can be constructed as a weekend project.

A 9-V battery is used to supply power through a momentary push-button switch. With a total battery drain of 8 mA, the battery should last for thousands of measurements. The unknown coil is attached to the unit by means of a pair of 5-way binding posts. By mounting alligator clips in banana plugs, you can at-

tach small coils readily and quickly.

### Calibration

The calibration procedure consists of finding and subtracting the circuit inductance from the total oscillator inductance to determine the value of the unknown inductor. Connect the L-meter to a 30-MHz frequency counter and place a shorting stub across the binding posts. Depress S1, note the reading of the frequency counter and compute the circuit inductance using this equation:

$$L_o = (15.915/f_{\text{MHz}})^2 - 0.015$$

Record this value as Lo-JACK — inductance of the oscillator when using the jacks. Repeat the procedure with a shorting stub across the ends of the alligator clips and record this as Lo-CLIP — inductance of the oscillator when using the clips. These inductance values should be marked on the L-meter using Dymo labels or other means.

### Operating Procedure

To use the L-meter, attach the coil to be measured, depress the switch and record the frequency of oscillation. Determine the inductance value by using a calculator or the charts in the 1981 ARRL *Handbook* (page 16-22, Fig. 42). When

calculating, use the following formula:

$$L_{\mu\text{H}} = (15.915/f_{\text{MHz}})^2 - L_o$$

For readout values of less than 5 MHz, Lo has little impact and may be omitted. If the Handbook method is employed, use the LC chart to convert the frequency to total inductance, then subtract Lo to obtain the correct value of the unknown inductance.

The L-meter was evaluated by measuring several rf chokes, rf coils and toroids of known value. In every instance, the measured values were within 5% of the known. Two of the coils were checked on a General Radio bridge and found to be within 1% of the indicated L-meter value. That was a pleasant surprise!\*

The unit is relatively insensitive to changes in battery voltage. From 15 to 3.5 volts, the inductance values varied only 0.2%. A 5° F (3° C) change in room temperature affected the readings by less than 0.1%.

I'm certain you'll find the L-meter to be as useful as I have. The experience of building your own test equipment is very rewarding.

\*[Editor's Note: A check in the ARRL lab showed the inductance values found by means of the L-meter were within 5% of those obtained with a Hewlett-Packard 4342A Q-meter. In some instances, agreement was within 1.5%.]

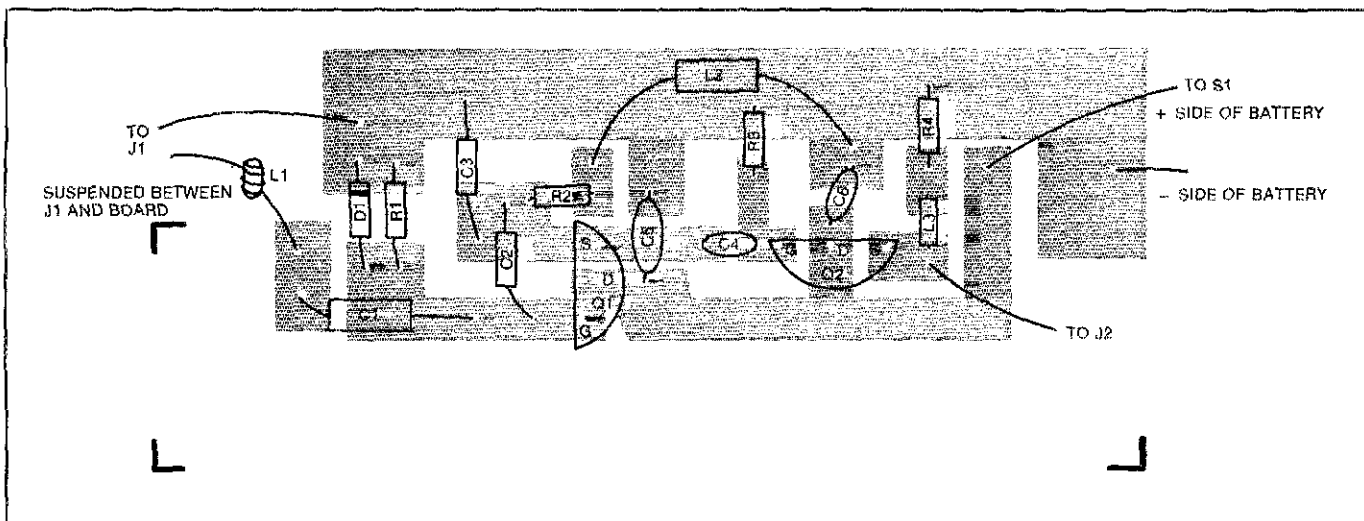


Fig. 2 — Component layout of the L-meter as viewed from the component side of the board. The etching pattern appears in the "Hints and Kinks" section of this issue.

## Strays

### SNOWFLAKE MADNESS

The Michigan Technological University ARC and the Copper Country Radio Amateur Association, in association with the Copper Country Chamber of Com-

merce, will issue a certificate to all amateurs who contact any station in Copper Country between 0000 UTC, February 2, and 0000 UTC, February 9. Suggested frequencies are 3.705, 3.975, 7.085, 7.105, 7.285, 14.085, 14.305, 21.085, 21.185, 21.385, 28.185 and 28.385 MHz. On cw listen for CQ WINTER CAR-NIVAL. Send your QSL with two 15-cent stamps to Debbie Nietzke, WD8JPX, 2005D Woodmar Dr., Moughton, MI 49931.

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

other amateurs who want to design and apply digital, tone and other controls to railroad models. Temple Nieter, W9YLD, 707 Sheridan Rd., Evanston, IL 60202, Tel. 312-475-4408.

anyone interested in organizing a national conference of blind radio amateurs and friends. Contact (in braille or print) The Hadley Radio Association, 700 Elm Street, Winnetka, IL 60093.

# The Poly-Tower Phased Array

Got a small lot and want a big signal? With this system, you can boost the performance of a 180-watt transceiver on 10 through 40 meters at a modest cost.

By Bob Hickman,\* WB6ZZJ



To most hams on a budget, the cash outlay for a transceiver is a large expenditure. After that, little remains in the family treasury that can be used to purchase an antenna . . . if the family is to continue to eat three meals a day!

For the rural ham, the problem is simple: Just erect a sloping V or some other low-cost wire antenna. If you live on a 60-foot city lot and are surrounded by neighbors, however, low-cost wire antennas become a real challenge.

## The City Dweller's Plight

Many city-dwelling hams solve their antenna problem by building or buying a quarter-wave vertical antenna. I've spent a lot of time operating successfully with this type of antenna during 24 years in the navy. But I hasten to point out that there is a marked difference in performance between a quarter-wave vertical antenna operating over seawater and one placed on a small city lot over an inadequate or nonexistent radial system and surrounded by buildings.

In reality, the city dweller with the quarter-wave vertical is often faced with the following choices: Put the antenna on the ground out of sight where it looks good (and have most of the radiated

energy absorbed by surrounding objects), or put it in the air, clear of surrounding objects. The latter is the better choice, but now that the antenna is above ground, a spider web of ground plane wires is visible. At 40 meters, these wires should be over 30 feet long.<sup>1</sup> Even if space is available, the results of your efforts are frequently referred to as an eyesore by the XYL and other helpful (?) persons.

Not liking either previously mentioned choice and not wanting to "bulldoze" with a linear amplifier, I turned to the center-fed vertical dipole. The center of this antenna (from which most of the rf is radiated) clears many surrounding objects and the antenna enjoys a few decibels of gain over the quarter-wave vertical. With the center-fed vertical dipole, operating performance of my station improved immediately and there was motivation to make a multiband phased array of center-fed vertical dipoles to achieve even greater performance. But a simple, cost-effective method of making these dipoles had to be found.

One afternoon, the XYL (the eyesore expert), our two harmonics, Bob Jr., WB6CWT, Chuck, WA6CWQ and I were brainstorming the problem. I suggested an antenna using no. 12 house wire run

through 1/2-inch PVC plastic sprinkler pipe, but this idea was dropped because the PVC got too shaky when it was stacked and traps would be required for multiband operation. We explored several other avenues, but kept returning to the PVC idea because of the low cost, simplicity and availability of supplies. Finally, we decided to make a tower of PVC and run no. 12 wire down each leg of the tower to form a multiband dipole.

Several scraps of schedule 125, 1/2-inch PVC pipe were made into an equilateral triangle to test the idea. The increased strength of the triangulated PVC was convincing and the XYL was even impressed with the appearance, so supplies were hastily gathered. With Bob Jr. and Chuck cutting out spacer triangles from cedar fencing planks, construction of the first poly-tower began.

## Poly-Tower Construction

Throughout the years of building antennas, I have frequently been frustrated trying to locate materials listed in the respective articles, or, upon locating the materials, finding that the cost was prohibitively high. The materials used in constructing the poly-towers are not only readily available, but are also low in cost. A poly-tower can be built for less than \$20. The four poly-tower phased array, including phasing unit and all coax runs,

\*7043 Lemonwood La., Lemon Grove, CA 92045

<sup>1</sup>Notes appear on page 34.



**Table 1****Materials Required for One Poly-Tower**

- 10 — 10-foot lengths of schedule 125 (or 40) 1/2-inch PVC sprinkler pipe (see note 1).
- 3 — 1/2-inch PVC tees.
- 9 — 1/2-inch PVC caps.
- 6 — 1/2-inch PVC connectors.
- 6 — 1/2-inch electrical conduit fasteners (see note 2).
- 3 — 8-inch lengths of 1- x 2-inch lumber.
- 34 — 6-inch equilateral cedar triangles (see note 3).
- 1 — 20-foot length of 2- x 4-inch lumber.
- 70 feet — No. 12, single-conductor, insulated electrical wire.
- Misc. — Epoxy cement, PVC cement, white paint, mounting hardware.

**Notes**

- 1) Nine of the 10-foot lengths are used for the poly-tower legs. Three of the 10-foot lengths are cut in half to provide six, 5-foot lengths for use as described in the text. The tenth length of PVC is used to make short lengths to reinforce the poly-tower at the PVC pipe junction points and to close the PVC tees.
- 2) The 1/2-inch fasteners marked "EMT" are too small for the 1/2-inch PVC pipe.
- 3) Normally, three triangles can be cut from each foot of a cedar fencing plank. Therefore, 34 equilateral triangles can be cut from two 6-foot or three 5-foot planks.

**Table 2****Dipole Wire Lengths for One Poly-Tower**

- 10 meters 7 ft 8 in.
- 15 meters 11 ft 1 in.
- 20 meters 15 ft

Note: The lengths specified above are one-half the total dipole length that should be cut and placed in each half of the poly-tower (see text).

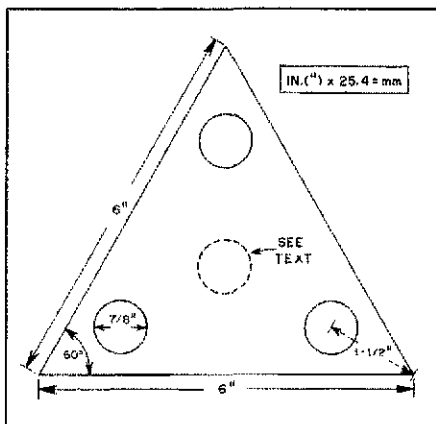


Fig. 1 — The equilateral triangular braces for the poly-tower are cut from cedar planking as described in the text.

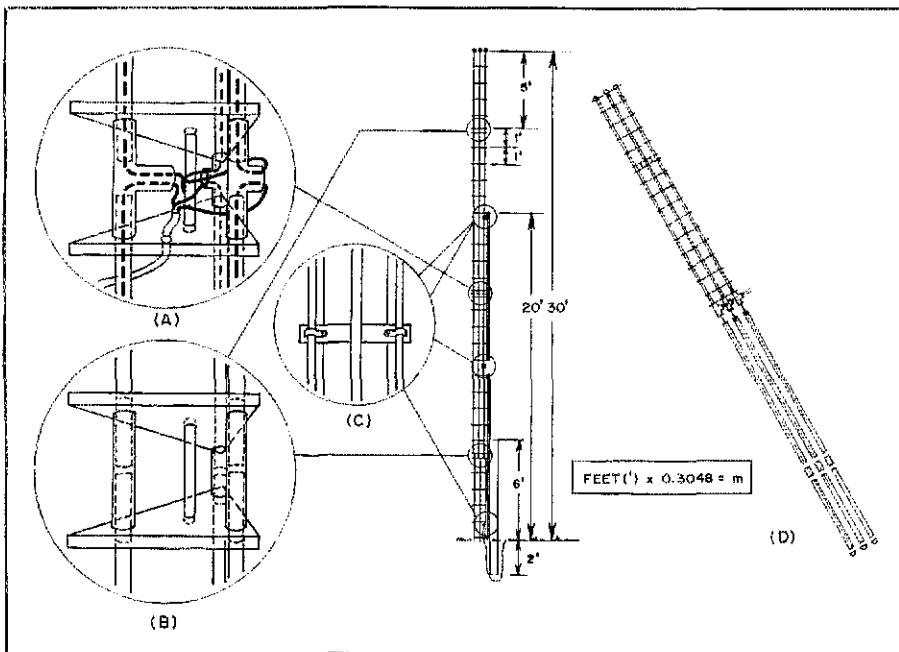


Fig. 2 — This drawing shows some essential details of poly-tower construction. At A, the joining of the dipole wires. Structural strengthening details are shown at B. The electrical conduit fasteners and cross-bracing is evident at C. Basic assembly of the poly-tower legs and dipole wires is shown at D and described in the text.

was constructed for approximately \$150.

Table 1 contains a list of materials required to construct one poly-tower. A word of caution: When selecting schedule 125, 1/2-inch PVC pipe, be aware that some brands on the market are not suitable for making poly-towers. A simple test will help you determine the suitability

of PVC pipe. Take the end of the pipe between your thumb and index finger and squeeze the pipe. If the end of the pipe collapses under moderate pressure, you don't want it!

**Preparing the Spacer Triangles**

Equilateral triangles with 6-inch sides

are cut from 6-inch-wide cedar fencing planks (see Fig. 1). These planks are rough cut, and rarely measure exactly 6 inches, but this doesn't matter — just cut the planks you get into equilateral triangles. A mitre box makes cutting the cedar triangles easier and results in neater-looking pieces. Or the triangles can be marked out on the planks and then cut out with a hand saw.

Drilling the holes in the cedar triangles requires some care. If there is no means of drilling reasonably straight holes, difficulty will be experienced when trying to thread the PVC pipe through tandem sections. The drill press sold at many hardware stores, in combination with a 1/4-inch electric drill, will prove most satisfactory for this job.

A 7/8-inch wood bit will bore a hole that makes a nice fit for 1/2-inch PVC pipe. A fourth hole should be drilled through the center of six of the cedar triangles as shown in Fig. 1. This fourth hole accommodates a short length of 1/2-inch PVC pipe at the tower junction points to provide additional strength.

**Putting It Together**

PVC cement is used to bond all PVC fittings. Epoxy is used to join the cedar triangles to the 1/2-inch PVC pipe. See Fig. 2 for triangle placement. Use of 5-oz cans of epoxy is recommended, as you'll go broke before you finish the job if you use the squeeze tubes.

Start cementing the cedar triangles, beginning with the middle PVC tees of the tower and work to the end, completing the upper 15 feet of the tower. Then fit one half of the dipole wires into the completed upper half of the tower and their counterparts into the loose 10-foot lengths of PVC pipe of the lower half of the tower, as shown in Fig. 2D. Dipole wire lengths are listed in Table 2.

Cement the lower 10-foot lengths of PVC pipe to the respective tees with PVC cement and continue epoxying the cedar triangles to the pipe. When the first 10 feet of the lower tower half is completed, stuff the dangling ends of the 15- and 20-meter dipoles into the adjoining 5-foot lengths of pipe. Secure these 5-foot lengths to the tower with PVC cement, then proceed to epoxy the remaining cedar triangles to the PVC pipe.

Unless fast-setting epoxy is used, a lot of patience is required to get the triangles in the right place. One method employed is to cement just a few triangles at a time and let the epoxy harden before moving on. Another equally satisfactory method is to tack each triangle with epoxy and let it cure. After the tacks harden, you can make other applications of epoxy to strengthen the junctures without having the triangles shift position.

Six PVC caps are used to close both ends of the poly-tower. Three PVC caps and a short length of 1/2-inch PVC pipe

are used to seal the PVC tees at the center of the poly-tower. Prior to sealing the tees, two small holes are drilled into each PVC cap and the dipole wires are brought out through these holes. Use a sealing compound around the exit points of the wires to prevent moisture from entering the poly-tower. All the upper wire halves are connected together and to the center conductor of the coaxial transmission line. Similarly, all the lower dipole wire halves connect together and to the shield braid of the transmission line.

### Erecting the Poly-Tower

The completed poly-tower is light enough to be lifted by one hand, so getting it into the air is easy. The schedule 125, 1/2-inch PVC poly-tower will not freestand without a supporting structure. Initially, two-thirds of the tower height was supported by a 2 x 4 piece of lumber. After a year of testing in winds of 50 to 60 mi/h, I concluded that this amount of support may be unnecessary. If the thicker-walled schedule-40 pipe is used, even less support will be required. Additional study is required to determine

the minimum supporting height required for the poly-tower. Supporting it to a height of 20 feet should, however, provide a tower that will weather a lot of storms.

Since the poly-tower is wider than the standard 2 x 4 piece of lumber, three strips of 1 x 2 lumber were bolted to the 2 x 4 piece and the poly-tower fastened to these strips with 1/2-inch electrical conduit fasteners, as shown in Fig. 2C. Two of the 2 x 4 supported poly-towers used in the phased array were fastened to the back of the house with 1/4-inch lag screws, and two were secured to 8-foot lengths of 4 x 4 lumber buried in 24 inches of concrete.

### Phasing and Tuning the Array

The electrical arrangement of the phased array draws extensively from the

work of others. Electrically, the poly-tower phased array is an adaptation of that designed by Atchley, Stinchelner and White.<sup>2</sup>

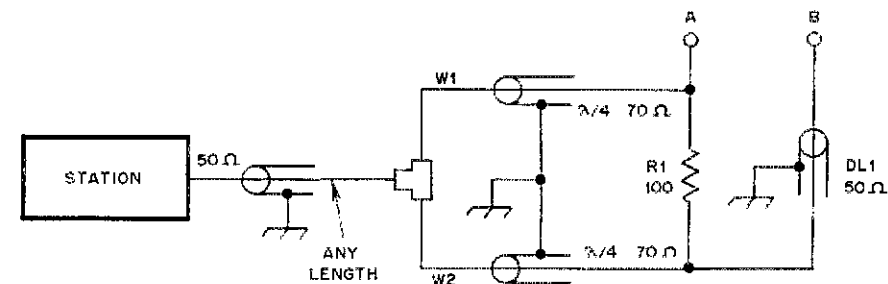
The four poly-towers are arranged in a 12-foot square. Phasing line lengths for each band, shown in Table 3, were adjusted for optimum performance at the 12-foot spacing in accordance with the data compiled by Lawson.<sup>1</sup>

Several cost and space economies were made possible by designing for low-power, multiband operation. RG-58U and RG-59U coaxial cables were used in place of RG-8/U and RG-11/U for transmission and phasing lines. This permitted all phasing lines to be coiled on an 18- x 24-inch board and fitted under the operating table in an area 3-1/2 inches deep. Smaller resistors than those

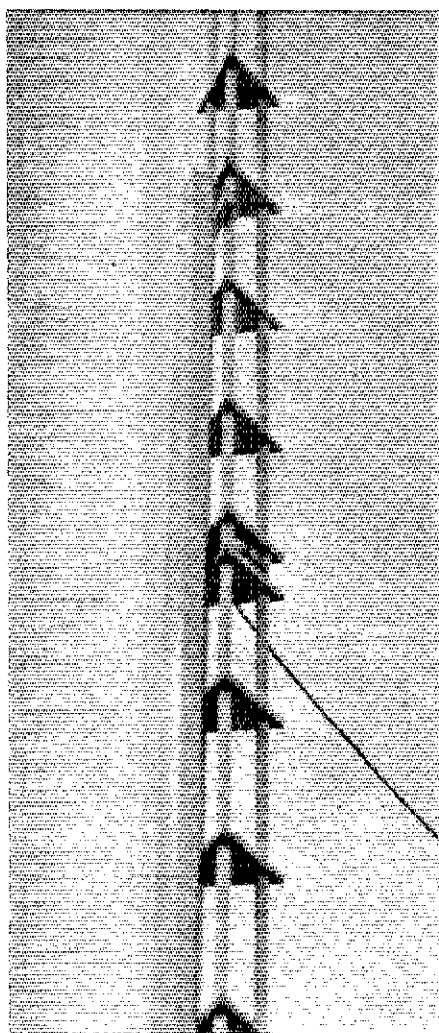
**Table 3**  
**Phasing Line Lengths for DL1, DL2 and DL3**

	Degrees	Length
10 meters	- 80	5 ft 2 in.
15 meters	- 110	9 ft 6 in.
20 meters	- 130	16 ft 8 in.
40 meters (DL1 only)	- 135	34 ft 8 in.

Note: Refer to Fig. 33, page 20-14, of the *ARRL Handbook* (1979 or 1980 edition). DL1, DL2 and DL3 lengths are modified in accordance with Table 3. Other values in the referenced diagram remain unchanged. One complete phasing unit is required for each band. The diagram of Fig. 33 is modified as follows for 40-meter operation:



RG-58/U was used for DL1, DL2 and DL3. RG-59/U was used for W1 through W6 of Fig. 33. The velocity factor for both types of coaxial cable is 0.66



A portion of one of the poly-towers showing the method of bracing used.

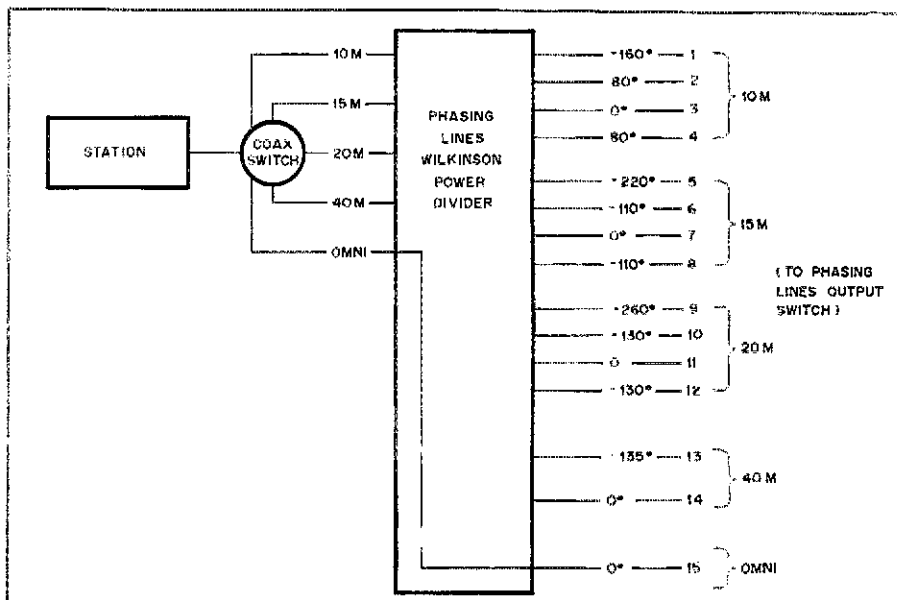


Fig. 3 — The overall diagram of the poly-tower phased array system.

specified in *The Radio Amateur's Handbook* were used for the Wilkinson power divider. Four 390-ohm, 5-watt carbon resistors were paralleled to provide the called-for 100 ohms at each power divider junction. Similarly, ten 1-k $\Omega$ , 2-watt carbon resistors can be used with satisfactory results if 5-watt carbon resistors are not readily available. Terminal strips rather than expensive coax fittings were used at the power divider junctions. The common ground for the coax braids was provided by lining the mounting board for the phasing lines with extra-heavy-duty aluminum foil. Then the entire board was enclosed using the same foil and aluminum tape.

The three switches that replace *The Radio Amateur's Handbook* array relays are mounted on the bottom of the phasing lines board. A coax switch was used to transfer the transmitter output to the input of the phasing lines for the desired band. Four coax fittings were installed on the rear panel of a 4- $\times$ -6- $\times$ -5-inch aluminum box. Two, four-wafer switches were bought from a local supplier of surplus equipment and mounted within the box. One of the switches has six positions. This switch is used to connect the output of the phasing lines to the direction-selection switch. Four positions

are used for the 10- through 40-meter bands. Of the remaining two positions, one is used to select single-antenna operation. This is especially desirable for periodically checking the "health" of each antenna. The sixth position is used to ground all four antennas in the array.

The second four-wafer switch is the direction-control switch, which ideally, should incorporate 90-degree indexing. Such a switch was not available, so I settled for a five-position switch. This permits switching through all quadrants and returning to the starting quadrant at the fifth position. Figs. 3 and 4 show the wiring arrangement of the three switches.

Transmission line lengths must all be the same. Significant differences in length will alter the operation of the array. The lines should be cut to lengths specified in *The ARRL Antenna Book* to reduce line currents.<sup>4</sup>

To keep the transmission lines as close to right angles as possible for as great a distance as possible, the lines were run through the attic from the front to the rear of the house, then out to the antennas through an attic air vent.

#### Operation on 40 Meters

Only two diagonally opposite poly-towers are used at any time on 40 meters.

Inoperative towers are grounded. The resistance of the poly-towers at 40 meters is about 12 ohms, so two identical L networks are used to tune the phased towers. These networks are enclosed in a 4- $\times$ -8- $\times$ -6-inch aluminum box. The networks are separated by a Masonite panel covered with heavy-duty aluminum foil that is fastened to the box with L brackets. Because of the proximity of the poly-towers to each other on 40 meters, tuning is a little critical. If it is desired to work both the cw and phone portions of the band, it will be necessary to provide some means to alter the tuning of each L network. Only cw operation is used here on 40 meters, so no such provision was made.

#### L Network Tune-Up Procedures

Tune the transceiver into a 50-ohm dummy load on 40 meters, then reduce the transmitter output to zero. Connect an SWR meter to the transmitter side of one of the L networks. Increase transmitter output power just enough to obtain a reading on the meter at its most sensitive setting. Adjust both L networks simultaneously and identically for a low SWR reading (below 2:1). When this has been done, check the second L network SWR. If it is essentially the same as that of the first, you're in business.

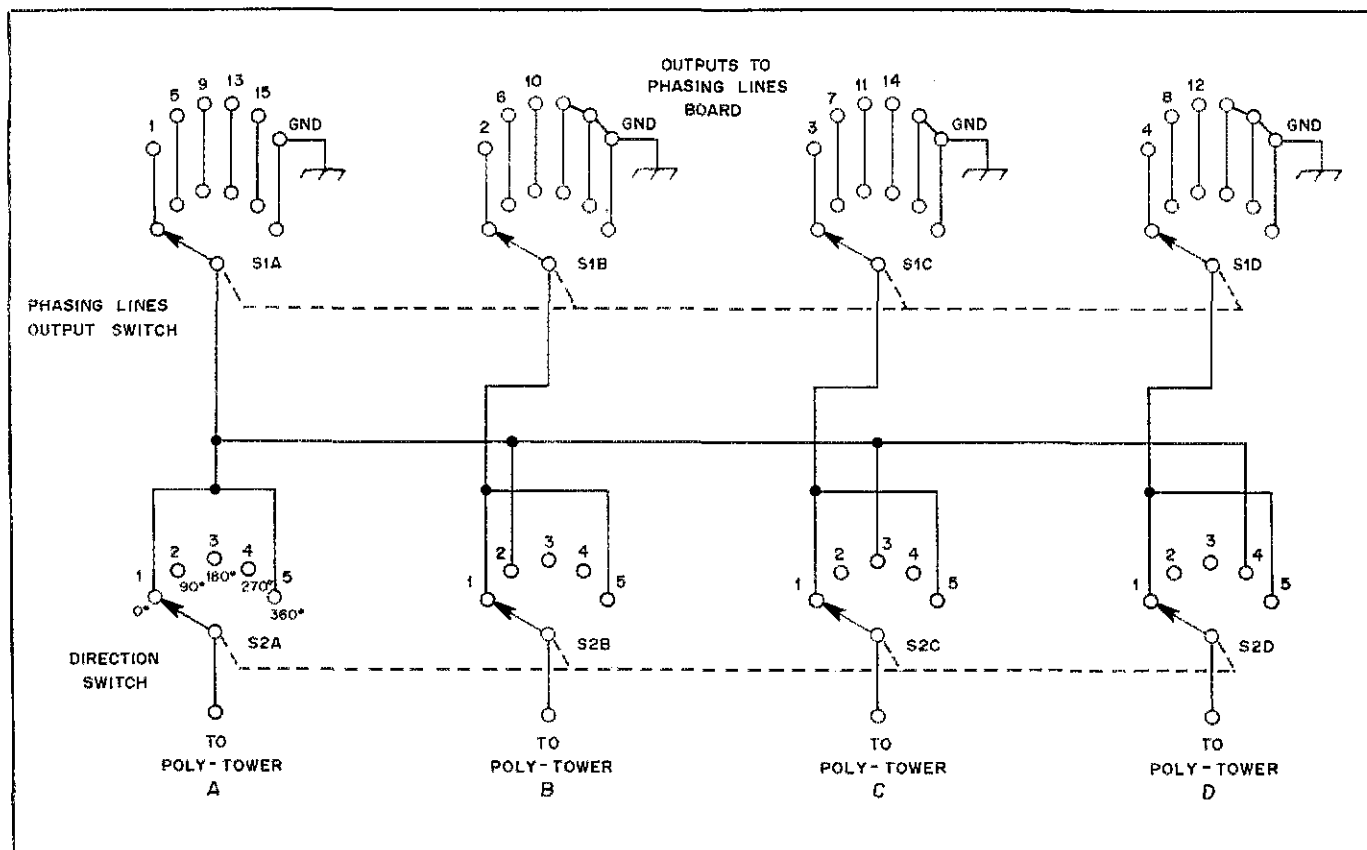


Fig. 4 — The wiring diagram for the phasing lines output and direction switches is shown here. The interconnection chart shown is to be used when wiring switch S2; only the first set of interconnections is shown for clarity. The direction switch interconnections are:

S2A-1,5 to S2B-2 to S2C-3 to S2D-4  
 S2B-1,5 to S2C-2 to S2D-3 to S2A-4  
 S2C-1,5 to S2D-2 to S2A-3 to S2B-4  
 S2D-1,5 to S2A-2 to S2B-3 to S2C-4

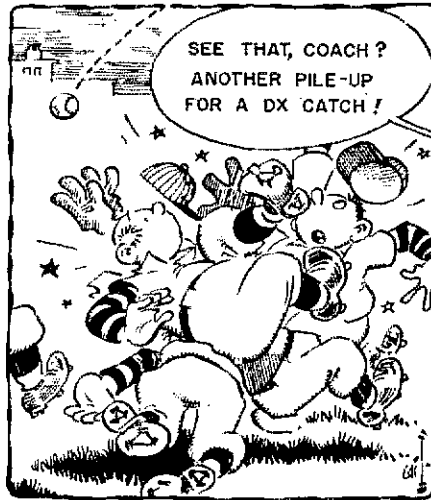
The exact component values of the L networks will depend on transmission-line lengths and other factors. A 365-pF receiving-type capacitor should be adequate to tune a single poly-tower. When phasing two towers, however, the required capacitance may exceed 1000 pF. Silver mica capacitors may be added in parallel with the 365-pF variable to achieve a matched condition. After the L networks have been tuned, fixed-value capacitors may be substituted for the variables.

### General Notes

The poly-tower is not as sharply resonant (except on 40 meters) as normal wire antennas. As a rule, 20, 15 and much of 10 meters can be covered with a low SWR. The broadband effect of the poly-tower antenna is attributed to the multiband dipole arrangement and the placement of the dipoles inside the PVC legs of the poly-tower.

Occasionally, climatic conditions will cause a rise in SWR on one or perhaps two bands. When this occurs, the reflected power is absorbed by the power-divider resistors. The 5-watt resistor combinations have been more than adequate to handle these occasional SWR excursions.

If for some reason the resonant frequency of one or more of the dipoles in the poly-tower should be far enough removed from the desired frequency of operation to cause a constantly high



Do you have to sit on the sideline or are you able to participate in the action?

SWR, the frequency of that dipole can be shifted by methods outlined in the *Antenna Book*.

### How Does It Perform?

The real test of an antenna does not come when the band is open, but rather when conditions are marginal. Under marginal band conditions, do you have to sit on the sideline, or are you able to participate in the action? The poly-tower phased array has taken me off the sideline

and put me into the action during such times.

The array has been in operation for over a year now. The following general observations have been made while running approximately 150 watts into the array: On 40 meters, the antenna appears to provide performance equal to that of operating with a linear amplifier and using an inverted V or quarter-wave vertical antenna; On the 10- through 20-meter bands, the performance is as good as (and often better than) operating "barefoot" with a triband beam at 50 feet. Naturally, 150 watts and a poly-tower array does not match the performance of a linear amplifier feeding a mammoth monobander at 70 feet!

If you are living on a small city lot and have a limited amount of money to spend for your hobby, the poly-tower phased array offers a cost-effective way to add to your operating enjoyment. As a start, you can assemble one tower and achieve an immediate improvement over a quarter-wave vertical stuck into the sand. As time permits, build additional poly-towers and enjoy the pure pleasure of instant beam switching. □

### Notes

- <sup>1</sup>feet × 0.3048 = meters
- <sup>2</sup>inches × 25.4 = millimeters.
- <sup>3</sup>*The Radio Amateur's Handbook*, fifty-seventh edition, p. 20-13.
- <sup>4</sup>Lawson, "Simple Arrays of Vertical Antenna Elements," *QST*, May 1971.
- <sup>5</sup>*The ARRL Antenna Book*, thirteenth edition, p. 197.

## Strays

### TA PROFILES

□ For services rendered as an ARRL Technical Advisor since 1978, we extend our gratitude to Edwin S. Oxner, KB6QJ. His professional area of expertise is field-effect transistors (JFETs, MOSFETs and VMOS). He has written many amateur and professional articles on this subject. Ed has also given several excellent technical papers at ARRL-organized IEEE seminars and ARRL conventions.

Ed was first licensed in 1952 as W9PRZ and now holds an Advanced class license. Beside his sheer enjoyment of QSOs, both phone and cw, he is also interested in astronomy, archaeology (Near Eastern) and Semitic languages. He resides in San Jose, California, is a member of the Santa Clara Valley Repeater Society and has been a senior member of IEEE since 1947.

Ed received his BSEE and BSRE from Tri-State University. He is listed in *Who's*

*Who in the West and Who's Who in Finance and Industry*. Ed is employed as the senior engineer for Siliconix Incorporated. — *Marian Anderson, WB1FSB*



TA Ed Oxner, KB6QJ, wearing his usual friendly smile.

### STILL GOT SOME SPARK LEFT?

□ Were you operating a spark rig when you obtained your first amateur license? Amateur spark became obsolete about 1924 and was made "officially" illegal in 1927.

Ralph Hasslinger, W2CVF (ex-2CVF) is spearheading the formation of a very informal organization of ex-spark operators — no constitution, politics, membership fees, dues or assessments — just a group that pioneered the development of the hf bands. If you can remember the nostalgic aroma of ozone and want to become a member of this group, contact Ralph at 28 Warren Pl., Glen Rock, NJ 07452.

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

□ Dave, in Sacramento, who worked PA0LH with an FT-7, QPR, in the spring of 1980. I have the FT-7 modification he was looking for, but have been unable to locate him through the call sign WA6JSA. L. Tysma, PA0LH, 1 Wiersmajof 29, 9203 RG Drachten, The Netherlands.

# The (Not Quite) Ultimate Dummy Load

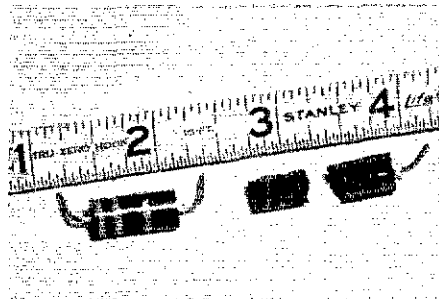
What has 66 resistors, dissipates 132 watts, is easy to construct and is educational? This dummy load may be the answer to what to do with the box of resistors Aunt Millie gave you for Christmas.

By Peter O'Dell,\* AE8Q

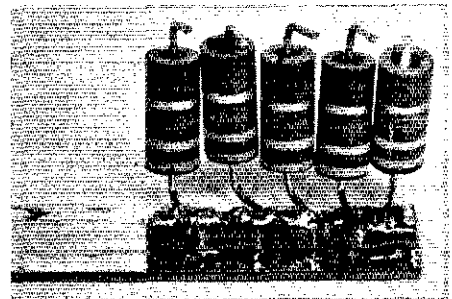
That will never fly. I'd be surprised if that thing works above 20 meters. You're kidding!

Such was the chorus of support I received as I announced my intention to build a large dummy load from 2-watt, carbon-composition resistors. I must admit that I wasn't so sure that it would work myself, but I am a rather stubborn type who has to prove things for himself.

A dummy load is simply a resistive device that should be much better at generating heat than propagating rf energy (Fig. 1). The first dummy load I had was a 100-watt electric light bulb. Don't laugh; it worked. It was a good visual tuning indicator and the tube finals didn't seem to mind that it probably was not exactly a 50  $\Omega$  load. I've never tried one with a rig that has solid-state finals, but it should work with them, up to maybe 10 meters or so. If a light bulb presents such a good match, why do people use anything else? Ask some people who have been around for a few years. One staff member recalls working another station about 10 to 15 miles away with 30 watts into a light-bulb "dummy load." In



How do you spot a 2-watt carbon resistor? If it is a little over 1/2 inch (13 mm) long, then it is the right wattage. If you are not sure if it is carbon, take a blunt object and smash the resistor. A carbon composition resistor will look something like the pieces on the right when broken open; a wire-wound resistor will have wire inside (naturally).



Construction technique for assembling resistors. A bead of solder is run lengthwise along both edges of the pc board. In our case the leads of the resistors were pre-cut and bent in the shape shown, resulting in a simple procedure for mounting. If your resistors have long, straight leads, it may be advantageous to adopt a different construction technique.

fact, light bulbs are better signal radiators than the "antennas" that some hams use.

Besides radiation characteristics, the other important considerations for a dummy load are that it present something near a 50  $\Omega$  load and that it not be reactive. In other words, it should be a "pure" resistance. Obviously, there must be some kind of conductor that connects the transmission line to the resistor. For the lower frequencies, these conductors or leads are of relatively minor concern; but as we move toward the very-high frequencies the leads begin to act like inductors or capacitors, depending upon their size and location. Therefore, a dummy load that looks like a pure resistance to an 80-meter transmitter may look like a resistor in series with an inductor or capacitor to a transmitter operating at 10 meters. This effect will become more pronounced as the frequency is increased.

If we are talking about enough 2-watt resistors to handle the output of a typical hf transceiver of 100 watts or so, then we are also talking about several leads to several resistors. Without experimenting, it is quite reasonable to *assume* that the composite load will be quite reactive. Hence, the justifiable skepticism that greeted my idea.

## Two By Two

What happens to the resistance and power-handling capabilities of resistors in parallel? Let's take a look at the case where we are dealing with only two resistors (Fig. 2). As depicted in Fig. 2A, the total resistance of two resistors in parallel is equal to the reciprocal of the sum of the reciprocals of the individual resistors. Let us suppose that we have the situation that is depicted in Fig. 2B. R1 is 100  $\Omega$  and R2 is 150  $\Omega$ ; both resistors are

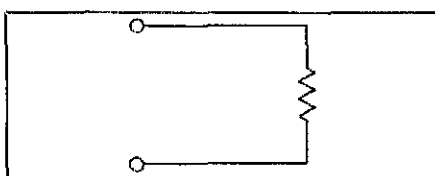


Fig. 1 — A dummy load consists of nothing more than a resistive device with two terminals. It converts the rf energy coming into it on the transmission line to heat.

\*Basic Radio Editor

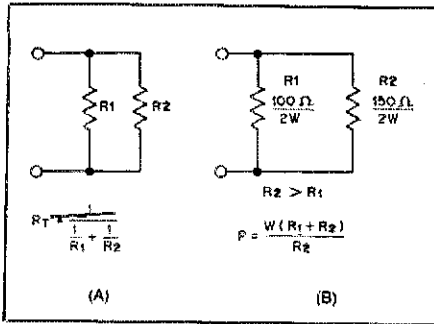


Fig. 2 — A shows two resistors in parallel and the formula for calculating the resistance of the circuit. The diagram and formula at B show what happens when resistors of unequal value are wired in parallel.

2-watt carbon composition. The reciprocal of 100 is 0.01; the reciprocal of 150 is 0.0067. The sum of these two numbers is 0.0167, which produces a reciprocal of 60 (ohms) for the effective resistance of the circuit. How much power can safely be dissipated by these two resistors in parallel? If you said 4 watts because both resistors are of the 2-watt size and, therefore, the power-handling ability should be the sum of the two, think again.

Each resistor by itself can handle 2 watts. But how is this power level determined? Power is equal to the voltage times the current. Since the two resistors are in parallel the voltage across one will always be the same as the voltage across the other. However, the current through each individual resistor is equal to the voltage divided by the resistance of that resistor. Thus, more current will flow through the lower value resistor for any given voltage across the resistors. Because that resistor has more current flowing through it, it will reach its level of maximum safe dissipation (2 watts in this case) before the other resistor reaches its maximum safe level. The formula for calculating the total safe power dissipation level (P) of two resistors in parallel is given in Fig. 2B. R2 is assumed to be larger than R1 and both resistors have the same wattage rating (W). This formula can be derived from Ohm's Law by simple algebraic manipulation. (I bet there are

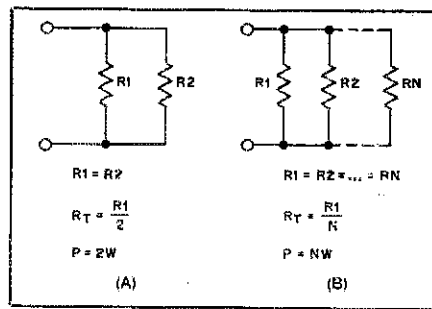


Fig. 3 — Using resistors of the same value, we can maximize the ability to safely dissipate heat. B shows the simple formulas that can be used to calculate the total circuit resistance and the effective wattage when equal-value resistors are used.

three or four of you who would enjoy deriving it.)

If we insert the values given in the example in Fig. 2B, we find that the total safe power dissipation is only 3.33 watts. If we are interested in maximizing the power dissipation for the fewest number of resistors, then intuitively we will want to use resistors of equal wattage and resistance.

#### The More the Merrier

Fig. 3 depicts what happens when we parallel 2 or more resistors of equal resistance and equal wattage. In this special case, the resistance of the circuit  $R_T$  is equal to one-half the resistance of one of the resistors. The formula for this relationship can be derived from the more general formula for resistors in parallel by simple algebraic manipulation. (Is anyone interested in staying after class and working out the math involved?) The safe power dissipation is equal to twice the wattage rating of the individual resistors.

This relationship can be extended to three or more resistors, as depicted in Fig. 3B. The resistors are numbered sequentially with N being the number of the last resistor in the chain. Again, all resistors are equal in resistance and wattage. Can you derive the formulas for the total resistance ( $R_T$ ) and the total wattage (P)?

If we use three equal resistors, we find that the resistance of the three in parallel

will be equal to one-third the resistance of the individual resistors and that the power rating will be tripled. If we go to four resistors, the total resistance will be one-fourth and the power rating will be four times that of the individual resistors. We can extend this relationship as far as we need to.

Suppose that we want to build a 50  $\Omega$  load from 2-watt resistors. The load will be required to handle the output power of our typical transmitter (120 watts maximum). We will be using equal-value resistors to minimize the number of resistors needed to safely dissipate the required amount of power. Therefore, we will need at least 60 of them (120 watts divided by 2-watt resistors equals 60 resistors). Plugging values into the formula in Fig. 3B and solving for R1, we find that the resistors must be 3000  $\Omega$  each to give us a total resistance of 50  $\Omega$ . On the other hand (and more likely in reality), if we had a stock of 3000- $\Omega$  resistors, we could calculate the number needed to make a 50  $\Omega$  load by dividing 3000  $\Omega$  by 50  $\Omega$ .

#### What for Watts

Throughout this article we have been talking about 2-watt resistors. The reason is that the largest stock-value wattage for carbon-composition resistors is usually 2 watts. Larger wattage resistors are often available, but they almost invariably are wire-wound. These resistors are pretty much what the name implies — a precise length of high-resistance wire wound into a coil and encased in some heat-conducting package. Because of the construction, wire-wound resistors are totally unsuitable for dummy loads; they're highly reactive.

Where do you get 2-watt carbon composition resistors these days? You probably won't find them at your local CB-supply house or discount store. You will find them at large industrial electronic supply houses, but the cost may be prohibitive. I checked the catalog of a national distributor (with a \$25 minimum purchase) and found that they sell 2-watt resistors for about \$12 per hundred. Such pricing is reasonable if several individuals go together and buy enough to exceed the minimum order. If it turns out that this is the only way that you can obtain enough resistors to build one dummy load and you have no one to share the costs with, it will cost you less to buy a commercial dummy load or kit. Probably the best source for the resistors is a hamfest flea market. I have often seen bags of resistors of the same value go for \$2 or less at these gatherings.

Here is where knowing the formulas that we developed earlier will help you. Surplus dealers will not likely have a wide range of values to choose from. It will be incumbent upon you to do a little mental arithmetic and decide which value resistors are suitable for use and which are not, in addition to the number needed.

Table 1

#### Resistor-Capacitor Color Code

Color	Significant Figure	Decimal Multiplier	Tolerance (%)	Voltage Rating*
Black	0	1		
Brown	1	10	1*	100
Red	2	100	2*	200
Orange	3	1,000	3*	300
Yellow	4	10,000	4*	400
Green	5	100,000	5*	500
Blue	6	1,000,000	6*	600
Violet	7	10,000,000	7*	700
Gray	8	100,000,000	8*	800
White	9	1,000,000,000	9*	900
Gold	-	0.1	5	1000
Silver	-	0.01	10	2000
No Color	-	-	20	500

\*Applies to capacitors only

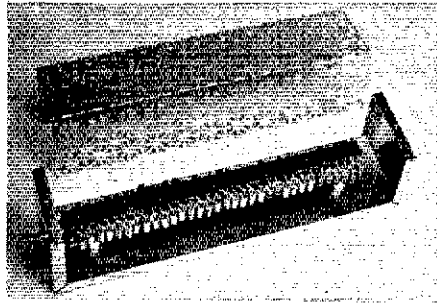
Since carbon-composition resistors are marked with the standard color code (Table 1), you may want to memorize it or carry a copy with you (a full explanation of the color code can be found in chapter 17 of *The 1981 Radio Amateur's Handbook*, available from ARRL for \$10). Carbon-composition resistors are usually tubular in construction, with the value of the resistor specified by the color code; wire-wound resistors are customarily encased in oblong, box-like structures, with the value of the resistor printed on the top. If there is any doubt about what kind of resistors you have, it would be advisable to break one apart and see what is inside.

### Wet vs. Dry

As can be seen from the accompanying photographs, we have constructed the dummy load in two different formats. The elongated version is meant to be used as an air-cooled (dry) dummy load. The heat dissipated in the resistors of the dummy load is transferred to the air around the load by convection. If the duty cycle is less than 100%, the power rating of the dummy load can be exceeded. A rule of thumb is that if the resistors become too hot to touch (don't key the transmitter while touching them!) then you should reduce the power level, the duty cycle or both. A perforated cabinet may be constructed to further reduce any incidental radiation.

The second version of the dummy load is shown attached to a paint-can lid. A significant improvement in the transfer of heat can be accomplished by immersing the dummy load into an oil bath. Thus, a dummy load that would be rated for 100 watts dry may be able to withstand several hundred watts for a minute or two if submerged in oil. The best oil to use is transformer oil, which you may be able to obtain from your local utility company. If local hams are employed by the utility, check with them. Be wary of transformer oil that individuals may have had for several years because it may be contaminated with PCB, a highly toxic substance. If you have no luck with transformer oil, you may want to use mineral oil. Purchased in a drug store, mineral oil can cost up to \$3 per pint. The reason for the high cost is that the product has been certified as fit for human consumption and it may carry the label of a major pharmaceutical house. Veterinarians have used quantities of mineral oil to treat horses, cattle and other large animals for years. A check with local veterinarians specializing in large animals indicated that mineral oil should be available from this source for about \$5 to \$10 per gallon. (It may be less embarrassing as well as less expensive to buy a gallon of mineral oil from the veterinarian.)

Over the years hams have used various other oils as a coolant in dummy loads.



Dry dummy load. The resistors are mounted in two long rows. The bottom pc board is mounted to two standoff insulators. The enclosure was specially constructed in the ARRL lab to fit the dummy load. Any metal cabinet that the dummy load will fit in will serve to reduce incidental radiation and to prevent possible accidental contact when the transmitter is being keyed.

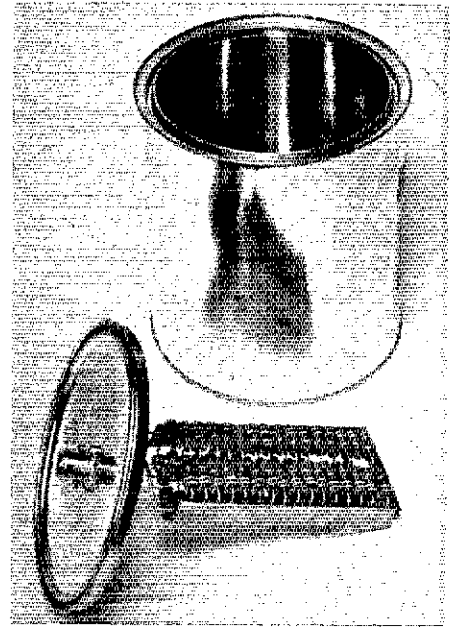
Most of these oils, including motor oil and cooking oils, have a considerably lower flash point than transformer oil or mineral oil. We advise you to err on the side of caution in this matter — one accidental fire could easily cost 20 times the saving of using a less costly oil.

Whether to build wet or dry is a choice each builder will have to decide. A dry dummy load is certainly less messy and easier to build. Also, there is no need to scrounge for an empty paint can and oil to fill it. On the other hand, a dry dummy load will not handle nearly as much power.

### Putting It Together

The 3300- $\Omega$  resistors I used were a portion of a large donation of parts from a member. Each resistor came with the leads clipped short and bent as shown in the photograph. My first thought was to drill equally spaced holes through the circuit board and mount the resistors with the shortest possible leads. Common sense [read: laziness — Ed.] intervened and I decided to solder the resistors directly to the circuit board without straightening them or drilling the holes. Two strips of double-sided circuit board, 1-inch wide by whatever length necessary, are used if the dry dummy load is to be constructed. You will need three strips half as long if the wet format is chosen. The outer copper laminations are not connected. We are not sure what the effect will be to use single-sided pc board — we ran out of resistors before we thought of trying it that way. One side of the bank of resistors is connected to the center pin of a coax connector and the other side is attached to the ground side. Make the connecting leads as short as possible.

Once the dummy load has been built, attach an SWR indicator and transmitter and check the SWR of the dummy load. On both models constructed in the lab we showed an SWR no greater than 1.1 to 1, 80 through 10 meters. Incidentally, we used a reactance bridge to double check



The wet dummy load. In this format the length has been halved by constructing with two sets of two rows each. A small pinhole is punched in the top of the can to allow the can to "breathe." The can shown was obtained from a chemical supply house. If you have available a paint can that has been emptied it should work — be sure to clean out the paint before adding the oil. Some paint and hardware stores that buy paint in bulk may be willing to sell you a new, clean paint can.

the figures obtained from the SWR bridge and found no discrepancy. At 2 meters we found that the dry dummy load had an SWR of 1.8 to 1 and the wet one had an SWR of 2.6 to 1. While it may not be suitable for vhf work, this design is perfectly adequate for hf.

### Lessons to Be Learned

I am not one who advocates building anything and everything just for the sake of building it — particularly if the end result is not better and less expensive than something that can be bought. (The SWR figures on this dummy load are not as good as those of most commercial dummy loads, especially at vhf.) You are justified in building this if you happen to have enough resistors around, you know where you can get them cheap or you want to do it as a group project and go for a quantity discount.

This project demonstrates the value of knowing the most basic fundamentals of electronics — and being able to recognize what is significant and what is not. If you know the fundamentals, you will be in a better position to make use of the bargains that you encounter at flea markets and surplus houses. If you know the fundamentals of electronics, you will be able to make do in an emergency whether you have the exact replacement part or not. If you don't know the fundamentals of electronics, now is the time to start learning them.

## ICOM IC-2A 2-Meter Hand-Held Transceiver

ICOM's contribution to the world of synthesized, 2-meter hand-held transceivers is the rugged, compact IC-2A. With the Touch-Tone pad installed, it is called the IC-2AT. ICOM provided Hq. with one of the first production models, and in the seven months I have operated this transceiver, it has undergone a lot of rugged use and given no problems.

What do I mean by rugged use? How about clipping it on my belt for monitoring the local repeater while bicycling the 12 miles from home to League Hq. and back two or three times a week during this summer? Or using it to keep in touch with civilization while climbing Mount Katahdin, Maine's tallest mountain, and camping at Baxter State Park? (I wish I were as unaffected by that mountain climb as the hand-held was. Whew!) On top of that, I lent it to K1FHN, who used it to get onto 2-meter fm for the first time. The little ICOM saw no rest that month! Believe me, this rig was *not* babied. Yet, it performed flawlessly. On-the-air reports gave it high marks for overall signal intelligibility and clarity.

The best thing going for this rig, in my opinion, is its small size and light weight. The rig is so light it's easy to forget you're carrying it until someone breaks the squelch.

### Metamorphosis: IC-2A Becomes IC-2AT

The unit ICOM sent to Hq. was the IC-2A because, at that time, production models of the IC-2AT were not available. A few months later however, ICOM sent a new case front, including the Touch-Tone pad, allowing me to change the IC-2A into an IC-2AT. This required only the removal of six screws and disconnection of the wires to the speaker and microphone. The case front with the Touch-Tone pad was installed by plugging in the Touch-Tone connections and soldering the wires for the speaker and microphone. The whole procedure took about 10 minutes. For those of you who purchase the IC-2A and then decide to retrofit your rig with the pad, you may order the 2A-TTN from your ICOM dealer.

The ICOM factory tests and adjusts the tones for the IC-2AT. However, retrofitting the IC-2A with the Touch-Tone pad required a minor adjustment of the tone level to get the autopatch on the local repeater to accept the tones. This was a simple matter of adjusting R77. Page 19 of the owner's instruction manual shows where this potentiometer is located. The tone frequencies were measured in the ARRL lab and were found to be within 0.7% of the standard, an extremely accurate figure.

I used the standard IC-BP3 NiCad battery pack and BC-25U wall charger exclusively and found the IC-BP3 to be adequate for most of my needs, though there were a few times when longer battery life would have been nice. The radio has a small, red transmit/battery indicator that is illuminated while transmitting.

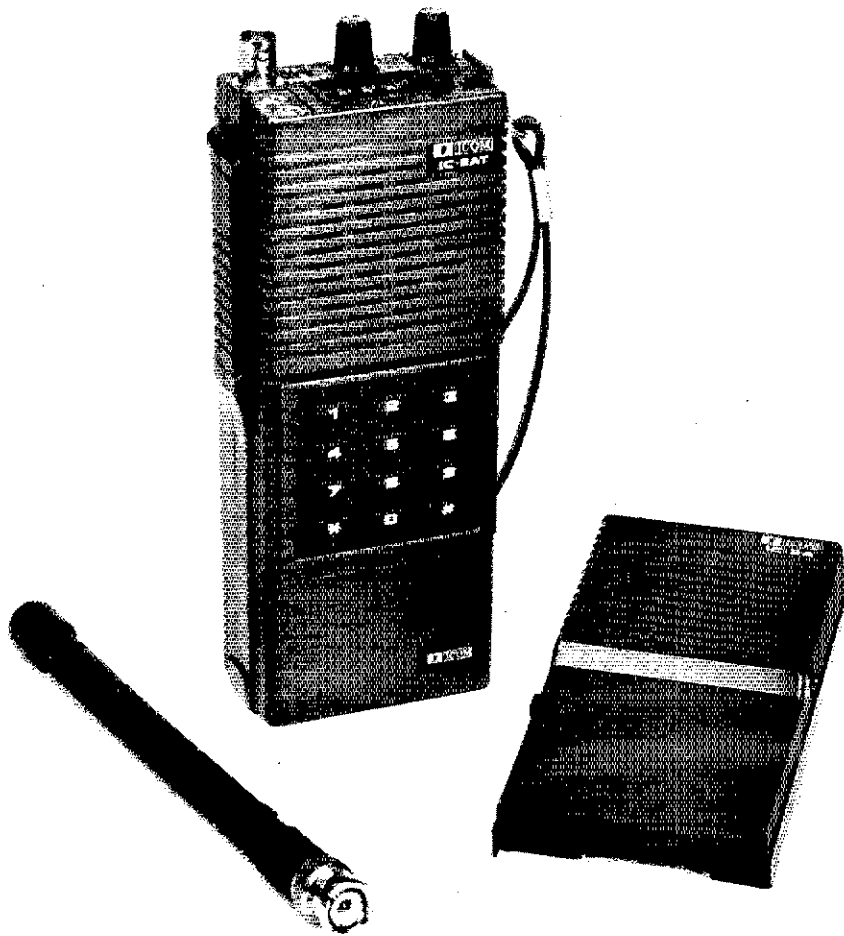


Fig. 1 — The IC-2AT. A BNC antenna connector permits rapid and positive antenna connections to be made. The flexible antenna is a part of the standard package. To the right of the transceiver is the original case front. Conversion from the IC-2A to IC-2AT is discussed in the text.

Table 1  
IC2A/AT Battery Packs

Battery Pack Model	Height	Charger Required	Batteries	Voltage	Typical Output (in watts)	Dealer's Suggested Retail Price	Brief Description
IC-BP2	1.5 in. (39 mm)	BC-30	N-425 AR	7.2	1.0	\$34.50	Low voltage/high capacity
IC-BP3	1.5 in. (39 mm)	BC-25 or BC-30	N-250 AA	8.4	1.5	\$27.50	Standard voltage/standard capacity
IC-BP4	1.9 in. (49 mm)	BC-30	UM-3	9.0	1.5	\$9.50 (no cells included)	Holder for dry cells or NiCads
IC-BP5	2.4 in. (60 mm)	BC-30	N-425 AR	10.8	2.3	\$47.50	High voltage/high capacity

Note: The BC-25 is a wall charger and is supplied as standard equipment with the transceiver. A drop-in charger, the BC-30, is optional and sells for approximately \$70.



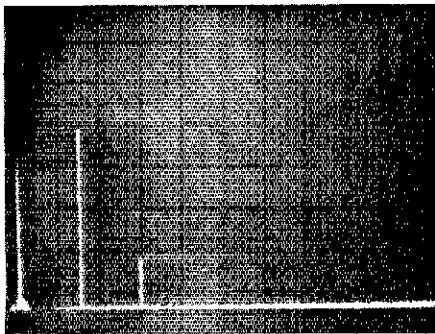


Fig. 2 — A spectral photograph of the IC-2A/AT output. The fundamental signal has been reduced in amplitude some 30 dB by means of notch cavities; this prevents analyzer overload. The second harmonic is shown approximately 62 dB below peak fundamental output. Vertical divisions are 10 dB; horizontal divisions are 100 MHz. Power output was 2.5 watts at a frequency of 146.52 MHz. Tests were performed in the ARRL lab. The IC-2A/AT complies with current FCC specifications for spectral purity.

## ICOM IC-2A Serial no. 11501169

### Manufacturer's Claimed Specifications

Frequency coverage: 144.000-147.995 MHz  
 Frequency resolution: 5-kHz steps, 800 channels.  
 Frequency control: Digital PLL synthesizer, with thumbwheel switches.

Antenna impedance: 50 ohms, unbalanced; no VSWR protection claimed.

Power supply requirements: 8.4 V dc

Dimensions: 4.6 × 2.6 × 1.4 inches (117 × 65 × 35 mm)  
 HWD without battery pack. IC-BP3 pack dimensions:  
 1.9 × 2.6 × 1.4 inches (49 × 65 × 35 mm) HWD.

Weight: 16.6 oz (470 g) including IC-BP3 and flexible antenna.

Transmitter output power: High — 1.5 W, low — 0.15 W at 8.4 V dc.

Receiver: Double-conversion superheterodyne.

Intermediate frequencies: 1st — 10.695 MHz; 2nd — 455 kHz.

Sensitivity: > 26 dB S + N + D/N + D at 1 μV; < 0.5 μV for 20 dB noise quieting.

### Measured in ARRL lab

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If the light fails to go on, the battery voltage is too low. Bringing the BP3 back up to full charge takes 15 hours. However, optional battery packs have more capacity and can be quick-charged in 1 to 1-1/2 hours with the BC-30 drop-in charger.

Four different battery packs can be used with the IC-2A/AT (see Table 1). The hand-held's receiver is self-regulating; however, the transmitter will draw more current from the higher voltages. This means a higher-voltage battery pack will deliver more output. Each battery pack, with the exception of the BP-4, is a sealed NiCad battery. The BP-4 is actually a battery holder for six AA-sized cells. This case will accept dry cells, zinc or alkaline, for 1.5-W output, or NiCad cells for 1-W output.

The BC-30 drop-in charger is necessary to charge any NiCad battery pack except for the CO-3. The BP-3 can be charged with either the wall charger or the BC-30. However, the other battery packs, including the BP-4 if loaded with NiCad cells, must use the BC-30. The BC-30 drop-in charger is a "smart" charger. If you drop in the hand-held with any of the battery packs, the notches on the bottom of the pack identify it for the charger and it will supply the right voltage and current. The BC-30 has a heat-sensing device that makes use of the fact that a fully charged NiCad cell's temperature elevates once it reaches a full charge. When it senses the temperature elevation, the BC-30 knows the NiCads are fully charged and shuts down. It takes the BP2, BP4 (with NiCad cells) and BP-5 about 1 to 1-1/2 hours to charge. Though the BP-3 can be charged with the drop-in charger, it still takes 15 hours.

The battery life varies with the battery pack being used. According to ICOM, the BP3, the standard NiCad battery pack, should last for approximately 100 minutes of continuous use. This assumes a duty cycle of 3:1, i.e., three minutes of reception for every one minute of transmission. My experience seems to bear this out. Of course, a squelched receiver draws less current (20-mA) than an active receiver (130

mA), so expect longer battery life if monitoring a quiet repeater or simplex channel.

### On-the-Air-Operation

Most of the operating controls are located on the top of the hand-held. The ON/OFF switch is a little unusual because it is a small slide switch separate from the VOLUME control knob. Whenever I handed the rig to a friend, he or she would invariably twist the VOLUME control knob in an attempt to turn it on. The ON/OFF switch is clearly marked so you can chide your friends for being so impetuous! Actually, I like the separate ON/OFF switch because it saves the trouble of readjusting the volume whenever the transceiver is turned on. The other controls: VOLUME, SQUELCH and FREQUENCY SELECTION thumbwheel switches are in a convenient configuration. There is also a 5-kHz SHIFT switch located next to the ON/OFF switch to add 5 kHz to the frequency displayed. On the back of the radio there is a small depression where there are three more slide switches. The switches are, from top to bottom, HIGH/LOW POWER, SIMPLEX/DUPLEX and a +600/-600 TRANSMITTER FREQUENCY OFFSET. It works very well. You select your receiver frequency with the thumbwheel switches on the top and then relate your transmit frequency to it using the controls on the back. A friend criticized the separate SIMPLEX/DUPLEX and +600/-600 switches, saying these functions could have been incorporated into one three-position switch. I think he is a little too picky.

The only serious problem I had with this rig is that everyone wanted to borrow it! Fortunately, the radio is modestly priced so one can seriously say "go out and buy one of your own." It's light, rugged and compact — a lot of radio for the money.

ICOM supplies a 29-page instruction manual, a schematic diagram and a board layout sheet with each transceiver. The instruction manual is of excellent quality. It has a trouble-shooting section, but it is confined to possible operator errors. All in all, I give the instruction manual high marks for completeness,

understandability, and good diagrams and pictorials.

### The Package

The basic package includes the following: BP-3 battery pack, BC-25 wall charger, flexible antenna, belt clip, carry strap, earphone and a couple of extra earphone and microphone plugs. The flexible antenna has a standard BNC connector for quick installation and disconnection. Besides the optional battery packs already mentioned, a number of other accessories are available. The IC 2A/2AT is available from: ICOM, 3337 Towerwood Dr., Suite 307, Dallas, TX 75234. Price class: IC-2A \$230; IC-2AT, \$250; 2A-TTN, \$30. — Dale Clift, WA3NLO

### BIRD MODEL 6736 TERMALINE WATTMETER

□ The 6736 combines a high-power, highly accurate, 50-ohm termination with a multirange wattmeter to provide power measurements up to 1000 watts in the 1.5- to 35-MHz range. Two units make up the 6736: a 50-ohm termination (a Bird Model 8251 that has been fitted with a 50-ohm line section and voltmeter cartridge) and a three-range meter unit. The two units are connected by a 43-1/3-inch (1100-mm) length of shielded cable (RG-58/U). The cable is attached to the termination with a screw-on connector so that the units may be separated.

It should be noted that while the frequency range of the 6736 is 1.5 to 35 MHz, the termination can be used as a 50-ohm load to 2.5 GHz. Full-scale power ranges of 50, 250 and 1000 watts are available on the model 6736; a fourth position of the range switch shorts the meter movement for protection during transit. Accuracy is 5% of full scale. The input connector is a Bird quick-change type that permits easy interchange so that any of the standard type connectors can be used. Though the model 6736 is normally supplied with a female type LC connector, changing to a type N connector takes less than a minute. It is also possible to

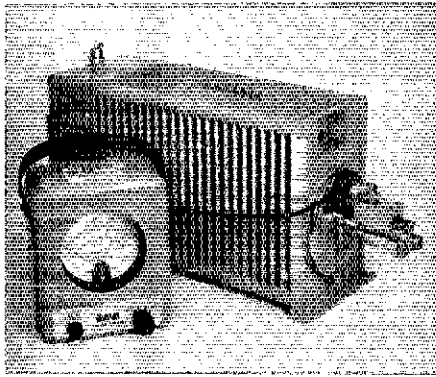


Fig. 3 — The 6736 combination shown here is only one of a number of combinations available from Bird. A multirange wattmeter eliminates the need to change slugs.

remove the voltmeter line section and place the input connector directly on the termination if desired. Both the meter unit and the termination are fitted with carrying handles for convenience. The termination unit requires 1.1 gallon (4 liters) of coolant oil (supplied by Bird) and comes with a vent plug to prevent leakage while moving the unit. Comparison to a laboratory reference meter (a Bird model 43) showed that the 6736 meets the manufacturer's specification for accuracy. There are four other Termaline wattmeters in the model 6730 series, covering power levels from 250 to 2500 watts and frequency ranges to 1 GHz. The price class for the model 6736 is \$625. It is available from the Bird Electronic Corp., 30303 Aurora Rd., Cleveland OH 44139. — *George Collins, ADØW*

### TELEX/HY-GAIN HDR-300 HEAVY DUTY ROTATOR

[I]n a word, the HDR-300 is *hefty*. This unit, weighing in at 27 lb (12.2 kg), is designed to support a vertical load of 500 lb (227 kg) and rotate an antenna with a projected wind surface area of 25 ft<sup>2</sup> (2.3 m<sup>2</sup>) when mounted inside the tower. The antenna in use at WISE at the time the rotator was tested was a large, six-element tribander with a 32-foot (9.8 m) boom. This 75 pound (34 kg) antenna hardly taxed the capability of the HDR-300, which operated as if it had no load upon it.

Telex/Hy-Gain recommends that the minimum outside tower width be 11.5 inches (292 mm). The top section of the tower at WISE is just 11 inches (279 mm). This, and the fact that the HDR-300 mounts *beneath* the rotator mounting plate, at first made it impossible to mount the rotator and have it clear the tower bracing. The job was finally done on the fourth try by *inverting* the mounting plate, permitting the rotator housing to clear the tower bracing. If one has a tower with the recommended minimum-width face, or larger, no problem should be encountered. Earlier, some difficulty was experienced in determining the location of the holes to mount the rotator to the mounting plate. The required spacing is not the same as the HAM-II holes that were already there. Though a template is provided,

its use is limited to two sizes of Hy-Gain towers. The second, and successful, effort at alignment of the rotator to the mounting plate was "eyeballed." Other size mounting plates, for other towers, might prove easier — or produce similar problems. As a suggestion, Hy-Gain might consider a template marked with the holes of other popular rotators. Then it would be a snap. Once these mechanical problems were solved, there were no others.

### Control Unit

The nicely styled, functional HDR-300 control console is provided with a convenient digital readout accurate to  $\pm 1^\circ$ . The 21 lb (9.52 kg) console, supplies 24 V ac for the rotator motor, 5 V dc for the azimuth potentiometer, and converts the analog voltage received from this potentiometer for input to the three 7-segment LEDs that display the digital azimuth readout. Both transformers are factory wired for 117 V ac, but may be re-strapped for 235 V ac operation.

Just above the ROTATE switch lever is a rocker-type switch labeled BRAKE, with FREE and LOCK positions. The switch must be moved to the FREE position before the rotator may be activated. In the LOCK position, power is removed from the ROTATE switch. Thus, the brake is not released automatically as one rotates the antenna, and then automatically applied as rotation power is removed. The antenna is free to coast to a stop as it nears the end of rotation. A simple idea, but Telex/Hy-Gain will be thanked many times by amateurs for this thoughtful feature. It is possible to lock the rotator *when* one wants it locked: Just push the BRAKE rocker-switch to LOCK. In addition, should one forget to push the BRAKE switch to LOCK at the end of an operating period, pushing the POWER switch to off automatically locks the brake on the rotator. Both the BRAKE and POWER switches are illuminated, so it is difficult to ignore them.

In addition to the operating convenience provided by the digital readout, the brake-release feature offers a degree of safety and protection. This feature, in which the operator independently activates the brake, is designed to reduce the effects of torsional forces on a tower caused by instant deceleration when a large antenna is brought to a stop. After a few attempts, one is able to release the ROTATE lever slightly before the desired antenna position is reached, thereby permitting the antenna to coast to a stop. The desirability of coasting a large antenna to a stop before brake application is an idea that appears to have escaped the minds of most rotator manufacturers. Here is one manufacturer who has heard and answered this need with the HDR-300.

The manufacturer does not recommend operation of the rotator at its rated capacity in winds above 50 mi/h (80.5 km/h). However, Telex/Hy-Gain says it is possible as long as certain precautions are taken. (1) Always allow the antenna to coast to a stop before locking the brake. (2) Always keep the brake locked when the rotator is not being turned. (3) Avoid rotating near the ends of rotation. Do not depend on the limit switches to stop rotation of a large antenna in strong winds. The manufacturer also suggests that the above precautions be followed when rotating even medium-size antennas in light winds. The life of the rotator will be prolonged.

The HDR-300 is manufactured by Telex/Hy-Gain, 8601 Northeast Highway 6, Lincoln, NE 68505. Price class: \$500. — *Lee Aurick, W1SE*

### AEA KT-1 KEYS/TRAINER

[F] Do you avoid reading keyer reviews because some arrogant cw hotshot starts off by telling you how easy it is to rag chew at 40 wpm when you have trouble at 10 wpm? I'm not a cw hotshot; in fact, I struggled to get through the FCC code exams. My first three contacts were so disastrous that I dropped out of the hobby for five years! This wouldn't have happened had the KT-1 been available.

Besides being a full-feature-keyer, the KT-1 is also a trainer. The trainer has approximately 24,000 characters stored in its memory. The operator can choose from among 10 fixed and 1 random starting points. So far it doesn't sound much different than a tape recorder with a cassette, but there is more — a lot more! I suspect that the designer had flexibility in mind as the utmost consideration when the circuit was developed.

The trainer can be set up to "spit out" the code at one constant speed or to start at a slow speed and build up to a fast speed (starting speed, ending speed and duration of speed change are all user programmable). The user has the option of choosing "slow" or "fast" code. Slow code employs the standard timing of dits, dahs and spaces, at whatever code speed.

"Fast" code is also known as the Farnsworth method. Characters are generated at a higher speed, but the spacing between letters is increased so that the overall speed is slow. For example, on speeds below 13 wpm, WIAW generates the characters for code practice at a 13-wpm rate, but the spacing between the characters is increased so that the rate of words per minute actually sent is that specified by the schedule. Above 13 wpm, WIAW sends code practice using slow code. The KT-1 user can



Fig. 4 — On first inspection, the outward appearance of the KT-1 gives no indication of its capabilities. Inside this 1-3/4 x 2-1/2 x 5-inch (44 x 63 x 127 mm) housing hides a tremendous amount of electronic sophistication.

# New Books

program it for any speed up to 99 wpm, which means that those of us in the midrange of ability can use the Farnsworth method to help us increase our speed more rapidly. Try to find a tape recorder that will do that!

I don't know if everyone struggling to learn the code or increase speed (for a code test?) will find the KT-1 helpful, but I certainly have. For years I have been listening to cw hotshots talk about hearing characters and words instead of individual dits and dahs; I had been pretty skeptical that I would arrive at that blessed condition. Thanks to the KT-1 and the Farnsworth method I am getting there. My procedure has been to set the finishing speed (that sets the rate at which the character is generated) at 35 wpm and the beginning speed at 10 wpm. (Don't get me wrong; I wouldn't classify myself as a cw hotshot now, but I am a lot better than I was.)

The keyer portion has all the features (and more) that we expect in a modern piece of equipment. It can be used as an iambic keyer with dit-only memory, dah-only memory and with or without both. For anyone so inclined, the dah input can be turned into a straight-key input, which allows the KT-1 to be used as a straight key or a bug. At initial power up, the dit-space ratio is set at 1.0 to 1. The user can program the KT-1 for any ratio between 0.5 and 1.5 to 1. The dah-space ratio is set to 3.0 to 1 at power up, but the user can select any ratio between 2.0 and 4.0 to 1.

Even though I am exposed to miniaturized, computerized equipment on a daily basis, it never ceases to boggle my mind when I see so much crammed into something so small! The KT-1 has two ICs (about 23,000 transistors in one), six diodes and five discrete transistors. The only knob on the KT-1 is a dual function ON/OFF and VOLUME control for the sidetone (the tone frequency is selected from the keyboard). All programming is by means of the 12-key pad. Some of you may suspect that the KT-1 is difficult to operate because of all the features that I have described as "programmable." Just the opposite is true. The KT-1 is simple to use after you read the manual. AEA has devoted enough time and effort to produce a manual that is complete, accurate and easy to understand. A few minutes of off-the-air practice should be enough to provide most any amateur enough "programming skill" to operate the KT-1 successfully.

The KT-1 has been designed with a bipolar keying output that will handle either positive or negative keying without modification. It should work with any modern transmitter. I found it quite enjoyable to unplug the KT-1 from my Drake TR-4C and then plug it into a Kenwood TS-130 without having to alter anything. The operating manual mentions that there are a few transmitters that the KT-1 will not key. A simple modification (which involves shorting out one of the diodes in the keyer) will overcome this difficulty. This modification will make the keyer inoperable for negative keying; however, it should never be necessary to resort to an external reed relay with the KT-1, as is the case with some other keyers on the market.

The KT-1 should be of interest to those amateurs (and would-be amateurs) who are struggling to improve their code speed, those who teach Amateur Radio courses and those looking for an extremely versatile keyer. Price class is \$130. Additional information on this keyer and other products can be obtained from AEA, Inc., P. O. Box 2160, Lynnwood, WA 98036. — Peter O'Dell, AEAQ

□ *From Beverages Through OSCAR — A Bibliography*, by Rich Rosen, K2RR/Ø. Published by Rich Rosen, 6043 W. Maplewood Dr., Littleton, CO 80123. Softcover edition or topical booklet form, 8-1/2 × 11 inches, 620 pages. Book price is \$24.95 plus \$2 handling; individual sections by subject are \$2 each plus 50 cents handling.

No longer is it necessary for the amateur or engineer to become buried in a landslide of assorted publications while looking for an obscure and forgotten article of interest. Rosen's in-depth bibliography spans in chronological form a 65-year period during which pertinent data were published in 288 different magazines, journals and publications — including the amateur and professional magazines.

This massive and complete bibliography references 30,000 articles on Beverage antennas, Yagis, receivers, preamps, oscillators, filters, ssb, lasers and 84 other subjects of amateur and commercial interest. Although the complete listing cost \$20 and the individual sections sell for \$2, one can also order larger subject volumes (up to 2378 entries) for \$5 plus \$1 handling.

The author invested four years of his spare time in compiling this enormous file of data and getting it into proper order for publication. He calls it a true "labor of love," and has read every issue of *QST* since 1945 (plus *CQ*, *Ham Radio*, 73 and others) in order to gather the necessary information. Rosen is not only an active radio amateur, but is a professional engineer with extensive industrial experience. He is thus well qualified to have selected the best of the published material. Rosen also is editor of the trade journal, *RF Design*, of Denver, Colorado. This reviewer feels that Rosen's work will represent an important part of any active amateur's technical library. The review copy will be extremely useful here at League hq. — Doug DeMaw, W1FB

□ *Interrelated Integrated Electronics Circuits for the Radio Amateur, Technician, Hobbyist, and CB'er*, by Robert M. Mendelson. Published by the Hayden Book Company, Inc., Rochelle Park, New Jersey, 1979. Softcover, 6 × 9 inches, 121 pages, \$6.95.

If you fit into any one (or more) of the categories named in the title, you'll enjoy this project book. It contains approximately 25 different circuits, many of which are interrelated (note the title again) and can therefore be tackled in building-block fashion if desired.

Starting with six power-supply-oriented projects, the reader/constructor progresses to an audio mixer, two-tone generator, ssb detector, high- and low-pass filters and band-pass and notch filters using linear CMOS circuitry. Resistance boxes, a Wheatstone bridge and a passive attenuator are next. The instruments section contains information for, among others, a multipurpose rf detector, portable digital voltmeter, battery-operated frequency counter and a capacitance meter. Then, for fun and games, there are electronic dice and digital roulette.

My first impression of the book was its neatness. It's easy to read, with clear photographs and distinct parts overlays. It is evident that care was taken in the construction

of the complete units shown in the photographs as they are all "well-groomed," presenting a professional appearance.

Circuit operation is discussed briefly in everyday language. While most circuits described are shown using pc-board construction (there's an appendix with complete pc layouts), there's no reason why perf-board construction cannot be used.

Be sure to read the preface pages, as they contain some general rules that apply to the construction of all the projects presented. Parts procurement should not be a problem, as most of the components are readily available. You'll note that most of the project enclosures appear to have come from the shelves of a Radio Shack outlet. Although the author cautions that some of the latest IC types may have to be obtained from an RCA distributor, this should not be a deterrent since there are some 300 such distributors nationwide. In all, I'd have to rate this book a cut above many of the project books I've seen. — Paul K. Pagel, N1FB

□ *Modern Electronic Circuits Reference Manual*, by John Markus. Published by McGraw-Hill Book Co., New York, NY 10020. Hard-cover edition, 8-3/4 × 11-1/2 inches, 1238 pages including index, \$44.50.

The John Markus name certainly must stand out in the minds of many amateurs and engineers, for Mr. Markus has been writing compendium-style circuit books for many years. I recall vividly how, during my early and lean years as a professional engineer, a gift of the John Markus/Vin Zeluff book, *Electronics for Communications Engineers* (McGraw-Hill 1952), became an important source of practical circuit information. By today's standards, the book would be a dismal addition to one's technical library, since it deals exclusively with vacuum-tube circuits (FETs that glow?). The current John Markus book treats practical circuits that employ semiconductors. It is perhaps the largest book of its kind that I have had the occasion to leaf. One almost needs to have muscles in his shirt sleeves to carry this volume around; it weighs 8 pounds, 5 ounces!

Although the book seems to be aimed at the professional community of engineers and technicians, it is a radio amateur's cornucopia of practical data. The more than 3600 circuit diagrams have been harvested from the pages of *QST*, *Ham Radio*, *Wireless World*, *CQ* and 73. Other material has been gleaned from such publications as *Byte*, *Kilobaud*, *EDN*, *Electronics* and other trade journals. All manner of practical circuits are represented, including rf, audio, digital and logic. There are even QRP rigs, burglar alarms, TV circuits, test equipment and temperature-control circuits. You name it; Marcus has it!

The only original writing found in the book is seen in the captions, which in capsule form tell what each circuit is and where to find the original article. The complete address of each of referenced publication is given at the beginning of the book.

If you have \$44.50 to invest in an interesting and useful reference book, this may be the next publication to add to your Amateur Radio library. Better get a small red wagon to pull it in when you go from one point to another! — Doug DeMaw, W1FB

# Technical Correspondence

Conducted by  
Jerry Hall,\* K1TD

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

## MY EXPERIENCE WITH SOLAR POWER

□ I have used my Heathkit HW-8 for more than one year entirely on energy collected from the sun. I use a solar panel that is rated at 12 volts, 300 mA, containing 32 solar cells. It sits in a southeast window at a 50° angle. The panel is connected to a 12-volt lead-acid auto battery in the basement. I use the HW-8 in the room next to the solar panel. It is best not to have the rig too close to the panel or the rf energy will destroy the blocking diode in the panel. There has to be a diode in the panel circuit or the battery will discharge back through the panel when the sun is not shining. I have made more than 250 QSOs without using any commercial power. This gives me a kind of self-satisfied feeling when I hear our fearless leaders telling us to save hydro.

I have another panel that powers lights in the garage; it is rated at 14.7 volts, with 36 cells. (Sealed-beam lamps with one element burned out are easy to get at any service station or garage, for taking them away.) I think the bigger panel is the better value. Both my panels came from Edmund Scientific; they were manufactured by Solarex of Rockville, Maryland. In all my solar-powered contacts I have never run across another solar-powered station or anyone who has worked another such station. It is easy to set up a QRP station on solar power, so I will be looking harder than ever now. Hope to see you soon. — *McRae McNaughton, VE3EQQ, 230 Ontario Rd., P. O. Box 507, Mitchell, ON N0K 1N0*

## SAFETY AGAINST ELECTRIC SHOCK

□ How many times have you worked on a piece of electrical equipment and received an uncomfortable shock? After further checks, you may have realized it was "normal" ac leakage to ground, which sometimes must be tolerated with line-to-chassis bypass capacitors. Have you ever wondered how much leakage was acceptable? Where do you draw the line? And how can you measure such leakage?

\*Technical Editor, QST

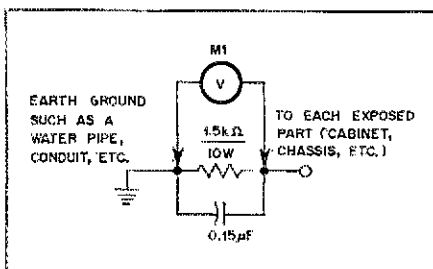


Fig. 1 — Measurement setup for determining ac leakage. M1 must have a sensitivity of 5-kΩ per volt or greater, and the capacitor must be nonpolarized. A measured ac voltage greater than 7.5 indicates a potential shock hazard.

Well, the Consumer Electronics Group of the Electronic Industries Association (EIA) has a guideline designed to be used by radio and TV service technicians. This covers their service obligation always to deliver a safe unit to the user. You should always be conscious of the safety aspects of each piece of equipment, and never be tempted to ignore any of them. The guideline covers the following.

### AC Leakage Test

Do not use an isolation transformer during this test. Use an ac voltmeter having 5 kΩ per volt or more sensitivity in the manner shown in Fig. 1. Connect a 1.5-kΩ, 10-W resistor paralleled by a 0.15-µF nonpolarized capacitor between a known good earth ground and the exposed metallic parts, one at a time. Measure the ac voltage across the combination resistor and capacitor. Reverse the ac plug and repeat the voltage measurements for each exposed metallic part. A potential as much as 7.5 V rms is permitted. (This corresponds to 5 mA ac.) The lower the measured value, the better. Any value exceeding the 7.5-V limit should be corrected immediately, as a defect is indicated. This is a potential shock hazard and may lead to death.

As amateurs, we often have contact with gear that should pass the above test. If the leakage is too high, we probably should look deeper into the cause, and naturally find a remedy. For extra protection, we should always ground all equipment — with a separate ground wire — to insure against any possible shock hazard. Remember, you do not want to find out your equipment is a shock hazard when you are making antenna connections at the top of your tower or on your wet lawn! — *Thomas R. Rosica, W2GIR, 125 Grandview Ter., Batavia, NY 14020*

## COMMON FREQUENCIES FOR UHF AND HIGHER

□ For some 10 years the use of 2304.0 MHz for weak-signal work has been employed because of several advantages realized: 2304 is 16 times 144 MHz. The British hams have also suggested using other frequencies in the uhf spectrum, 3456 MHz for example. See Table 1.

The use of a common frequency of 1080 MHz for receiving converters would reduce the stages needed for 2304- and 3456-MHz reception, as follows:

$1080 \text{ MHz} \times 2 = 2160 \text{ MHz}$  (144 MHz i-f from 2304 MHz)

Table 1

### Suggested Crystal-Controlled Frequencies with a Common Lower Frequency

Frequency Relationship	Band (MHz)
$1152 \text{ MHz} \times 2 = 2304 \text{ MHz}$	2300-2450
$1152 \text{ MHz} \times 3 = 3456 \text{ MHz}$	3300-3500
$1152 \text{ MHz} \times 5 = 5760 \text{ MHz}$	5650-5925
$1152 \text{ MHz} \times 9 = 10,368 \text{ MHz}$	10,000-10,500

$1080 \text{ MHz} \times 3 = 3240 \text{ MHz}$  (216 i-f from 3456 MHz)

These intermediate frequencies would permit using 144- and 220-MHz converters for reception of 2.3- and 3.4-GHz signals. — *Paul M. Wilson, W4HHK, ARRL TA, P. O. Box 73, Collierville, TN 38017*

## Q VERSUS BANDWIDTH

□ One concept that I was confronted with some years ago was the simple relationship of bandwidth and Q. Generally, one almost takes for granted that bandwidth and Q are related only to the well-accepted 3-dB level. That is, we accept the 3-dB bandwidth as representing the calculation of Q. The problem then presents itself: What does one do when he wishes to consider a bandwidth or Q based on a different attenuation level, say the 1-dB bandwidth?

This concept is not original: It has been written up in the *ITT Reference Data for Radio Engineers* for many editions. Perhaps for amateurs it is new. The formula given in that reference is

$$\frac{\Delta F}{F_0} = \frac{1}{2Q} \sqrt{\left(\frac{E_0}{E}\right)^2 - 1}$$

where the ratio  $E_0/E$  is the reciprocal of the voltage for the dB. For example, let's consider the 3-dB bandwidth. For 3 dB the voltage ratio is 0.707; the reciprocal is 1.4144, so, using the foregoing equation we obtain the well-known expression

$$\frac{\Delta F}{F_0} = \frac{1}{2Q} \sqrt{1.4144^2 - 1} = \frac{1}{2Q} \cdot 1$$

or,

$$\frac{\Delta F}{F_0} = \frac{1}{2Q}$$

In the *Reference Data* book the expression  $\Delta F$  is not bandwidth, but is what amounts to one half the bandwidth, so the equation for the 3-dB "Q" reduces to

$$\frac{BW}{F_0} = \frac{1}{Q} \text{ or } Q = \frac{F_0}{BW}$$

Now, if one wishes to determine the 1-dB bandwidth characteristic, simply substitute the reciprocal of the 1-dB voltage ratio (1.122) into the equation and crank away. Simple?

I found this approach valuable when I designed a synchronously tuned, three-stage wideband amplifier. Maybe there are easier ways, or maybe not. — *Ed Oxner, KB6QJ, ARRL TA, Siliconix Incorporated, Santa Clara, CA 95054*

## MORE 28-MHZ LONG-DELAYED ECHOS

□ More than a dozen possible LDEs were recorded on 28 MHz at VE2AEJ/3 during the fall/winter seasons of 1979/80 and details are available on request. However, the purpose of this short note is to mention that conditions for LDEs seemed particularly good during

November 1979, with possible echos being received on November 6, 8, 12, 13 (a double echo and a single echo) and 19 (a triple echo), all at about 0200 to 0300 UTC. Noting that 6-meter DX conditions were especially good according to "The World Above 50 MHz" on November 5 to 8 and to November 16 to 19, I suggest it might be worthwhile for anyone interested in listening for LDEs this winter to monitor 50 MHz.

Enough 28-MHz LDEs have now been analyzed to show that some of the echo delay times are not always integral multiples of the round-the-world (RTW) travel time of 138 ms (see Goodacre, *QST*, May 1980, pp. 14 to 16). However, the two main time "quanta" which show up in the 1979/80 delay times are 124 and 152 ms, the latter having been observed some years ago in 50-MHz data. Curiously enough, the arithmetic mean of these two numbers is the RTW travel time of 138 ms. By the way, anyone recording LDEs should provide timing calibration by also recording WWV or CHU either simultaneously or before and after the event.

Please note that the time of observation of echo B in my May 1980 *QST* article on 28-MHz LDEs is in error. The correct time is 0100 UTC November 18, 1978; I originally made a mistake in converting from 12-hour to 24-hour time.

My thanks go to Mr. Howard Lorenzen, W7BI, for his initial encouragement to study LDEs and to Dr. Mike Villard, W6QYT, for suggestions as to how to improve my experimental technique. These will be put into effect this fall/winter season. — Alan Goodacre, VE2AEJ/3, 1286 Woodside Dr., Ottawa, ON K2C 2G9 Canada

## ANTENNA AND TRANSMISSION-LINE QUIZ

□ Check your understanding of the performance of antennas and transmission lines with this quiz. The information was prepared by Richard C. Fenwick, K5RR, ex-W5KTR, for appearance in *QST* in 1965. Mr. Fenwick is now Vice President, ElectroSpace Systems, Inc., Richardson, Texas. Arising from questions asked at radio-club talks, it covers a lot of ground, ranging from things every amateur should know to points that will require real thought. This information appeared in *QST* for July 1965. Answers appear in August 1965 *QST* and will be republished next month.

### True or False?

- 1) VSWR at the input to a transmission line is normally the same as that at the load.
- 2) VSWR on a transmission line is normally different when receiving than when transmitting.
- 3) VSWR is the ratio of maximum voltage to minimum voltage on a transmission line.
- 4) "Reflected power" from an antenna is absorbed in the transmitter final tube and matching circuitry.
- 5) Feeding a horizontal half-wave dipole directly with coax cable normally results in serious feed-line radiation.
- 6) Transmission-line loss is independent of the VSWR on the line.
- 7) The loss in 100 feet (30.5 meters) of RG-8/U coax is less than 2 dB in any of the hf bands below 30 MHz if the VSWR is less than 4:1.
- 8) A perfectly balanced open-wire transmission line will not radiate.

9) Symmetrical radiation patterns cannot be obtained from a beam antenna unless it is fed through a balun or with a balanced transmission line.

10) There is seldom any justification for reducing the transmission-line or antenna VSWR below 2:1.

11) Coaxial transmission line is preferable to open-wire line for feeding a simple dipole antenna which is to be used on several amateur bands.

12) A Transmatch or "antenna tuner" can be used at the transmitter to reduce the VSWR on the transmission line running to the antenna.

13) The gain of a half-wave dipole antenna can be increased by more than 6 dB by placing it in front of a flat screen reflector.

14) A 5-element 20-meter Yagi on a 48-foot boom can be expected to give more than 3 dB gain over a 3-element Yagi on a 24-foot boom.

15) For all practical purposes a single ground rod is as good as a system of many quarter-wave radials on a quarter-wave vertical monopole antenna.

16) There is no point in using ground radials longer than a quarter wavelength on a quarter-wave vertical monopole antenna.

17) A 40-meter horizontal half-wave dipole 70 feet above average ground has greater gain than a quarter-wave vertical monopole with many quarter-wave ground radials.

18) High antenna efficiency is less important for receiving than for transmitting.

19) The gain of an inductively loaded quarter-wave dipole can be within 1/2 dB of the gain of a half-wave dipole.

20) The bandwidth of a half-wave dipole is greater than that of a half-wave folded dipole.

21) Ground radials on an hf vertical monopole antenna can be buried several inches deep without seriously affecting antenna performance.

22) The gain of a vertically polarized antenna at hf is significantly greater if the antenna foreground is sea water rather than ground.

24) A horizontal half-wave dipole is nearly 100% efficient if mounted at least a quarter wave above ground.

25) A vertically polarized antenna should be used for best results at hf when working DX stations using a vertical antenna.

26) Vertically stacked Yagis may give no improvement in signal-to-noise ratio over a single Yagi when used for receiving.

27) The gain of two vertical monopole antennas side by side can be greater than 3 dB over the gain of a single monopole.

28) The presence of the ground increases the maximum gain of an antenna elevated above ground by up to 3 dB relative to what it would be if the ground were not present.

29) The gain at beam maximum of a horizontal half-wave dipole is independent of the height of the dipole, considering 100% overall radiation efficiency.

30) A half-wave folded dipole gives at least 2 dB gain over a half-wave dipole. □

## Feedback

□ In "Modern Design of a CW Filter Using 88- and 44-mH Surplus Inductors," December 1980 *QST*, the formula in the caption under Table 1 should read:

$$F_{3dB}/F_{Ap} = 1.248$$

Fig. 1A should appear as shown here. On page 17, first column, 23rd line from the bottom, the text should read: "when the headset or speaker." Page 18, first column, the fifth line under *Conclusion* should read: "are certainly still applicable to." In the second column, near the center of the page, Eq. 1 should read:

$$(I) \rho = (1 - 0.1A\rho)^{0.5}$$

and Eq. 3a should be:

$$(3a) \varepsilon = (10^{0.1A\rho} - 1)^{0.5}$$

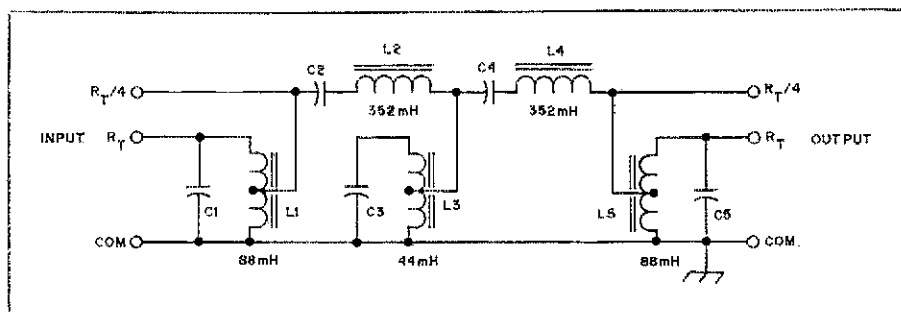
□ In the schematic diagram of the "Smart Push-to-Talk Circuit" on page 39 of December

1980 *QST* the 1-MΩ resistor connected to pin 3 of U1 should be labeled R2 to correspond with the text.

□ Jack Hardeastle, G3JIR, author of the article, "Ladder Crystal Filter Design" appearing in November 1980 *QST*, advises that correspondents should use his new address: 8 Norwood Grove, Rainford, St. Helens, Merseyside, WA11 8AT, England.

□ The snowy scene on the December cover is the home QTH of K1NH, not W1NH as the cover blurb misstated. Our apologies, Bill.

□ Arthur S. Westneat, WIAM, Newmarket, New Hampshire, and Peter R. D. Munroe, WB1DQC, Holliston, Massachusetts, were mistakenly listed as Silent Keys in December 1980 *QST*. Our apologies for this error. □



Corrected schematic diagram of a 5-resonator cw filter.

# Hints and Kinks

Conducted By Stuart Leland,\* W1JEC

## N6AZL STATION CONSOLE

□ A cabinetmaker would have hysterics looking at it. In fact, three of them told my son Scott, N6AZM, who assisted in the project, that it couldn't be done my way. However, as a stubborn accountant-wood-butcher type, I proceeded to do it anyway.

The gimmick is the surfacing. Instead of using bare wood, wood-toned stain or paint as a covering for plywood, I wanted something different. Formica was too expensive, so I settled on a melamine-coated, Masonite-like hardboard product with a thin covering of plastic. Mine is stamped "Made in Brazil" but similar products must be made elsewhere. The 4' × 8-foot (1.2 × 2.4-m) or 5' × 5-foot (1.5 × 1.5-m) sheets are sold in home-improvement stores as shower stall or tub wall coverings. I bought two 5' × 5 sheets for \$8 each. This material does not warp, shrink, swell, chip or peel. It can be sawed, filed, planed, sanded or whittled.

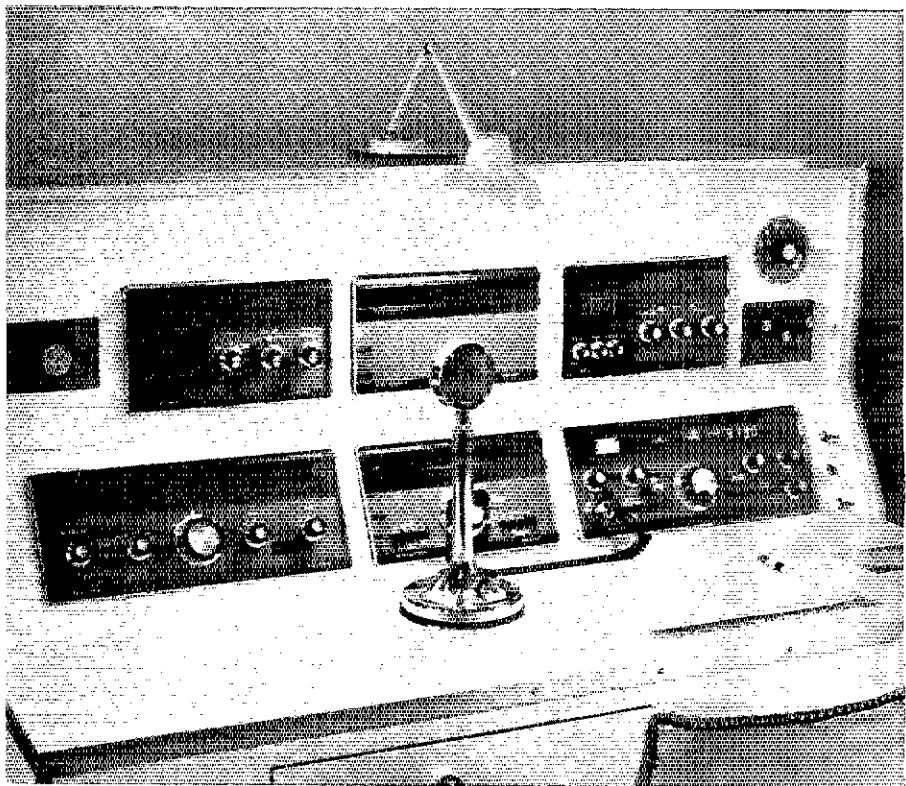
If you already have a satisfactory bench or table for your rig, these sheets could be adapted by making cut-outs for the equipment faces. This alone would eliminate those dark, gaping holes and hide the tangled mass of cables and wires that are necessary at even the simplest station.

The framing of my console consists of 3- × 3-inch (76- × 76-mm) corner posts, equipment shelf bracing and footrest. For the top and desk any grade of 3/4-inch (19-mm) plywood is satisfactory inasmuch as it will be covered. The front panels and equipment shelves are made with 1/2-inch (13-mm) plywood.

I designed the lower panel for a 25-degree slope. The Masonite covering the instrument panels is not glued to the plywood, although it could have been. It fits nicely and is held in place by friction along the edges. Vertical instrument panels are screwed from the side on the outside of the covering for easy removal. Screws do not show from the front. The desk drawer, ready made, is from a modular set of shelves.

The remaining hardboard is glued to the "ply" with standard wall panel adhesive. Corners were beveled with my new saber saw. (What a chore!) Aluminum corner mouldings prevent dents and cover mistakes. An acrylic-plastic desk top is surrounded by standard moulding. Casters are under the corner posts. For easy turning these should have a fairly large diameter.

My XYL, Helen, constructed the Heathkit equipment shown in the photograph. She knows nothing about electronics and has yet to master 5 wpm. But she taught herself to solder years ago and everything she builds works like a dream. Maybe if she got a license I would never be allowed time to sit down in front of this thing. Hmm! Maybe I shouldn't encourage her so much. Helen, turn off the cassette . . . you'll never learn the difference between A and M! — *Bill Sheppard, N6AZL, San Jose, California*



This well-arranged station console is the handiwork of Bill Sheppard, N6AZL, of San Jose, California. Bill proudly explains that credit for the faultless construction of the Heathkit equipment in the console goes to his wife, Helen. A goose-neck boom, mounted on the upper front panel, has recently replaced the D-104 microphone desk stand in order to avoid desk-top clutter. (photo by WA6WNU)

## 10-METER ADAPTATION FOR DRAKE L7

□ Owners of Drake L7s can benefit from the following 10-meter adaptation. Proceed with the following steps while using the owner's manual for reference.

Replace the low-pass filter with a short piece of RG-58 coaxial cable. Later models have a shorting path on the low-pass filter board identified by empty terminal lugs at the input and output. On these units simply switch the input and output coaxial-cable center conductor to these empty terminals. (Do not short the input to the output of the low-pass filter. Doing so does not remove it from the circuit.)

Removal of the band stop from the band switch is the next step. On early models this was a removable stop located on the back side of the index of the band switch and may be found at the rear of the input matching filters. Use a sharp, pointed tool to rotate the nut on the stop and then extract the stop.

On later models, the band-switch stop is a bracket mounted on the bottom plate behind the input matching filters. Remove two sheet metal screws and sheet metal band stop.

Add two 68-pF DM19 or DM20 mica capacitors to the input coil assembly. One is

wired to the jumper across the input wafer. The other is connected to the input side of the 15-meter input coil. With the linear amplifier placed upside down, observe that the 15-meter coil is the one farthest toward the back and on the left. The input side is the bottom end (closest to the clip).

Retuning of the 15-meter input coils may be necessary. Use the input-coil adjustment procedure outlined in the manual. There is no tuning for 10 meters. — *Jeem Newland, WBSRXI, Mishawaka, Ohio*

## TEFLON FOR PREVENTING ICE BUILD-UP ON ANTENNAS

□ As another approach to applying Teflon to beam elements to avoid ice build-up ("Hints and Kinks," March 1980) one might try Teflon Coating Product no. 82808 sold in 16 oz. spray cans by H. W. Chesterton Co., Middlesex Industrial Park, Stonham, MA 02190. The maker claims it contains an acrylic carrier and provides a slippery coating for surface protection and lubrication. It is resistant to water, mild acids and alkalis. The price of a can is about \$5. — *John H. Ferguson, W1HIM, Wayland, Massachusetts*

## HW-8 IDEAS

□ I wish to report a method of eliminating parasitic oscillation in a Heathkit HW-8 transceiver. Although Doug DeMaw has implied that the spurious radiation from this source is weak enough to satisfy the FCC rules (April 1979 *QST*, p. 18), I still consider it ethically and esthetically unsatisfactory to operate the transmitter without silencing this unnecessary noise.

The direct current bus lines to the band-switching diodes for the three bands which are not selected, support the relaxation oscillations in the audio-frequency range when the key is down and the transmitter is on the air. The amplitude of these oscillations depends upon the positions of the receiver preselector and rf gain controls and may become large enough to be heard in the headset, in spite of the muting circuit and sidetone. They are probably the cause of the spurious radiations referred to above.

I have completely eliminated these oscillations in my HW-8 by providing back bias to turn off the bandswitch diodes which are supposed to be off. There are surely many ways this could be done. I did it by lifting the grounded ends of resistors R81, R84, R87 and R91 from the circuit board. These are then connected to a C battery as shown in Fig. 1. A TN94 serves to disconnect the battery when the HW-8 is not in use. The drain is about 0.2 mA so that I expect long life for this bias supply. My HW-8 is now clean and quiet but otherwise operates exactly as before. — *James E. Gray, WØGNV, Boulder, Colorado*

□ My version of the K6TG HW-8 RIT modification, in use for over two years without problems, does not require drilling holes or cutting the foil of the main circuit board. R36A and C55A (see Fig. 2) replace R36 and C55 on the main board. D11A replaces D11. C101 is mounted on the foil side of the main board. R103 may be mounted between the load control and the rf-output meter if a miniature potentiometer (type MLC-14L, Burstein and Applebee no. 14A937-7) is used.

S101 can be mounted at the left of the preselector control in the spot indicated by CQ (October 1977) for an RIT potentiometer. Two other locations are the top cover, mentioned by CQ, or the back of the set as suggested by the K6TG RIT modification. Power can be obtained from ZD1 or ZD101. Parts are mounted on a Radio Shack pc board like the K6TG RIT.

The dial calibration on my HW-8 varied as much as 5 kHz whenever I switched between power supplies until I made the following change to regulate the supply voltage for the crystal oscillator. Remove the wire from point D on the main board. See part B of Fig. 2. Install one end of a 27-ohm resistor (1/4 W) at point D. Connect the removed wire to the other end of the resistor. Solder two 6.2-V, 1-W Zener diodes together in series, connecting the cathode to pin 8 of SW4 and the anode to pin 4 of SW4 (the 21-MHz bandswitch). I shall be glad to help anyone who tries this modification. — *John Lock, WB5WOQ, Wichita, Kansas*

## ELIMINATING SB-102 FREQUENCY JUMP

□ After using my SB-102 in favorite portions of each band over a long period of time, I began to hear crackling accompanied by sharp

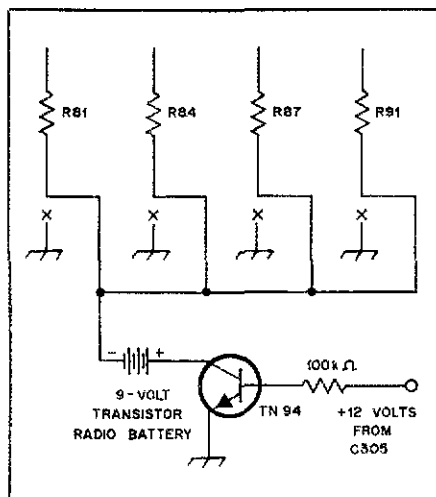


Fig. 1 — Lifting the four resistors shown above from ground and connecting them to a battery in series with a TN94 or any small npn silicon audio transistor will prevent unwanted oscillation that may occur in some HW-8 transceivers.

jumps in frequency as I attempted to zero in on a signal. I even received reports of having a signal in spots that were not desired.

I cured the problem by carefully peeling off the piece of adhesive-backed foil on the top of the LMO and spraying each end of the variable capacitor with a nonpetroleum contact cleaner.

Two drops of light gun oil were then placed on each bearing.

Try this idea if your SB-102 has developed a similar behavior. You will help maintain the value of your set by carefully removing and replacing the foil. — *Lynn A. Deppen, N3IN, ex-WA3VHV, Lykens, Pennsylvania*

## TOWER-STATIC CURE

□ After erecting my antenna atop a new Rohn tower, I unhappily found an annoying amount of static bothering reception. After some thought and investigation, I found that my Ham IV rotator lacked proper electrical contact between mast and tower. There is no thrust bearing in my tower assembly. A shorting strap between the mast and tower cured the problem. The strap is just long enough to permit a  $\pm 180$ -degree rotation. — *Jim Scarbrough, WD5FIP, Houston, Texas*

## STICKING RELAYS

□ Sticking relays have always been annoying. Although this may be an old remedy, it works. Just cement a piece of very thin clear plastic to the pole piece to prevent intimate contact between the armature and the pole piece. — *J. O. Myers, W2SVI, Neptune, New Jersey*

## EXTENDING BATTERY LIFE

□ Extra life for your flashlight, lantern and QRP rig batteries can be had by storing them in your freezer. — *Glenn Jacobs, WB7CMZ, Eagar, Arizona*

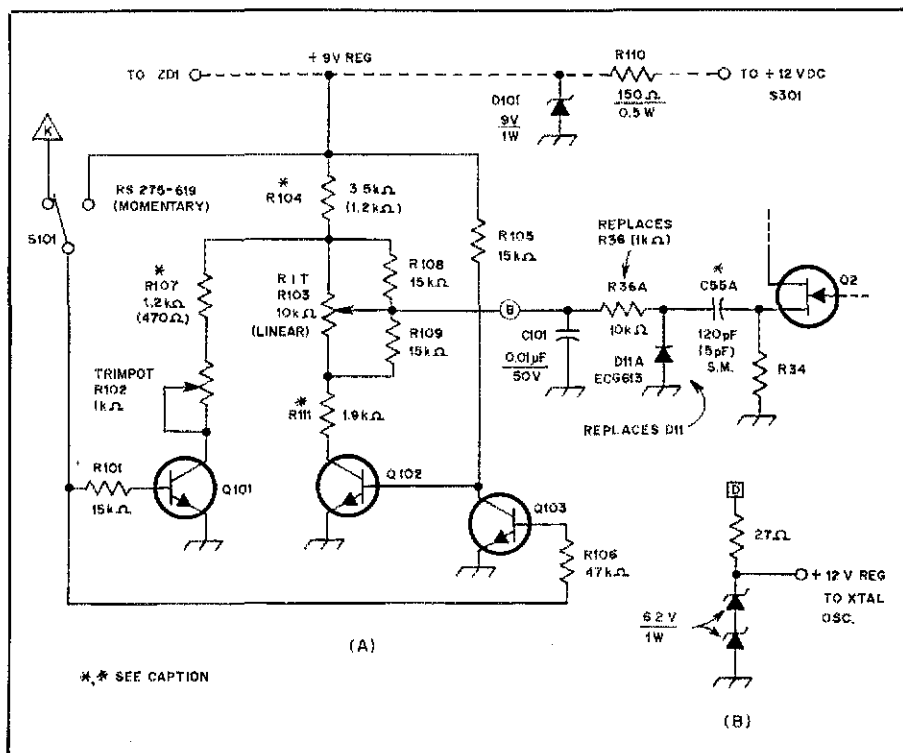
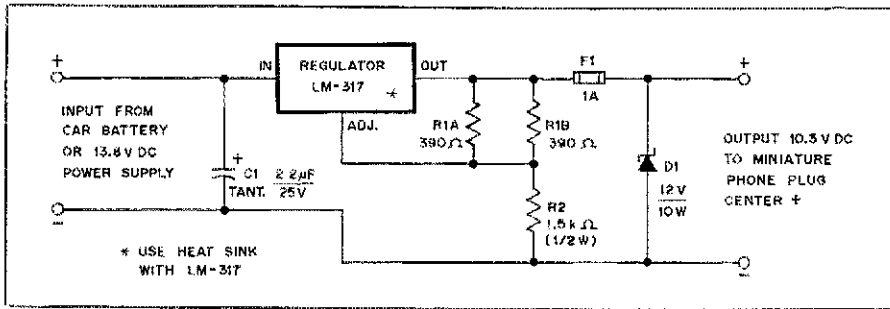


Fig. 2 — An RIT modification for the HW-8 provided by John Lock, WB5WOQ. This is an adaptation of the RIT circuit described by Ben Saylor, K6TG, in July 1977 *QST*. Also see January 1978 *QST*, p. 40; March 1978 *QST*, p. 36; and December 1978 *QST*, p. 38. The circuit is built on a Radio Shack board (RS-276-024). Values marked (\*) may be adjusted to tailor the range. Those values shown in parentheses are minimum for proper operation. The value of R111 (#) may be varied or eliminated to adjust the RIT range. Q101-Q103, incl., are 0.3- to 0.5-W switching transistors (ECG123A, RS2016, or 2N3860). Dashed lines show optional power control circuit. Regulation of the oscillator supply voltage is provided by the circuit at B above. Resistance values are 1/4 watt except for R110 (150  $\Omega$ ), which is 1/2 watt.



Diodes have a voltage drop of 0.6 to 0.7 V. To supply a nominal 9.6 V to the S-1, the external voltage would have to be 10.3. In a straightforward design, an LM-317 voltage regulator easily delivers the 10.3 V. Overvoltage protection is a must and is provided by a 1-A fuse and a 12-V, 10-W Zener diode. This device can work with input voltage from the car battery or any 13.8-V power supply. Terminate the output in a miniature phone plug. Turn off the battery, plug the ac line in and don't worry about running out of power! — *Henry Schickler, W2ICW, Whitestone, New York*

### EXTERNAL POWER FOR THE TEMPO S-1

□ The Drake TR-22C is a great little 2-meter machine. Its best feature is versatility — it operates from its own batteries, the car battery or a power supply. The Tempo S-1 is an even better little machine. It, too, can operate from its own batteries, the car battery or a power supply. How? Just use a switch to disconnect the negative side of the battery and feed the external power through the existing charger jack. A slide switch is ideal for this purpose.

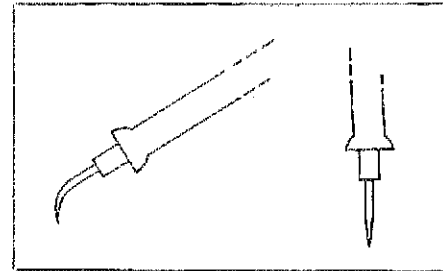
Remove the cover of the S-1. Replace the screws to hold the circuit boards in place while handling. Carefully unplug and remove the

battery pack. Mark the right-hand side of the case at the battery compartment for the switch hole. The hole can be made easily with the help of a small drill and a small flat file. Try to get a smooth, snug fit. Put a drop of glue on the ears of the switch and press it firmly from inside the case. Unsolder the black lead from the battery pack. Connect this lead to the center pole of the switch. Solder a new black lead to the battery pack and then connect it to one of the other poles of the switch. Press the poles down flat and cover the switch with a piece of tape. The battery pack and cover can now be replaced.

The diagram and examination of the S-1 show a diode in series with the charger input.

### OLD TIMER'S NOTEBOOK: HINTS FOR THE WORKSHOP

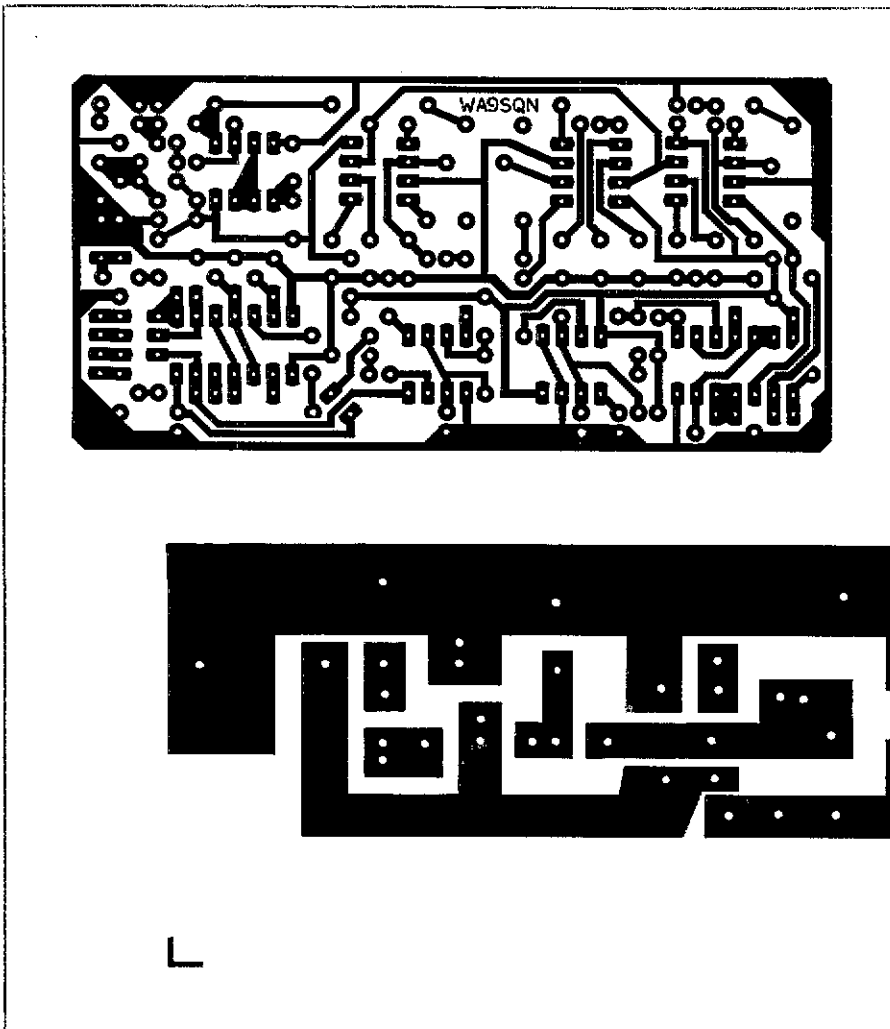
□ Not everyone likes to use a pencil iron with a curved tip. However I find it much easier to use than a straight tip.



To avoid burning wiring or small parts when working in cramped areas of equipment, aluminum foil can be used as a soldering aid. Place it near the wires or parts that could be touched by the tip of the soldering iron or gun. — *Antonio G. O. Gelineau, W1HFF, ex-W1BHR, W4LEQ, KP4FN, TG9AG, Burlington, Vermont*

### TRI-YAGI ADDENDUM

□ The author of "A Tri-Yagi for 50 MHz," (June 1980 *QST*) in response to inquiries, advises that the distance from the driven element to the vertical boom supporting the trigonal reflector is 35 inches (889 mm). QST



Etching patterns for construction projects in this issue. The upper pattern is for the Standard-Tone Alert System (see Fig. 4, page 27 of this issue), and the lower pattern is for the L-meter (see Fig. 2, page 29). Black represents copper; both boards are single sided. The patterns are shown at actual size from the foil side of the board.



# License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL hq.; s.a.s.c. please).

2) Mail to FCC, Box 1020, Gettysburg, PA 17325.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a one-year grace period under which you may still renew and keep your call sign without retesting, but you must wait until the new license arrives to operate. There is also a five-year grace period under which you may still renew; however, after the initial one-year period, you will be issued a new license with a new call sign. After this five year grace period expires, you must be re-examined for a new license. Normally, application should be made approximately 90 days before expiration;

**Table 1**

## The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities:

1800-1810 kHz	cw, DX calling	21.09-21.10 MHz	RTTY
1825-1830 kHz	"DX window" (no WVEs)	21.34 MHz	SSTV
3610-3630 kHz	RTTY	28.09-28.10 MHz	RTTY
3845 kHz	SSTV	28.68 MHz	SSTV
7090-7100 kHz	RTTY	28.30-29.50 MHz	Satellite downlinks
7171 kHz	SSTV	29.52-29.58 MHz	Repeater inputs
14.08-14.10 MHz	RTTY	29.60 MHz	FM simplex
14.23 MHz	SSTV	29.62-29.68 MHz	Repeater outputs

(In addition, on 20 meters in particular, the low end of the U.S. phone segment is reserved for DX, the high end for traffic, and ragchewing in between. The dividing lines are not definite, however.) Radio Control R/C Channels: 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7 and 53.8 MHz.

however, renewal can be applied for at any time during the term of the license.

4) If you are simply modifying your license (change of address, for example), you must fill out the Form 610; a letter is no longer suffi-

cient. Incidentally, your license will also be automatically renewed at this time.

5) If you have any questions or problems, drop a note to the Membership Services Department, ARRL.

# U.S. Amateur Frequency and Mode Allocations

**Power Limits:** All U.S. amateurs are limited to 250-watts dc input in the Novice segments. On all other segments, with certain exceptions in the 160-meter and 420-MHz bands, 1-kilowatt dc input is permitted. Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. (Revised as of December 6, 1980)

## Bandwidth Limitations

**FREQUENCY (OR PHASE) MODULATION:** On frequencies below 29.0 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

**TELEVISION:** On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz, single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband

emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

## DIGITAL TRANSMISSION:

(a) *International Telegraphic Alphabet No. 2 (Baudot code).* When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

(b) *American Standard Code for Informa-*

*tion Interchange (ASCII).* F1 emission shall be utilized on those frequencies between 3.5 and 21.25 MHz where its use is permissible, and the sending speed shall not exceed 300 bauds. F1, F2 and A2 emissions may be utilized on those frequencies between 28 and 225 MHz where their use is permissible and the sending speed shall not exceed 1200 bauds. F1, F2 and A2 emissions may be utilized on those frequencies above 420 MHz where their use is permissible and the sending speed shall not exceed 19.6 kilobauds.

The code must conform to the American Standard Code for Information Interchange (ASCII) as defined in American National Standards Institute (ANSI) standard X3.4-1968. See §97.69 of the Amateur Rules.

**ALL MODES:** The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate subbands.

**NOTE:** Some amateur bands are shared with other services. Some geographical limitations exist for the 420-MHz band. For details, and for information on specialized modes, see *ARRL License Manual*. For information on repeaters, see the *License Manual and Repeater Directory*.

**160 METERS:** Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see *License Manual* or request form MS/G-7 from ARRL hq.

Other — All modes, except as noted.

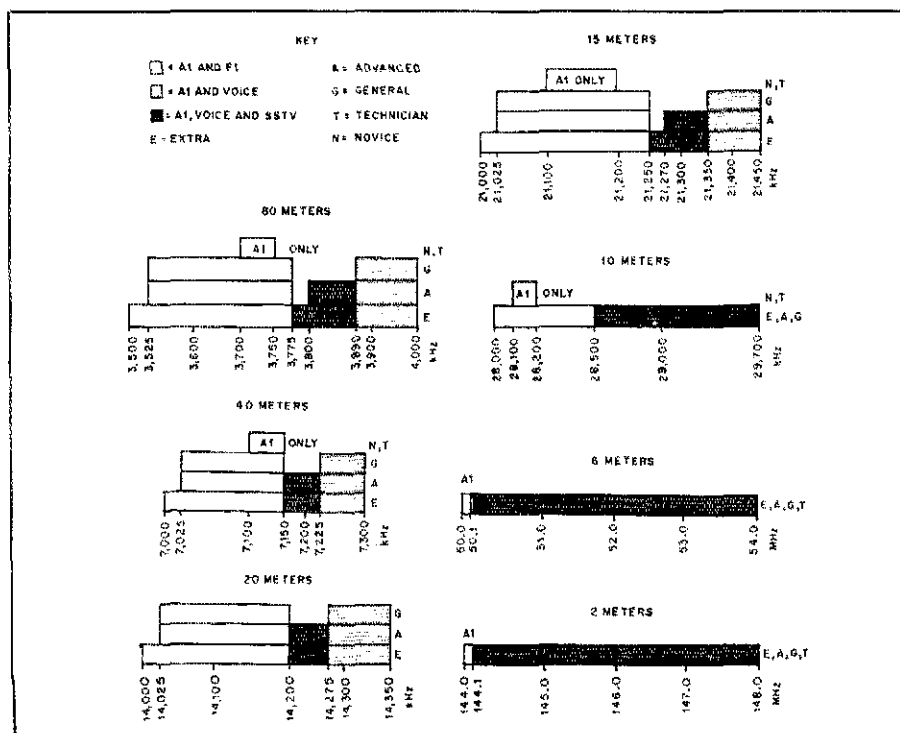
## Extra, Advanced, General, Technician

MHz	GHz**
220-225*	10.0-10.5*
420-450*	24.0-24.25
1215-1300*	48.0-50.0
2300-2450	71.0-76.0
3300-3500	165.0-170.0
5650-5925	240.0-250.0
	All above 300

\*Pulse not permitted.

\*\*1 GHz = 1000 MHz.

QST



**MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1981**  
(Check QST monthly for updates)

<p><b>JANUARY</b></p> <p>1 Straight Key Night 1-4 SAROC (Las Vegas)* 3-4 CD Party, phone 7 West Coast Qualifying Run 10-11 CD Party, cw 11 ARRL Hamfest (Oak Park, MD) 12 W1AW Qualifying Run 17-18 VHF Sweepstakes 17-18 ARRL Hamfest (Sarasota, FL) 25 ARRL Hamfest (Arlington Heights, IL) 27 W1AW Qualifying Run 31-February 8 Novice Roundup</p>	<p><b>FEBRUARY</b></p> <p>5 West Coast Qualifying Run 7-8 Florida State Convention (Miami) 10 W1AW Qualifying Run 14 Frequency Measuring Test 21-22 International DX Contest, cw 21-22 ARRL Hamfest (Vero Beach, FL) 25 W1AW Qualifying Run</p>	<p><b>MARCH</b></p> <p>1 ARRL Hamfest (Davenport, IA) 4 West Coast Qualifying Run 7-8 International DX Contest, phone 11 W1AW Qualifying Run 13-15 ARRL National Convention (Orlando, FL) 21 ARRL Hamfests (Sioux City, Iowa and Flemington, NJ) 21-22 ARRL Hamfests (Ft. Walton Beach, Florida and Lafayette, LA) 26 W1AW Qualifying Run 28-29 ARRL Hamfest (Kenney, NE) 29 ARRL Hamfest (Mentor, OH)</p>	<p><b>APRIL</b></p> <p>2 West Coast Qualifying Run 4 ARRL Hamfest (Columbia, MO) 4-5 ARRL Hamfest (Little Rock, AK) 4-5 CD Party (open), phone 11-12 Missouri State Convention (Kansas City) 11-12 CD Party (open), cw 11-12 EME Contest (part 1) 16 W1AW Qualifying Run 24-26 Dayton Hamvention (Dayton, OH)* 25-26 Mississippi State Convention (Jackson) 25-26 West Indies Section Convention (Dorado, PR) 26 W1AW Qualifying Run</p>
<p><b>MAY</b></p> <p>6 West Coast Qualifying Run 8 Frequency Measuring Test 9-10 EME Contest (part 2) 11 W1AW Qualifying Run 15-16 Atlantic Division/NY State Convention (Rochester, NY) 15-17 Pacific Division Convention (Evanston, CA) 16-17 Southeastern Division Convention (Birmingham, AL) 28 W1AW Qualifying Run</p>	<p><b>JUNE</b></p> <p>4 West Coast Qualifying Run 5-7 ARRL Hamfest (Dallas, TX) 5-7 Northwestern Division Convention (Seaside, OR) 9 W1AW Qualifying Run 13-14 VHF Contest 20-21 Georgia State Convention (Atlanta) 23 W1AW Qualifying Run 27-28 Field Day</p>	<p><b>JULY</b></p> <p>1 West Coast Qualifying Run 8 W1AW Qualifying Run 11-12 IARU Radiosport Championship 22 W1AW Qualifying Run 24 West Gulf Division Convention (Oklahoma City, OK)</p>	<p><b>AUGUST</b></p> <p>6 West Coast Qualifying Run 8-9 UHF Contest 13 W1AW Qualifying Run 23 W1AW Qualifying Run</p>
<p><b>SEPTEMBER</b></p> <p>2 West Coast Qualifying Run 12-13 VHF Contest 12 Frequency Measuring Test 14 W1AW Qualifying Run 19-20 New England Division Convention (Hartford, CT) 23 W1AW Qualifying Run</p>	<p><b>OCTOBER</b></p> <p>1 West Coast Qualifying Run 2-4 Texas State Convention (Houston) 3-4 Midwest Division Convention (Sahna, KS) 9-10 Southwestern Division Convention (Scottsdale, AZ) 10-11 Delta Division Convention (Memphis, TN) 10-11 CD Party, phone 11-12 CD Party, cw 13 W1AW Qualifying Run 17-18 Simulated Emergency Test 25 W1AW Qualifying Run</p>	<p><b>NOVEMBER</b></p> <p>5 West Coast Qualifying Run 7-8 Sweepstakes, cw 11 W1AW Qualifying Run 13 Frequency Measuring Test 21 W1AW Qualifying Run 21-22 Sweepstakes, phone</p>	<p><b>DECEMBER</b></p> <p>2 West Coast Qualifying Run 4-6 160-Meter Contest 10 W1AW Qualifying Run 12-13 10-Meter Contest 29 W1AW Qualifying Run</p>

\*Not an ARRL event

# Hemispheric Cooperation Keynote of IARU Lima Conference

Delegates from North and South American national organizations gather in Peru for IARU Region 2 post-WARC planning.

By David Sumner,\* K1ZZ

The national Amateur Radio organizations of 22 countries in the Western Hemisphere, 15 in person and seven by proxy, were represented at the Seventh Triennial Conference of IARU — Region 2, held in Lima, Peru, in mid-October. The Radio Club Peruano served as host, in conjunction with its Fiftieth Anniversary celebrations. IARU — Region 2 has existed as a Regional Division of the International Amateur Radio Union since 1964, and has increased steadily in size and effectiveness since its founding. Membership in the IARU does not automatically confer membership in Region 2, because to finance its operations Region 2 collects dues based upon an assessment per licensed amateur in each society. (There are no dues for membership in IARU itself; administrative expenses are borne by ARRL.) However, nearly all of the IARU member-societies in Region 2 have chosen to join the Regional Division (see Table 1).

The IARU Region 2 organization, and particularly its hard-working Executive Committee, was largely responsible for the solidarity in support of Amateur

Radio shown by the countries of the Western Hemisphere at WARC-79. At its meeting in Miami in 1976, the Region 2 member-societies pledged to work hard to convince their governments to support Amateur Radio at the conference in Geneva.<sup>1</sup> At Panama two years later, the member-societies reviewed their progress and voted financial support for the team of IARU observers that went to WARC-79.<sup>2</sup>

With the successes at WARC-79 behind them, it was time for the delegates to look to the future. Preparations for that all-important conference had taught valuable lessons about the advantages of intra-Regional cooperation, and the delegates were anxious to apply those lessons to other problems facing the radio amateurs of North and South America.

## ARRL Representation

The combined U.S. and Canadian delegation to Lima was the largest ever sent by the League to an IARU conference. Some of us wore more than one hat, as representatives of IARU Headquarters as well as the League. ARRL

**Table 1**  
**Region 2 Countries Represented at Lima**

Argentina	Guatemala
Bermuda*	Honduras*
Bolivia	Jamaica*
Brazil*	Nicaragua*
Canada	Panama
Cayman Islands*	Paraguay
Chile	Peru
Colombia	Suriname*
Dominican Republic	USA
Ecuador	Uruguay
El Salvador	Venezuela

\*By proxy

## Member-Countries Not Represented

Antigua	Haiti
Bahamas	Mexico
Barbados	Trinidad & Tobago
Costa Rica	Netherlands Antilles
Grenada	



The delegations of Ecuador and Chile: HC2JP, CE3DZ and CE3GF.

\*Assistant General Manager, ARRL

<sup>1</sup>Notes appear on page 51.

President Harry J. Dannals, W2HD, who carried the vote of the United States, was assisted by First Vice President Carl L. Smith, W0BWJ; Hudson Division Director Stan Zak, K2SJO, who is chairman of the Board's International Affairs Committee; ARRL Secretary/General Manager Richard L. Baldwin, W1RU, who is also Secretary of IARU; and ARRL Assistant General Manager David Sumner, K1ZZ, who also has the title of IARU Assistant Secretary. ARRL Atlantic Division Director Jesse Bieberman, W3KT, also a member of the International Affairs Committee, paid his own way to Lima with the intention of being an observer, but found himself drafted into a committee chairmanship! Canada was represented by Thomas B. Atkins, VE3CDM, a Director of the Canadian Radio Relay League. Noel B. Eaton, VE3CJ, attended in his capacity as President of the IARU, and Victor C. Clark, W4KFC, as President of IARU — Region 2.

### Conference Organization

The Lima Conference began on Monday morning, October 12, with the assembly of the delegates for the opening Plenary Session. The President of Region 2 presides at the Plenary Sessions. The opening session is largely ceremonial at a conference such as this, although the opening statements by the officers can set the tone for the working sessions that follow. The first working Plenary Session opened right after the lunch break, the first order of business being the election of Mr. Luis Dibos C, OA4DV, President of the host society, as Honorary President of the Conference. Next came the certification of the attendees' credentials by Committee C, Credentials and Finance, which consists of the Secretary, the Treasurer, and one member selected from the delegates.

Most of the work at a Region 2 Conference is performed in committees. Member-societies that wish to make pro-

posals for consideration at the Conference are required to submit them in advance so they may be translated into Spanish (or English, as the case may be) and distributed ahead of time. At the conference itself, the documents containing the proposals are assigned to one or more of the following committees for study: Committee A, Organization and Administration; Committee B, Technical and Operational; and Committee D, VHF/UHF. Any of the conference attendees can volunteer to serve on any of these committees; if the national delegation is sufficiently large, it can have one or more members on each. The committees select their own chairmen and secretaries; the secretaries usually are bilingual, but the chairmen often are not. Another, smaller committee, the Electoral Committee, is responsible for the mechanics of the Executive Committee election.

At the close of the Plenary Session, the committees went to work. The rest of Monday afternoon, and most of Tuesday and Wednesday, were reserved for committee meetings. The idea is for the committees to study the documents assigned to them, and to make recommendations to be considered at the Plenary Session on Friday. A committee may recommend that a document be adopted as submitted, that it be modified or combined with another proposal, or that no action be taken. Usually the objective is to achieve a consensus within the committee, accommodating minority viewpoints as much as possible, rather than simply to vote matters up or down. This is important if a spirit of cooperation is to exist, in this or any other conference. If the committee does its work well, and if it is properly constituted, there should be little debate or discussion of the committee's recommendations when they are submitted to the Plenary Session. Alberto Shaio, HK3DEU, was selected as chairman of Committee A; W1RU, of Committee B; W3KT, of Committee D; and Jorge Dawson, HP1GD, of the Electoral Com-

mittee.

Thursday was a free day for delegates but not for the secretariat, which needed the time to catch up on the translating, typing and duplicating of the committee reports and other conference documents. Friday saw the consideration of reports, election of the new Executive Committee, selection of the site for the next conference, and the closing ceremonies, followed by the closing banquet. Because of their cost, simultaneous interpretation facilities were not available; this lengthened the time it took to transact business, because everything had to be done in both English and Spanish.

During the week, time was set aside for the assembly to hear from VE3CJ on the subject of the possible restructuring of the Union,<sup>2</sup> and from K1ZZ on future ITU Administrative Radio Conferences. Two observers from outside Region 2 also were given time on the program: Region 1 Vice Chairman Wojciech Nietyksza, SP5FM, and the President of the Union de Radioaficionados Espanoles, Esteban Bosch Castaner, EA3BD. The evening hours were occupied with receptions at the beautiful headquarters building of the Radio Club Peruano, which was admirably equipped for the purpose.

### Conference Results

Committee A received several proposals for expansion of the Executive Committee. Until now, the seven members of the Executive Committee were selected to represent each of seven geographical areas into which Region 2 is divided. There were four officers: President, Vice President, Secretary and Treasurer; and three members-at-large. In recognition of the heavy workload of the President and Secretary, on recommendation of Committee A the Conference relieved them of the responsibility for representing their areas, and created two additional members-at-large to be elected from those areas.

Committee A also dealt with several



YV5BPG translates a report by VP9GO into Spanish.



Outgoing Region 2 President W4KFC, flanked by OA4AV and OA4DV, beams at the photographer.



Some of the Lima Conference attendees: (l-r) front row: W1RU, HT1FI, CP5EC, YV5BPG; rear: W4KFC, W0BWJ, HK3DEU, SP5FM, K1ZZ, VE3CJ.

other topics. At its recommendation, the Conference:

- Endorsed the ongoing study of the IARU structure, and adopted a plan for participation by Region 2 member-societies in the project.

- Urged member-societies to continue to seek reciprocal operating agreements between their countries.

- Established Area Committees to assist the Executive Committee members in their work.

- Directed the Executive Committee to take steps, when possible, to establish a Technical Committee for Region 2 and to hold technical symposia in conjunction with future Region 2 conferences.

- Thanked the ARRL for its technical, administrative and economic contributions to worldwide Amateur Radio, especially in connection with WARC-79.

- Urged member-societies to conduct training programs to increase the number of new amateurs, as well as their technical and operating skills.

- Endorsed an educational program to curb abuses of phone patch and third-party traffic privileges.

- Congratulated IARU President VE3CJ, the Region 2 Executive Committee and Region 2 President W4KFC for their effective leadership in recent years.

- Selected Colombia as the site of the next Region 2 Conference, in 1983.

- Endorsed the principle of freedom of communication between amateurs in all countries.

Committee B also had a heavy workload. At its recommendation the Lima Conference:

- Proposed that the Region 2 member-societies, when practical, adopt policies concerning the use of the new 10-MHz band as follows:

- 1) Only A1 and F1 (300 baud or less) emissions normally shall be used by amateurs in the 10.1- to 10.15-MHz band, with RTTY permitted only in the top 10 kHz.

- 2) SSB emission shall be used only during emergencies involving the immediate safety of life and property and only by stations actually involved in the handling of emergency traffic.

- 3) The power limit shall be 250 watts input.

- 4) Operation in this band should be permitted only to the higher class of licenses in each country.

- 5) No competitions or contests should be allowed, nor should contact credit for awards be given for contacts in the band.

- Thanked E. H. "Bill" Conklin, K6KA, for his long service to the Intruder Watch.

- Approved the appointment of M. L. Gibson, W7JIE, as Director of the IARU — Region 2 Intruder Watch Service, and adopted a Region 2 Intruder Watch Program to assist and encourage member-



The members of the IARU team that went to WARC-79 have received lots of accolades and honors during the past year. Another group, at least as deserving of amateurs' thanks but largely ignored until Lima, is the team members' wives and families who suffered through the years-long preparations and the Geneva conference itself. Terri Smith, wife of W0BWJ, was feted in Lima by Maria, wife of HP1GD; Irene, wife of YV5BPG; Olimpia, wife of YS1IM; and (to Terri's left) Marya, wife of OA4DV.



For the past 16 years, wherever he has gone as the secretary of IARU — Region 2, OA4AV has carried a hefty briefcase belonging to the Region. Now that Gustavo is assuming the presidency, treasurer VP9GO thought it appropriate for the Region to make a "partial distribution of assets" and let Gustavo keep the well-worn briefcase instead of making him pass it on to his successor! The "presentation" took place at the close of the Lima conference.

societies in establishing Intruder Watches.

- Adopted guidelines for phone patching and international third-party message traffic to minimize the impact of phone patches on other amateur radio-communication.

- Condemned the operation of over-the-horizon radars in bands allocated to the Amateur Service.

- Urged member-societies to take steps to clear phone operations from the 80- and 40-meter subbands reserved exclusively for radiotelegraphy.

- Urged that efforts be made to rid the 28-MHz amateur band of unlicensed stations.

- Asked that administrations not deny

amateurs access to band segments set aside for emergency calling, except when actual emergency conditions exist.

- Proposed standards for QSL card dimensions to facilitate the work of the QSL bureaus.

- Endorsed the principle of region-wide uniformity of subbands in the new 18- and 24-MHz bands when they become available.

Committee D met for the first time at Lima. Previously, vhf/uhf matters had been treated in Committee B. This year, however, it was felt that vhf/uhf deserved its own forum. Based on the work of Committee D, the Conference:

- Adopted procedures to minimize the problem of co-channel interference between repeaters along international borders.

- Expressed strong support for the amateur satellite program, and urged financial support of AMSAT and wide dissemination of information about amateur satellites.

- Encouraged the establishment of beacons on coordinated frequencies in parts of the 6- and 10-meter bands.

- Urged that steps be taken to curb the use of the amateur vhf bands by nonamateur stations.

- Deferred approval of a worldwide vhf locator system proposed by the Region 1 VHF Managers until its application to Latin America can be thoroughly analyzed.

Following the adoption of the committee reports came the election of a new Executive Committee. As reported in "International News" last month, the new officers are Gustavo Reusens, OA4AV, president; Victor C. Clark, W4KFC, vice president; Pedro Seidemann, YV5BPG, secretary; and Peter Parker, VP9GO, treasurer. Members-at-large are Hugo Coscio, CP5EC; Luis Caamano, HI8LC; Alberto Shaio, HK3DEU; Fabian Zarrabe, HT1FI; and Carlos Kaufman, LU9CN.

After a spirited closing banquet, the delegates departed for home. The importance of a conference such as this is not the decisions that it takes, but the atmosphere of cooperation and trust which develops among the participants as they grapple with common concerns; the sharing of experience and knowledge; and the follow-up work which must be done at home, between conferences, if the decisions are to mean anything. The Lima Conference provides a solid foundation on which the work can go forward to further the interests of Western Hemisphere amateurs, and of Amateur Radio world wide.

#### Notes

1. Sumner, "Miami Conference Brings Region 11 Amateurs Together," *QST*, July 1976, p. 46.

2. Sumner, "Region 2 Amateurs Review WARC Progress," *QST*, December 1978, p. 52.

3. "It Seems to Us," *QST*, September 1980, p. 9.

# WAS — Restated



Work All States . . . Win All Stickers

By Jeannie DeMaw,\* W1CKK and John F. Lindholm,\*\* W1XX

The red, white and blue of Old Glory proudly and prominently drapes the all-new ARRL Worked All States certificate. January 1 is the effective date for issuance of this handsome award.

This will mark the continuation of a 44-year tradition. Since W1WV became WAS number 1 on January 8, 1936, a total of 35,357 amateurs have braved the wilds of QRM, QSB, solar flares and weak-signal work to snag the elusive QSO with Nebraska, Wyoming or Vermont to complete working all 50 states of the USA.

## Basic Award and Endorsements

The vast majority have qualified for the basic award, which allows any mixture of bands or modes. Such awards are numbered sequentially. The new basic certificate will be the reward to those who have not previously qualified (sorry, no reissuance of previously earned awards). In addition to the basic certificate, however, one may qualify for one of the specialty band/modes that are numbered sequentially for each category. These include SSTV, OSCAR, RTTY, 50 MHz and 144 MHz. Yes, 30 amateurs have actually worked all states on 2 meters — but not on fm simplex! Not only that, but two amateurs, W0YZS and K2UYH, have qualified on 432 MHz. Engraved plaques adorn their shack walls. Plaques still await the next eight qualifiers on 70 cm.

Previously, working all states on 160 meters carried no special designation. We have researched the files and have now assigned sequential numbers to top-band qualifiers, of which 128 have previously



## THE AMERICAN RADIO RELAY LEAGUE



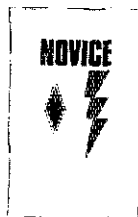
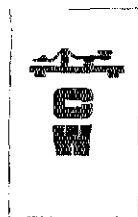
has submitted confirmation of having conducted two-way communication with amateur stations in each of the states constituting the United States of America.

Award Number

*Henry J. Standa* W1HD  
President

*John F. Lindholm* W1XX  
Communications Manager

\*Communications Assistant, ARRL  
\*\*Communications Manager, ARRL



submitted the necessary pasteboards.

For those who crave specialty awards, the very popular 75-meter, two-letter Extra Class WAS certificate can be earned by tuning your favorite radio to 3787 kHz. The league sponsors the initial-entry, sequentially numbered WAS for working 1 x 2, 2 x 1 or 2 x 2 call signs. This is the passport to attaining more difficult achievements such as double letters, state abbreviations (like K2NY, N4VA and the like) and a host of others, all sponsored by the "Geritol Net." An inquiry to the 3787 kHz net will produce the needed information.

#### Other Endorsements

The basic award can also be endorsed either upon initial application or at some later date for any or all of the following: ssb, cw, Novice and single band (80 through 10 meters). For those who

achieve an additional endorsement after January 1, a new certificate with the endorsement sticker will be provided. As they are earned, future endorsement stickers will be added to the new basic certificate.

Low power, or QRP, is also recognized with a special endorsement sticker. QRP is defined as the *applicant's* input power of 10 watts (or 5-watts output), and the applicant so certifies on the application form. Contrary to some popular belief, the cards of stations worked need not mention that the applicant was QRP. How could they know?

The integrity of the WAS award has long been maintained by the requirement for submission of confirmation of contact. Photocopies of QSLs are not acceptable — that means packaging up that valuable half century of cards and sending them to ARRL for thorough checking.

You'll find the Communications Department staff totally in sympathy with the League member who has worked hard to collect the cards. So rest assured that your cards will be treated with tender loving care. We suggest using registered mail and including sufficient postage for return via the same route.

If you anticipate making an initial or endorsement application soon, your first step is to write for an application form that contains all the particulars. In following the rules, your application will be in order for expeditious handling, just as you want it.

So if you have not already qualified, or if you want to try for an additional endorsement or separately numbered specialty award, set your sights on the new red, white and blue ARRL Worked All States certificate. Until then: "CQ Alaska . . . CQ Alaska . . . this is. . ."

#### First 10 WAS Qualifiers

2 Meters	6 Meters	160 Meters	OSCAR	RTTY	SSTV	75-Meter 2-Letter Extra Class	70 Centimeters
1) K0MQS	1) W0ZJB	1) W4EEE	1) K9JUJ	1) W0BP	1) WB4OVX	1) W0NL	1) W0YZS
2) K5CM	2) W0BJV	2) W5GKZ	2) K7GWE	2) W2JAV	2) W8YEK	2) W8LBM	2) K2UYH
3) N0JA	3) W0GJS	3) W4FNC	3) W9OII	3) W1BGW	3) W4MS	3) W7UG	
4) K9HMB	4) W5AJG	4) W8RHZ	4) WA6RQP	4) K8YEK	4) W6EYY	4) W5DS	
5) K1WHS	5) W9ZHL	5) W3HXV	5) W6CG	5) W2UGM	5) WA7QBV	5) W8OA	
6) WA4MVI	6) W9NJT	6) W4DID	6) VE5XU	6) FG7XT	6) W8ATK	6) W5HW	
7) K5JL	7) W6OB	7) W9BZT	7) W7MCU	7) W1MX	7) K7NEQ	7) W5SW	
8) WA9DOT	8) W0INI	8) W9ZGX	8) W8CSM	8) W8FWG	8) WA9USE	8) K4EZ	
9) WB0ZXU	9) W1HDC	9) W5FUA	9) WB4RUA	9) W5VJP	9) WB4ECE	9) W9SFR	
10) K9CA	10) W5MJD	10) W4EWP	10) W6ETJ	10) DK3CU	10) WA1NXR	10) W8JOF	

## Strays

QST congratulates . . .

Ray Meyers, W6MLZ, of San Gabriel, California, who was awarded the Quarter Century Wireless Association Hall of Fame plaque for his contributions to the art of communications and humanitarian activities. The plaque was presented by ARRL President Harry Dannais, W2HD, at the ARRL Southwestern Division Convention, held in Los Angeles in September.

#### MOVING? UPGRADING?

When you change your address or call sign, be sure to notify the Circulation Department at ARRL hq. Enclose a recent address label from a QST wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive QST without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each separate request.

#### ATTENTION OUTDOORS-MINDED AMATEURS

Amateurs who are canoeists, kayakers, cross-country skiers, backpackers or those who have an interest in these or similar outdoor activities are invited to join the Paddler's Roundtable. This informal group meets every Wednesday at 1815 Central time, at or near 7228 kHz, to provide a forum for the exchange of ideas and information about equipment, techniques, trips and both tall and not-so-tall tales about life in the great outdoors. — Gary E. Myers, K9CZB, Naperville, Illinois

# Amateurs March in Orlando

Put away those snow shovels, get the travel schedules out — QST to the 1981 ARRL National Convention and Orlando Hamcation '81, March 13 to 15.

By Albert J. Canning,\* WB4HAK

The Orlando Amateur Radio Club, with its hardworking Hamcation Committee, is leaving no stone unturned in their efforts to make this event a bell-ringer! The planning phase, begun about two years ago when Headquarters notified the Orlando ARC that they had been selected to host the convention, has resulted in a well-balanced affair, with something for all who attend.

The greater Orlando area boasts some of the country's greatest entertainment centers, offering family-type recreation for all ages. The location is ideal for vacationers, with easy access travel to all points of the compass. To the north, it's just a short drive to Daytona Beach, and the famous beach that you can drive your car on. Further to the northwest are the white beaches near Pensacola and Fort Walton. To the east you'll enjoy the magic of the Kennedy Space Center, where you can tour the visitor's center, the launch pads and museum — and the nearby beaches. To the south, the resort cities of Vero Beach, Palm Beach, Fort Lauderdale and Miami Beach offer numerous sightseeing attractions. To the west are the beautiful beaches of the Gulf of Mexico, with nearby Tampa, St. Petersburg, Clearwater and Fort Meyers, home of the Thomas A. Edison museum.

Orlando is rapidly becoming the hub of Florida for all types of entertainment and new business ventures. It was not too many years ago that two-lane roads provided the only access to the city. Now, super highways dot the map and skyscrapers are beginning to appear on the skyline. Many and varied industrial com-

plexes have bloomed. The first major entry was the Martin-Marietta facility, which is busily engaged in the production of national defense and space products. National insurance companies are setting up their headquarters here, while Dart Industries proudly shows its beautiful convention center and showcase theatre. Major shopping centers abound. Downtown Orlando is phasing in a restoration and revitalization program. One of the best-known centers is called Church Street Station, comprised of the famous Rosie O'Grady's, Lili Marlene's and the Phineas Phogg's Balloon Works. Orlando is also the home of the University of Cen-

tral Florida and a number of junior colleges.

The city of Winter Park is adjacent, with its Parisian-style shops and dining spots. Winter Park is the home of Rollins College and many beautiful waterways and homes. Also nearby is the Loch Haven Art Center with famed Edyth Bush Theatre, the John Young Museum and Planetarium. A Native Orlandoan, Young was one of the first astronauts.

Don't miss Walt Disney World and the wonderful world of Disney, which has captured the hearts of young and old, presidents, royalty and just "plain folks." New attractions are in progress and EPCOT, the experimental city of tomorrow, is under construction. RVers will enjoy Fort Wilderness. Just across the highway is Sea World, with its great marine shows featuring the unbelievable antics of Shamu, the giant killer whale and his newly acquired friends of the deep. Right next door, the Stars Hall of Fame displays the wax museum figures of John Wayne, Frank Sinatra and many others. Next door to the convention center, Mystery Fun House and Wei N' Wild will keep the youngsters happy!

The Sheraton Twin Towers Convention Center provides over 700 guest rooms divided between two 20-story towers with over 75,000 square feet of convention area. A junior-size Olympic pool, a mini shopping center, three restaurants and many other facilities will make one's stay most enjoyable.

## Convention Activities

Hamcation '81 activities commence at 6 P.M. Friday evening with the opening of the gigantic Swap Shop. Festivities continue until 9 P.M. On Saturday morning



Shamu the killer whale demonstrates his good taste before an appreciative audience. "Shamu Goes to College" is a daily feature of Sea World, where audience volunteers take part in the show. Sea World is located just across the street from Orlando's Sheraton Twin Towers Convention Center, site of Hamcation '81. (photo courtesy Orlando Area Chamber of Commerce)

\*6 Camellia Dr., DeBary, FL 32713



at 8 the Swap Shop reopens, and at 9 the large commercial exhibitor area will unveil over 125 booths, displaying the latest products of the electronic industry. Many retailers will also make their products available.

The primary function on Saturday will be the official opening of the convention with a forum, called to order by ARRL President Harry Dannals, W2HD. Vice President Larry Price, W4RA, will be the moderator, assisted by Frank Butler, Jr., W4RH, Southeastern Division director. Members of the Hq. staff, Division directors, Executive Board members and others will be available. The FCC is also expected to have representation. Be sure to attend this very important session to learn all the latest developments of the amateurs' world.

Other informative activities are planned, including a DX forum, ATV seminar, Antique Wireless display, AMSAT presentation, various MARS meetings, net meetings, a Computer digest, antenna forum and a great ladies' program. Orlando Hamcations have established an enviable record for their ladies' activities. A fashion show, microwave school, slim-girl belly dancing, side trips and many other features will keep the distaff side happy! All day during the weekend, Sheraton guests will be able to board free buses to all attractions. Trolley service connecting the many other hotels with the convention center will be available.

Come prepared to enjoy a great National Convention and hamfest. Registration for amateurs and students 14 and over is \$4 prior to February 20, \$5 after that. Spouses of amateurs and children under 14 are free at all times, when accompanied by a ticket holder. Swap Shop tables, \$10, are good for Friday night, Saturday and Sunday. Please, amateur and electronic-related items only. RV parking available on adjacent secured property. No hook-ups available. No RV parking on convention center property parking areas.

The Saturday evening dining experience will differ from the usual banquet format — buses will transport diners to Sea World for a magnificent Polynesian-style luau, an evening of entertainment featuring a guest speaker, a major award and a splendid floor show, "The Drums of Tahiti." A cash bar will also be available. At the conclusion of activities, buses will be waiting to carry all back to the convention center. Reservations are \$16 before February 20, \$18 after that date. Please note — early reservations are advised.

For all hotel, motel, RV, commercial booth information, convention registration, Swap Shop tables, or banquet reservations, write to Hamcation Chairman, P. O. Box 191, DeBary, FL 32713. Mail requests must be postmarked by February 15.

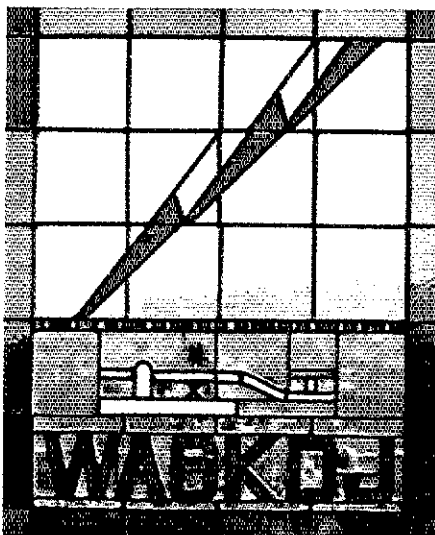
# Strays



Ed Moody, N3ED (left), receives the Frankford (Pennsylvania) Radio Club's perpetual trophy for outstanding achievement in contest operating. The award was made by club President Jay Gerber, N3AW, at a recent awards banquet. The FRC internal awards program, similar to that of many contest clubs, apparently has been one of the keys to the club's success during the past three years when they placed in top position in the unlimited category of the ARRL DX Contest.

## GROUNDHOG DAY 1981

□ The Woodchuck Net will commemorate Groundhog Day 1981 and issue certificates to all amateurs who check in and send a legal-size s.a.s.e. The frequencies will be 7.230, 7.245 and 3.980 MHz at 1 P.M. on February 1, 1981. K3HWJ, W3FJY and KA3CUY will be participating. Mailing address is P. O. Box 345, Punxsutawney, PA 15767. — *Art Sweeney, K3HWJ*



When Wally Fairfield, WA6KDJ, of Laguna Niguel, California, set out to design and make a stained glass window for his shack door, he did it with style. "The bar between the key and lightning consists of square pieces of blue glass and rectangular pieces representing dits and dahs," he writes. "The letters are separated by white squares of glass; they spell my name."

## HOUSE HUNTING? CHECK ANTENNA ORDINANCES

□ More and more cities and municipalities are drafting antenna and tower ordinances. (See November 1980 *QST*, page 56.) Almost every issue of *QST* or any other radio magazine contains an article or note about some amateur who found out about antenna ordinances when it was too late.

No matter how quickly you have to find a house, you can always find time to make a call to the city engineer or building inspector of the city in which you are house hunting. They may know what antenna or tower legislation is currently on the books and what may be added soon. If they say there is no antenna or tower legislation or none pending, get it in writing. Record the date, name and title of any official giving you such information.

You should get to know your way around City Hall, as you will have many occasions to visit it once you are a homeowner. The city engineer can also be a source of information on altitude, flooding, termites, landslides, water tables and other such items.

Be sure to check all the requirements and fees for construction permits that may be necessary to install a tower and antenna. Make sure you check all angles before you lay down the hard cash for a house. This may sound like a lot of work, but I have bought eight houses, and believe me, I went through it every time.

The city engineer and building inspector are usually willing to help. They are basically interested in seeing that anything erected will stay up and cause them little trouble. A real estate agent is not the best source of information on antennas and towers; agents are usually not well informed on this topic. Real estate agents may be helpful, though, in making the proper contacts for you in City Hall.

A good indication that amateurs are tolerated in a town is the presence of other antennas and towers. If you drive into a town in which you would like to live and see antennas and towers, you know you're in a good ham town. Also, be ready to experience earshattering signals after you move in. A visit to one of the local amateurs may be in order. Stop in and find out what the rules are. They may have changed since the tower was put up, or there may be an exorbitant tower fee. In any case, make the acquaintance of a local amateur. — *Joe Ratkiewicz, NØEL, Bettendorf, Iowa*

# China's Ham Radio Slightly Closer

As it opens its doors to world commerce, China is looking more favorably on Amateur Radio. This on-the-scene report seems to confirm that BY may be active shortly.

By John E. Felber,\* K2BPR, Jean Chittenden,\*\* WA2BGE, Irv Emig,\*\*\* W6GC and Don C. Wallace,\*\*\*\* W6AM

When the China News Service invited editors, writers and amateurs to the Xinhua News Seminar in Peking, we eagerly accepted the invitation. The Chinese government had arranged our stay at the same Peking hotel that President Nixon and Secretary of State Kissinger had stayed at during their visits to China's capital city.

Our first meeting was with six Xinhua officials who represented the 5000 employees, 29 Chinese branches and 87 overseas branches of Xinhua. The officials are very interested in Amateur Radio. It was our pleasure to present ARRL publications, *Callbooks* and maps to Xinhua News Agency Director Zeng Tao. League publications were furnished by the ARRL, and *Callbooks* and maps were furnished by the Radio Amateur Callbook Inc.

During this meeting we were encouraged to describe Amateur Radio and explain its advantages. We explained that the scientific development of virtually all countries tends to be in direct ratio to the number of hams and that youngsters interested in electronic activities should be encouraged. If today's young people can become involved in electronics, China can expect great progress in the future. As we stressed amateur self instruction, we noted that China's top reporters examined our publications with interest. These reporters are the ones who can create the encouragement necessary for Amateur Radio to flourish in China.

It is interesting to note that a nearby department store had a large radio depart-



China's interest in electronics is mirrored in the faces of these electronics students.

ment with high-power tubes, such as the 833, available. We even bought some wire for an antenna for the shortwave receivers that were installed in our hotel rooms. Local television showed a course in radio fundamentals. Yes, the Chinese are interested in electronics and Amateur Radio.

## Other Visits Prove Fruitful

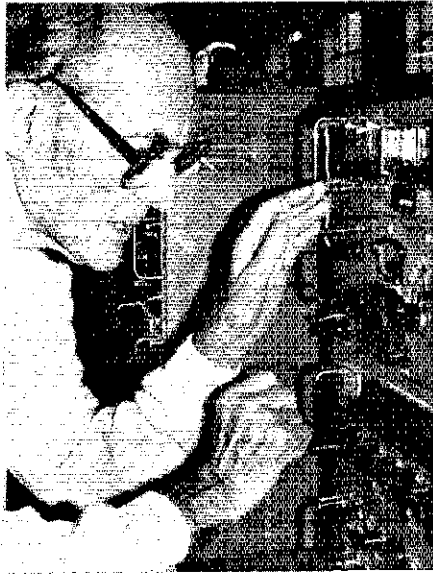
In a meeting with Zuo Moye, deputy director of the Central Broadcasting Studios, and his staff, we had another opportunity to extol the virtues of Amateur

Radio. We left more publications with this group.

Yuan Xianlu, director of international affairs of the *People's Daily*, arranged a meeting with our group, which now included Shinway Dong, Xinhua coordinator, and Chin Ming Yuan, deputy of the foreign news department of Xinhua. Further amateur exposure was welcome and our QSL cards, amateur literature and *QST* were eagerly reviewed by our hosts.

Zeng Tao presided at a beautiful 10-course dinner that Xinhua put on for

\*Box 636, Federal Square, Newark, NJ 07101  
\*\*Rte. 1, Box 2105, Edge Rd., Syosset, NY 11791  
\*\*\*737 12th St., Manhattan Beach, CA 90266  
\*\*\*\*28503 Highridge Rd., Rancho Palos Verdes, CA 90274



Don Wallace, W6AM, tunes in a marine transceiver still on the assembly line at Radio Manufacturing Plant Number 1 at Nanking. Many U.S. amateurs were heard on 14.025 MHz, despite the handicap of a 6-foot-long antenna. (Photo courtesy Lee Ewing, *Army Times*)

us. We also had the opportunity to meet with officials of the Chinese Peoples Army and discuss the virtues of Amateur Radio. They reciprocated with a demonstration of military weaponry.

We were fortunate to spend two afternoons at the Department of All China Sports Federation, where we met Secretary General Cheng Ping and Assistant Secretary General and International Liaison in Communication of bilateral agreements Wang Xun. Both of these gentlemen are former operators of club station BY1PK. Another official, the director of International Liaison Department, Mr. Liu, promised to ask for amateur permission and to pursue an okay. Mr. Xun said that there were hundreds of low-power cw stations in China. Both Cheng and Wang conduct training classes and were very pleased to receive



Gathered in front of the All China Sports Federation Building (l to r) are Irv Emig, W6GC; Wang Xun, deputy secretary general of All China Sports Federation; Virginia Reynolds; Don C. Wallace, W6AM; Cheng Ping, secretary general of All China Sports Federation; John E. Felber, K2BPR; Jean Chittenden, WA2BGE; and Mr. Liu, deputy director of All China Sports Federation.

the many ARRL publications we presented.

### Radio Equipment in China

The Nanking Radio factory, with a staff of 4000, occupies 1.4 million square feet. Here we saw many 400-watt ssb transmitters on dummy loads. We operated an ssb receiver and monitored amateur transmissions for a period of time (see photo). Apparently commercial, military and ship equipment meet the Chinese needs. We were also shown their 2-kW ssb transmitters and associated equipment.

The Chinese export transistor radios and 3-band shortwave receivers, mainly to markets in Southeast Asia. The factory manager indicated that there were other such radio factories in China and that once the okay for Amateur Radio operation was given they could build amateur ssb and cw equipment. The Chinese keep up with the latest developments in the electronics industry through information exchange with foreign factories.

There is a radio club in Nanking. Through the encouragement of the Central Committee, factory officials believe that electronic technology will continue to develop. In this factory, 90% of the

profits go to the State; the remaining 10% is used for workers' bonuses and stock. We were also shown an experimental satellite tracking station on the outskirts of Nanking. The station consists mainly of West German equipment.

Our visit to the Peoples Republic of China was a most worthwhile personal experience. The interests of world friendship through Amateur Radio were explored and, hopefully, furthered. The Chinese have both the interest and technology to become a part of the international amateur community. We eagerly await the day when we can once again have the opportunity to meet our Chinese friends through the facilities of Amateur Radio. China smiled and we smiled, too.

Upon returning home, W6AM was able to tune in a large number of Chinese low-power cw stations. There they were, the band essentially full of them, sending Chinese 56-character code at 10 to 15 wpm, and having a great time. The signals, scores of them, were loud and clear!

GET

[Editor's Note: Xinhua News Agency, the China News Service, is sponsoring another China trip in April. Interested amateurs should contact author Felber for more information.]

## Strays

### NOVEMBER COVER UPDATE

□ The peaceful Field Day scene that graced the November cover was taken by Bob Kirk, W7IND, at Heaven Valley ski area on the California/Nevada border, elevation 7200 feet.

### GHOST TOWN LIVES AGAIN — OPERATION BALLARAT

□ For a short period, the old ghost town of Ballarat, California, will return to life. Amateur Radio will join the town with its

namesake in Australia for a special operation during the weekend of January 31 to February 2 UTC. Once a thriving mining town, Ballarat, Inyo County, California is today an almost-forgotten ghost town in the rugged mountains that ring Death Valley.

To participate, stations must contact both Ballarats on either 10-, 15-, 20- or 40-meter ssb. Time of operation: 0200 UTC January 31 through 1400 February 2 UTC. Frequencies: 28.5 to 28.6, 21.3 to 21.4, 14.275 to 14.350 and 7.225 to 7.300 MHz. To qualify for a certificate, you

must contact two of the 20 Ballarat, Australia, stations in addition to the California station. Give call and signal report. You will get an identifier, a sequential number and the last two characters of the Ballarat station's call sign. Contact the other Ballarat and give your call and the identifier. Send your name, call sign, identifier, address and one IRC to WA6NKL, 4817 Paseo De Las Tortugas, Torrance, CA 90505, or VK3VEZ, 2 Cambridge St., Wendouree, Vic 3355, Australia. — Paul M. Turckheimer, WA6NKL

# Newsreel 1980 — The Year in Review

In the wake of WARC-79, the League and Amateur Radio entered the '80s with justified optimism.

By Richard Palm,\* K1CE

**S**ure, 1979 was a tough act to follow, but 1980 proved itself a worthy year in Amateur Radio. Thanks to WARC-79, 1980 was a year of renewed spirit in anticipation of a bright future for the amateur community.

The year was not without its darker days, though . . . *"This is the AMSAT Launch Information Network . . . we just had the report that the launcher is about . . . splashdown!"*

So ends the narrative of Dr. Tom Clark, W3IWI, president of AMSAT, on that fateful "Black Friday," May 23, when the Ariane launch vehicle carrying its precious cargo plummeted earthward, depositing the AMSAT Phase III-A satellite in Davy Jones' Locker. A fitting epitaph, perhaps? No — a fitting prologue for a new determination and promise in the amateur space program. What was lost was hardware — what was gained was thousands of hours of experience, proven design and development skills, and knowledge. The AMSAT program established a trained reservoir of volunteers with a sense of pride and accomplishment who *will* persist and prevail in the achievement of AMSAT's long-time dream of high-performance satellite communications. ARRL, the ARRL Foundation and the amateur community are collectively devoted to converting this dream to reality — perhaps this is the theme of 1980. Our sincere congratulations to Jan King, W3GEY, and Dr. Karl Meinzer, DJ4ZC, two stalwarts of the Phase III program, and the entire



The ARRL flag was unfurled for the first time during 1980.

AMSAT crew, for a job well done on Phase III-A.

## Regulatory Matters

The Federal Communications Commission made a grand entrance into the new decade by proposing, and later adopting, formal rules for the Amateur Satellite Service. The new Subpart H of Part 97 defines terms, lists frequencies and makes special provisions for amateurs using the new space-age modes.

**10 MHz Band Proposal.** The ARRL Board directed the staff to file a petition proposing that the new 10 MHz band be made available to U.S. General, Advanced and Extra class licensees, for cw and RTTY only, with an input power limitation of 250 watts. To be included in the proposal is a request for the addition

of Extra Class phone privileges between 7075 and 7100 kHz and the extension of phone sub-bands on 20 meters.

The Commission amended its rules to protect its monitoring stations from interference. The rule provides for a non-mandatory procedure of consulting with the Commission if an amateur station is to be established near an FCC monitoring facility.

The League's Committee on the Biological Effects of Radiofrequency Energy reported their findings to the FCC in response to an FCC Notice of Inquiry. This NOI is an inquiry into the FCC's responsibility to consider the biological effects of radio-frequency energy when authorizing the use of radio-frequency devices. The ARRL committee located no reference to any ill effect caused to people

\*Membership Services Assistant, ARRL

from radio-frequency energy generated by amateur stations.

The League also commented on the Commission's consideration of a new Personal Radio Service at 900 MHz: ARRL supports both the creation of a new Personal Radio Service and a new band for the amateur service in the vicinity of 900 MHz, but cautions against *contiguous* amateur and CB-type bands.

*ASCII at Last!* The Commission released official wording of the new rules governing ASCII and its use for such purposes as radioteletype communication; control of amateur stations, models and other objects; transfer of computer programs or direct computer-to-computer communications; and communications in various types of data networks. Incidentally, the League (with its petition RM-3788) has asked the Commission for more room to move in the digital arena.

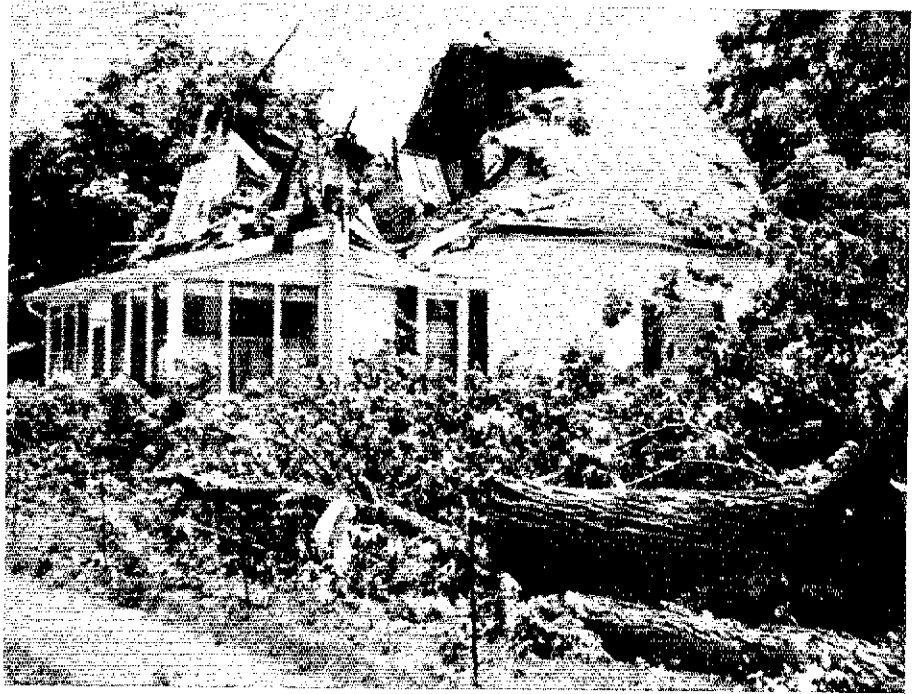
ARRL issued a hearty "aye" in support of FCC's proposal to eliminate the requirement that an amateur sign the other station's call sign at the end of a QSO (except in cases where international third-party traffic is involved).

Consistent with its spirit of deregulation, the Commission removed the bandwidth restriction between 50.1 and 52.5 MHz, making room for the use of standard-bandwidth fm (16F3), the emission commonly used by amateurs.

Further deregulatory action was proposed by the Commission to allow General class licensees the use of TV and facsimile in their hf sub-bands (except 160 meters) where voice transmissions are currently allowed. The League filed in support of this proposal.

In view of the reduced role of Loran-A radionavigation, the League requested that the FCC remove the restrictions presently in force on the 160-meter band: "The restrictions now in force impose serious limitations on the usefulness of the band for public service communications networks and for long-distance experimentation and communications."

*League Officials Meet With FCC Chairman Ferris.* In an effort to improve relations between the Amateur Radio Service and the FCC, ARRL President Harry Dannels, W2HD, and Washington Area Coordinator Perry Williams, W1UED, met in June with Commission Chairman Charles Ferris and other high-ranking FCC officials. Dannels and Williams praised the Commission for its support of the Amateur Radio Service at WARC-79 in Geneva and discussed the importance of such domestic issues as the accessibility of license exams to the public, the possibility of digital licensing and the encouragement of a closer alliance between FCC and amateurs in exploring new technologies. ARRL's representatives emphasized the value of the public service aspects of the amateur service and its continuing role in serving the public interest.



When nature unleashes her fury, a quick response by local amateurs could easily save hundreds of lives. Hurricanes and tornadoes — as well as "mere" thunderstorms such as the one that hit Bloomington, Illinois last summer, usually bring out local amateurs eager to provide the emergency communications needed so desperately by local officials. (Photo courtesy K9ORP)

*Trial Balloon Shot Down — the Digital License.* The Question: Should the U.S. follow Canada's example and produce a new license class, above the Novice level, for digital scientists and experimenters? A written test on computer techniques would replace the code exam, resulting in a codeless amateur license. The Answer: A resounding no! Long live the Morse code!

*Malicious Interference — Malignancy by Minority.* The Amateur Radio Service is in the throes of a major crisis, a crisis generated from within our own ranks: some amateurs deliberately and maliciously interfering with fellow amateurs. And like the problem itself, the solution will come from within. It's already begun, with the formation of local committees for the purpose of applying peer pressure to the social deviants in our midst, publication of direction-finding techniques, publicity for FCC enforcement actions in columns such as *QST's* FCC "Censure-y Club" and coordination of efforts with the FCC. The League's Board of Directors established the Interference Task Force, charged with coordinating an educational program, publishing a reference manual and guidelines for interference committee operating procedures, and providing liaison with FCC. "Whatever it takes, we will do it."

New amateur exams were put into use at Commission exam points. Code exams were changed to a fill-in-the-blank format with the passing grade lowered to 70%.

### Communications Highlights

Amateurs responded with emergency

communications assistance in several areas during 1980. In southern California, amateurs responded to the mud-slides emergency that occurred after a period of heavy damaging rains. Hams were there when the call came in on Hurricane Allen and the Cuban refugee boatlift. Amateurs were in the thick of the volcano action on Mount St. Helens with the tragic loss of two hams who died while serving in the public interest.

*NTS on trial.* The National Traffic System implemented two symmetrical cycles on a trial basis to promote expeditious traffic handling in the U.S. and Canada. Amateurs involved themselves in emergency communication preparedness exercises such as the annual ARRL Field Day and Simulated Emergency Tests. *QCD*, an ARRL Communications Department publication, continued to keep the Field Organization abreast of developments in the operating arena. The ARRL International DX Contest was returned to the original format of DX-to-W/VE contacts, based on input from the membership, the Contest Advisory Committee, the ARRL Board of Directors and foreign contest operators.

### International

The International Amateur Radio Union will continue to play a vital role in post-WARC planning. The International Telecommunication Union will be holding several conferences in the years ahead, and the IARU will be prepared to represent the interests of Amateur Radio throughout the world. Region 2 held its

first post-WARC meeting in Lima, Peru in the fall to discuss the ever-increasing complexities of international spectrum management and allocation, and the role IARU societies will play. Other IARU meetings will follow.

The IARU, of which ARRL is headquarters society, will meet the challenges of the future. To help, ARRL has created the office of International Affairs Vice President, to which IARU President Noel B. Eaton, VE3CJ, has been elected.

Carl L. Smith, W0BWJ, was elected IARU vice president, and Gustavo Reusens, OA4AV, was elected IARU Region 2 president. Vic Clark, W4KFC, who did not seek reelection, had held both positions. Vic continues to serve ARRL as honorary vice president and Region 2 as vice president.

### Technical Matters

At the forefront of amateur technology, *QST* presented articles on solar power applications, ASCII, long-delayed echoes (LDEs), results of the Great Ionospheric Hole Experiment, SSTV in color, an introduction to spread-spectrum techniques and much more. Congratulations to Ed Oxner, KB6QJ, who won the 1979 technical excellence award for his article, "Build a Broad-Band Ultra Linear VMOS Amplifier." Congratulations also to Helge Granberg, K7ES, A. C. Doty Jr., K8CFU, and Dr. Allen B. Macnee, ex-W1JIR, who were recognized by the ARRL Board of Directors with honorable mention. The ARRL Technical Department played host to a team of Canadian amateurs who presented a demonstration of packet radio and its use in Canada, and to Charles Woodson, W6NEY, who presented a lecture and demonstration on coherent cw. Both demonstrations brought out a good number of Hq. staff members.

### Canadian Matters

The Board of Directors of the Canadian Radio Relay League accepted, with regret, the resignation of Ron Hesler, VE1SH, as president. Mitch Powell, VE3OT, was appointed the new president. Ron Hesler, with a long and impressive record of service to Canadian Amateur Radio, was formerly ARRL Canadian Division vice director and director. A founding member of CRRL, he was its first president.

In other areas, automatic reciprocity between Canada and the U.S. was effected so that prior written permission to operate reciprocally in either of the two countries is no longer required.

Noel B. Eaton, VE3CJ, was honored at Noel Eaton Appreciation Night in Ontario to honor his accomplishments and outstanding contributions to Amateur Radio.

Duty was eliminated on amateur equipment, including transmitters, receivers, transceivers, transverters, linear ampli-

fiers, VFOs and power supplies.

CRRL released a Canadian License Manual.

The DOC authorized A3 operation for Advanced Class amateurs on the frequency band 7050 to 7100 kHz.

### On the Horizon

Amateurs can look forward to experimenting with new technologies such as spread-spectrum techniques, packet radio, ASCII and much more. Digital will more than likely be the name of the game in Amateur Radio. The Communications Act rewrite will continue to be a matter of concern to amateurs in the days ahead, as will developments resulting from the FCC's ever-tightening grasp on its philosophy of deregulation. But, in the final analysis, the future of Amateur Radio is limited only by the collective imaginations of the amateur community.

### Milestones

□ *Amateuradio*, a new ARRL Public Information Office publication, is designed to keep Washington officials and decision makers abreast of happenings in the amateur and amateur satellite services.

□ The new 1981 *Radio Amateur's Handbook* was released with several new sections and 64 more pages.

□ ARRL's all-new *Operating Manual* hit the streets with chapters on emergency communications, DXing, traffic handling, contesting, and more.

□ *QST's New Frontier* column changed hands, with Bob Atkins, KA1GT, taking the reins from Bob Cooper, W5KHT.

□ *QST Profiles*, a new bi-monthly column, features interviews with Amateur Radio's notables.

□ The ARRL flag (with N4RX's winning design) was unfurled for the first time.

□ The League introduced Dave Bell's new promotional film, "The World of Amateur Radio," featuring Dick Van Dyke, Stu Gilliam, King Hussein of Jordan and narrator Roy Neal.

□ The membership elected a slate of directors and vice directors in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions.

□ Nick Laub, W0CA, achieved recognition for being the first radio amateur to win the Worked All Continents Award via satellite.

□ ARRL established the Development Office to seek contributions to the League and/or the ARRL Foundation to support a number of additional worthwhile programs in Amateur Radio.

□ The ARRL *Radio Amateur's License Manual* underwent major surgery to reflect the changes in the FCC's new exams.

□ The ARRL National Convention was held at Seattle, Washington, in July as Mount St. Helens came to life nearby.

□ George Oelkers, W6QOL, represented by attorney Fred Lawson, K6JAN, won a precedent-setting antenna case in California.

□ Perry Williams, W1UED, former Manager, Membership Services Department, was named ARRL Washington Area Coordinator.

□ Hal Steinman, K1FHN, formerly ARRL Washington Area Coordinator, took the helm of the Membership Services Department.

□ The "woodpecker," the Soviet Union's over-the-horizon radar system, continued to plague the amateur hands with its pulse-type interference.

□ Larry E. Price, W4RA, and Max Arnold, W4WHN, were elected vice-presidents of ARRL.

□ New ARRL Honorary Vice Presidents are Victor C. Clark, W4KFC, who did not seek reelection as first vice president, and past directors John Griggs, W6KW, and J. Lincoln McCarger, W6EY.

□ Carl L. Smith, W0BWJ, is the new Vice President of IARU and First Vice President of ARRL.

□ The ARRL Foundation Board of Directors held their annual meeting at ARRL headquarters in January. New directors are Andrea T. Parker, K1WLX, Frank Butler Jr., W4RH, Leonard Nathanson, W8RC, and L. Phil Wicker, W4ACY. The Foundation announced the new YLISSB Scholarship program and plans for support of the amateur satellite program.

□ Amateurs were on hand to provide communications assistance at the 1980 Winter Olympics.

□ Dave Porter, K2BPP, and his Arctic DXpedition, fell just short of the North Pole.

□ A U.S. District Court denied author James Reston Jr., copies of tapes made by FCC of Amateur Radio contacts between stations associated with the People's Temple religious organization. In denying Reston's Freedom of Information Act request, the court applied the Secrecy Provisions of Section 605 of the Communications Act.

□ Amateurs participated in IEEE Electro/80 in Boston, Massachusetts.

□ ARRL's Long-Range Planning Committee continued to serve in its role of clearinghouse for ideas and recommendations that will help the amateur community to perceive the shape of things to come in time to initiate effective preparatory action. A random-sample survey of the U.S. and Canadian amateur populations was conducted by Florida State University for the LRPC.

□ John Huntoon, W1RW, retired after 46 years of dedicated service to ARRL. John served as SCM, Assistant Secretary, Assistant General Manager, General Manager and, finally, as Treasurer.

□ James E. McCobb, K1LUU, was elected Treasurer.

# Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE  
MEETING NO. 383  
November 19, 1980

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 12:57 P.M., November 19, 1980, at the Headquarters offices of the League in Newington, Connecticut. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, W0BWJ; Directors Gar Anderson, K8GA, William J. Stevens, W6ZM, L. Phil Wicker, W4ACY, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice President Larry E. Price, W4RA, Director Donald C. Miller, W9NTP; Vice Director George Diehl, W2IHA, Washington Area Coordinator Perry F. Williams, W1UED; and General Counsel Robert M. Booth, Jr., W3PS.

On motion of Mr. Anderson, the Committee recognized the names of 291 members who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Wicker, the affiliation of the following clubs was approved: Amateurs for Better Communications (ABC) Radio Club, Waukegan, IL; Amateur Radio Club Silvertown, Silvertown, OR; Bedminster ARC (Long Lines), Bedminster, NJ; Branson High School ARC, Branson, MO; Branson Valley ARC, Inc., Stafford, TX; Champlain Valley ARC, Plattsburg, NY; Go-On Amateur Radio Club, Wakefield, MI; Helena Amateur Radio Club, West Helena, AR; Hill Country Amateur Radio Club, Kerville, TX; Islander Amateur Radio Assn., Hilton Head Island, SC; Jackson County ARC, Jackson, OH; Ottawa Area Radio Club, Ottawa, OH; Putnam Emergency & Amateur Repeater League, Carmel, NY; Varian Amateur Radio Club, Palo Alto, CA; Warrick Amateur Radio Club, Chandler, IN; West Volusia Amateur Radio Society, Orange City, FL. (With the above action, the League now has 1917 Category I affiliated clubs, 8 Category II clubs, and 354 Category III clubs.)

On motion of Mr. Anderson, approval was granted for the holding of the following ARRL conventions:

March 21-22, 1981 — North Carolina State — Charlotte, NC

April 25-26, 1981 — West Indies Section — Dorado, P.R.

May 15-16, 1981 — Atlantic Division/New York State — Rochester, NY

May 16-17, 1981 — Southeastern Division — Birmingham, AL

June 20-21, 1981 — Georgia State — Atlanta, GA

July 24-26, 1981 — West Gulf Division — Oklahoma City, OK

October 2-4, 1981 — Texas State — Houston, TX

October 3-4, 1981 — Midwest Division — Salina, KS

The Committee also took note of the proposal for a National Convention to be held in New York during 1984, to be timed so as to be held in conjunction with the second Board Meeting of that year.

The Committee also took note of the conflicts in the scheduling of several ARRL conventions for the weekend of May 15-17, 1981, and expressed concern that this would create problems for major equipment exhibitors. The Headquarters staff was instructed to include suitable language in future correspondence with those planning proposed ARRL conventions which would highlight this concern.

The General Manager was directed to write to the chairman of the 1981 National Convention Committee expressing concern over the non-receipt of the convention program, and asking that the proposed convention program be provided promptly so that it can be circulated to the Executive Committee by mail and the required approval obtained.

On motion of Mr. Anderson, the following additional 1980 appropriations were approved:

a) an additional \$1200 for the Delta Division

b) a transfer of \$2000 from the Section Traffic Managers allocation to the National Traffic System allocation

c) an additional \$1200 for the West Gulf Division

d) an additional \$1000 for the Central Division.

General Counsel Booth and General Manager Baldwin reported on the request by James Stitt, WA8ONQ, for financial assistance in a tower litigation case. Mr. Stitt has three towers, of 110, 90 and 75 feet, which violate the 60-foot local ordinance. He had applied for a variance, after the fact, which had been denied. The ensuing discussion revolved around the

question as to whether Mr. Stitt's case fits the guidelines which had earlier been established by the ARRL Board for League participation. On motion of Mr. Wicker, the Committee voted to reserve decision until General Counsel Booth has had an opportunity to review the transcript of the variance denial and to report further to the Executive Committee.

Informally, Director Zak urged the Editor of *QST* to regularly remind amateurs that, when they propose to move to a new location, they should carefully check local ordinances for any restrictions which might cause difficulty with their proposed amateur operation. (Such a reminder is already scheduled to follow the National Convention write-up in the January issue of *QST*.)

On motion of Mr. Stevens, approval was granted for the changing of the language of the "Rules and Regulations of the Communications Department" (contained in the booklet "Articles of Association and By-Laws of the ARRL") beginning on page 11 to reflect the change from Official Traffic Station to Official Relay Station and the new appointment of District Emergency Coordinator, both in accordance with the Communications Manager's letter of November 14th to the Executive Committee.

On motion of Mr. Zak, the committee approved the new edition of CD-180, "Reimbursement Provisions for ARRL CD Leadership Officials," which had been submitted to the Executive Committee on November 14th by the Communications Manager.

On motion of Mr. Smith, the Committee unanimously approved the opening of a checking account at Shawmut Bank, to be used for recording: the purchase of securities, interest and dividends received, and maturity proceeds.

On motion of Mr. Wicker, the Committee unanimously approved the following to sign checks drawn on the checking account at the Shawmut Bank, with two signatures to be required on each check, one signature from each of the following groups:

- 1) Treasurer  
Controller  
Martha L. Babcock
- 2) Secretary and General Manager  
E. Laird Campbell  
Harold M. Steinman

(Where titles rather than names are listed, the approved signer will be the current holder of that title.)

On motion of Mr. Anderson, the Committee unanimously approved the establishment of a custodial account to be used internally at Shawmut Bank to safeguard securities, collect income, process investment transactions, and to provide a record of transactions.

The Committee then proceeded to examine in detail the various problems or alleged problems in the current director elections. The Committee had before it a written summary prepared earlier by the General Manager, together with the written comments from a number of candidates and non-candidates. After extended discussion, in which there was participation by all officers and directors present, the Committee unanimously agreed to take no action which would affect the counting of ballots scheduled for the morrow.

(During the above discussions, at various times Messrs. Dannals, Miller, Diehl and Williams were absent from the meeting room. In Mr. Dannals' absence, First Vice President Smith assumed the Chair.)

In accordance with a Board Standing Order, the General Manager reviewed progress on various items of action adopted by the Board at its July meeting, supplementing his September 13th report to the executive Committee. Action on Board minutes 36, 42, 66, 74, 78, 79, 80 and 85 has been completed, while action is still in progress on minutes 26, 27, 33, 43, 47, 48, 51, 65, 70, 75, 81, 88 and 89.

Mr. Anderson, as chairman, reported on the progress of the Interference Task Force and its plan of action.

The General Manager reported on letters received from the Radio Society of Great Britain and the Radio Society of Bermuda concerning the Board's action to petition the Commission for expansion of the U.S. phone bands. After extended discussion, it was agreed that the needs of U.S. amateurs and the intent of the Board would be best served by proceeding promptly to file suitable petitions with FCC.

Washington Area Coordinator Williams reported that a Notice of Inquiry would soon be issued concerning 10 MHz and that the Board's intent concerning 10 MHz would best be served by our responding to that 10 MHz NOI rather than filing a separate petition.

The General Manager reported the inquiry by an individual as to whether the protection afforded members by *QST*'s advertising policy carried over to ARRL conventions. After discussion, it was the sense of the Committee that the sponsor of a convention, not the League Headquarters, was responsible for providing any necessary protection for members in their business transactions with exhibitors at a convention.

President Dannals reported on current developments involving chairmanship of the Federal Communications Commission, with the likelihood that Mr. Ferris would leave the Commission and the availability of Robert E. Lee to serve as interim chairman until the Reagan administration had an opportunity to make a long-term appointment. Mr. Dannals recalled our excellent relations with Mr. Lee over the years, and Mr. Baldwin reported on a recent phone conversation with Mr. Lee in which Mr. Lee expressed his willingness to serve as interim FCC chairman and his appreciation of support by the League. Mr. Dannals will address a suitable letter to the Reagan Transition Team.

Mr. Dannals and Mr. Baldwin reported on developments at 220 MHz, involving the possible use of those amateur frequencies by certain inland waterways users. Mr. Dannals reported that he and the staff would continue to explore every avenue of opposition to such proposed use.

Mr. Baldwin presented the draft of a proposed response to the 2nd Notice of Inquiry in the 1982 Mobile WARC, and the Committee gave approval for its filing.

At this point Director Miller presented his resignation to the Executive Committee, stating that because of his desire to contribute to the technical amateur field both as a writer and a hardware supplier, he found that he could not continue as director of the Central Division and satisfy the By-Law requirement. On motion of Mr. Stevens the Committee accepted Mr. Miller's resignation, effective November 19.

On motion of Mr. Anderson, VOTED unanimously that in view of Donald C. Miller's resignation as director of the Central Division, ARRL, Edmond A. Metzger, W9PRN, is declared the only eligible candidate in the current director elections in the Central Division and is therefore declared elected Director, Central Division, without membership balloting, for the two-year term beginning January 1, 1981.

Mr. Dannals announced that Mr. Ebnetter, currently vice-director of the Central Division, would serve as Director, Central Division, for the remainder of the current term, until December 31, 1980.

The General Manager reported informally on his continuing search for a fund development director, and on the news that HR Report was about to change its publication schedule from weekly to fortnightly. He further reminded the Committee that members of the staff were specifically instructed not to permit their names to be entered in prize drawings at ARRL conventions because it is a breach of ethics for those who travel on League-reimbursed funds to accept prizes which should more properly go to those who attend conventions at their own expense as members.

On motion of Mr. Wicker, the President was directed to form an ad hoc committee which would examine the establishing of a code of ethics for the conduct of ARRL elections. President Dannals acknowledged the need for such committee study, and obtained consent of those present to expand the scope of the committee work to provide for an indoctrination of new directors and the development of a code of ethics to be followed by incumbent directors. He then announced that Vice President Larry E. Price, W4RA, would serve as chairman of the Ad Hoc Ethics Committee, and that the other members of the committee, none of whom would be current directors, would be announced shortly.

During the course of the meeting the Committee discussed, without formal action, the following additional matters: appropriations for the Ad Hoc Committee on Interference and the Interference Task Force, arrangements for attendance at that evening's meeting of the Hq. 10-Year Club, better control of the use of membership mailing labels, background investigations of applicants for Hq. employment, Board meeting arrangements during the March National Convention, and participation in the ballot-counting scheduled for the next day.

There being no further business, the meeting was adjourned at 5:38 P.M.

Respectfully submitted,  
Richard L. Baldwin, W1RU  
Secretary

# Correspondence

Conducted By Bruce R. Kampe,\* WA1POI

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

## SMASH SHORTCUTS

□ I'm sure most amateurs feel the same way I do. The printing of books that contain exact or nearly exact questions and answers from Advanced and Extra Class FCC exams is at best unethical. It borders on the unsavory, the dishonest, and is certainly without class.

However, it furnishes those of us who have been calling for rougher and tougher exams with a real opportunity. Instead of rewriting the exams, just have eight or ten exams with an expanded number of questions. Then, the individual who goes on memory instead of knowledge is going to have an awfully rough time. Can you imagine buying an exact question and answer book at a hamfest and then trying to remember which answer goes with which of one thousand questions? People looking for shortcuts just don't have the brainpower to handle that.

Another idea would be to write just one exam each for the Extra and Advanced license classes and make the questions dependent on numerical input parameters. The examiner would draw the inputs from a randomized table, perhaps with the throw of a few dice. The majority of the questions would require calculations from these random inputs. In this way, there would always be a different set of "correct answers." After all, Technician and General licensees should know the rules and regulations anyway, therefore make the Advanced and Extra levels technical. Those who are not good with numbers will not make it with a cookbook of cheap answers anyway. The cream will indeed settle to the top. — *Phil Anderson, W0XI, Lawrence, Kansas*

□ I have been reading with interest the various references to manners, both good and bad, on the ham bands today. Surely, it is all too easy today, with instant hamming from question and answer hooks and credit cards. This can be compared to road-hogs with one small pedal and as much horsepower to do as desired. Is it not significant that on the cw bands, where time and effort have to be spent attaining the necessary proficiency, manners are much better? As a cw-only operator I suggest standards necessary to operate in the non-phone portions, be raised making it something to be cherished. — *Edward D. Ross, A9XCE/VP2AV/G3CYC, Bahrain*

## ELMER GOES A'COURTIN'

□ Kindly understand, I am neither for nor against Women's Lib, but it might be interesting to have a counterpart to "Elmer." How about "Janie," which contains the same number of letters and the most missed ones as the beginner increases code speed. — *J. L. Flaccus, WB3JMT, Pittsburgh, Pennsylvania*

## RESCUE REGS

□ This is in response to the October letter from David T. Geiser, WA2ANU, about the supposed pirating between the U.S. Coast

Guard and a distressed vessel, initially mentioned in the August 1980 Public Service Diary.

I would like to clear up a few misconceptions about search and rescue operations by the Coast Guard on amateur frequencies. Anyone who is in a distress situation may use any frequency or mode to attract attention and obtain the needed aid. The agency having a prime interest may also use these frequencies to communicate with a distressed unit. This is covered both in FCC regulations and in the International Telecommunication Union manual. Interested amateurs will not find these regulations hard to locate. I hope this will settle the complaints about Coast Guard operations on the amateur frequencies, which is not illegal in the eyes of the FCC or the international community. — *Curtis D. Law, WA2PIV/3, Laurel, Maryland*

[Editor's Note: A distress call may be made on any frequency where it is felt help will be found. However, some boating enthusiasts who are non-amateurs have been led into thinking an Amateur Radio transceiver is an inexpensive substitute for an hf marine radio, and that the amateur bands are suitable for routine marine communications.]

## ENCOURAGING WORDS

□ Thank you ARRL. Thank you very much. It was during the month of July that I decided to obtain my Extra Class license. I knew that my code speed was in the vicinity of 15 wpm for copying and about 22 in sending, so I posted a copy of the WIAW Code Practice Schedule very conspicuously in front of my transceiver. After disconnecting the microphone and assuring that my key and keyer were in good operating condition, I commenced a two-month exhaustive study program in copying and sending cw.

On some nights, the WIAW transmissions were bothered by almost intolerable QRM and QRN, which was so bad on other nights I had to discontinue copy. On many nights the transmissions were nice and clear. Never did I copy or attempt to copy anything less than 20 wpm during the Code Practice transmissions. However, I did copy the 18-wpm cw bulletins in their entirety. There were mistakes and omissions, which I didn't let stop me, although some evenings were frustrating as my cw copy diminished from the night before. The first night I listened to 35 wpm, it seemed "all that buzzing" meant nothing and could never be copied. As time went on I was amazed to be able to copy letters and then words. When I received the ARRL 20-wpm code proficiency certificate it seemed a plateau had been reached and my confidence had been restored.

Without the study I put in copying your WIAW code practice transmissions, I could not have passed the cw test administered by the FCC. My Extra Class license was issued on September 10, 1980. Again, thank you ARRL. — *John P. Reymond, Sr., KC4MT, Birmingham, Alabama*

[Editor's Note: This conductor could never have become a ham without WIAW. During code practice, three or four receivers were scattered around the house, all tuned to WIAW. One a-m bc radio was

tweaked up to 160 meters and used a jury-rigged BFO. With that radio, it sure helped to live close to Newington.]

## DEREGULATION DEGRADATION

□ On page 10 of November QST there is a proposal listed by the FCC to eliminate the Commercial First Class Radiotelephone operating license. I have one of these licenses and went to considerable effort to get it. I remember what happened to the Amateur Extra license I obtained in 1933. The FCC decided to eliminate it and give everyone an Advanced license. A few years later they turned 180 degrees and decided an Extra ticket was the way to go. The only ones who got kicked around were the ones who had the know-how to get an Extra ticket in the first place. Nobody in the FCC was hurt at all.

Now they want to eliminate the First Class Radiotelephone license with no mention of what takes its place. It appears that the broadcast lobbyists have infiltrated the FCC and are interested in breaking unions. Hiring anyone off the street will result in a mediocre group of technicians. Who is going to examine a prospective employee, a radio station? That's a big laugh. By the same illogical logic, look at the "citizen's band." It now stretches from 26 to 28 MHz and maybe into the 10-meter amateur band. The language on CB gives an idea of the depth of degradation which appears when standards are eliminated.

I am for leaving the licensing structure alone and requiring broadcasters to hire personnel who have passed standards to back up what they claim they have done. — *Leonard Clark, W2LM, Conklin, New York*

## CHAPTER 22, NOT CATCH 22

□ CQ CQ CQ DE W5XW AR K. I'm calling for anybody, nobody in particular. What I really mean is that I'm calling a particular station with whom I haven't yet established contact, so please go ahead any station. Better yet, go ahead all stations at the same time . . . No, that might make it too hard to sort one of you out.

What have I done? Maybe I should have sent AR KN. Anybody, the specific station with whom I haven't yet established contact, go ahead that station only. The rest of you stand by and I'll get to you in due time. You guys know who I mean.

RRR QRZ? DE W5XW AR K KN. I copied 300% but who was the station calling me? Please try again, all of you at once, but please . . . only the station that called last time. The rest of you please hang loose while I get my act together. If a particular station is in there, you call me too.

If Hiram Percy could only hear us now! Let's see now, maybe I could replace the RRR with 10-4, or 10-4, 10-4, 10-4? If The Old Man was here today, he'd write all this stuff down in a book so it wouldn't be so hard to figure out. I'll bet he'd even put it in Chapter 22. — *Bob Wheaton, W5XW, San Antonio, Texas* ☺☺☺

[Editor's Note: Check the 1981, 1980 and 1979 ARRL Handbooks, all under Chapter 22.]

\*Membership Services Assistant



## ARRL Directors and Vice Directors for 1981-1982

Every year, the terms of half of the members of the ARRL Board of Directors expire, and the general membership of the League has the opportunity to replace these directors or reelect them for another two years. There are 16 ARRL divisions (see page 8), and each division is entitled to elect one director and one vice director. Vice directors can fill in when directors are unable to serve.

The general membership cast 29,250 votes last fall in those divisions with elections activity. The newly elected officials have become members of the ARRL Board of Directors, which is the governing body of the *American Radio Relay League, Incorporated*, as chartered under the laws of Connecticut. The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and the services that will be made available to the membership. The new directors and vice directors take office on January 1, 1981. Here are the results of these races:

### West Gulf Division

*Raymond B. Wangler, WSEDZ*, of San Antonio, Texas, continues in office as director. First elected as vice director of West Gulf in 1978, Ray became director last year when then-director Jack Gant, W5GM, resigned. Last fall Ray decided to run for director, and the ARRL Executive Committee declared him elected when no candidate filed to run against him. Presently employed as director of safety and industrial hygiene at Southwest Research Institute, Ray is a senior member of IEEE and holds a B.S. in chemistry and a B.A. in physics. He has also done graduate work in industrial engineering. A lifelong resident of Texas, Ray is an Advanced class amateur and a life member of ARRL. He is a member of the board of directors of his local Red Cross chapter, president of the San Antonio Radio Club and chairman of the ARRL Committee on the Biological Effects of RF Energy. An avid amateur since 1952, Ray's on-the-air activity includes operation on all amateur frequencies from 80 meters through 70 cm. He is a member of AMSAT, SWOT, SMIRK, 10-10 International, QCWA, Central States VHF Association, Texas VHF FM Society, Alamo DX Amigos and TTN, and is past president of Southwest Research Center Amateur Radio Club, San Antonio Repeater Organization and Kaddidlehopper. Ray also served as a Technical Program Manager for Air Force MARS for eight years.

*Thomas W. Comstock, N5TC*, of College Station, Texas, continues in office as vice director. Tom first became vice director in January 1980 when he was appointed to take then-vice director Ray Wangler's place when Wangler succeeded to the directorship. Last

fall the ARRL Executive Committee declared Tom elected when no one filed to run against him. Presently employed as a professor at Texas A&M University, Tom, a life member of the League, has a family tradition of supporting ARRL. His wife, W5QCI, and son, W5ODI, are both life members. Tom is very active in Amateur Radio public service and is a member of the Transcontinental Corps (TCC), liaison for NTS region to area net, liaison for section to region net, and NCS for the region NTS net and section phone and cw nets. Tom holds the following awards: Brass Pounder's League, A1 Operator Club, Public Service Honor Roll, DXCC (mixed), and DXCC (cw). A past net manager for the Texas Traffic Net, Tom is a member of the Texas VHF Society, faculty advisor for Texas A&M University Club Station W5AC, and RACES officer for Brazos County.

### Southwestern Division

*Jay A. Holladay, W6EJJ*, won his bid for reelection by defeating challenger Fried Heyn, WA6WZO, by a vote of 3019 to 2821. Jay, who lives in La Canada, California, is employed as an engineering supervisor at the Jet Propulsion Laboratory in Pasadena. He first became director in 1978 after being vice director during 1975 to 1978. As one might expect by Jay's occupation, he is very active in Amateur Radio satellites. He earned the first West Coast WAS via OSCAR 6, served as chairman of the Amateur Satellite Service Council from 1976 to 1980, and is director and trustee of the Jet Propulsion Laboratory Amateur Radio Club and station W6VIO. Jay was also trustee for special events stations N6V, WS6MVM and WP6JPL. He is a past president, treasurer and director of the Southern California DX Club, DXer of the year 1970, former editor of the SCDXC Bulletin and past chairman of the Fresno International DX Convention. Jay holds the following operating awards: DXCC Honor Roll, 5-band DXCC and 5-band WAS. First licensed in 1950, Jay is ex-W5SAT and ex-K7IDI, and is a life member of AMSAT, QCWA and ARRL. He holds an Extra Class license.

*Peter F. Matthews, WB6UIA*, of San Pedro, California, automatically became elected for another term as vice director when the ARRL Executive Committee found no other eligible candidate for that office. Pete holds an Advanced class license and is employed as a supervisor for the Lord Electric Company. He first became vice director in 1978 and became a member of the ARRL Board's Ad Hoc Committee on Malicious Interference. Pete is a director of the Los Angeles Area Council of Amateur Radio Clubs and served as chairman, cochairman and representative to that organization. He is a past president, vice president, secretary and director of the United Radio Amateur Club, and used to edit URAC's

newsletter, "Short Circuit." Pete is also a past letter-manager for the W6-QSL Bureau and presently holds membership in the Southern California DX Club. Pete has earned DXCC, WAS and a National Certificate of Merit. A life member of ARRL, Pete has been licensed since 1966.

### Rocky Mountain Division

*Lys J. Carey, KØPGM*, of Lakewood Colorado, becomes the new director of the Rocky Mountain Division by defeating Hugh Winter, W5HD by a vote of 1157 to 712. Lys, an Advanced class amateur, is employed as a machine shop foreman at the Gates Rubber Company. He served as ARRL vice director from 1979 to 1980 and assistant director 1974 to 1978. He also served as a League public relations assistant and was finance chairman of the 1976 ARRL National Convention. Lys is a member and past deputy director of Air Force MARS; treasurer, past president and past vice president of the Denver Radio Club; and past editor of "The Round Table." Active in public service, Lys is a member of the Board of Directors for Denver Civil Defense, and has served as chairman of the electricity/electronic advisory board for Denver public schools. He has earned WAS, WAZ and WAC operating awards, and was first licensed in 1958. Lys is a life member of ARRL.

*Marshall Quiat, AGØX*, of Denver, won election as vice director by defeating Karl O. Ramstetter, WAØHJZ, and Robert A. Scupp, WB5YYX. Marshall polled 803 votes to Karl's 590 and Robert's 478 votes. The new vice director is a lawyer and senior member of Quiat and O'Fallon, which operates a general law practice with emphasis on trial law. Marshall was an assistant ARRL director from 1976 to 1980, and has served as president, board member, vice president, secretary, radio interference committee chairman and liaison with the FCC for the Denver Radio Club. He was also chairman of the legal committee for the 1976 ARRL National Convention and is a former trustee of the Personal Communications Foundation.

### Roanoke Division

*Gay E. Millus, W4UG*, was declared the new director of the division when the ARRL Executive Committee found him to be the only eligible candidate for that office. Gay, an Extra Class licensee, is a retired attorney and a retired commander in the U.S. Navy Reserve. (He saw 20 years of active duty.) Gay served as vice director of the Hudson Division in 1950 and 1951 and vice director of the Roanoke Division, 1977 to 1980. Licensed since 1940 and a life member of the League, Gay has had a very active amateur hobby. He has held positions of responsibility in many clubs and organizations including the Washington (DC) Mobile Radio Club, Virginia Beach ARC, Virginia Century Club, N.A.S. Norfolk Radio Club and the

\*Deputy Manager, Membership Services

Gaithersburg Hamfest. Gay was also a coorganizer of the Maritime Mobile Service Net. Among his many awards are: DXCC Honor Roll (mixed and phone), 5-band DXCC, DXCC (cw), WAC, WAS, Bicentennial WAS, WAZ, WPX Honor Roll, A1 Operator Club and a National Certificate of Merit. Gay is ex-W2NJV and ex-W4NJV, and resides in Virginia Beach, Virginia.

*John Kanode, N4MM*, was declared the new vice director when the ARRL Executive Committee found him to be the only eligible candidate for that office. John lives in Boyce, Virginia, and is employed by IBM doing electronic circuit research and development for SONAR and special data processing equipment. An Extra Class licensee, John became an assistant director in 1975 and is a former ARRL QSL Bureau manager for W4, K4 and N4. A former president of the National Capitol DX Association and the Potomac Valley Radio Club, John has served on the ARRL DX Advisory Committee, CQ DX Advisory Committee and the CQ Contest Committee. Among his many awards are: DXCC Honor Roll, DXCC (phone), DXCC (cw), 5-band WAS, 5-band DXCC, 5-band WAC, 6-meter 600 Club, WAZ and WPX. Licensed since 1952, John has held the following calls: W4WSE, KSUYF, KZ5II, HP1XWS and PJ9KK. He is a member of AMSAT, QCWA and IARC.

#### Northwestern Division

*Mary E. Lewis, W7QGP*, has the distinction of being the first woman to become a director of the League. Mary polled 2982 votes to 969 votes for Dale T. Justice, K7WWR, and 718 votes for Robert A. Thurston, W7PGY. Mary, an Advanced class licensee, resides in Seattle and is employed as an electronics instructor at North Seattle Community College and Bellevue Community College. She has held offices and other positions of responsibility in the following organizations: Puget Sound Council of Amateur Radio Clubs, North Seattle Amateur Radio Club, Washington Amateur Radio Traffic System (net control), Washington State University Radio Club, and Mount Baker Amateur Radio Club. A past editor of "The Parasite," Mary is a member of the Society of Broadcast Engineers, Boeing Employees Amateur Radio Society, North Seattle ARC, Mike & Key ARC and the Western Washington DX Club. She earned awards from ARRL and the Red Cross for her work in providing communications in the aftermath of the Mount St. Helens eruption. First licensed in 1951, Mary is definitely a part of a ham radio family: her husband, Harry, is W7JWJ, daughter Diana is K7ETY/KH6, and son Gary is WA7BBJ. Mary is a life member of QCWA.

*Mel C. Ellis, K7AOZ*, is the new vice director with 2745 votes cast to 1882 votes cast for Ronald D. Mayer, K7BT. Mel is from Spokane, is retired, and holds an Advanced class license. He is a past president of the Spokane ARC and Spokane Dial Twisters, past Board member of the Spokane Amateur Radio Council, past EC for Spokane County, and is a member of the Inland Empire VHF Club and the NW Tri-State ARC. A dedicated DXer, Mel holds DXCC, WAC and WAS awards, as well as a certificate of appreciation from the Spokane Radio Council. Licensed since 1957, Mel is ex-W0LNS and ex-YN3AOZ.

#### New England Division

*John C. Sullivan, W1HHR*, of Columbia, Connecticut, returns for another term as direc-

tor. The ARRL Executive Committee declared John the director for the 1981 to 1982 term when it found no other candidate eligible for office. John has been director since 1975, and before that he served one term as vice director. He is employed as a design engineer for Emhart Industries. A holder of the Extra Class license, John has been an active radio amateur, serving in several positions of responsibility for the Willimantic Radio Club and the Connecticut Yankee Radio Club. John is a director of the ARRL Foundation and is a former ARRL section emergency coordinator, Connecticut communications officer, director of the Columbia Civil Defense, and founder and past advisor of Radio Explorer Post 64, BSA. First licensed in 1955, John is a life member of the League.

*Richard P. Beebe, K1PAD*, is the new vice director of the division. The ARRL Executive Committee declared Richard the new vice director when it found no other eligible candidate for office. Richard is employed as an engineering project manager for the medical products division of the Hewlett Packard Company. An Extra Class licensee, he is a co-founder of the Billerica Amateur Radio Society, a former net manager for the Massachusetts/Rhode Island Phone Net and former EC for Billerica. At this writing he is SCM for the Eastern Massachusetts Section and editor of "The Crossbander." First licensed in 1960, Richard is a life member of the League and resides in Billerica, Massachusetts.

#### Hudson Division

*Stan Zak, K2SJO*, of Port Chester, New York, was declared reelected for another term as director by the ARRL Executive Committee. No candidates had filed to run against Stan. A supervising engineer for the New York Telephone Company, Stan holds an Advanced class license. He first became director of the division in 1972 after being vice director for eight years. He is a former director and secretary of the Westchester Amateur Radio Association and a former editor of "Bandspread." In 1964, Stan cochaired the ARRL National Convention. He is the communications chief for the Port Chester/Town of Rye Civil Defense and advisor for a Radio Explorer Post, BSA. First licensed in 1956, he is a former director and officer of the Hudson Amateur Radio Council and a life member of ARRL.

*Linda Ferdinand, N2YL*, of Clinton Corners, New York, is the new division vice director, having defeated George Diehl, W2IHA by a vote of 2181 to 1977. She is presently pursuing a Bachelor of Science degree in Computer Science at Dutchess Community College and Union College, and serves as a director of the Trans-Continental Corps (TCC). A former secretary of the Rip Van Winkle ARC, Linda is a member and control operator for the Mount Beacon ARC and the Sunset Trail ARC. She is also a member of the Poughkeepsie ARC and has the following appointments or awards: BPL Medallion, Public Service Commendation, OTS, NTS assignments for four nets and New York State cw Net Liaison to the Second Region Net. She is ex-WB2EMU, has a code proficiency certificate for 30 wpm, and has been licensed since 1962. A family life member of ARRL, Linda's husband is W2CS.

#### Central Division

*Edmond A. Metzger, W9PRN*, of Springfield, Illinois, became the new director of the division when the ARRL Executive Committee

found him to be the only eligible candidate for office. Don C. Miller, W9NTP, who had been a candidate, presented his resignation as director to the Executive Committee, stating that because of his desire to contribute to the technical amateur field both as a writer and hardware supplier, he found that he could not continue as director of the Central Division and satisfy the by-law requirement. Ed, an Advanced class operator, is employed as the comptroller of Keasotes Theatres. A former assistant director and vice director, Ed has also held positions of responsibility in the Sangamon Valley Radio Club. In 1976 he won a special award from the Starved Rock Radio Club to add to his other public service awards. He has served as general chairman of the Central Division ARRL Conventions in 1961 and 1968, and is the holder of the following: OTS, OVS, OBS, ARES and A1 Operator certificates. Ed is a life member of QCWA and a charter life member of ARRL. He has been licensed since 1941.

*Kenneth A. Ebnetter, K9EN*, of Portage, Wisconsin, has won reelection as vice director by defeating Norman E. Meyers, N9MM, by a vote of 3591 to 2625. Ken is employed as the service manager at Hays Music Store and is chief engineer for Kramer Broadcasting. Ken was an assistant director of the League from 1972 to 1978, and is a former Wisconsin SCM and former president of the Yellow Thunder ARC and the Wisconsin Area Teleprinter Society. Formerly K9GSC, Ken has been active as OTS, OO, OVE, NM and EC (Columbia County), and has earned the DXCC award. He is a life member of ARRL and AMSAT, and has been licensed since 1957.

On page 8 of this issue, the names and addresses of the directors and vice directors starting their 1981-1982 terms are included with those of the Board continuing in their 1980-1981 terms. Be sure to let your director know how you feel about the issues facing Amateur Radio so that he or she has the benefit of your opinion when guiding the League.

#### NEW "PLAIN LANGUAGE" AMATEUR RULES PROPOSED

The Amateur Rules are headed for simpler language according to a Notice of Proposed Rulemaking adopted by the FCC. Deadline for comment is June 19, 1981, with replies due August 19, 1981. Its assigned docket number is PR 80-729. The new plain-language rules will still be designated Part 97, but they will be divided into four subparts: A — The Amateur Radio Service, B — The Radio Amateur Civil Emergency Service, C — The Amateur Satellite Service, and D — Technical Standards.

At least five substantive changes will be incorporated into the rewrite proposal: (1) elimination of all log-keeping, (2) an express statement that amateurs' stations be available for inspection any time operations are being conducted or at convenient hours, (3) a requirement that a copy of Part 97 be kept at the station, (4) code credit to any holder of any commercial radiotelegraph license, and (5) a formal name change from "The Amateur Radio Service" to "The Amateur Telecommunications Services."

There is a problem caused by the sheer volume of the NPRM. FCC's Executive Director, Don Lichtwardt, estimates it will cost the Commission \$30,000 to run the full text in the *Federal Register*. It would take QST 35 pages to run the NPRM in its entirety. ARRL hq.

staff expects to have a complete copy of the document as soon as it is available, and *QST* will be reporting the highlights of the proposal in future issues.

## INTERFERENCE TASK FORCE MEETS

The members of the recently formed Interference Task Force met at ARRL hq. November 19, 1980. Present were Chairman Gar Anderson, KØGA; Carl Smith, WØBWJ; George Diehl, W2IHA; Robert M. Booth, W3PS; and Hal Steinman, K1FHJN.

The objectives of the task force were discussed, and a plan of action was developed. It was decided that the prime avenue of attack would be to encourage the formation of local interference committees, and to provide those committees the necessary procedural guidance from ARRL hq. To this end, a procedural manual will be developed by ARRL hq. This manual will be based on input now being received from ARRL-affiliated clubs and others who have had experience tracking down and eliminating malicious interference.

The group agreed that it was essential to develop a cooperative relationship between the Amateur Radio Service and the Federal Communications Commission so that FCC officials understand the purposes of the interference Task Force. Another goal is to ensure that FCC will follow up on cases that cannot be resolved by the amateur community itself. Washington Area Coordinator Perry Williams, WIUED, and General Counsel Robert M. Booth, W3PS, will arrange a meeting with FCC officials to pursue these goals.

The task force also encouraged the appearance of more direction-finding articles in *QST*, directed that a bibliography of direction-finding articles (and other articles related to the tracking of malicious interference) be developed, and asked that a tape and/or outline be prepared on the subject of interference countermeasures for the use of clubs and others who want to present forums on the subject.

For further information on the Interference Task Force, please see the editorial in November 1980 *QST*. — *Hal Steinman, K1FHJN*

## W7JIE NEW REGION 2 INTRUDER WATCH DIRECTOR; K6KA STEPS DOWN

We are pleased to announce that the Executive Committee of Region 2 IARU has unanimously appointed M. L. "Gib" Gibson, W7JIE, 1215 North 28 Pl., Renton, WA 98055, to the position of Intruder Watch Director for Region 2. Gib will be responsible for coordinating the efforts of 35 Region 2 IARU member societies into an organized effort aimed at combatting the encroachment of nonamateur stations into the amateur bands. Gib has been active in the Intruder Watch for many years, holds an Extra Class license, is an ARRL Official Observer and is active with QRP/cw on all bands.

The Region 2 IARU Executive Committee also unanimously commended E. H. "Bill" Conklin, K6KA, 402 Oliveta Pl., Box 1, La Canada, CA 91011, who is stepping down from the position that Gib is assuming. We at ARRL hq. also thank Bill for his tireless efforts through the years, and we are sure that he will continue to make his wisdom and valuable ser-

vices available to the Intruder Watch program in the future. — *Hal Steinman, K1FHJN*

## NONGOVERNMENT RADIO-LOCATION ALLOWED CONTINUED USE OF 420- TO 450-MHz BAND

Terminating part of a rulemaking in General Docket 80-135 begun last March, the FCC has amended Parts 2 and 90 of its rules to allow continued use of the 420- to 450-MHz band for nongovernment radiolocation operations. This usage will be secondary to government radiolocation and the Amateur Radio Services along the shorelines of Alaska and the contiguous 48 states. Nongovernment radiolocation is used for offshore applications such as mapping offshore areas for oil exploration, precisely determining drilling locations and measuring for hydrography research.

The rulemaking resulted from a petition by Del Norte Technology, Inc., a radiolocation equipment manufacturer, seeking continued nongovernment radiolocation in the 420- to 450-MHz band after a January 1, 1981 cutoff date for such use established in 1976 in Docket 20147. That proceeding permitted the use of the 420- to 450-MHz band for nongovernment radiolocation as an alternative to the frequencies 220 to 310 MHz, which were no longer available, and until equipment could be developed for use in the 2900- to 3700-MHz band. The 420- to 450-MHz band was selected because operation on a waiver basis produced no reported harmful interference and because of its suitability for highly accurate medium-to-long range radiolocation.

Of the nine parties commenting on the rulemaking, only one opposed deleting the cutoff date. The American Radio Relay League cited the threat of interference to amateurs and the availability of other authorized higher frequencies in its objections. Supporters of the proposal stressed that positive positioning and extended ranges are available when using the 420- to 450-MHz band versus much higher frequencies, that all adequate services should be used to develop U.S. offshore energy resources, and that continued operation on a noninterference basis will insure protection of the primary users.

The Commission agreed with the supporting comments, adding "the experience gained regarding compatibility of operation coupled with the increasing range requirements for offshore exploration" and increased frequency usage and resultant spectrum efficiency are valid reasons for continuing the 420- to 450-MHz operations."

Del Norte also proposed expanding nongovernment radiolocation inland using spread spectrum techniques. A subsequent proceeding will consider that proposal, the Commission added. For more information contact Sam Tropea at 202-653-8167. — *FCC News Release*

## ADDITIONAL DIGITAL MODES PROPOSED BY LEAGUE, RM-3388

ARRL has filed a petition requesting the FCC to amend its rules to permit the use of digital techniques in the amateur bands above 50 MHz in addition to the already authorized techniques using International Morse and Baudot codes and the American Standard Code for Information Interchange (ASCII). Citing a "compelling need" if radio amateurs are to continue as the primary contributors to the ad-

vancement of the radio art, the League found it necessary that amateurs be permitted a wider scope of authority to conduct digital experiments than now exists. The petition noted that amateurs in other countries, perhaps with less formal rulemaking procedures, are already engaged in experimentation with digital techniques. Canada has "packet network" experimentation, the United Kingdom has a team constructing an amateur satellite that is expected to use synthesized-voice telemetry and onboard microcomputer image processing, telemetry and command management.

U.S. amateurs, too, have been active in today's technology with Dr. Donald C. Miller, W9NTP, having recently renewed a Special Temporary Authorization (STA) for experiments for medium-scan television, and Dr. Tom Clark, W3IWI, having received an STA for tests of digital phase-shift-keying F1 emissions. The League noted that because both of these U.S. experiments are being conducted in high-frequency bands where worldwide propagation is often available, the cautious approach of an STA rather than an immediate change in the rules is appropriate. However, ARRL feels that the urge to experiment can be encouraged to a degree far greater than that which is provided through the use of an STA, by the allowance of additional digital techniques as a matter of course on the bands above 50 MHz where typical propagation extends to a few hundred miles at most.

Specifically, the League proposes that the rules be changed in the following ways:

(1) that the words *and other digital techniques* be added after "(ASCII)" in §97.69's list of permissible digital transmissions;

(2) that ASCII be permitted between 3.5 and 28 MHz where F1 emission is permitted (sending speed not to exceed 300 bauds), and that *A1 emission also be allowed for ASCII where F1 is permitted;*

(3) that *on frequencies between 28.0 and 28.5 MHz, F1 emission may be used for ASCII and the sending speed shall not exceed 1200 bauds;* and

(4) that F1, F2 and A2 emissions be permitted between 50 and 225 MHz where their use is permitted and that the maximum sending speed *be raised to 4800 bauds.*

The League's petition also proposes that a new subsection c be added to §97.69 as follows:

(c) *Use of digital techniques in addition to Morse, Baudot or ASCII codes is permitted on all amateur frequencies above 50 MHz, except those on which only A1 emission is permitted, subject to the following additional requirements:*

(1) *Bandwidth of a signal from a station using such digital techniques shall be no greater than that of a station using ASCII at the baud rate specified by Section 97.69 (b)(3), (4) or (5), above for the band then in use.*

(2) *At the time a particular digital emission is first used from a given amateur station, an entry shall be made in the log of the station describing the system and the technique to be used, in sufficient detail so that such technique may be identified solely by that description. A similar entry shall be made when changes are to be made in the technique(s) in use.*

(3) *A station using such digital techniques shall identify the station in accordance with the requirements of Section 97.84 of these rules.*

Members wishing to receive a complete copy of RM-3388 may get one by sending a self-addressed, stamped envelope to ARRL Membership Services Department, 225 Main St., Newington, CT 06111. Comments on the petition should be sent to the Secretary, FCC, Washington, DC 20554, and a copy sent to the petitioner, ARRL, at 225 Main St., Newington, CT 06111. □

## An FCC License Guide

As we head into the new year, a veritable bounty of "what ifs" and "how comes" remains in the amateur licensing arena. Just as mankind will eternally ponder the questions of the dawn of time, so too will amateurs continue to consider the philosophical, if not transcendental, complexities of the Form 610.

This month, we present a guide for amateurs who are preparing their licenses (and themselves) for license surgery with the hope of minimizing pre- and post-operative trauma.

### Renewals/Modifications

#### Q. How do I renew my license?

A. What is the meaning of life? How does man fit into the scheme of things? How do I renew my license? — a weighty question, indeed.

To renew your license, follow these simple commandments:

I. Complete the Form 610, being careful not to miss any applicable boxes or blanks that apply.

II. Attach a photocopy (or the original) of your license to the Form 610.

III. Mail your application to: FCC, Box 1020 Gettysburg, PA 17325.

It's a good idea to retain copies of everything. Make a note of the date you mailed the application in your logbook. If you file before the expiration date of your license, you may continue to operate your station beyond expiration while waiting for your new ticket. Failure to check all appropriate boxes and fill in all applicable blanks will cause your application to be returned.

#### Q. But my license has already expired. Can I still renew it?

A. Affirmative — under a period of grace. If your license has expired within the past year, you may renew it and still retain your call sign. If your license has expired between one and five years ago, the Commission will renew your license but will issue a new call sign. After this five-year period of grace, you'll have to be retested for a new license. Note: If you apply for renewal under these grace periods, you must *not* operate your station until your new ticket arrives.

#### Q. My license was destroyed accidentally. How do I get a new one?

A. A formal application is not necessary. Simply mail a letter explaining the situation to FCC in Gettysburg. They'll provide you with a duplicate license.

#### Q. I've recently moved. How do I notify the FCC?

A. A letter to Gettysburg is no longer sufficient — you must file a Form 610 with the Gettysburg office. Note: When applying for modifications such as change of address, the Commission will automatically renew your license along with the modification.

#### Q. I've moved to a new call area. Can I request a new call sign?

A. Yes; the Commission will issue your station a new call sign that reflects your new call area, if you request a new call. It will be in the same group as the relinquished call.

There's an important exception, however: If you hold a "preferred" call because of seniority or other considerations under the former rules, you may lose this preferred status if you elect a new call — the Commission will issue you a call sign from a call sign group no higher than is consistent with your license class.

Remember, you cannot choose which call sign you will get. FCC does not honor requests for specific calls.

In every case, however, an amateur holds the option of retaining his current call sign. If you do not want a new call sign, *do not check Box 2F* on the Form 610. (Item 13A on the old series Form 610).

### Licenses

#### Q. How do I apply for an Amateur Radio license?

A. A fundamental question, indeed. If you're applying for a Novice class license, you must first locate a volunteer examiner. The Novice class exam is available *by mail only* — the volunteer examiner administers your test. After you've passed the code test, the examiner certifies this fact on the back of your Form 610 and mails the application to FCC Gettysburg. FCC, in turn, will mail the written portion of the exam to the volunteer examiner, who administers the test to you. The test papers should be returned to the Commission for grading and subsequent licensing if you pass.

If you're applying for a Technician class or higher license, complete a Form 610 (carefully) and send it to the FCC District Office where you'll be taking the exam. If you pass, the District Office will forward your application to the Gettysburg licensing unit for processing. If you wish to take the exam at one of the Commission's field examination points, you must file the Form 610 at least one month in advance with the FCC office conducting the exam. Exact information, time and place of the examination are sent after the application is filed. Remember that the only license available *by mail* is the Novice class — for higher class licenses, an exam must be taken before an FCC examiner.

Note: Exam schedules are available from the Commission's Field Operations Bureau.

#### Q. I am physically handicapped and unable to travel. Will the FCC send an examiner to give me the test?

A. The Commission will either send one of their examiners or appoint a volunteer examiner in certain cases. A disabled applicant should write to the engineer-in-charge of the closest FCC District Office with a request to take the test at a location convenient to the applicant. The letter should be mailed with a completed Form 610, along with a physician's signature certifying the applicant's protracted

disability, which prevents travel.

#### Q. How does the Commission give exams for blind individuals?

A. Blind applicants may request that the exam be taken at home. If blindness or other disability makes it impossible to read the printed words of an exam, the Commission may allow the applicant to have someone read the exam questions to the applicant and the applicant may dictate the answers to the reader, who in turn puts the answers on the sheet.

If the applicant is deaf, the examiner may allow the applicant to use a flashing light or vibrating device brought to the exam point by the applicant, for use in the code test.

The Commission also makes available examination element 3 (General/Tech written portion) without diagrams for blind applicants with vision of 20/200 or worse. Elements 4A and 4B (Advanced and Extra Class written exams) are available in braille.

#### Q. I'm a Novice applying for a General class license. If I pass the code portion but flunk the written part of the exam, does this mean that I'll have to take the code test again next time?

A. Not if you try the written part of the exam within a year of passing the code. In such cases, the Commission issues Code Credit Certificates that are valid for one year and are good at any exam point.

#### Q. Does the Commission conduct exams outside the U.S.?

A. At one time, the Commission conducted exams for U.S. citizens living temporarily outside the U.S. Because of budget constraints, however, the agency is no longer able to provide this service.

#### Q. How about exams at conventions and hamfests?

A. The Commission has cut back in this area, but will continue to visit some hamfests and conventions as the budget allows.

#### Q. Are there any fees for filing an amateur application?

A. No — the Commission no longer charges any fees for filing applications.

### International

#### Q. A friend from Peru is visiting the U.S. How does he get permission to operate?

A. Since Peru has a reciprocal operating agreement with the U.S., he should file an application on Form 610-A with the FCC in Gettysburg. The Commission, upon review of the application, will issue him a reciprocal operating permit good for one year. [95F]

[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.]

\*Membership Services Assistant, ARRL

# Canadian NewsFronts

Conducted By Harry MacLean,\* VE3GRO



CRRL Officers and Directors

President: A. Mitch Powell, VE3OT

Honorary Vice President: Noel B. Eaton, VE3CJ

Secretary: Frederick H. Towner, VE6XX

Directors: Thomas B. J. Atkins, VE3CDM

Albert G. Daemen, VE2IJ

A. George Spencer, VE6AW

Counsel: B. Robert Benson, Q.C., VE2VW

## Tariff Reduction on Amateur Equipment — A Reality

On Tuesday, October 28, 1980, Finance Minister Allen MacEachern presented his new federal budget to the parliament of Canada. In that budget was the one item that Canada's 20,000 radio amateurs were hoping for: "Another Tariff Board report related to antiques, collectibles, amateur radio and other hobby equipment. I propose to provide duty-free entry for most of the goods for which such treatment was recommended. . ."

These recommendations had been spelled out last year, in Tariff Board Report Item 156. It was proposed that duty be eliminated on amateur transmitters, receivers and transceivers. CRRL submissions had been an important factor in bringing the matter to this stage. But would these recommendations be included in a forthcoming federal budget? And could the recommendations somehow be broadened to include accessory equipment such as remote VFOs and power supplies?

CRRL Counsel Bob Benson, Q.C., VE2VW, went to work. Bob has a quiet, professional manner. He knows what he is talking about, and he expresses himself well. The combination wins instant respect, and Bob is very persuasive. During August, September and October, Bob wrote, called and met personally with high Department of Finance officials in Ottawa. These contacts established our credibility with people who initially knew very little about Amateur Radio. Bob justified the proposed tariff reduction in the name of fairness and on the basis of facts. He pressed hard for broadening the reduction to include accessory equipment, and for the inclusion of the reduction in the very next federal budget. Bob spoke eloquently for us all, and we have evidence that people were impressed. And while many organizations and individuals contributed to the success of the effort, we are con-

vinced that much of the credit for what happened on October 28 should go to CRRL Counsel Bob Benson.

What are the terms of the tariff reduction? Here is the exact text: "On the tariff number 44534/2, transmitters, receivers, transceivers, and transverters, assembled or in kit form, designed for use only on the amateur bands of the radio frequency as defined by regulation made pursuant to the Radio Act; linear amplifiers, variable frequency oscillators and power supplies designed for use with the foregoing; parts of all the foregoing. British preferential tariff: free. Most favored nation tariff: free. General tariff: 25%."

British preferential tariff applies to all Commonwealth countries. Most favored nation tariff applies to all countries from which amateur equipment is now normally imported, including the United States and Japan. The general tariff applies to a host of countries, none of which normally manufacture amateur equipment for export.

Of course, a 9% federal sales tax will still be charged on all amateur equipment that enters Canada. However, amateurs visiting, say, the United States can partly offset the effect of this tax by applying their 48-hour/\$50 or 7-day/\$150 exemptions to any purchase of amateur gear.

One important departure from the original Tariff Board recommendations was the decision to implement the entire reduction in one step. Originally, the Board had proposed a two-step reduction, to cushion the impact of the reduction on dealers who had large inventories of duty-paid amateur equipment. Finance Department officials, acting partly on precedent and partly on input from CRRL Counsel Benson, decided that a two-step reduc-

tion would disrupt buying patterns. Companies and individuals would likely not buy new amateur gear until the second step of the tariff reduction. The one-step reduction was deemed the lesser of two evils.

The tariff reduction took effect the day after the budget, on October 29, 1980. At that date, the budget had not yet been approved by Parliament. Nevertheless, no problems were anticipated. The tariff reduction was a relatively minor item in the overall budget, and it would not likely become cause for debate or be subject to amendment. Immediate implementation of the tariff reduction was a practical move which would prevent a flood of refund applications to Canada Customs later on.

At the time of writing, there are still some unanswered questions. Nothing is mentioned in the text about new or used equipment, so it can safely be assumed that the tariff reduction applies to both. But it appears that microphones will still enter Canada with 7.3% duty and 9% tax; antennas will enter with 14.3% duty and 9% tax. It also appears that the reduction, taken literally, applies to equipment designed for use *only* on the amateur bands. Still, we do not feel there will be difficulty importing transceivers such as the KWM-380, TR-7 or IC-720, which have a general-coverage receive function. All amateur equipment has some out-of-amateur-band capability, even if just off band edges. Besides, customs officers regularly consider "intended use" when deciding what tariff should apply. A parabolic dish, for instance, could be subject to any of three rates of tariff, depending on whether it had entered Canada as part of an antenna system, a bird-bath or a piece of original sculpture! Some interesting stories illustrating ham ingenuity could be told using this particular example, but that is another column!

### BITS AND BYTES

Noel Eaton, VE3CJ, has been named 1980 CRRL Amateur of the Year. The award was presented in recognition of Noel's untiring efforts on behalf of Amateur Radio in general, and his leadership in IARU (the International Amateur Radio Union), which resulted in the success at WARC '79. Noel is president of IARU, ARRL vice president for International Affairs, and honorary vice president of CRRL.

No, the 30-meter band isn't open yet, at least not to common folk like you or me. But Larry Kayser, VE3QB, and Bert deKat, VE3DPB, have received permission to operate between 10.1 and 10.15 MHz, using special VE9 calls. If you hear some strange sounds from this band, it will likely be Bert on coherent cw, or Larry

trying some new digital transmissions with his strictly modern, modified Heath AT-1!

Tom Atkins, VE3CDM, chairman of the CRRL Novice Licence Committee, has presented his final report. Tom's committee received many letters in reply to requests for comments on a Novice license for Canada. While a majority of those writing favored a Novice licence, Tom's committee did not feel that the response was strong enough to warrant reopening the matter with DOC.

When will the CRRL *Advanced Amateur Training Manual* be out? Give us a chance, fellows! CRRL, in its present form, has only been in operation for a year! But since you asked, it should be ready *right now!* The author is Ralph Zbarsky, VE7BTG, whose CRRL *Canadian Amateur Radio Licensing Manual* has received nothing but praise since it became available last year. CRRL has just

finished printing a *Canadian Amateur Question Book*, a useful study-aid prepared by members of the Burnaby (BC) Amateur Radio Club. And yes, a CRRL *Digital Amateur Training Manual* is in preparation.

A group of amateurs in the Ottawa area have applied to DOC for a voice channel on the experimental commercial synchronous satellite, ANIK-B, expected to be launched this year. If approved, the voice channel will be used to relay transmissions from packet radio systems already in operation in Montreal, Ottawa and Vancouver, and systems under development in Edmonton, Saskatoon and Greenwood, Nova Scotia. CRRL and CARF, the Canadian Amateur Radio Federation, are *jointly* sponsoring this proposal. Coordinator of the project is Hugh Pett, VE3PIL.

Best wishes for a happy and prosperous 1981 from all the gang with CRRL. [QST]

### Microwave Components

Several letters have recently arrived asking for some comments on basic microwave components, their use and how they differ from components used on the lower bands. It is not possible in the available space to go into great detail concerning microwave component design, but perhaps I can give some insight by considering a few general principles and practical examples.

The difference between the microwave and the lower regions of the rf spectrum is simply the frequencies involved. This may be stating the obvious but there is sometimes a tendency to regard the microwave region as a separate entity, which it is not. It is all a question of degree. Let's take a look at a capacitor and see in what way and to what degree its behavior at microwave frequencies differs from that at lower frequencies.

First, all capacitors have an associated series inductance. This inductance is primarily caused by the capacitor leads but is also in part a function of the mechanical design of the capacitor package itself. At low frequencies the inductance of a capacitor lead may be insignificant to the operation of the circuit in which it is included. A 10 mm length of 22 awg wire has an inductance of about 8 nH. At low frequencies the resultant inductive reactance will be small, but as the frequency increases the reactance increases and its effect on the circuit performance becomes important. The same 10 mm piece of 22 awg wire has a reactance of 0.5 ohms at 10 MHz, but at 1 GHz this increases to 50 ohms. This can cause problems in circuits where the effects of the inductance associated with the capacitor leads has not been allowed for, or in circuits where inductance must be kept at a minimum for proper operation.

The second problem with capacitors that appears at microwave frequencies is loss in the dielectric medium between the capacitor plates. This loss can be quantified in terms of a parameter called the *dissipation factor* (DF) of the dielectric material, a measure of the ratio of the effective series resistance to capacitive reactance of a capacitor. The dissipation factor of a dielectric material is directly related to the amount of power lost in the capacitor and, unfortunately, it increases with increasing frequency. This means that materials that are fine for use at lower frequencies can become very lossy in the microwave region.

Capacitors that avoid the problems referred to above by minimizing both associated inductance and dielectric loss are called *microwave chip* capacitors. They are constructed so that connections are made directly to the capacitor plates (no leads), and they are physically small to minimize associated inductance. A typical size might be a cube of 2 mm on each side. The dielectric material used in these capacitors (alumina, for example) is chosen for its low

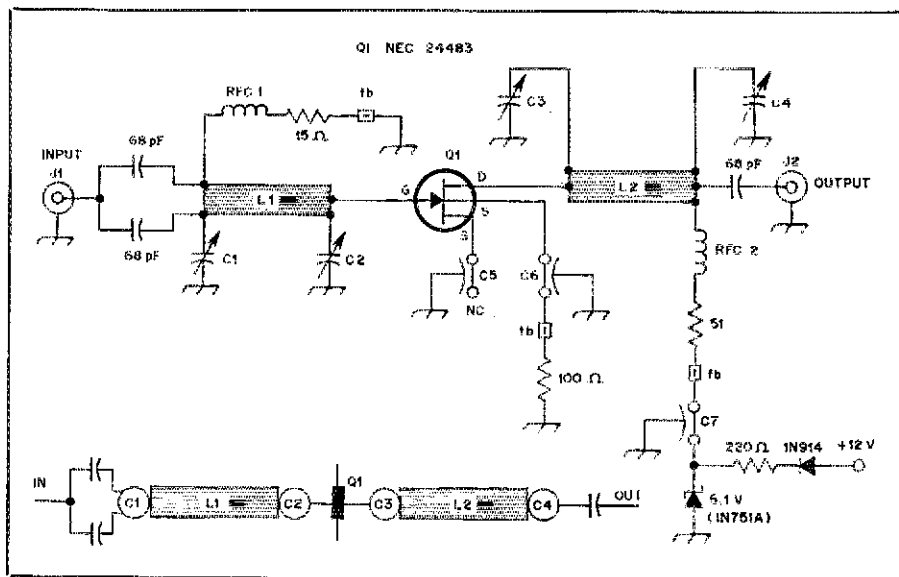


Fig. 1 — 1296 MHz preamplifier by WB5LUA.  
L1, L2 — Microstrip line, 0.25" wide, 0.8" long, 0.2" above ground. Note lines suspended between variable capacitors as shown in figure.  
C1-C4, incl. — 0.8- to 10-pF air dielectric piston trimmers.  
C5-C7, incl. — 470- to 1000-pF feedthrough capacitors, miniature type preferred.

RFC1, RFC2 — 6 turns, 1/8" ID, close-spaced no. 20 enamelled wire.  
Q — GaAs FET (see text)  
F.B. — Ferrite bead. These must be used to ensure that the preamp is stable.  
J1, J2 — SMA connectors.  
Note: 68 pF input and output capacitors should be microwave-chip type.

dissipation factor at microwave frequencies. Such capacitors are relatively expensive, costing from \$1 upwards each, depending on their capacitance value and microwave-frequency characteristics. Fortunately most amateur microwave circuits use only a few such capacitors and the additional cost is repaid in terms of circuit performance and dependability. It should be mentioned that all chip capacitors are not designed for microwave use. Some, designed for minimum associated series inductance and intended for use in the hf, vhf or uhf region, may be constructed using dielectric materials that are not suitable for use at higher microwave frequencies.

I hope that this simple look at how one component, the capacitor, behaves at microwave frequencies, and what problems may be encountered, gives something of an idea as to the factors that become important as circuits are designed to operate at higher frequencies.

#### 1296 MHz GaAs FET Preamplifier

The preamp circuit described here was developed by Al Ward, WB5LUA. The circuit diagram and basic layout are shown in Fig. 1. Al has found that the pi input and output networks used will allow acceptable matching of a number of different GaAs FETs in this circuit. The devices he has tried are the NEC NE24483, the Dixel 3501, D432 and the MGF 1400. This

circuit, using an NE24483, produced a noise figure of around 0.7 dB, with 17 dB of gain at 1296 MHz. The dc circuit parameters under these conditions were  $V_{DS} = 2.5V$  and  $I_D = 17$  to 18 mA. I assume that other transistors may require reoptimization of the dc bias conditions to yield their minimum noise figures. Such information is usually available from the device data sheets provided by the transistor manufacturer. If circuit economies are desired and the NE24483 is used, then C2 may be left out if the length of L1 is increased from 0.8 to 1.05 in. (20.3 to 26.7 mm).

A few comments on the microwave component considerations of this preamp. Note that the input and output capacitors should be high-quality chip capacitors. The trimmer capacitors should be air dielectric, low-loss types (e.g. Johannson). The input and output connectors that Al recommends are SMA type. If these are not available, the next best alternative would be type N connectors. The use of BNC connectors may degrade the preamp noise figure, especially if used on the input (the output is not so critical).

I would like to thank Al for his permission to reproduce his circuit here. If you have any comments about this preamp you can write to Al Ward, WB5LUA, Rte. 7, Box 32, McKinney, TX 75069. I'm sure Al would appreciate an s.a.s.e. if a reply is needed.

\*c/o ARRL, 225 Main St., Newington, CT 06111

## 20 Questions

In a recent letter, NIATT suggested that "FM/RPT" should conduct a reader survey. To my knowledge, a nationwide survey has never been conducted on the topic of fm and repeaters. Such a survey could produce a wealth of information, including a full profile of the average repeater operator that would reveal his or her modus operandi and opinions as to the state of affairs in the repeater world.

So this installment of "FM/RPT" presents 20 questions for your consideration. If you complete the survey, mail it to yours truly (WA1LOU, 72 Stiles St., Waterbury, CT 06706). I will tally the answers on the computer and publish the results in a future column. The full results will be presented to the ARRL VHF Repeater Advisory Committee and will be available to any interested parties to be used as a tool in improving our lot in the fun mode.

Your cooperation is essential. The more people who answer the survey, the more representative the results will be.

This is your chance to be heard. So step right up. Here's question number one.

1) What is your location (state or province)?

2) What is your license class? (check one)

- Technician?
- General?
- Advanced?
- Extra?

3) How long have you been active in the fm repeater mode? (check one)

- 0-1 year
- 2-4 years
- 5 or more years

4) How much of your ham operating time do you spend in the fm repeater mode? (check one)

- 0-25%
- 25-50%
- 50-75%
- 75-100%

5) Which bands do you use in the fm repeater mode? (check as many as are appropriate)

- 29 MHz
- 52 MHz
- 144 MHz
- 222 MHz
- 450 MHz
- 1215 MHz and above

6) Indicate what type of equipment you use on any of the following bands (use an X for a crystal controlled radio, and S for a synthesized radio).

	144	222	450 MHz
mobile installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
base installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hand-held/portable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7) What is your primary operating activity in the fm repeater mode? (check one)

- Autopatching
- DX information
- Emergency communications
- Experimentation
- Mobile communications
- RTTY or ASCII
- Ragchewing
- Traffic handling
- Other (please specify) \_\_\_\_\_

8) How many repeaters can you access from your station? \_\_\_\_\_

9) How many of these accessible repeaters do you actually use? \_\_\_\_\_

10) Do you financially support a repeater through membership dues or otherwise?

- Yes  No

11) Do you have access to an autopatch in your area?

- Yes  No

12) If you do, in the average week, how often do you use the autopatch? \_\_\_\_\_

13) Are you a repeater owner?

- Yes  No

14) If you are an owner, how did you obtain your repeater's frequencies? (check one)

- Frequency coordinator
- Had them before there was a coordinator
- Self-coordination
- Other means (please specify) \_\_\_\_\_

15) In your opinion, what is the purpose of an autopatch in Amateur Radio? \_\_\_\_\_

16) What is the main problem, if any, in the fm repeater world today? \_\_\_\_\_

17) Can you suggest any solutions to the problem? \_\_\_\_\_

18) What is the biggest attraction of the fm repeater mode? \_\_\_\_\_

19) What is your opinion of "FM/RPT"? \_\_\_\_\_

20) What topic would you like to read about in this column? \_\_\_\_\_

Remember to send your answers to WA1LOU, 72 Stiles St., Waterbury, CT 06706. If you don't want to rip this page out of QST, photocopy the page or jot your answers on a piece of paper and send it in.

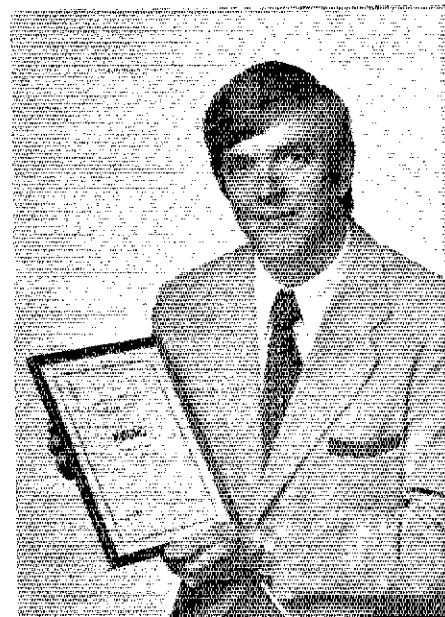
Happy New Year.

## NET HELPS SPREAD WORD OF BAHAMAS TRAGEDY

The Waterway Amateur and Cruising Net, which meets each morning to handle traffic and offer assistance to small boats, helped report a tragedy at sea last summer. An Illinois state representative found a Florida couple's 40-foot sloop adrift in the Exuma Islands in the Bahamas. A man's body, partially wrapped in a sailbag, was in a dinghy behind the yacht. Ken Nichols, W2BDF, whose boat was anchored nearby, passed along the information to a local marina owner, who in turn notified authorities.

Most net members first heard of the tragedy during the net on August 1, the day after the *Kalia III* was found, when Nichols asked if anyone could identify the boat. The author, who had known the Florida couple, attempted to trace their home address, as did regular net control Gene Lazowska, N4ADA, in Cocoa Beach, and Carol Bond, KA4CXG, in Winter Park. Gene was eventually able to contact the couple's grandson in Michigan. Meanwhile, Ray Basham, AG3L, reported the incident to the American embassy in Nassau.

Net members have monitored developments in the case since the summer, and have taken pains to warn yachtsmen of the potential danger. The apparent murder-disappearance had still not been solved as of November. — Mike, N4CPL, and Anne Adair, Wadmalaw Island, South Carolina



For his outstanding work with both the Lincoln (Nebraska) ARC and his community, Reynolds Davis, KØGND, was named "Midwest Amateur of the Year" at the ARRL Midwest Division convention at Lincoln in October. Aside from serving five terms as club president, he is on the PRAC, is county EC, has taught Novice classes and has been a major promoter of the community service aspects of Amateur Radio.

# Club Corner

Conducted By Sally O'Dell,\* AE8P

## GIVE THE LITTLE GUY A BREAK, OR ELMER WHO?

Does your club keep track of your new local Novices? Have you given them a helping hand? Most clubs sponsor a Novice class periodically. That's great! We want to fill our ranks with interested people, but what then? If you drop the new Novice like a hot potato after class is over do you really believe he/she will have enough initiative — or motivation — to continue alone? After you sponsor or teach a Novice class, do you meet your responsibilities to the people you taught?

Every newcomer needs someone to turn to for assistance, someone who will answer those "embarrassing" but really not-so-dumb questions. That is where you and your club come into the picture. According to the Florida State University survey commissioned by the League in 1980, 42.8% of the Novices reported no activity on the air during the previous 12 months. One of your routine tactics should be to make sure that every Novice in your class has a ham willing and able to assist. Your main objective is to help them get on the air safely, properly and successfully — and stay on. Getting a license is only the tip of the iceberg. Underneath, down in the water, waits "What type of radio do I buy?", "How do I string a long wire?", "Where do I get all this wonderful stuff?", "How do I do it?" It was so easy to read the books and understand the theory, but now is the time to get into the practical stuff.

For instance, there is the true story of the young fellow who strung a wire antenna and couldn't understand why his CQ brought no reply. Elmer showed up and searched in vain for his antenna. "Where did you

hide it, Furd"? He led Elmer down to his basement shack and exclaimed proudly, "There it is!" And, sure enough, there it was, carefully draped over the underground beams among the plumbing and heating ducts. Furd explained how it was more convenient to keep his antenna at eye level where it wouldn't get wet or break in the wind, and where he could easily admire it day in and day out. Without Elmer, Furd might have dropped out of ham radio. As it was, Elmer explained the necessity for height. Furd raised his antenna, and today is one of the leading contesters in the country.

Elmer's first step in helping Furd get on the air is tracking down a rig. The club can present Furd with a "loaner"; just make sure it's a rig that works. Sometimes students buy used equipment and then pass it on to a later class at their cost. This keeps the rig in the "family." Use the expertise of your old timers who are familiar with used equipment. They'll help the Novice get it into shape.

The second step is deciding on accessories. We can include antennas here. When Furd decides how much he can realistically afford to spend on equipment, Elmer can visit his QTH and together they'll make some decisions: what antennas to make (or purchase), where to place them, how to put them up, etc.

An SWR bridge and Transmatch may be necessary additions. Furd's transmitter and receiver will help them determine additional necessary accessories for the shack. A 24-hour clock is nice although not critical; a key is essential. Elmer should be there acting as a resource loaded with information. His job is not to "do" but to "make suggestions." Next comes the purchase and installation of all these wonderful new (to Furd, that is) belongings. Elmer is available for a safe and effective installation of all gear.

Finally, the time has come for that first contact . . . and Furd is ready! All his supplies are on the desk. Three sharp pencils, a pad of paper and a list of such

interesting things as: "Name is Furd Thugwump," "QTH is . . ." etc. Furd is all set. He sits down, tells the butterflies in his stomach to cool it and calls CQ. "Code? Morse code? I don't remember!" were Furd's first words. It's a good thing Elmer was right next to him, pen in hand ready to help. Once Furd got started he was okay, but the first few moments of his first contact were survived with trembling hand. (Do you remember your first contact? Furd received his first piece of wallpaper in the mail from Clark, the fellow he spoke to that first time, knowing how important the first QSO is, Clark had requested from ARRL's Club and Training Department a First Contact Club certificate to send Furd.)

Do your Novice classes end with the FCC ticket? How about getting some club participation by continuing the class and spending a few weeks discussing the different types of antennas and rigs, pros and cons. Help the newcomer decide if that cute little rig with the bunnies painted on the side will last as long and be as useful as the olive green one.

What about the stuff you need between the antenna and the radio? Did anyone discuss the need for a Transmatch while trying to help Furd get his license? Does he really need an SWR meter? These questions and more should be discussed and really absorbed by our new hams. Remember the four major steps following that license class. With Elmer's help: (1) get a rig, (2) decide on antennas and accessories, (3) install the gear, (4) first contact. Get out to Furd's house and be right there when he needs you to help and guide him. Clubs have a responsibility to all of us not to leave the new Novice dangling. What's in it for the Elmer (besides satisfaction)? An Elmer certificate, naturally — and the knowledge that another ham has made it the right way! You and your club can help. You and your club can be instrumental in another ham's life. Why not start an Elmer program now?

\*Club Program Manager, ARRL

## Hamfest Calendar

**\*Illinois:** The Wheaton Community Radio Amateur's Hamfest will be held Jan. 25 at Arlington Park Race Track EXPO Center, Arlington Heights. 300 free flea market tables, 100 commercial booths. For booth info call WB9TTE at 312-766-1684; for general info call WB9PWM at 312-629-3296. Clear, paved parking. Prizes. Tickets \$3 at door, \$2 in advance. Send s.a.s.e. to WCRA, P. O. Box QSL, Wheaton, IL 60187. Talk-in on 146.94 and 01/61. Doors open 8 A.M.

**\*Louisiana:** The Southeast Louisiana ARC (SELA) and Southeastern Louisiana University ARC (SLUARC) will sponsor a hamfest Jan. 17-18 in the Student Union Building on the SLU Campus in Hammond. Tickets are \$1. For further info write to: Robert Priez, WB5FBS, 125 Florence Dr., Hammond, LA 70401.

**\*Michigan:** The Oak Park ARC annual swap & shop will take place on Sunday, Jan. 11, at Oak Park High School, Oak Park Boulevard. Doors will be open from 8 A.M. to 3 P.M. Admission \$2 at the door. Food, prizes and free parking. Talk-in on 04/64 and 52 simplex. For reservations and general info, write to: Rob Numerick, WB8ZPN, 23737 Couzens, Hazel Park, MI 48030. Include an s.a.s.e. Tel. 313-398-3189.

**Pennsylvania:** The Lancaster Hamfest will be held Feb. 22 at the Guernsey Pavilion, Rte. 30 east of Lancaster at intersection of Rte. 896. General admission \$3 except children and spouses. Doors open at 8 A.M. Inside spaces by advance registration only. \$4 each 8-foot space, with table. Deadline Feb. 13. Vendors set-up 6 to 8 A.M., reservations not held after 9 A.M. Free tailgating outside, weather permitting. Food served at hamfest, restaurants and accommodations in area. Call 717-768-8271 for motel reservations under Sercom. Talk-in on 01/61. Write to Sercom Inc., P. O. Box 6082, Rohrerstown, PA 17603.

**Texas:** The Texas VHF-JM Society will hold its annual winter meeting Feb. 6-8, at the Sheraton-San Antonio, 1400 Austin Hwy., under the sponsorship of the San Antonio Repeater Organization. For further information, contact Jim Wright, K5CDT, 4518 Moana

Dr., San Antonio, TX 78218.

**Virginia:** FROSTFEST 1981, sponsored by the Richmond Amateur Telecommunications Society, is scheduled for Sunday, Jan. 11 from 8 A.M. to 4 P.M., at the Chesterfield County Fairgrounds, Chesterfield. New and larger facilities, spacious aisles, plenty of on-site parking. Charter buses welcome. Commercial exhibitors, flea market and auction. Homebrew contest, cw contest. Plenty of prizes. Admission is \$3 at gate; additional \$3 each for 4-foot-long flea market tables; \$2 each vehicle for tailgating. Talk-in on 34/94 and 28/88. Contact Richmond Amateur Telecommunications Society, P. O. Box 1070, Richmond, VA 23208.

**Wisconsin:** The 9th annual Midwinter Swapfest of the West Allis RAC will be held Saturday, Jan. 10, beginning at 8 A.M. at the Waukesha County Exposition Center. Prizes awarded. Sandwiches available. Tickets \$2 advance, \$3 at door. Reserved tables \$3 (4 foot). All-indoor swapfest. Write: 1981 Swapfest, P. O. Box 1072, Milwaukee, WI 53201.

\*ARRL Hamfest

[Note: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL hq. for up to two years in advance.]

## Coming Conventions

February 7-8  
Florida State, Miami

March 21-22  
North Carolina State, Charlotte

April 11-12  
Missouri State, Kansas City

April 25-26  
Mississippi State, Jackson

April 25-26  
West Indies Section, Dorado, PR

### ARRL NATIONAL CONVENTIONS

March 13-15, 1981  
Orlando, Florida

July 23-25, 1982  
Cedar Rapids, Iowa

October 7-9, 1983  
Houston, Texas

### FLORIDA STATE CONVENTION/ TROPICAL HAMBOREE

February 7-8, 1981, Miami

Amateur Radio operators from all continents gather annually in sunny Miami for the ideal vacation/convention combination. The 1981 Florida State Convention/Tropical Hamboree is an international meeting with a full program of forums, technical presentations, exhibits and demonstrations covering all fields of Amateur Radio. There are special group events such as, QCWA/OOTC/SOWP Luncheon and DX Forum-Dinner. Our famous awards list has expanded to include a 2-meter hand-held transceiver each hour. The ladies will be entertained with programs, exhibits, demonstrations and the exciting diamond ring award. Free overnight parking is available for self-contained RV units.

Registration is \$3 in advance, \$4 at the door. For further information on hotel rates, swap tables and other activities write: Dade Radio Club, P. O. Box 350045, Riverside Station, Miami, FL 33135.





## Station Design for DX Again<sup>1</sup>

We promised practical examples of DX antennas. Here they are. This info comes from January 1964 *QST*; the author is W2JMJZ.

Which is better, the Yagi or the quad? How do the many fixed arrays compare with the rotary designs? Is height as important as some say? What better way to learn the answers to questions such as these, it was reasoned, than to ask the leading DXers of the world what they have used for antenna systems and for them to rate them for DX effectiveness. Although a nontechnical approach to the subject, this method should produce information and opinion based upon heavy experience, DX-ing being the competitive avocation that it is.

Questionnaires were sent accordingly to members of the DX Century Club credited with 280 or more countries as listed in the July 1963 issue of *QST*. None of these "DX Kings" or their opinions were known in advance by the author. A total of 24 antenna designs having gained advantage over a simple dipole were listed, and each DXer was asked to check off only those types which he had used personally, and then to rate them using 1,2,3 and so on, as to the best DX antenna, second best DX antenna, etc. A column was provided for listing any antenna types intended for trial in the future, and another column for listing any types that would be tried if space, time and cost permitted.

Each recipient was requested further to explain why the antenna rated no. 1 was the favorite and to submit any other general information on antennas he wished. Inclusion in the format of the two columns for antenna types that will be tried or that would be tried if circumstances permitted was for the purpose of determining whether some respondents had reason to feel that there was a type superior to their favorite, it being reasonable to assume that few would install a new antenna not considered to offer some additional advantage.

### Results of the Survey

It proved fascinating to go through the 57 returns received and observe a rather definite pattern of agreement emerge from the many experiences and opinions expressed, a composite opinion which may hold for you a few surprises, as it did for the author. In order of importance the leading DXers say that:

- Height is more important than antenna type.
- A good natural location can offset antenna shortcomings.
- An antenna must be rotatable to be truly effective.
- Fixed arrays, including verticals, are relatively poor.
- The best antenna is the quad.
- The most popular antenna is the 3-element, monoband Yagi.

The importance of radiating at a low wave angle is obvious from these comments. Height is the variable most under control of the average amateur. It appears that a height of from 60 to 90 feet is necessary (on 20 and 15 meters where more than 95% of all DX is worked) to obtain the low angles of radiation so important for long-haul DX. In most situations a significant increase in antenna height will achieve a greater improvement than changing to another good antenna design. If a move to a new QTH is being considered, however, you'd better include topography and soil conductivity among your criteria for that new location.

### Rotatable Versus Fixed Arrays

One can conclude quite readily that fixed arrays are held in rather low esteem by the fraternity. They rate them no better than third and fourth choices at best, and only the long single wires, extended double Zepps, ground planes and V beams are modestly popular. The more intricate arrays are definitely unpopular. Only a few respondents made mention of them in their comments, indicating again the lack of interest in them relative to the rotary types. The rhombic and the V beam are obviously felt to be good antennas, for a total of 19 of them would be erected if circumstances permitted, yet none from this group of DXers actually intends to! In fact, only five fixed arrays of all types will be put up and evaluated — so they say.

Perhaps it is not too difficult to understand why the fixed arrays hold so little interest. Likely few of them were installed at heights enjoyed by the quads and Yagis because of the difficulty and expense of providing 2, 3 and 4 supporting structures rather than the one required for rotary. If so, it follows that the majority were evaluated under less than optimum conditions and hence suffer by comparison. Most fixed arrays offer no more gain than rotary designs, so there is little to recommend them apparently, except the ability of some to perform over several bands.

The vertical ground plane deserves minority opinion mention here, as it has its supporters despite preponderant opinion favoring rotaries. It is known that for 80 and 40 meters a ground plane (or vertical worked against ground) is effective for low wave angle radiation. The American DX leaders rate them ineffective for use on 20, 15 and 10 meters. Some European and African DXers find the omnidirectional pattern of benefit in finding the DX before switching over to their beams to work the station. Others use ground planes for both transmitting and receiving as they feel it is a definite asset to be able to receive and radiate equally well in all directions, and they are willing to put up with their susceptibility to ignition noise pickup and at times to QRM from all points of the compass.

Overall, the world's best DX leaders believe the rotary beam antenna designs to be noticeably superior to any fixed array. Could it be that the facility to aim a signal at the DX

target overshadows all other considerations?

### The Best Antenna is the Quad

The composite rating for the 2-el quad shows it to be superior to the 2-el Yagis and to the 3-el triband Yagi, and not as good as the 3-el and 4-el monoband Yagis. If there is any validity whatsoever to the theory that more elements the better the performance, then one is led to the conclusion that on an element-for-element basis the quad will outperform a Yagi under equivalent conditions.

The quad antennas are not nearly as popular as the Yagis. All indications are, though, that they will grow in popularity, for these DXers indicate that 12 new quads will be tested in the future and 18 more would be if circumstances allowed. These totals compare more favorably with the equivalent figures on the Yagis, a strong indication that element-for-element the quad is better. Why else would these users of 3- and 4-element monoband Yagis today be trying out the quads tomorrow?

### The 3-Element Monoband Yagi

Winner by a very large margin of the popularity contest is the 3-element monoband Yagi, a real surprise to the author who would have guessed earlier that the triband Yagi would win handily. Not so. The DX Kings learned long ago, it would seem, that limiting one's DXing to just the 20-meter band involves no sacrifices whatsoever — therefore the reason for all the monoband Yagis for this premium DX band.

The 3-el monoband Yagi also has the best rating for DX effectiveness, somewhat better than its 4-element brother. In direct head-to-head comparison in the 12 cases where a DXer used both, the 4-el wins in seven instances, loses in three and ties in two others. This evidence indicates the 4-el monoband Yagi to be the better. The 3-el came out on top in the averaging probably because it picked up a lot of first-place votes, being so popular in usage; and third- and second-place votes hurt it a lot less than third- and second-place votes for the 4-el. (Those nasty quads did the damage.)

There was insufficient comment in the returns to shed much light on the additional advantage a 4-el offers over a 3-el, except that generally the opinion prevails that the more elements the better the performance. W3GHD states, "4-el is an improvement on reception and sharper on transmit than the 3-el." W9LNM feels that "advantages of more elements do not justify mechanical problems at optimum spacing — more elements close-spaced are too hard to handle electrically." As in many aspects of ham radio, final decisions must be made in accordance with individual situations.

### Conclusions

It would be misleading to imply that one needs a super-duper antenna to work a lot of DX. HB9J reports working over 280 countries using a ground plane vertical. 4X4DK tells of similar results, and LA7Y has built up his

<sup>1</sup>Ross, "How DX Kings Rate Antennas," *QST*, January 1964, p. 75.

impressive total using nothing but dipoles for the various bands. So it can be done.

Without an exotic call to attract DX, however, the average American ham, at least, needs an antenna which is rotatable, enabling him to direct his signal at the DX and, at the same time, by means of some front-to-back discrimination, eliminate some of the QRM. You may, if you wish, limit your DX chasing to 20 meters, but it is nice for DX chasing and ragchewing as well to radiate effectively on 15 meters and, to a lesser degree, on 40 and 10.

Depending upon individual circumstances and desires, the average ham thinking of a new antenna system or systems for DXing could limit his deliberations to these designs, according to survey evidence: 40 meters — a vertical ground plane; 20 meters only — 3-el mono-band Yagi; single band 2-el quad, 20 and 15 meters (or 20, 15 and 10 meters) — 2- or 3-band, 2-el quad; or a triband 3-el Yagi.

The quad is the choice of the survey findings. As G4CP states: "The triband 2-el quad score very heavily on a small suburban location. It is cheap, lightweight and easy to tune for top performance on each band without specialized equipment. It has a smaller turning circle than a horizontal beam. It is not aesthetically pleasing to a nonham, nor is it quite as good as a single-band, parasitic beam that is tuned on the nose for that one band."

But whatever your decision, get the antenna of your choice as high up as your pocketbook will allow!

If on the other hand you are desirous of putting out what is called the "big signal" on the

DX bands, then you are talking about the 4-, 5- and 6-el Yagis and the 3- and 4-el quads. They are in a class by themselves, along with stacked antennas of the Yagi type. A kilowatt helps, too. You get what you pay for! [REDACTED]

## QSL Corner

Administered By Joan Becker

### The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.

#### How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL-Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

#### Claiming Your QSLs

1) Send a 5- x 7-1/2-in. s.a.s.e. to the bureau serving your district.

2) Neatly print your call sign in the upper left hand corner of the envelope.

3) A preferred way to send envelopes is to affix a 15-cent stamp. If you expect to receive more than 1 oz. of cards, please affix postage accordingly.

4) When requesting any information from the bureau serving your district, always include a s.a.s.e. for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of 6 to 8 months, or longer, may take place before you receive your cards.

#### Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

#### DOs

Do keep self-addressed 5- x 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

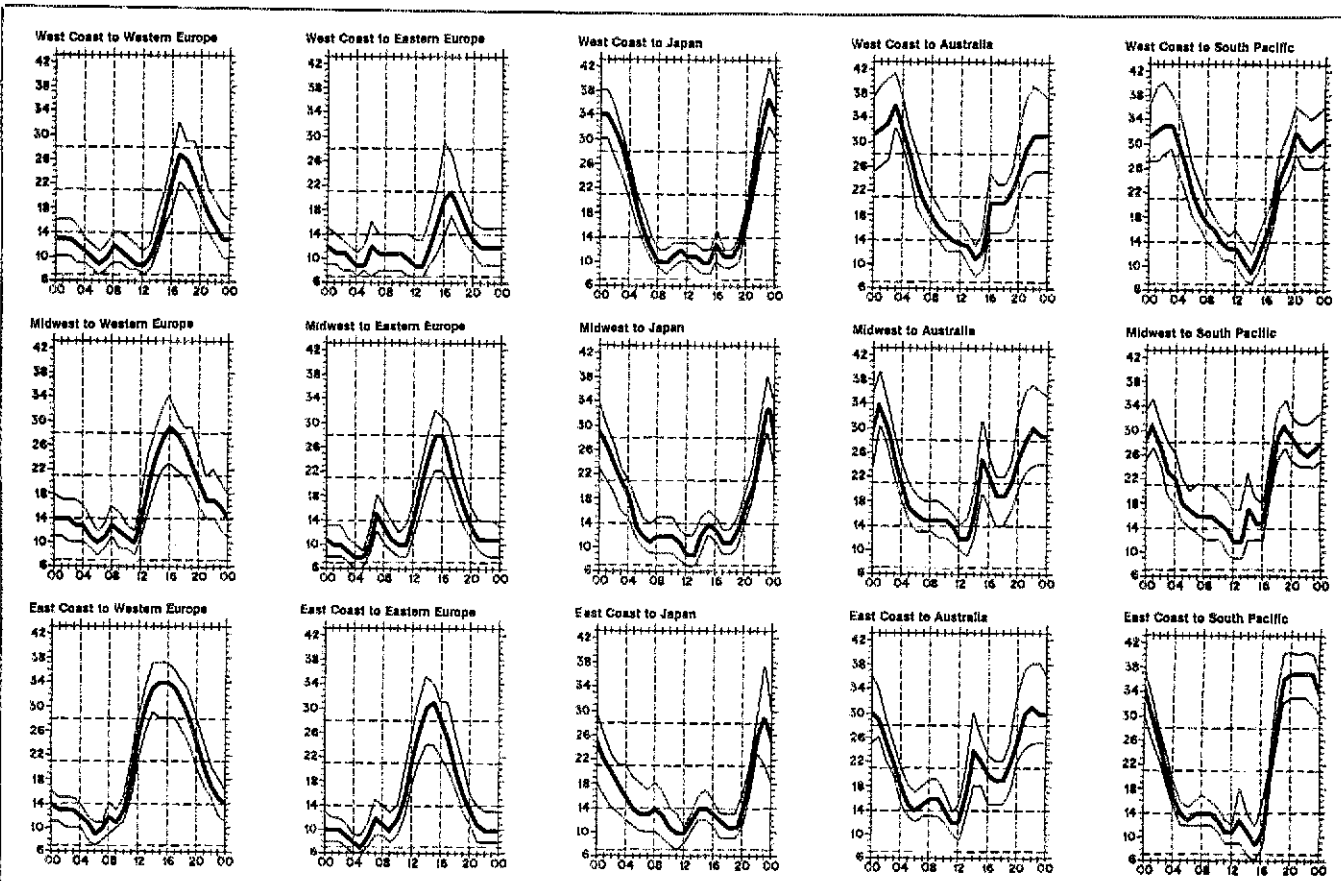
Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade.

Do include an s.a.s.e. with any information request to the bureau.

Do notify the bureau in writing if you don't want your cards.

Do be appreciative of the fine efforts of these volunteers.



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 hf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or mu). On 90 percent of the days of the month, it will be at least as high as the

**DON'Ts**

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QSL Service" in this column every other month).

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

**ARRL DX QSL Bureau System**

First Call Area: all calls\* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls\* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07538.

Third Call Area: all calls\* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: single-letter prefixes — Mecklenburg ARS, P. O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls\* — ARRL W5 QSO Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls\* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 535, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls\* — Northern Illinois DX

Assn. Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls\* — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls\* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P. O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls\* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls\* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

VE1\* — L. J. Fuder, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4\* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5JJ, 2328 Grant Rd., Regina, SK S4S 5E3.

VE6\* — G. D. Holeton, VE6AGV, 4003 First St., N.W., Calgary, AB T2K 0X2.

VE7\* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8\* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

VY1 — ARRL QSL Bureau, W. L. Champagne, VY1AU, P. O. Box 4597, Whitehorse, YT Y1A 2R8.

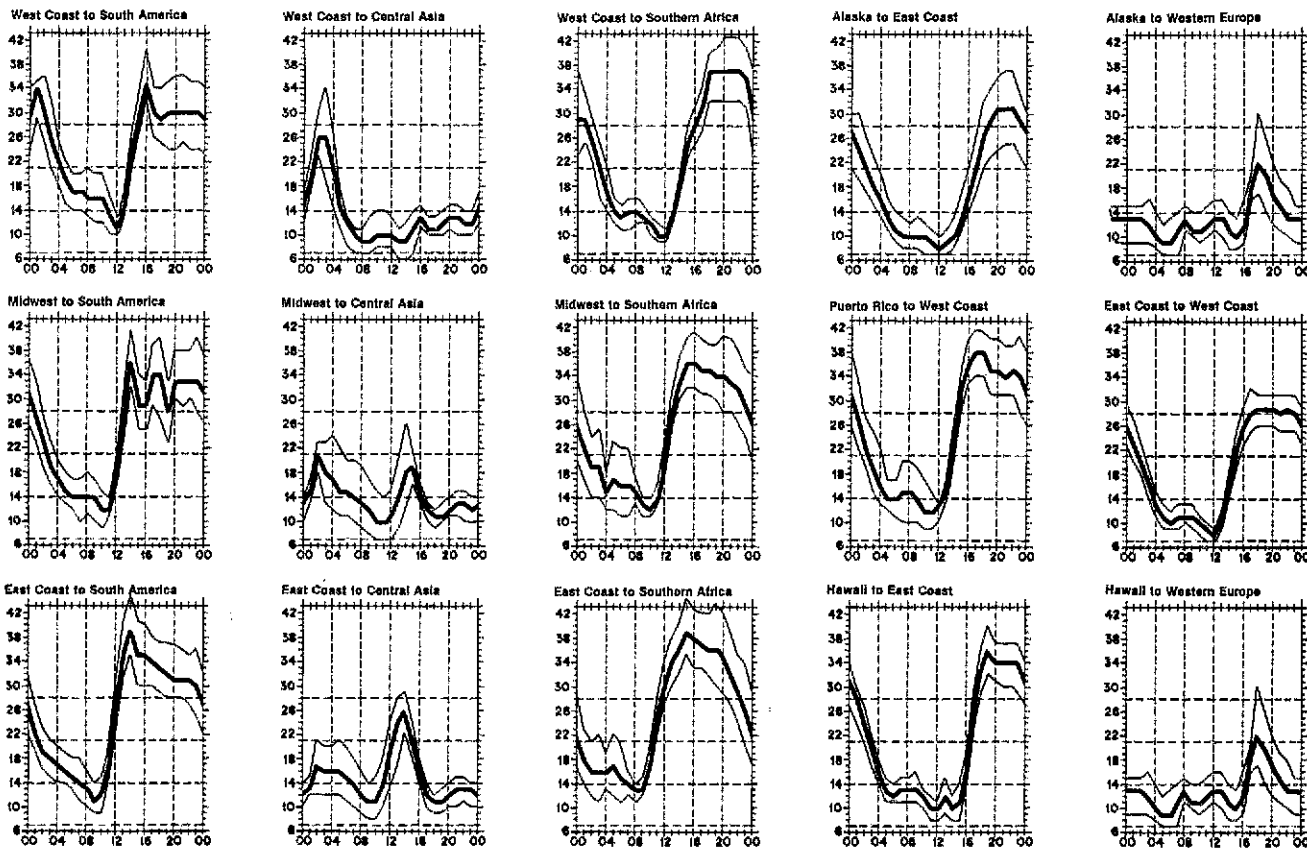
\*These bureaus sell envelopes or postage credits. Send an s.a.s.c. to the bureau for further information.

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and therefore may not be entirely accurate.

- CP8AL (P.O.B. 240
- Guayaramerin, Bolivia)
- EL2AM (WD4NBX)
- EL2AR (WA5ZWC)
- FG0GBL/FS7 (K8BPX)
- FG0FIS/FS7 (K6LPL)
- FP0EP (VE3IUE)
- FP0GAP (W8NR)
- FP0GBG (W8AH)
- G3JKI/5A (F6CYL)
- I73D (W2OB)
- KA6ISE/CX (W6KBD)
- KA6MIQ/KH3 (WB7VVU)
- KC6YC (W7ET)
- K4II/NH6 (K4II)
- K9EF/8R1 (K1RH)
- N2BA/H18 (N2BA)
- N4PW/OA4 (N4PW)
- PY8Z (W7BUN)
- TC9XGV (K4CLA)
- T3LA (W7OK)
- VP2AJ (WB2TSL)
- VP2EA (KB4QB)
- VP2KAQ (N0TG)
- VP2VDH (N6CW)
- VP8WA (WA4JQS)
- WB4ZNH/5X (K4PHE)
- WN4FVU/5X (N4NX)
- W4HE not manager for ZF2BN
- W3PJ not manager for 9H1EQ
- N1NA not manager for 5Z4QS

**QSL MANAGER VOLUNTEERS**

- ADIS P. O. Box 32735, Oklahoma City, OK 73123
- K3AT
- W5CBN — for any VK stations.



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, Colorado. These predictions, for January 15 to February 15, 1981, assume a sunspot number of 145, which corresponds to a 2800-MHz solar flux of 189.

# 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 October 1 through October 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

AH4AA/110 CT2BD/102 DF1PB/107 DK9BN/107 DL1XT/113 FO1JY/106 G3HIC/189 G4FVJ/108 HA9RT/100 HB9BK/107 HB9BOO/109 HI8WR/100 HK9EHM/123	I9PVT/122 IH92YP/110 JH1OYH/204 JR1CQZ/106 JA3APL/327 JA4YFN/107 JH4UYB/155 JASKT/220 JH7DFZ/110 JH7IMX/141 KG4WM/102 KH6JDF/103	LA3WU/100 LA2JK/256 OH2KN/103 PA2RDL/106 PA0LIE/114 K2FJ/PJ5/101 583W/102 SM6JAO/170 SM7FP/2111 SM7GGK/103 SMØDZ/110 VE3EJB/102 VK3BFD/113	YN1FMQ/107 YO3JU/325 YU3SE/182 YU3TF5/173 ZE1EZ/101 5T5ZR/233 KA1CR/109 KA1KD/110 N1AFW/102 W1TPK/280 WA1TQP/110 WB1AUL/136 WB1CNM/100	K2OY/102 KA2BED/101 KA2BYH/103 KB2CT/113 KB2DX/101 W2FRA/101 WA2GRG/141 WA2LJF/202 WB2IVC/103 WB2JUL/100 WB2ZLJ/121 K3UKO/150 KA3BRG/102	KA3CRC/110 N3ACUJ/125 W3GNQ/184 W3VQ/302 WB3EVL/114 WB3FPA/102 WB3ICL/104 AA4S5/102 KA4CMG/102 WB3EVL/112 K4HTV/193 KA4DZK/103 N4BFA/105 W4HL/118	W4LWS/123 W4TAS/114 W44ZFL/110 W4MWW/110 W4PEQ/105 AF5W/106 KA5AJB/110 N5BDH/120 W5VGX/142 WB5CPH/108 WB5JVU/103 K6TS/104 K6WC/313	W6LEN/145 W6ATMG/101 WB6FHK/101 WB6IQ/101 WB6OIP/275 WB6CZ/101 WB6EQP/101 KB7BL/100 KB7HH/102 W7KHD/175 W7LHO/102 WA7VTI/102	WB7QEP/103 KB8L/101 KB8TE/105 NB8AHK/108 NB8BB/109 WB8CC/107 AA9D/128 AA9U/136 K9JU/100 KA9CKJ/108 KA9FUS/100 N9AGB/105	N9BN/103 W9DCB/108 WB9WHG/100 WD9BBL/105 WD9CIV/100 WD9CUG/101 K9PCG/150 K9QOE/185 KD9Q/226 KN9QJY/162 N9BKY/124 W9PFX/105
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### Radiotelephone

CT4NH/160 DJ0SI/103 DL1SN/105 DL4YA/H/105 EA7AVU/116 EA7BDJ/132 EA8RG/105 FO8FU/106 G3ZAR/110 G13YDH/105	HB9BK/105 HB9BMA/101 HI8FCN/110 HK9EHM/123 HL9TN/101 ON7EJ/254 IB5C/112 JA3APL/324 JA3MKM/102 JH4UYB/103	JASKT/190 LA6KV/107 K25EI/104 SM6JAO/167 SV9BC/106 VE3IC/109 VE3BBJ/150 VK6RU/360 W1YCC/100 XE1MD/108	YC1GJ/109 5T5ZR/225 AA1M/182 K1AS/107 KA1KD/107 KAIKM/167 WA1PIV/143 WA1TQP/110 WA1YO/116 WB1AUL/118	WB1EJ/120 K2KVX/108 K3UKO/142 KA3CRC/105 W3GNQ/159 WB3EVL/112 WB3ICL/103 KB2Z/101 K4HTV/193 KA4MNS/109	WD2AER/100 AE3Y/106 K3UKO/142 KA3CRC/105 W3GNQ/159 WB3EVL/112 WB3ICL/103 KB2Z/101 K4HTV/193 KA4MNS/109	N4CLT/102 W4DKB/101 W4GEH/105 W4PUS/112 KA5AJB/109 KA5DFE/102 KA5DNP/104 W5VGX/107 WA5SKY/102	KB6ZL/103 NB6NF/159 W6LEN/108 WB6NKW/102 WB6BLR/104 WB6MNF/118 W7KHD/104 WB7QOH/109 K8LHX/101	KA8D/100 KB8JD/118 KB8TE/103 NB8AHK/108 WB8WUY/104 WB8CZR/100 WB8LUV/101 WB8PT/109 K9RFW/111	K9TI/186 K9ACB/110 N9AGB/103 WD9BBL/104 WD9CIV/100 K9DC/318 K9RRY/180 KB9OE/115 KD9Q/111
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### CW

DF5QH/122 DF7KG/109 DJ1QA/112	JH4UYB/110 JH7IMX/101 OH2VD/110	PA0RRS/102 AA1M/157 AK1A/107	W2IGZ/102 K3KNL/101 W3GVR/103	AA4SS/101 K4CPT/100 WA4FV/100	WD4AHZ/100 KA5APB/104 W5BWF/101	N6ADI/104 K7NN/168	W7KHD/120 W7ZR/136	K9JU/100 W9NUD/104	AF9Q/101 KB9K/115
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### RTTY

G3HJC

### 5BDXCC

WB4UVZ KB4BH LA7ZD	K2UO SM5AYY W9RW	SV0AA HB9KC W1AER	OK1MG OZ1CTK K9RR	K3KA K9IKP	W1SD AA1K	K8GG VE2YU	LA7JO NAVZ	K4XG K1CC	SP5XM W1YN
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## Endorsements

### Mixed

CX6CW/309 DF3TN/221 DJ2YE/182 D16BN/134 D16DU/203 DK9AD/272 DK6GK/250 DL4FL/166 DL6CT/224 DL6GMK/327 DL9YC/251 F2BS/330 F3CB/246 G3KDB/322 G3PM/140 G3VBL/284 GM3LY/182 HA5KBM/232 HS1ALP/174 IT9JLA/283 JH1OYU/250 JH1JEY/180 JASOP/204 JA7JWF/262 JA8BMK/308 JA9AE/280 JA9DDM/187 KP4A/308	KP4AM/280 LA7GI/247 GE1FF/344 OE1UZ/331 OH2BLD/261 OH2VZ/292 ON6RH/156 ON7EJ/254 OZ6Z/194 PA4FX/352 PA0RRS/210 PY6TM/285 SK4BX/162 SM5BBC/320 SM6TG/297 SM7BW/238 SP9AI/316 VE3BHZ/279 VE3DZV/197 YU1DZ/301 YU2AKL/297 ZE3JO/251 ZE4JS/331 ZL2AQ/304 ZL2VQ/345 4X4NJ/305 5W1AU/256 8P6B/154	AD1S/250 AK1A/251 K1GVW/173 K1ST/282 N1AC/265 N1AKX/201 NICQ/175 W1CNU/266 W1DQH/280 W2LL/300 W1GDQ/320 W1IAS/342 W1LUD/297 W1MLG/283 W1MRT/283 W1WV/305 W1WV/299 W1RR/307 W1SD/345 W1LUN/308 W1VH/265 W1WEF/254 W1ST/255 WA1AER/301 WA1UUV/278 WB1CCH/265 WB1FRZ/192	AF2L/200 K2ENT/203 K2SHZ/346 K2YV/220 K2XA/313 N2AIF/158 N2ATD/234 W2CC/311 W2GA/315 W2KI/225 W3WGS/228 W2LNB/338 WB3FY/170 W2MUM/330 W2QL/293 W2TO/247 W2VUF/328 W2WV/299 WA2IFS/232 WA2KWP/180 WA2MVG/174 WA2OVE/125 WA2OVG/130 WB2EPG/328 WB2FLE/150 WB2QEU/164 AE3Y/231 K3DR/250	K3H/352 K3NB/159 KA3BFX/220 N3ARK/200 N3US/293 W3FM/279 W3HXO/295 W3KWH/179 W3LM/310 W3WGS/228 WA3EPT/306 WB3FY/170 WB3GPR/255 AA4BA/270 AA4N/282 AA4NA/269 AG4S/247 K4BVJ/335 K4GDJ/300 K4JAF/241 KA5DO/257 K85FV/128 K85J/122 N5HB/250 N5HF/250 K4XG/322 K4XQ/307 N4CQ/297 W4BV/310	W4DHz/332 WA4HDD/293 WA4LBX/201 WA4NTM/153 WA4VDN/202 WA4WIP/333 WB4DWD/157 WB4SGQ/121 WB4SJB/184 WB4PRM/226 WB4SX/281 AF65/281 K6AX/300 K6ELQ/192 K6GX/227 K6HH/230 K6MT/270 K6SMH/208 K6YJ/200 K5JUC/252 KA5BML/214 K85DO/257 K85FV/128 K85J/122 N5HB/250 N5HF/250 W6GO/290 W6KPC/319 W6NLG/177	W5LUXE/140 W5XY/290 W5YZ/262 W5ZPA/200 WA55UE/270 WB5ZAM/161 WB5ZDO/283 W55ABG/152 W55GJ/184 W55JL/149 AF65/281 K75ZN/188 K7GPR/123 W7CG/350 W7EJI/303 W7GXC/283 W7JAC/202 W7JYX/338 W7ZR/284 N6NF/186 N6PV/195 N6ST/254 N6SV/293 WB6FW/321 W6GO/290 W6KPC/319 W6NLG/177	W6NZX/298 W6XY/328 W6IGU/160 WB6GP/186 WB6NHV/250 WB6QPG/158 WB6VGY/168 WB6SG/204 WB6WKM/151 K70XK/298 K75ZN/188 K7GPR/123 W7CG/350 W7EJI/303 W7GXC/283 W7JAC/202 W7JYX/338 W7ZR/284 N6NF/186 N6PV/195 N6ST/254 N6SV/293 WB6FW/321 W6GO/290 W6KPC/319 W6NLG/177	N8JW/297 WB8OC/261 WR8G/118 WA8AJH/202 WA8EUL/225 WB8KSG/227 K9HLW/280 K9HQM/293 K9KCA/310 AL9A/255 AF9K/295 KB9G/207 KB9KB/281 N9AIB/169 N9BW/206 N9GK/302 N9KV/286 W9EIZ/180 W9FAM/209 W9GAF/340 W9HF/284 W9HK/334 WB9LQ/320 W9LW/313 W9NA/243 W9NN/278 W9NYW/146 W9OBF/300	W9RF/328 WR9K/354 K9ACB/110 WB9VM/152 WB9VNE/323 WA9AEB/250 WA9TNC/200 WD9CUG/120 WD9CJP/233 WD9RIV/211 AL9A/255 AF9K/295 KB9G/207 KB9KB/281 K8CD/325 KB9KW/150 K8LD/250 K8YV/290 KD9B/127 N9YC/216 W9GAX/196 W9HF/284 W9LQ/320 W9LW/313 W9NA/243 W9NN/278 W9NYW/146 W9OBF/300	W9GQ/310 WB9K/272 W9YRM/300 WB9VX/253 WB9AHI/160 WB9CPX/232 AG9A/252 K8AL/125 K8GT/270 K9HLW/250 K9LD/241 K9LUD/150 K9QV/159 WB9CS/337 WB9F/202 WB9G/300 WB9VDB/270 WB9CG/250 WB9TCQ/254 WB9WAY/240
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### Radiotelephone

CA2XC/198 DX1MV/150 DF1DB/289 DF3TN/217 DJ6VM/320 DL1HH/329 DL7QG/208 DL9CQ/272 EA1QF/270 EA3TT/298 F2BS/327 F6DLM/295 F8BO/191 FRUJ/331 G3VBL/284 G3YJ/241 HS1ALP/174 IX1BGJ/324 IUUW/321 I3RAF/110	I4LCK/323 I5KKW/291 I6MRD/149 I8HTZ/146 I8W5/235 JA5OP/194 JA8BMK/285 JA9DDM/185 KP4A/289 LA5WN/185 LA7GI/218 LU3AJW/252 LU8BF/160 LU6CW/281 OE1FF/324 OE3WVB/315 OH2VZ/205 PA0LEG/207 PA0RRS/174 PY6TM/285	S8AAP/179 SM6CTQ/220 VK3OT/284 XE1J/282 YO3JU/322 ZL1H/362 ZL5RS/253 Z56YQ/347 Z56YQ/342 5W1AU/256 AD1S/248 AK1A/245 K1NLQ/208 W2MPL/280 W2QL/283 W2VO/315 WA2IFS/229 WA2WCW/155 WB2EJ/179 WB2JFH/153	W1VRK/261 WA1AER/301 WA1UUV/275 WA1WTP/275 WB1DWO/184 N3ALJ/244 N3US/284 W3HXO/280 W3WGS/226 W3YHR/270 WB3CHS/224 WB3GPR/252 AA4KT/276 AA4NA/176 K4BVG/325 K4DSQ/250 K4GDJ/300 K4KAK/221 K4LNO/261 K4XG/273	W4CQ/294 W4ZCB/280 WA4HMM/300 WA4MMO/292 WA4QCY/140 WA4WU/160 WA4WIP/333 WB4DWD/157 WB4JLO/287 K5IF/200 KA5BML/210 K85DO/246 N85AJW/268 W5JWM/350 W5LJ/320 W5ZLJ/224 WB5OFN/200 WB5TKR/132 WB5ABG/152 WB5DVB/270	K6AXC/300 K6HHD/225 K6SMH/160 K6WC/309 KM6L/201 K6PV/129 N6ST/325 N6SV/293 W6GO/283 W6GTL/310 KA5BML/210 W6LUR/160 W6KPC/318 W6NLG/175 W6ST/313 W6ZPV/251 WA6MHZ/154 WA6VQ/155 WB6BPZ/183 WB6NLG/250	WB6VGY/164 WB6VSK/254 K7GZ/200 K7OXB/279 N7BES/132 W7CQ/300 W7GXC/281 W7JYX/338 W7KTI/242 W7ZR/272 WA7KNK/262 WA7JFS/230 KB8H/274 K8VIR/280 K8Z/270 K8ZLU/180 K8AEQ/125 KB8DT/210 NB8KF/207 NB8E/178	N8JW/265 WB8G/262 W8JRW/152 WA8AJH/199 WB8KLC/183 WB8SRD/203 WB8ZS/255 WB8NQE/260 AA9U/135 K9HLW/250 K9LUD/241 K9KKB/229 N9ACK/220 N9AIB/123 N9BWA/270 N9BWB/295 W9ABA/300 W9DMH/240 W9GBC/199	W9GQ/310 WB9K/272 W9YRM/300 WB9VX/253 WB9AHI/160 WB9CPX/232 AG9A/252 K8AL/125 K8GT/270 K9HLW/250 K9LD/241 K9QV/159 WB9CS/337 WB9F/202 WB9G/300 WB9VDB/270 WB9CG/250 WB9TCQ/254 WB9WAY/240
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### CW

DF3KT/220 DL6GMK/204 F3AT/288 GM3LY/177 HB9ALQ/225 I3HDI/219	I59NZA/140 JH1HEY/159 OH7EJ/222 PY2CYE/126 SM9CCE/240	K1UO/243 N1AC/275 W1MLG/250 W1RR/228 W1WKP/150	WA1AER/192 WB1FRZ/187 K2QD/140 K2SHZ/246 K2TQC/305	K2UFM/153 N2AIF/132 W2QL/195 W2TO/179 AE3Y/159	W3ODJ/220 AA4NA/158 K4NV/239 K4XG/139 N4CQ/146	W4MPY/199 W4RHZ/118 W5TVX/142 AF65/266 K6CBL/260	K6SMH/136 KB6X/141 N6NF/184 W6GO/203 W6MUL/142	WA1GU/132 K8H/205 NB8E/177 N8JW/212 K9TE/120	KB9KB/250 N9KW/200 W9ZM/297 K9GUG/151 W9JF/134
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# YL News and Views

Conducted By Jean Peacor,\* K1IJV

## Send More 88s in '81

If there are any licensed YLs who have not QSO'd Howy Bradley, W2QHH, from Hamilton, New York, you just aren't sending enough 88s. Howy holds the record for number of confirmed YL QSOs, with a total of 2900. He is working toward the Young Ladies' Radio League (YLRL) 2950 endorsement sticker.

It all began in the late '30s and early '40s, when YL operators were a rarity. Gradually, as more YLs appeared, Howy envisioned YL/WAS as a possibility so his search began in earnest. West Virginia was the elusive state for a while. When a West Virginia YL finally appeared on the ham bands, you can bet Howy was one of her first contacts. He completed WAS/YL in 1949. Most of these contacts were made on 80-meter cw with a maximum input of 17 watts to a 616 final.

### A World Record

Completion of his first YL award provided the motivation to move on to WAC/YL, YL/DXCC and YLCC. Howy has them all.



Howy Bradley, W2QHH, on his way to 3000 YL contacts

YLRL awards YLCC for 100 confirmed QSOs with YLs. Endorsement stickers are added for each additional 50. Gold stickers are awarded to applicants who have worked their additional contacts from the same location (or within a 25-mile radius). Howy has 56 gold stickers — a world record.

Upon reaching 2000 confirmed YL contacts,

Howy was pleasantly surprised with an engraved silver bowl from YLRL (see photo). This has since been endorsed for 2500 YL contacts. At the 2000 total, he decided to cease the chase, but pleas from many YLs caused him to continue.

Everyone helps Howy; YLs and OMs alike. All are continually helping him to build his score. Combing the Novice hands has proven quite productive. His ears are always alert to 88s or names being exchanged.

Howy now operates on 160 through 10 meters with low-power gear and an end-fed, single-wire antenna. He operates 90% cw, but the use of a-m phone in recent years has enabled him to contact many YLs not previously accessible. Of late, local commercial QRM hampers his operating somewhat, but Howy's still hunting YLs. When W2QHH gives you a call, it's not just another station — it is Howy setting new records. If his previous record holds, he'll surpass 2950 and be on his way toward 3000 YLs in 1981.

## EMISSARIES OF GOOD WILL

The opportunities to spread worldwide goodwill abound for radio amateurs. It's easy to travel in today's world and more and more people are taking advantage of that fact. In the process, much goodwill is created.

Penny, WA50TK, and George Bean, WSMY, of Little Rock, Arkansas, recently hosted visitors Zelda, ZL3AAB, and Russ Garlick, ZL3AAA, whose home QTH is Greymouth, New Zealand. Many radio amateurs in Little Rock joined together for activities during the course of their visit. The memories of that kind of goodwill not only go back to New Zealand with the Garlicks, but stay with many Little Rock amateurs as well.

When Luxembourg's Lea Toussaint, LX1TL, learned that Karla Holmes, WA1UVJ, from Nashua, New Hampshire, planned a visit to her country in the fall of 1979, plans were made for a special dinner meeting. Many OMs, YLs and XYLs were on hand for the occasion. Luxembourg had but 10 licensed YLs at the time, but four of them attended the dinner welcoming Karla to their country. Such visits are never forgotten. More goodwill — at its best.



(l to r) LX1SM, LX1LS, WA1UVJ, LX1TL and LX1TP.

## YLRL'S HOWDY DAYS RESULTS

Martha King, WD4NKP, scored 124 — member winner. Freida Meissner, DK6FM, scored 97 — nonmember winner.

### HOW DO YOU RATE?

As a radio amateur, are you: (1) considerate? (2) loyal? (3) progressive? (4) friendly? (5) balanced? (6) patriotic? (Score 2 points for each.)

If your score is 12, you are fulfilling all aspects of "The Amateur's Code." A 10 in this case, means you're falling short and there's room for improvement.

Being a 10 created a stir in 1980; why not make 12 the magic number for 1981? Happy New Year.

### A LIVING LEGEND

Mrs. F. V. McKenzie, sat quietly in her chair in the Glenwood Nursing Home in Greenwich, Australia, listening as Terry Clark, VK2ALG, presented her with a Certificate of Membership in the Royal Naval Amateur Radio Society. Born in 1892, "Mrs. Mac" is Australia's first qualified woman electrical engineer, first licensed woman radio amateur, VK2FV, and the first woman member of the Wireless Institute of Australia.

As storm clouds gathered over Europe in 1939, Mrs.

Mac started thinking what part she and other women could play in the coming war. Realizing how important communications would be and knowing that women could be trained in this field, she opened a school in Sydney to train YLs in Morse code and radio. More than 50 enthusiastic women were in the process of being trained six months before the start of the war. The number of trainees greatly increased and started the formation of the Women's Emergency Signaling Corps.

Mrs. Mac is directly responsible for the Morse code training of over 10,000 Allied servicemen during WW II, many of whom were USAF and USMC. She continued to provide Morse code training for returning pilots and policemen for nine years after the war's end. No tuition was charged any student. Mrs. Mac and the women she trained were all volunteers. After the war, she received the Officer of the Order of the British Empire (OBE) for her services.

Two years ago Mrs. Mac suffered a stroke that left her right side paralyzed. She now lives in a nursing home in Greenwich but is far from lonely. She has a constant stream of visitors, which include many of her wartime pupils.

Because of her many outstanding contributions, the Royal Naval Amateur Radio Society took great pleasure in announcing that Mrs. Mac has accepted membership of the Society. [GET]



Mrs. F. V. McKenzie, VK2FV and Terry Clark, VK2ALG.



Mary Allsopp, WB5DVA (left), and Zelda Garlick, ZL3AAB, enjoying a day together in Little Rock. (photo courtesy of WD5AHP)

\*Country Club Dr., Monson, MA 01057

# The World Above 50 MHz

Conducted By William A. Tynan,\* W3XO



## Help Promote VHF Activity — Join a Group

Most of us who frequent the bands above 50 MHz have heard people swapping SMIRK or SWOT numbers. Some of us may even be members of one or the other of these organizations but take little part in their activities. Others, even though we may be long-time vhf'ers, don't know much about these clubs or their purposes besides that of passing numbers back and forth. Then there are the new converts to our realm, for whom almost every facet of vhf operation is unfamiliar. This month's column is devoted to vhf activity-promotion organizations, with particular emphasis on the constructive work they have done and are continuing to do to enhance everyone's enjoyment of vhf operation. Yes, I said everyone's. For whether one is a member of one of these groups or not, their efforts in promoting occupancy of the vhf bands makes life more interesting for all.

What are these organizations and what do they do? Many groups in various parts of the country promote vhf activity. Most concentrate their efforts on issuing certificates for working a certain number of their members. This certainly provides increased incentive for many who take pride in displaying an impressive array of wallpaper. But it is the large international organizations, SMIRK on 6 meters and SWOT on 2 meters, that most of us know. SMIRK, which stands for Six Meter International Radio Klub, was started in 1972 by Ray Clark, K5ZMS, and a small group of San Antonio 6-meter enthusiasts. Since then, it has grown to about 4000 members in 63 countries. Sidewinders On Two, or SWOT, began less than four years ago in Fort Worth, Texas. Len Hoops, W5JTA, and Lloyd Pratt, K5ASZ, were two of the original nucleus from which the organization, now numbering some 2000

throughout the U.S. and Canada, has grown. While SMIRK and SWOT also issue certificates, that is not their primary mission, merely one aspect of the promotional programs. Nevertheless, qualifying for Worked 500 SMIRK or 100 SWOT are both significant operating achievements and one certainly must be active to log that many members. And, we all know that activity breeds more activity.

Both organizations sponsor contests dedicated to their particular band. The 6-meter contests that SMIRK puts on are in June and November. See comments on the November bash in the 6-meter section of this column. SWOT conducts a week-long, 2-meter test each August. These contests serve a specific need for those who, because of preference or circumstances, concentrate their efforts on a single vhf band. Neither SMIRK nor SWOT contests have received the attention they deserve. Unless the SMIRK contest is blessed by a large band opening, one is hard-pressed to work more than a few dozen contestants. In the SWOT affair, participants spend most of their time explaining the contest to stations worked, even though some may be SWOT members. We should all try to put at least some operating time into these events and submit logs. This is one aspect of providing tangible evidence of activity on the vhf bands.

Sponsoring contests is but one of the activity-building efforts undertaken by SMIRK and SWOT. Both also have been instrumental in establishing nets in various parts of the country. SWOT has been particularly active in this phase. They both publish newsletters that provide much valuable information concerning operation on each band. In addition SMIRK has been successful in providing equipment to stations in rare parts of the world who would

otherwise not get on 6 meters. One such station making particularly good use of the loaned gear is CP8AZ. Another is ZB2BL. Certainly, the band has been much more exciting because of the presence of stations such as these.

Both SWOT and SMIRK are simple and inexpensive to join. The information in their newsletters, alone, is well worth the effort and expenditure. For SWOT membership, one must work, on 2-meter ssb or cw, two members and send their calls, SWOT numbers, date and time of QSOs along with five dollars for one year's dues to George Bretz, WBSMEV, 3530 Livingston, Fort Worth, TX 76110. SMIRK membership requirements are similar, except that six stations must be contacted on 6 meters using any mode. Send the list along with a one-time fee of four dollars to Ray Clark, K5ZMS, 7158 Stone Fence Dr., San Antonio, TX 78227. In addition, Ray asks that members send him a stack of business-size s.a.s.e.'s in order to receive the SMIRK Bulletin.

Both of these fine organizations are worthy of our support. I urge that readers who are not yet members join either or both.

No similar organizations exist as yet for 1-1/4 meters, 70 cm or the microwave bands. It would appear 1-1/4 meters may be the logical band on which to start the next activity-promotion organization. A very fine newsletter published by Lee Fish, K5FF, already exists for that band. See the November column for details on how to start receiving this publication. For 70 cm, K2UJYH distributes an informative newsletter devoted to EME on this band and higher.

Activity-promotion organizations are an important part of the world above 50 MHz. Let's all support them and derive as much benefit from them as we can.

### FLASH — TRANSATLANTIC 6-METER TO 4-METER CONTACT COMPLETED

Another page in the history of vhf was written at 1627Z November 17, 1980, when VE1ASJ St. John, New Brunswick, transmitting on 50.1 MHz, worked G4BPY who was on 70.1 MHz, the 4-meter band available to UK amateurs. The cw signals from England peaked 439 while Andy's 6-meter signals were running 59. The two had previously been working 6-meter-to-10 meter crossband and set up the 6-to-4 sked when conditions appeared favorable. Two days before, VE1ASJ had heard, briefly the 70.1 MHz signals of ZB2BL Gibraltar, but they didn't stay in long enough to permit a QSO. The G4BPY-to-VE1ASJ exchange thus becomes the first successful trans-Atlantic 6-meter-to-4-meter contact. This goal had been much discussed, but many thought it would never be attained. Congratulations are due to both Andy, VE1ASJ, and Gordon, G4BPY, for accomplishing a truly notable piece of pioneering vhf work.

### ON THE BANDS

**6 Meters** — As if to illustrate the difficulty of report-

\*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

ing the antics of 6 meters during a solar peak, December's copy saying that not much was happening in this part of the world was hardly in the mail when the flood gates opened and the black hole was a thing of the past, at least for a while. Who knows what the situation will be by the time you rip this issue from its mailing wrapper and flip to "The World Above 50 MHz"? We could again be in the clutches of that cosmic anomaly from whence no 50 MHz rf can enter or leave. Let's hope not, but even if the fickle gods of F2 do decide to desert us, as they did at the end of 1979, we can still look back on late October and the first half of November 1980 as one of the most interesting times ever seen on 6 meters. Even if we should see no more DX after this is written (in mid-November), it can still be said that this fall has been good; those who warned us that we shouldn't expect much have been proven wrong. I am sure they are not too unhappy with the outcome, however.

Now to try to summarize the wild goings-on. Once again, I can merely hit the high spots, based on what has been reported to me. Thus, if your super DX accomplishment is not included, it's undoubtedly because neither you nor the guy at the other end told me about it.

Reports of successful DX contacts began to roll in about October 19, with VE1BNN noting reception of the FY7THF beacon about 1400Z and a QSO with EL2AV at 1500. Reg says that EL2AV also worked K1IKN, VE1AVX and VE1ASJ on the same occasion. About two hours later the ZB2VHF beacon appeared, followed 45 minutes later by a QSO with ZB2BL. On the 23rd, KH6s were worked in W5, and EL2FY

QSOed VE1AVX, WB2RYE, VE1BNN, N3AH1, WA2YXP and W1QXX. The following day EL2AV contacted WB4OSN, WA5YX, W5VY, WBSHHE and C6ADV. Some of the action went to the Europeans, with E16AS working 5B4AZ and the two ELs on October 25. On the 26th, the Mid-Atlantic states got a taste of the action when N3AH1 caught ZS3E, and W2IDZ nabbed ZS3E and EL2FY. Crossband got underway during this same time period with far too many contacts to list. One of the favorites with the Gs, however, was VP2VGR in the British Virgin Islands. Also frequently reported was WA7UWE/KP4, better known to most of us as C6ACY.

Things really got rolling after November 1. On the 2nd VE1BNN reports working PA0RYS, who stated that he has verbal permission for 6-meter operation. K8EFS notes a contact with one of the more popular crossband catches, GU2HML on the Island of Guernsey. That made crossband country number 17. His luck was holding, as two days later he worked KH6IAA and the next day, the 5th, he nabbed ZS6LN on cw for two-way country number 27 and WAC. WACs will become a lot more numerous now that Africa is being worked. On the 6th, K8EFS worked E16AS and KL7NO. On the 8th E16AS, E19D and EI2W were all in here on the East Coast, working many 1s, 2s and a few 3s.

The SMIRK contest occurred the 8th and 9th and all I can say is that they sure picked the right weekend. The 8th did not appear to be producing much contestwise, although VY1AU and VY1CM were worked widely in the eastern part of the country and ZD8TC was worked by W7FN, W7WKR and K7KV. But the

## 70-Cm Standings

For WAS holders, listing is WAS number, call state and call areas. For others, call, state, U.S. states worked and call areas. Call areas are 10 U.S. call areas plus KH6 and KL7, plus each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico.

### WAS Holders

1 W0YZS*	MO	12	K2YCO	NY	17	6	W3OMY	PA	11	7	W85LUA*	TX	48	31	K8VW*	OH	40	10	K0VXM*	SD	21	11	
2 K2UYH*	NJ	12	W42FUZ	NY	16	6	W3ADM	MD	8	5	W5FF*	NM	39	18	W8IDU	MI	27	8	W0LER	MN	18	6	
W1JR*	MA	42	36	K2OVS	NY	15	5	K4QIF*	VA	39	21	K5JL*	OK	33	11	W85BKC	MI	26	8	K0CJ	MN	17	6
K1PXE	CT	25	11	W64NXY2	NJ	14	5	W4AIP†	KY	26	8	W5HN	TX	22	7	K8DEO	OH	24	8	W0OHU	MN	16	6
K1FO	CT	23	8	N2EO	NY	13	5	W4FJ*	VA	25	8	W5RC†	MS	19	6	W8AVPD	MI	22	8	W0PW	CO	15	5
K1WHS*	ME	21	9	K2BF	NY	12	4	W4ATG/4	VA	25	8	W5SHNK	TX	16	6	W8YIO	MI	22	7	W80ZXU	IA	14	7
K1LPS	VT	20	10	W42EUS	NY	12	4	W44COQ*	AL	25	5	K5JRH	TX	15	4	K8AXU	OH	20	8	W80IUT	NE	13	4
W41TZV	MA	17	7	W42DKB	NJ	11	4	W4ISS	GA	24	5	K5LLL	TX	11	6	W89SNR	IL	28	10	W80ZU	IA	11	3
W1AJR	RI	16	5	W42PVV	NY	10	5	W44SBC	VA	17	7	W0RRY/5	TX	10	11	W9JY	IN	28	9	K0WLU	SD	10	3
W1XJ	RI	15	5	W3RUE	PA	29	10	W3IY/4	VA	17	7	W5UKQ*	TX	10	5	W9UD	IL	28	9	W0VB	MN	9	3
W1GXT	MA	11	5	W3OZ*	MD	25	8	W44NMA	GA	17	6	W5ASTRE	TX	9	3	W9AAG	IL	27	10	W0SD	SD	7	2
W1HDD	CT	11	4	W3IP	MD	25	7	W44EXW	NC	17	6	W5DC	LA	8	8	W9AAG	IL	27	8	W80WAO	KS	6	3
K2RIW*	NY	27	12	K3WHC*	PA	23	8	N4CD	VA	17	6	W5GVE	TX	7	3	K9HMB	IL	21	8	KH6IHP*		7	7
W2VC	NJ	25	8	K3UCO	PA	23	7	K4GL	SC	16	7	K5UGM	TX	5	2	W9YF	IL	17	6	VE3AIB		9	6
K2LQJ*	NY	24	10	W3HMU*	PA	19	6	K3IUV	PA	19	5	K5MWH	AR	4	2	K9XY	WI	13	5	VE4MA*		17	13
W2BVL	NJ	24	7	K3IUV	PA	19	5	W44GPM	NC	14	4	W6ABN*		16	9	K0TLM*	MO	42	21	VE7BBG*		39	32
W2AZL	NJ	21	7	N3AHI	PA	18	7	K4QF*	AL	12	8	W6BNMT		8	7	K0Y*	IA	28	9	W8RAP*		9	8
K2CBA*	NY	20	8	W3UJG	MD	16	6	W44MUO	VA	12	5	W7JF*	MT	15	11	N0IS	MO	27	8				
W2CNS	NY	19	10	K3HCE	MD	16	5	K4PKV	NC	10	4	W7LX	AZ	5	3	W0DRL	KS	24	9				
W2PGC	NY	17	10	W43IUF	PA	14	5	K4KAE	SC	8	2	K7ICW	NV	4	2	W0RAP*	IA	23	10				
W42FGK	NJ	17	6	W3XO	MD	13	5	W44MVI	NC	7	1					K0DAS	IA	23	7				

\*Indicates some EME contacts  
†Indicates WAC

next day was when the lid blew off. It began with WATGCS working DUIIG at 0130Z. Not much happened toward Europe and Africa but the band opened early, about 1500Z, to the West Coast for us easterners. Then followed nearly seven hours of very strong 6s and 7s all up and down the Eastern Seaboard and well into the easterly portions of the Midwest. I am sure that it was the longest east-west opening that this conductor had ever witnessed up to that time. It will be interesting to see the SMIRK Party results. On the same day, W7ID in Idaho reports working 60 U.S. stations in 20 new states (Jeff is new to 6 meters) along with over 90 JAs. Among the JAs was JARDXB with whom he held a 20-minute QSO and completed the first known 6-meter exchange of SSTV pictures between the U.S. and Japan. November 10 produced another good east-west opening, but it is the 11th that may well go down in history as one of the most outstanding days of this cycle and perhaps all time. The curtain between North America and Africa fully parted, enabling ZS6LN to work 60 U.S. stations and ZS3E to QSO 64. Another massive east-west opening got underway, sparked by the appearance on the band of 4U1UN at the United Nations Building in New York City, thus providing an unexpected new DXCC country for many 6s and 7s. VK4RO managed contacts with K0GUY, W40CSL and VE4AS on 52 MHz. Numerous JAs were worked as far east as Ohio. This conductor drooled listening to K8IH near Cleveland running a string of them on 50.050 cw. As usual, none were worked from the environs of Washington, but K4GOK in the Virginia suburbs and I both heard one. The JRI I heard was very weak, however. One of the unusual things that sets this opening apart was how late the band stayed in from here to the West Coast. I had a contact with WA7RTA Oregon at 2215Z. 15 minutes after sunset, and heard a 6 after that. The last West Coast station heard here was W7FN Seattle at about 2250. I thought the band stayed open late on the 9th, but the 11th beat it by an hour. That's incredible!

Conditions declined a bit over the next few days but nevertheless there were some goodies to be had. On November 14 KG6DX was in on the East Coast, along with a few KL7s. The following day was particularly interesting. WWV indicated that a geomagnetic storm had begun about 0900Z and the solar flux had backed off from the 270 area of a few days earlier to around 210. When I turned on the receiver that Saturday morning about 1330Z, I was greeted by a crescendo of 59 backscatter signals. The whole East Coast, from Nova Scotia to Florida, was audible with the beam aimed anywhere from east to south. The FY7THF beacon on 50.038 was well over 59 but not much else was in evidence at the time. Later DL3ZM/YV5 broke through, weak here but stronger to the north. VP2VGR began working 4s and 5s but was not copyable at this QTH. I completed a crossband QSO with GW3MHW and found that my beam had to be aimed slightly south of east to be received in Wales. Then I16AS appeared weak but readable. He also was best with the beam at about 160 degrees. Then right on top of him was PA0CRA who proceeded to work a string of 4s, including W4CKD in the Virginia suburbs of Washington. After an hour or so of receiver noise and a short QSO with W6XJ, the next thing heard was the T3LAA beacon on Christmas Island. But alas, no one out there was listening. At the same time the western part of the country was hearing ZS3E, ZS6LN, ZS6KJ and the FY7 beacon, which had faded out here at 1430Z. Beginning about 1900, the KH6s, including IAA, H1 and BZF, were busy working stations as far east as Georgia — but much to the chagrin

of those in the mid-Atlantic and northeastern states, they didn't get into those areas.

The authority the ZLs received last year to operate at 50 MHz prior to TV hours was again fortuitous as the low end of the band opened to that area about 2000Z, with K8EFS in Michigan reporting a contact with ZL2KT and hearing ZL1AUM and ZL2AQF. It is understood the K8MMM in Cleveland scored several contacts too, and that W2CNS in New York was also among the lucky ones.

I have reported the events of November 15 in more detail than usual because it was an unusual day in that propagation occurred to so many places. This was in the face of declining solar flux numbers and increased geomagnetic activity, which shows that we don't necessarily have to have low A and K indices and 10.3-cm solar fluxes upwards of 300 in order to experience 50-MHz F2 DX.

Sunday, the 17th, began like the previous day with many East Coast backscatter signals and the FY7THF beacon. DL3ZM/YV5 was quite strong here for awhile, as was T12NA. This conductor received a call from XE2GE who was 59-plus. In the midst of this was Es, with stations on the Gulf Coast putting in signals with typical signal hop strengths. Also, E16AS, E19D and E12W made many contacts on the East Coast up to about 1700Z. Later in the day, KH61AA worked as far east as W2 and QSOed several West Virginia stations for Al's 50th state. The ZLs were in as far as the Midwest and one, ZL3NE, was heard briefly, with strong signals, by K3HCE in Maryland. For awhile, that station was operating on ssb just below 50.1, leading some of the U.S. gang astray. Midwest Es came back in the evening lasting well after Midnight eastern time. Quite a day!

Naturally, with such good propagation conditions comes word of amazing QRP exploits. There's the one about the 6 running 100 milliwatts to an indoor dipole who worked a number of East Coast stations. I am sorry, I don't have his call. This conductor received 59 signals from K7OFT/M during the November 9 opening while Bob was running a barefoot IC-502 to a halo. Then there's WA7ETE/K0 in Colorado who worked JA8QX while running a 502 on internal batteries, using the built-in whip, while inside his basement. That's incredible, too!

Keep it up, Old Sol. You're doing fine!

**2 Meters** — The pyrotechnics on 6 meters pretty much overshadow everything else this month, but there are some interesting pieces of 2-meter news as well. The first involves one of those "almost" contacts. While WA6WJN San Jose was working VE3ASO on 6 meters during the mammoth opening of November 9, signals were so strong that they decided to try 144.2. Much to Stan's shock, when he turned up the gain on his 2-meter receiver, he heard VE3ASO's signal. It wasn't there for long, probably one half to one second, but he did positively identify it. The kW and multi-Yagi array on VE3ASO's end certainly helped. WA6WJN runs 10 watts to a single, 11-element beam, but this has spurred him on to build an amplifier and put up a better antenna. Maybe next time, Stan. The path from San Jose to Ottawa is 2425 miles (3900 km). It seems likely that a meteor was involved, but over such a distance the exact mechanism is hard to pin down. Even though they did not complete the contact, these fellows can be congratulated on some quick thinking and for not assuming that "it couldn't be done."

K1FO says he's happy with his new array of four Boomers. A tower-mounted preamp also helps.

Steve's EME total now stands at 31 stations. He expects to be in there trying to work some more soon.

W5TIT operating at the QTH of W5YIF Beaumont, Texas, found the Gulf tropo good the evening of October 29 when he was able to access the K4KE repeater in St. Petersburg, Florida, on 147.60/147.00, a distance of 710 miles (1145 km). A try at simplex was unsuccessful, however.

The Standing list submitted by W4ZD (formerly K4VW and W4CKB) is interesting from two standpoints. First, it shows contacts with four countries, and this is without the aid of moonbounce. Bev has worked the U.S., Canada, The Bahamas and Cuba. My attention was also attracted by the old familiar calls that appear next to some of the states. A few examples that some readers may recognize are: W1HDD Connecticut, W1JSM Massachusetts, K1ABR Rhode Island, W2AZL New Jersey, W3GKP Maryland, W4FJ Virginia, W4EJQ Tennessee, K4QIF North Carolina, WA5UNL Arkansas, W5RCI Mississippi, W9YF Illinois, WA0CHK Missouri, K0MQS Iowa and W0LER Minnesota.

**70 Cm** — The surprise EME test from the 1000 foot (305 meter) dish at Arecibo, Puerto Rico, between 1000 and 1045Z October 29 was the big event on this band during the period covered by this month's column. The short window of "free time" was the result of time remaining following completion of power-calibration tests on the big dish that went better than expected. Thus there was no opportunity for spreading the word in advance. Through the efforts of WA3FET/KP4, KP4EKA, NP4A and NP4B, however, phone calls were placed to W1JR, W6ABN and W7GBI the evening prior to the operation. They got on the horn and set up a phone-calling chain to alert as many 70-cm EMEers as possible. Although the Arecibo transmitter power output was only 44 watts, this coupled with an antenna gain of some 60.4 dBi (48.2 megawatts ERP), produced signal strengths reported to have averaged 20 dB above noise. In the 45 minutes that the moon could be tracked by the movable feed suspended high above the dish, 14 stations were contacted, some via ssb. The lucky ones were: W1JR, W0RRY/5, K5JL, W85LUA, VE7BBG, W5UKQ, K4QIF, W6ABN, W7GBI, VE4MA, W0RAP, W7JF, W1XP and W1UHE. Others who were notified had the misfortune to have their amplifiers down or their antenna pointing mechanisms frozen. Better luck next time — and let's hope there is a next time. Lack of advance warning or no, the 70-cm EME gang owes a debt of gratitude to the fellows at Arecibo for going to the trouble of running these interesting tests.

A long letter written on his computer fills us in on what K1PXE has been up to. Since he is blind, Pete finds the computer particularly useful in a number of ways around the shack. He works all bands from 6 meters through 23 cm but says that 70 cm is his favorite. His goal is to add at least one state on 2 meters or higher each year. This past fall's tropo helped with this objective, enabling him to work WA9DOT in Wisconsin for state number 25 on 70 cm. Pete now has up a 45-element loop Yagi for 23 cm built by W3CXU and W2EIF. It replaces his old 29-inch dish, which was falling apart. So far the new antenna has worked very well. K1PXE wishes to acknowledge and thank those who have helped him in his vhf activities over the years. These include, in addition to the above, WA2LTM, WA1EHL, WA1SFC, WA1GBZ, K2UYH, K3JYD, WB1CWZ and K1DQU.

# Silent Keys

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

W1AWE, Norman H. Miller, East Providence, RI  
ex-W1AYH, Edward W. Romney, Milford, NH  
W1BBE, Ernest A. Whited, Houlton, ME  
K1BSB, Edgar R. Mack, Hendersonsville, NC  
W1CQS/W4DWK, E. Willard "Twisty" Ljongquist,  
West Palm Beach, FL  
W1CZO, R. Clark Wallace, Jr., Melrose, MA  
W1EM, Robert D. Huston, Portland, ME  
W1FBB, Daniel J. Shea, Newtonville, MA  
W1GU, Myles L. Lamson, Rockland, ME  
W1HTR, Clinton F. Hanscom, Walpole, MA  
W1KTU, Melvin J. Oliver, Chatham, MA  
W1LKB, John W. Waser, Bridgeport, CT  
W1MV, Leo C. Wilber, Bridgewater, MA  
W1NND, Almond S. Pierpont, Rockland, ME  
W2AI, Robert W. Emott, Florham Park, NJ  
K4ZAWG, Ralph H. Empey, Ogdensburg, NY  
W2AW1, Carl P. Gallo, Pomona, NY  
K2BM, Christoph D. Lueschen, Buffalo, NY  
W2HXT, Robert E. Pearson, Reisterstown, MD  
W2KKA, Eugene L. Hamlin, Nicholasville, NY  
\*W2PEQ, The Rev. Julian L. Smith, Mt. Vernon,  
NY  
W2TII, Howard A. Scheer, Newark, NY  
W2TMG, Oliver C. Beitel, Pennington, NJ  
W2TRF, Milton C. Carter, Howell, NJ  
W2TSG, Walter D. Thomson, Paulsboro, NJ  
W2WUV, Virgil M. Bowers, Massapequa, NY  
W3DZP, Dr. William F. Klueber, Pittsburgh, PA  
W3IIB, John A. Berry, Philadelphia, PA  
W3JHE, Richard C. Luedtke, Glen Burnie, MD  
W3NCF, M. Scott Hunter, Kensington, PA  
W3NED, Orville H. Mills, Pittsburgh, PA  
W3NST, William J. Miller, Ellicott City, MD  
W3ROR, Harold Sion, Philadelphia, PA  
K3VOY, William Varsse, Pittsburgh, PA  
W3VZL, John W. Robinson, Glen Mills, PA  
W4AFT, Henry O. Freeman, Panama City, FL  
K4BIZ, Don E. Jarrett, Asheville, NC  
K4E1-K, James H. Forrest, High Point, NC  
W4EKJ, ex-W01YT, William S. "Sim" Heston,  
Lauderdale-by-the-Sea, FL  
K4FAT, Willard F. Cram, Salt Springs, FL  
K4FHC, Carroll M. Chalk, Howey-in-the-Hills, FL  
W4FQN, Thomas S. Baker, Memphis, TN  
K4IKK, Gordon L. Davy, Harrisonburg, VA  
\*W4JUI, Louis A. Williams, Middletown, KY  
W4MXT, John M. Frith, Tappan Springs, FL  
K4PLK, William W. Smith, Charleston, SC  
W4PV, Edward F. Ogilvie, Miami Springs, FL  
KB4QN, Max Bridges, Spartanburg, SC  
W4RL, Richard C. Peck, Herndon, VA

WB4RRL, Warner M. Anderson, Louisville, KY  
WB4TIM, Richard H. Johnson, West Palm Beach,  
FL  
W4WGU, Denver H. Snyder, Ladson, SC  
W4WRL/VP5MW, Mahlon S. Weir, Delray Beach,  
FL  
W4YKV, J. Graham Goodman, Lexington, VA  
K4ZAW, Joseph E. Flint, Charleston, SC  
W85AMV, Neil W. Shaw, Oklahoma City, OK  
W4SBZH, Elmo D. Wood, Okla. City, OK  
W5CQO, Paul T. Libby, Jr., Dallas, TX  
WD5DGV, Donald S. Lee, Jr., San Antonio, TX  
K5GBR, L. Francis Hess, McAlester, OK  
K5HGR, Buck H. Edgar, Odessa, TX  
K85MG, David L. Barker, Scurry, TX  
W5NXX, Norman L. Maguire, Albuquerque, NM  
W5QVI, William F. Bachman, Stinnett, TX  
W5UXW, Opal T. Helms, Wink, TX  
W6HO, Oswald M. Shaw, Los Gatos, CA  
ex-K6BSO, George A. Collins, Inyokern, CA  
ex-W6BZV, John Rickey, Jr., Sacramento, CA  
W6CEO, Gordon T. Howes, Boulder Creek, CA  
W6DVO, Gordon W. Bowser, Santa Barbara, CA  
W6FGW, Myrl M. Snow, Portola, CA  
KA6FPO, Warren A. O'Neil, LaMesa, CA  
W6LXI, Carlos W. "Bud" Jacklin, Los Gatos, CA  
KB6KCS, Jack B. O'Dell, Tustin, CA  
ex-W6QVA, Harold E. Harper, Escondido, CA  
W6QZO, Horace W. Bates, Sterling City, TX  
W6R6D, John M. Hall, Turlock, CA  
W6TMB, Charlotte B. Fredericks, Montecito, CA  
W6UJI, Joe M. Simpkins, Thousand Oaks, CA  
W6VXJ, Bruce N. Keenan, Paradise, CA  
\*W6WC/W6KAL, Benjamin Horn, Napa, CA  
W6WF, John E. Slater, Santa Clara, CA  
W6YGX, Eugene J. Camozzi, Burlingame, CA  
W7AA, Harold E. Renfro, Seattle, WA  
W7ASF, Virgil F. Morehead, Coulee Dam, WA  
W7BET, Lloyd B. Phillips, Cheyenne, WY  
ex-W7GQ, Milton D. Koupal, Eugene, OR  
K7GHK, Earl L. Hedden, Billings, MT  
KA7HHL, James Bleakley, Apache Junction, AZ  
W7KIE, Lawrence W. Kenner, Seattle, WA  
W7KYX, Dorothy K. Wickenhiser, Sun City, AZ  
W7MTW, Arthur L. Cummings, Portland, OR  
K7PPV, John M. Siebenthaler, Coeur d'Alene, ID  
AG7Q, Owen D. Dinger, Kaysville, UT  
K8ASW, Edward M. Babinchak, Olmsted Falls, OH  
W8DLT, Ralph R. Leland, Rochester, MI  
W8IK, James R. Morris, Fort Mitchell, KY  
ex-W8IVR, Edward J. Stratton, Marquette, MI  
W8JAI, Herbert L. Yankee, Royalton, OH

W8LER, Robert L. Parker, Bellfontaine, OH  
W81MQ, Samuel L. Braxton, Detroit, MI  
W8LOX, William S. Stoltz, Royal Oak, MI  
K8MK, Thurston A. Johnson, Huntington, WV  
K8NXU, Woody O. Williams, Akron, OH  
W8OSZ, Charles L. Wilson, Charleston, WV  
WD8PCC, James E. Hanna, Marietta, OH  
W8PCN, Loyal O. Rhodes, St. Albans, WV  
WD8RBC, Ralph W. Blanchard, Lansing, MI  
K8RHK, George S. Locher, Detroit, MI  
W8RXJ, Eugene S. Franks, Williamstown, OH  
W8LUPH, Charles E. Lessick, Akron, OH  
W9AMH, Harry A. Perry, Auburn, IN  
N9BC, Richard H. Norris, Fort Wayne, IN  
KA9HLD, J. Richard Tait, Amboy, IL  
W9KYQ, Albert A. Thompson, Frankton, IN  
W9LYI, Hugh A. Hoym, Orland Park, IL  
W9OYI, Morton L. Weigel, Columbia City, IN  
WB9POG, Charles W. Stolck, Lockport, IL  
W9RPN, Roland B. Brown, Terre Haute, IN  
ex-K9URW, John C. Anderson, Hardin, IL  
ex-W9YYA, Albert (Jann) Janowitz, Chicago, IL  
WB0BFH, James M. Leonard, Duluth, MN  
W0DCC, William M. Brown, Billings, MO  
W0HRS, James D. Jones, Warsaw, MO  
W0IDJ, Carl I. Dolin, Two Harbors, MN  
VE1BBN, Earl G. Ross, Armdale, NS  
VE1BMH, George H. Lane, Great Village, NS  
VE1FR, Murdock W. A. McLean, Sydney, NS  
VE2IT, Lawrence R. Montgomery, Lachine, PQ  
VE2ZZ, Georges Desrochers, Chomedey Laval, PQ  
VE3BHB, Horace Balcom, Ottawa, ON  
VE3FI, Henry R. Smyth, Manotick, ON  
VE4QJ, James D. Massie, Winnipeg, MB  
VE5BE, Edward W. Webster, Fort Qu'Appelle, SK  
VE6OS, Hugh Picken, Calgary, AB  
G5WP, W. E. Russel, Surrey, England  
VK3YO/YJ8KR, Keith Roget, Port Vila, New  
Hebrides  
ZE1DY, Basil Prout, Bulawayo, Zimbabwe

\*Life Member  
\*\*Charter Life Member

Note: All Silent Key reports sent to HQ, must include the name, address and call of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

## 50 Years Ago

January 1931

Department of Commerce Radio Division Chief W. D. Terrell reports that radio amateur station licenses reached a total of 18,994 in 1930, 2165 more than a year ago. Editor Warner uses these figures to chastise the prophets of doom who think the game is getting too complicated and the bands too crowded. Obviously referring to the ARRL's Technical Development Program, Terrell's report says that in 1930 "improved technical methods and apparatus devised particularly to meet the new conditions" permitted amateurs to continue successfully in the restricted bands imposed by the Washington treaty of 1927.

Ross Hull (director of the Technical Development Program during 1928) has rejoined the Headquarters staff after an 18-month sojourn in his native Australia.

In a 10-page article, Professor Howard A. Chinn describes the "Standard Frequency Station W1XP," the key station of the ARRL Standard Frequency System. Under the direction of the Massachusetts Institute of Technology, the station provides accurate band-edge and in-band markers during its scheduled weekend transmissions.

"Revising Amateur Tuner Design" by Robert Kruse uses the National SW-5 receiver as an example of what a modern receiver might include. Aside from sensitivity and selectivity, the author says single-dial tuning, audio fidelity, and operation from the a.c. line

rather than batteries are desirable features.

"A Four-Band 'Kitchen' Transmitter," by Ed Glaser, W2BRB, offers a solution to the shack-location problem. The complete transmitter (crystal-controlled Heising-modulated pair of 103As) is housed under the gas range in the apartment's kitchen. (Pity the poor mouse caught in the 1000-volt power supply!)

By way of contrast, the "modern" 160-meter phone station of Leon Faber, W9DAX, is located on the main floor of his house, "courtesy of Mrs. W9DAX." The front panel of the transmitter has no controls — just nine meters, certainly enough to check everything throughout the four-stage transmitter. An 852 final is used as a linear amplifier.

## 25 Years Ago

January 1956

"LONG Long Yagis," by James Kmosko, W2NLY, and Herbert Johnson, W6QKI, will become a classic: Nearly two years ago the authors found they were working independently on the same problem. They pooled ideas and results, and the 6-page article summarizes their conclusions. Yagis for 144 Mc. with booms as long as 40 feet were tested.

A transistor DX "Stray" reports best DX by Laird Campbell, W1CUT, and his 7-Mc. 55-mw. rig is 800 miles: Fred Marco, W9ZA, Fred is no stranger to QRP; in the late '20s he worked VK and ZL with a 199 (tube) and a 45-volt battery.

In his v.h.f. column, Ed Tilton, W1HDQ, tells of 50-Mc. "scatter" tests conducted with Paul Wilson,

W4HHK, over a 1000-mile path. The "scatter" mode had been classified and consequently not publicized, although many v.h.f. men knew the signal at 49.8 Mc. was part of a test being conducted by the Collins Company.

E. G. Von Wald, W4YOT, describes the use of a pair of 807s in "A Floating Grid" R.F. Amplifier". This cathode-drive circuit for tetrodes permits extra drive power to be passed through the normally low-drive amplifier and added to the output.

"A TVI Special for 50 Mc." by Mason Southworth, W1VLH, describes a 90-watt n.b.f.m. rig with a 50-Mc. crystal oscillator and extensive shielding and filtering.

The "Three-Band S.S.B. Exciter Using a Mechanical Filter," by David Hoisington, W6CHB, represents state-of-the-art techniques. Built around the Collins mechanical filter, it includes voice control, test signals, band switching and hand-pass circuits.

The use of a popular piece of WWII surplus is updated in "Interpolation Frequency Measurements With the BC-221" by Charles Riley, Jr., W1JJY.

In the Recent Equipment column, the widely-publicized national NC-300 receiver is reviewed. The manufacturer conducted a contest to find out what features amateurs thought their "dream receiver" should have. Despite all the hoopla and balderdash, the receiver was looked upon favorably by the cynical reviewer, for its well executed mechanical and electrical features.

In the same column, the Hallicrafters HT-31 Linear Amplifier (pair of 811As) was praised for its clean design and its operational features. (Unlike current designs, it was a neutralized grounded-cathode circuit, requiring less drive than the present grounded-grid designs.) — Byron Goodman, W1DX



# Club Competition Rules and Contest Disqualification Criteria

The 1981 contest season is upon us. Three of the ARRL-sponsored contests during 1981 include an ARRL-affiliated club competition — January VHF Sweepstakes, February/March International DX Contest and November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. The use of standard ARRL contest forms will help to ensure that your score is figured properly and speed up the publication of contest results in *QST*.

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

## Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings before being counted for a club.

For a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited*. Any club submitting 51 or more entries is in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX

Competition.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be an ARRL-affiliated club.

2) *Medium*. Any club submitting fewer than 50 entries falls in this class, except as noted in local club criteria, below. The same mileage and attendance requirements apply as the unlimited class club. The club must be an ARRL-affiliated club.

3) *Local*. Any club submitting 10 entries or less is in this classification. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be an ARRL-affiliate.

Single and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (i.e., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete).

It is not within the intent of these rules that a club should vote out a member or a member

resign and then be voted back into the club later so that the 50-percent attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a club certificate when at least three single-operator cw and/or three single-operator phone scores are submitted.

## Disqualification

If the claimed score of a participant is reduced by two percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified*.

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1980 phone SS prohibits submission of an entry for the 1981 phone SS, but 1981 cw SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by Hq., three additional contacts will be deleted as a penalty. The penalty will not be considered part of the two-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. □

## Strays

### ATTENTION QCWA MEMBERS

□ The 24th annual QCWA QSO Party will be held February 14-15 on cw and March 14-15 on phone. For full details, send an s.a.s.e. to Arthur Monsees, W4BK, 1407 48th Ave. N.E., St. Petersburg, FL 33703.

### HUNTING LIONS IN THE AIR

□ "Hunting Lions in the Air," sponsored by Lions Clubs International and coordinated by Lions Club Rio de Janeiro Arpoador-Brazil, will be held on Saturday, January 10, 1981. It will start at noon UTC and continue for a 24-hour period. Bands will be 80, 40, 20, 15 and 10 meters, phone and cw. For more information write to Contest Committee — Hunting Lions in the Air, Lions Club of Rio de Janeiro

Arpoador, Rua Souza Lima no. 310, apt. 802, 22801 — Rio de Janeiro-RJ-Brazil, South America

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

□ anyone who has information on, or is interested in forming, a postal employees cw net on 10 and 40 meters. Bill Merriman, KA8JMH, 2907 Church Ave., Cleveland, OH 44113.

# 1981 Novice Roundup Announcement

Attention, Novices and Technicians! It's time to get ready to enter *your* contest, the Novice Roundup. There's no other contest like it. Only Novices and Technicians are eligible to compete for awards. A handsome achievement certificate is awarded to every Novice or Technician (single-operator station) who submits a valid entry of 200 or more QSOs in the 1981 Novice Roundup.

An important part of playing the contest game is complying with the rules and doing the associated paperwork. The Novice Roundup is a very good place to start and learn the fundamentals of contesting. Many top contesters have gotten their start in the Novice Roundup.

To ensure your success in the NR, you should: (1) Read and understand the rules for the contest. If any part of the rules is unclear, by all means contact us here at ARRL hq. for a clarification. (2) Follow the rules to the letter during the contest. Be sure to copy all the contest QSO exchange information for every QSO. (3) Very carefully check your contest entry before sending it in. Make sure that all the pertinent information is included in your contest entry. (4) Last but not least, be sure to mail your entry by the deadline set forth in the rules (March 10, 1981 in this case). All your contest efforts will have been for naught if the logs do not arrive in time to make the listings.

## How to Participate

The 1981 Novice Roundup starts at 0001 UTC on January 31 and ends at 2359 UTC on February 8. That means the NR starts on Friday, evening, January 30, local time. You may operate 30 hours out of the nine days. Rule no. 2 further details the timekeeping. Entry forms are available from ARRL headquarters: log sheets, summary sheets (one needed) and CD-77 forms (one needed) to keep track of whom you have worked in matrix form. The log sheets have room for 100 contacts each. Send your self-addressed, stamped envelope to Headquarters now and you'll have your forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

The idea in the contest is to work as many stations as possible, in as many different ARRL sections and foreign countries as possible. ARRL sections are listed on page 8 of every QST. If you are in one of the few states with more than one ARRL section and do not know which section you are in, write and ask for a free copy of *Operating an Amateur Radio Station*. You may work each station *only once*. Keep your contacts as short as possible; send your exchange (RST report and ARRL section) only once and repeat it only if requested. Keep your CQs short, too! Here's a sample:

CQ NR CQ NR DE KA2YYY/N KA2YYY/N K  
KA2YYY/N DE WA1XXX/T AR  
WA1XXX/T DE KA2YYY/N 579 ENY K  
KA2YYY DE WA1XXX R 569 NH K  
WA1XXX R 73 DE KA2YYY/N K

Note that once you have established each other's license class you can drop the /N and


/T for the duration of the QSO; brevity is the name of the game!

## Scoring and Rules

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6, KL7, KP4/KV4 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have

an ARRL (not FCC) Code Proficiency credit of 10 wpm from WIAW or W6OWP, then your score is 100-plus-10 x total multipliers (31 + 3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see "Contest Corral" on page 90 of this issue. You may work DX stations for contest credit; a multiplier of one is earned for each different foreign country worked.

Read the rules carefully. Keep a check sheet of stations worked (we have CD-77 available free) so that you don't have duplicate QSOs. Log sheets, CD-77, and a summary sheet are



Do not write above this line.

## NOVICE ROUNDUP

License Class  
 Novice  
 Technician  
 Other

CALL USED KA1DYZ/N ARRL SECTION or COUNTRY CONNECTICUT

CHECK ONE:  Single Operator Station XX  Multioperator Station

If multioperator, show calls of all operators, loggers

( 127 QSOs + CP credit 1.5 ) x ( 5 Sections + Countries\* 8 ) =  
710 Clusters score      Hours of operation 8

\*Do not list U.S.A. or Canada here

Transmitter TS-520S Power Input 180 watts  
 Receiver TS-520S Antenna Dipole and vertical

*I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee.*

Date Feb. 9, 1981 Signature Maureen C. Thompson Call KA1DYZ

Please enclose log, photos, comments, ideas, etc. with your entry and mail promptly to: ARRL Communications Department, 225 Main Street, Newington, Conn. 06111.

	1	2	3	4	5	6	7	8	9	0	VI	DX (list)
	<u>Conn</u>	<u>ENY</u>	EPa	Via	Ark	Flav	Arz	Mich	Ill	<u>Calif</u>	Mar-Nfld	
(CROSS OFF EACH NEW MULTIPLIER AS WORKED.)	WMass	NH	Del	Pa	La	La	Ida	Ohio	Ind	Iowa	Que	
	Me	NNJ	WDC	Ry	Miss	Org	Mont	WVa	Wis	Kans	Ont	
	NH	NJ	WPa	Pa	NMex	<u>SDak</u>	Nev			Minn	Man	
	RI	WNY		NEla	NTex	SV	Oreg			<u>SB</u>	Sask	
	Vt			SE	Okla	SGo	Utah			Nebr	Alta	
	WMass			Fla	S Tex	Sb	Wash			N Dak	BC	
				Tenn	CZ	SJV	Wyo			SDak	YFS	
				Va		SV	KL7					
				W1		Pac						

Print or type:

NAME Maureen Crystal Thompson CALL KA1DYZ  
 ADDRESS: 999 Main Street  
Anywhere, USA #1234

CD-49 (R977)  
Printed in U.S.A.

now available from your ARRL headquarters. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed, stamped envelope containing your full name, call and mailing address complete with ZIP code.

B C N U in the NR!

### Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to exchange QSO information with as many stations as possible on the 3.5-, 7-, 21- and 28-MHz Novice/Tech bands. Others work Novices and Technicians only.

2) **Contest Period:** First week of February, including both weekends. Begins 0000 UTC Saturday, January 31, 1981 and ends 2359 UTC Sunday, February 8, 1981. Operate no more than 30 hours. Off periods must be at least 15 minutes long; listening time counts as operating time. Times on and off must be indicated in your log.

### 3) Categories:

(A) **Single Operator:** One person performs all transmitting, receiving and logging functions.

(B) **Multioperator:** Single transmitters only. Those obtaining any form of assistance such as relief operators or logging.

4) **Exchange:** Signal report and ARRL section or country for DX stations. Novices should send /N and Technicians /T after their call sign so others will know their license class.

### 5) Scoring:

(A) **QSO points:** Count one point for each complete two-way QSO. Work each station once, regardless of the frequency band.

(B) **Multiplier:** Each ARRL section (listed on page 8), plus VE8/VY1, plus each foreign country.

(C) **Code proficiency:** Additional points can

Novice Roundup						
CALL USED KADYZ/N			SECTION CONNECTICUT			
50 QSOs per side *Number each new multiplier as worked*						
FREQ.	DATE/TIME GMT	STATION WORKED	EXCHANGE		POINTS	
			SENT	RCVD		
28	Feb. 1, 1981					
	1645	NB1AVA/N	599 CT	599 CT #1	1	
	1648	W8RNL	599 CT	599 MO #2	1	
	1659	KA2XXX/N	599 CT	599 ENY #3	1	
21	Feb. 1, 1981					
	2105	Z1XA	599 CT	599 CT	1	
	2127	N6DPR	599 CT	599 SBAR #4	1	
	2134	K1HUG/N	599 CT	599 CT	1	
	2136	W0UA	599 CT	599 CO #5	1	
	2157	KA2XXX/N	599 CT	599 ENY	Duplicate 0	

be earned if you have qualified for an ARRL Code Proficiency certificate. FCC code credit cannot be used in lieu of the above. If an entrant does not already have an ARRL CP Award, apply for credit by attaching a copy of the qualifying run from WIAW or W6OWP for February to your Novice Roundup entry. CP credit equals the wpm speed indicated on the latest certificate or sticker held by the entrant.

(D) **Final score:** Add your Code Proficiency credit to your total number of QSO points. Multiply that by your ARRL section/country total for your final score.

6) **Miscellaneous:** Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL hq. for an s.a.s.e. Official forms are recommended. Any entry making more than

200 QSOs must submit duplicate checking sheets (alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs. Logs should include dates, QSO times, on and off times, complete exchange sent and received and band. Postmark your entry within 30 days after the contest (March 10, 1981).

8) **Awards:** Certificates to the top Novice and Technician in each ARRL section and each single-operator Novice or Technician who submits a valid entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards.

### 9) Conditions of entry:

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** See this issue, page 79.

# Strays



Then-Northwestern Division Vice Director Ron Mayer, K7BT (right), presents Al Berg, WB7SIC, president of the Oregon Tualatin Valley Amateur Radio Club, with OTVARC's Charter of Affiliation. During 1980 ARRL has welcomed 102 new affiliates, clubs that have expressed their commitment to Amateur Radio and the principles upon which the American Radio Relay League was founded. If you are considering forming a club or if your club is interested in affiliating, please contact us at headquarters.

## FREEZE YOUR ARCTIC OFF

The Ford Tin Lizzy Club's North Metro Chapter (Michigan) will hold its third annual "Freeze Your Arctic Off" expedition from 2000 UTC, January 17, until 1500 UTC, January 18, 1981, on the frozen wastes of Lake Saint Clair. Operating frequencies will be 7.275, 21.380, 146.52, 146.55 and 146.58 MHz, as propagation allows, with one station on 7.275 at all times. The call sign AD8R/8 will be in use and a handsome certificate will be awarded to all contacts. QSL to Box 545, Sterling Heights, MI 48078. No s.a.s.e. required. — Robert G. Lang, K8ZKJ

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

deaf or sightless amateurs, or persons who know handicapped persons interested in Amateur Radio. I am setting up an information bureau that will help handicapped persons obtain a license and get on the air. Steve Baumrucker, WD4MKQ, 107 West Main St., Apt. E, Carrboro, NC 27510.



Ted Glick, K6LJA (left), of Santa Ana, California, and Ed Glaser, W2BRB (right), of North Bellmore, New York, first met in Brooklyn 60 years ago, when Ed was 2BRB. Recently, they had a 60-year reunion when Ed was visiting his daughter in California.

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

U.S. hams to converse in French. Paul De Glas, WB3EMR, 3010 Cottage La., Norristown, PA 19401.

# Results, 1980 ARRL September VHF QSO Party

You can't tell the players without the scorecard!

By Bill Jennings,\* K1WJ and Tom Frenaye,\*\* K1K1

One can certainly tell who the dedicated, serious vhf contesters are. How? By simply looking at the call signs in the score listings for a vhf contest in which conditions were just "fair to middlin'."

It appears that the 1980 running of the September VHF QSO Party qualifies as one of those vhf contests where conditions were just "fair to middlin'." You can tell that just by looking at the number of entries submitted. The 1980 contest saw 372 entries received vs. the 422 logs received for the same contest in 1979 — a 12% decrease. You can tell by the number of entries that there was no monster Sunday evening tropo opening along the eastern seaboard, as there was in 1979. Therefore, one had to work a little bit, listen a little harder to work needed multipliers, call "CQ" a few more times and spend a little more time to make a fairly decent score. That's what separates the dedicated vhf contesters from the opportunist — the op who catches a big opening and runs up a big score in a hurry. We're pleased to print the scores of 372 vhf contesters in this report.

For those who did invest the time and effort to work the contest to the fullest, there were rewards to be reaped. There are three new all-time single-operator division records and three new all-time division records set by the multioperator stations. We won't list the new record holders here, but will direct you to the all-new, improved All-Time Division Leader Records Box. In that box you will find the all-time records for all three vhf contests; the June and September VHF QSO Parties and the January VHF Sweepstakes. Our answer to the old "clip and save" for the vhf contesters.

We record yet another "first" in the pages of the September VHF QSO Party history, as related by N6CA.

The first 1296-MHz Utah-to-California cw QSO was made September 12, 1980, at 2110 PDT, by N6CA/7 and K6ZMW. Distance was 345 miles over a mountainous path. This was the third N6CA/1296 expedition to Utah in the past two years. On September 13, at 1440 PDT, the first ssb QSO was made over the same path. Conditions on lower bands were very poor on both days. Equipment at N6CA/7 was 100-watts output, 70 watts at antenna with water-cooled single 7289 homebuilt cavity amplifier, driven by homebuilt



WA2FZW (front) and WB2IXP at the WA2ASM, multiop station site, overlooking scenic Route 78 in West Bridgewater, New Jersey (NNJ).

4-watt, solid-state transverter and antenna-mounted dual 645 preamp with 1.25-dB noise figure. Antenna was a single 38-element loop Yagi at 20 feet. Equipment at K6ZMW was 125 watts with dual 7289 water-cooled WB610M amplifier, 6-foot dish at 70 feet and 1.25-dB noise-figure N6CA preamp. Signals peaked to approximately 20 dB out of noise. Moving frequency in 5-kHz increments did not produce any noticeable effects on signal strength during fades. Originally it was thought that weather fronts virtually destroyed the Utah/California path. This was not the case. Weather on this trip was miserable at best; 30 to 40 mi/h winds in Nevada and southern Utah and relatively cold Los Angeles basin weather for good vhf tropo. This did not keep us from a good 20-minute contact on cw and ssb on Saturday. In spite of adding guy ropes to the tent for the high winds, the loop Yagi stayed on target,  $\pm 2^\circ$ . This antenna has heard Arizona at 403 miles and worked it at 338 miles.

Steve Katz, WB2WIK and the K2XR crew found some interesting results with different antennas.

We installed some pretty serious contest antennas. The 70-foot crank-up tower with two 6-meter beams really worked. We used both antennas in tandem with a phase-adjustable splitter to enhance meteor-scatter signals and often noticed a 10- to 20-dB enhancement over just the top 6-element antenna. This array was the brainchild of Dave, K2XR, who really isn't a vhf'er, but is an avid contestator and will try anything once.

Having two beams at different locations (heightwise) on both 432 and 1296 MHz gave us some insight regarding the age-old height vs. feedline-loss controversy. As you might suspect, the higher antenna for each band brought in the local signals a bit stronger. However, the lower antenna for each band seemed to do every bit as well on the weak, long-haul (200 to 500 miles) signals. In the future, we'll probably concentrate on larger arrays, closer to the ground, fed with b-i-g feedlines to build up lots of gain and keep feedline losses to nearly zero.

## Division Leaders

Single Operator	Division	Multioperator
WA2DPU	Atlantic	K3MTK*
GW3NJV/W9	Central	K9MRI
KØVXM*	Dakota	—
WB4JGG	Delta	W9IP/5
W7EKI/8	Great Lakes	WBVP*
WA2YWP	Hudson	K2XR*
WBØZKG	Midwest	WAØNOK
WA1MAO	New England	W2SZ1
K7KOT	Northwestern	—
K6KLY	Pacific	WB6NMV
N4CD*	Roanoke	K3LNZ/8
WBØIKJ	Rocky Mountain	AAØL
WA4NJP*	Southeastern	W4CUE
W6PFE	Southwestern	AE6E
WA5VJB	West Gulf	WB5KTC
VE3CRU	Canadian	VE3AEA/3
G6ADV	DX	XE2XW

\*Indicates new division record

## Call Area Leaders

	50 MHz	144 MHz	220 MHz	432 MHz
WA1MAO	237/27	420/22	52/16	89/20
W2SZ1*	358/29	621/23	95/19	115/23
WA2DPU	157/20	215/17	42/13	77/17
K2XR*	382/31	352/23	112/20	112/19
K3SXA	80/17	239/20	42/13	53/16
K3MTK*	272/22	353/23	81/19	58/18
N4CD	70/17	203/23	16/9	47/15
WA4WZQ*	102/16	201/13	4/2	18/6
WA5VJB	41/3	93/3	24/1	20/1
W9IP/5*	96/27	259/27	18/11	48/18
K6KLY	28/10	110/9	22/4	13/4
AE6E*	43/16	413/12	67/5	33/3
K7KOT	44/5	53/4	15/3	11/3
W6SFH/7*	—	11/4	—	4/3
WA2FGK/8	23/10	240/24	6/5	7/6
WBVP*	184/28	278/25	28/12	55/23
GW3NJV/W9	64/11	174/15	—	42/10
K9MRI*	121/19	298/22	—	38/10
WBØZKG	63/16	84/12	—	—
WAØNOK*	30/8	71/14	8/2	—
VE3CRU	28/9	96/12	12/5	30/10
VE3AEA*	56/13	139/16	3/2	20/6

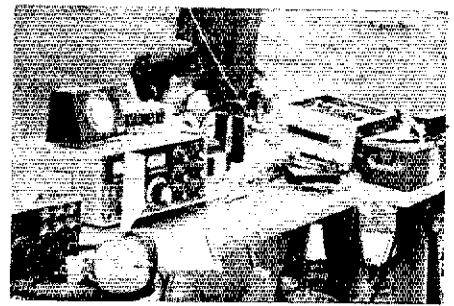
\*Multioperator

\*Communications Assistant, ARRL

\*\*Assistant Communications Manager, ARRL

## All-Time Division Records

	Single-Operator			Multioperator		
	Call	Score	Year	Call	Score	Year
Atlantic	Jan. WA3AXV	77,064	80	W3KKN	50,112	80
	June WA2DPU	43,351	78	W3CCX/3	215,750	79
	Sept. WA2DPU	45,360	79	K3MTK	74,046	80
Central	Jan. K9RO	30,080	80	K9HMB	45,312	78
	June W9IP	38,304	80	W0OHU/9	60,639	80
	Sept. GW3NJY/W9	35,310	79	W9IP	84,739	79
Dakota	Jan. WA0CSL	8190	76	K0VXM	7830	79
	June K0VXM	29,127	80	W0OHU/0	60,164	80
	Sept. K0VXM	3190	80	K0SE	10,492	79
Delta	Jan. WB4JGG	16,884	80	WB4HEL/4	8880	73
	June WB4JGG	36,936	80	W4BFB/4	74,404	78
	Sept. WB4JGG	28,424	79	WB4LHD/5	58,050	79
Great Lakes	Jan. K8LEE	41,080	76	K8III	80,984	79
	June WA8TTS	38,064	79	WA8ONQ	111,111	80
	Sept. WA8TTS	33,495	79	W8VP	55,264	80
Hudson	Jan. WB2WIK	63,070	80	K2OWR	65,562	76
	June WB2WIK	49,876	79	K2XR	186,538	80
	Sept. WB2WIK	54,202	79	K2XR	142,006	80
Midwest	Jan. K9ECV/0	12,690	68	K0VUY	14,196	76
	June W0TEM	30,304	80	W0OHU	68,796	79
	Sept. N0IS	24,119	79	K0TLM	7470	79
New England	Jan. WA1MAO	46,134	80	WA1RWU	70,400	80
	June N6NB/1	86,254	80	W1FC	250,194	80
	Sept. N6NB/1	102,795	79	W2SZ/1	175,835	79
Northwestern	Jan. WA7KYZ	10,296	79	K7ND	9690	79
	June K7GWE	20,515	74	W7LYE/7	35,776	77
	Sept. WA6JUD/7	4056	76	WA7NAN	8759	76
Pacific	Jan. WA6JUD/6	23,868	76	WA6BMV	24,814	77
	June N6NB	69,184	77	WA6JUD/6	81,213	76
	Sept. WA6JUD/6	24,640	77	WB6KBZ/6	31,995	78
Roanoke	Jan. K3ICH/4	23,744	80	W4BFB/4	27,392	80
	June K4WO	49,757	79	W4BFB	57,013	79
	Sept. N4CD	25,536	80	W4BFB	190,210	79
Rocky Mountain	Jan. N6NB/7	6120	80	WA0PHZ/0	8062	68
	June WA0TVZ	22,935	77	WB5AXC/5	23,424	76
	Sept. W0EVZ	546	64	N0KV	2970	79
Southeastern	Jan. W4GDS	26,400	73	W4VO	18,966	78
	June WB4QSN	55,380	80	WA4OYH	85,500	80
	Sept. WA4NJP	11,220	80	W4VO	24,426	79
Southwestern	Jan. N6NB	25,880	79	W6FNE/6	20,352	63
	June K6YNB	60,342	76	W6AMT	105,080	76
	Sept. K6YNB/6	34,013	76	K6MEP	18,960	79
West Gulf	Jan. K5CM	14,100	78	K5STI	12,804	59
	June WA5HMK	34,151	77	K5LZO	92,106	80
	Sept. WD5FZM	6020	79	K5CM	18,630	78
Canadian	Jan. VE1ASJ	21,156	79	VE1DXA	13,266	79
	June VE1ASJ	26,277	80	VE3ONT	82,188	74
	Sept. VE3ASO	18,816	73	VE3ONT	43,413	74
DX	Jan. —	—	—	—	—	—
	June W2BN/C6	18,700	77	VP5AA	29,526	80
	Sept. JA1RJU	8	79	K4GFG/C6	124	78



K1DS/1, operating out of Rhode Island, caught his multiop partner, K1PAM, pondering his fate on 6 meters.

eastern Georgia. Very dry and noisy on 6 and 2 with some good activity on 220 (WA4NJP). For the first time we made it through an entire contest without the uhf rigs going up in smoke. High point of the contest was working NSDL simultaneously on 2-meter ssb and 432 cw and hearing our 432 signal come back loud and clear on NSDL's ssb (W8VP). What a weekend; I think Bob and I worked harder this time than we have all year and then turned in our lowest score to date (K1D0R). I would like to suggest a change in the rules for those of us in the "boundocks," which would allow the use of .52 simplex on a full-time basis during the contest. I can understand the restriction in metropolitan areas, but here in Bismark, .52 is used so rarely that use during an entire contest period would cause no hardship for anyone. Got my 220 gear working and made what I believe is the first 220 MHz contest QSO in the state of North Dakota. It is possible that this was the first ever 2-way, 220-MHz QSO ever in the state (K00W). Frustration is hearing stations on 432 that would be new multipliers for me that are transmitting 5 kHz outside my VXO range. Kindly tune. Thank you (N4CD). Poor conditions on 6 here — mostly groundwave and scatter. Most of the operators weren't fast enough to work the scatter — too bad! (AA9D). While we were running a meteor sked with W0VB (unsuccessful), K0VXM (also in South Dakota) broke in on 2 meters. We worked 'VXM on 2 and 432 with very strong signals for the 750-mile path (W9IP/5). The toughest three points I've ever made in a contest . . . First cw/ssb QSOs to California on 1296 MHz! (N6CA/7). We need a 432 calling frequency (K7ZOK). Worked a W6 the day before the contest! (VE1ASJ). Local activity very low on all bands. If I didn't have 2 meters, it wouldn't be worth it (VE7ASJ). At XE2XW it was like we had left our 50-MHz antenna at home . . . worse than if we'd been hit by an electrical blackout. Our score deserves honorable mention and *no* snickers. The only reason for filing a report is that we put forth some effort to make an XE available on 50 MHz and want to let those who need Mexico know that we're still plugging (XE2XW/W5XW). I know that the score is very low but I felt that the work involved plus the uniqueness of 10-GHz ssb deserves acknowledgement. KA1GT and I spent five hours trying to find a suitable site. We made a 15 dB over S9 (30 to 35 dB above the noise) QSO over a 7-1/2-mile path (WA1VUW). Propagation? What's propagation? (WA1MAG). Wow! What a contest! The conditions and activity on 6 and 2 meters were so good that my XYL had to come into the shack several times to wake me up (WA2CWA). If you wish to encourage operation on the 220 MHz band, please remove that restrictive rule . . . Until you have the level of activity on 220 that you have on 2 meters, you are not helping the cause of higher band utilization. We all do not have ssb/cw rigs on 220. Give us fun fellows a chance (K2JF). Don't forget the East Coast 70-cm net called on Wednesdays at 9 P.M. EST and EDT on .432.090 MHz (W4ATC/W44MBK/ K4CAW).

### FFEDBACK

Corrections to the 1979 September VHF QSO Party. Kindly refer to pages 99 to 104 of December 1979 QST.

In the multiplier box on page 102, that's K2LWR with 37 multipliers on 432, *not* K2OWR. Ditto on the comment in the text on page 101.

W5KTC's corrected log sheets show a linescore of 1550 - 139 - 10 - ABD to move Bonnie into fourth place in Northern Texas.

In the East Bay Section, WB6NMV, shown as the single operator section leader, was in reality a multioperator station with WA6VPH as the second op. This change moves N6DN/6 into the top single-operator slot in East Bay and makes WB6NMV the Pacific Division multioperator leader.

There was some tropo to be found along the extreme East Coast from a cold front extending from New Hampshire through Virginia. N4CD's new record was helped by QSOs up the coast of up to 550 miles on 144 and 432 MHz. Six meters was a disappointment to most, though the persistent did outdo their 2-meter totals. The W9IP/5 group, all set for a run at the division record from Mississippi, ran into no special propagation but nevertheless did run up the total with a good deal of patience and digging signals out of the mud. Not a record, but hard work also has its rewards.

Oh yes, KH6FLD cornered the market on DX QSOs, logging 6 meter contacts with Guam, Solomon Islands, Papua New Guinea, New Hebrides and Nauru. Kinda makes up for the lack of stateside openings!

Perhaps the October and November

fireworks on six meters will last until the January VHF SS. No way to know unless you get on a check it out — January 17 and 18!

### SOAPBOX

Had the antenna and coax ready for 220, but no rig . . . next time (K9MRJ). Used homebrew triplers on 432 through 1296, but power output was at a minimum. Working on amplifiers for those bands now (WA2ANZ). Some good groundwave and coastal tropo, but nothing unusual (WA2SLY). This was the first vhf contest for the Birmingham ARC . . . looks like we're hooked! (W4CUE/W44PVI). After 10 years of active vhf contesting, I had to be absent from the fun for three years while living in an apartment. Now that I'm a homeowner again, who will cut the grass and fix the leaks in the roof while I'm listening for the rare ones? (W2CRS). Sure missed N6NB. Had looked forward to working him from Utah or Nevada. (K6LMN). [You must have missed the opening, Roger. Wayne was on from Chicago. See the Illinois listings — Ed.] A very good contest here in north-

Scores are listed in order, single-operator stations first within each section. From left to right: call, score, number of QSOs, number of multipliers, bands operated (A=50 MHz, B=144 MHz, C=220 MHz, D=430 MHz, E=1215 MHz, F=2.3 GHz, G=3.4 GHz, H=5.7 GHz, I=10 GHz).

**U.S.A.**

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<b>Connecticut</b>	WA1MAG	79,985-800-	88-ABCD
	K1PXE	50,015-296-	69-ABCF
	W1UQC	20,313-291-	61-ABCD
	K1F0	18,240-208-	67-ABCF
	K1ABX	18,811-201-	37-ABD
	K1EM	15,744-145-	38-ABD
	W1AZNT	16,644-177-	32-AB
	W1FAJ	4,699-96-	37-ABCD
	W1AGTP	3,760-82-	39-AB
	W1ACYN	3,794-67-	26-ABCD
	W1WHL	354-58-	13-A
	W1XX	350-35-	10-B
	W1B1U	240-30-	8-B
	W1YUW/V	2-1-11	
	WB1UW	181,141, K1A1 BRD CLT	
	DZY GDI	60,680-735-	73-ABCD
	W1QK(W1P)W1A1 KOK PMA		
	W1XV,WB1S E2L HJR	39,940-652-	62-ABCD

**Eastern Massachusetts**

K1FWF	19,650-334-	50-ABCD
W1QXX	16,470-225-	61-ABCD
W1R1FK	10,850-174-	50-ABCFD
K1DA1	8512-266-	32-AB
W1JR	7955-102-	37-CDEI
W1AS	3312-184-	18-B
W1R1WY	2,600-132-	16-AB
W1ACRE	1,394-77-	17-AC
N1AFQ	663-51-	14-AB
W1AY	300-18-	10-ABCD
W1KMK(K1KE C)W1XG,W1ATG		
(ops)	42,196-421-	77-ABCD
W1AJAY(AJIE)	11,234-268-	41-ABD
W1MAA(A)W1AZML NSL		
W1B1GA	900-30-	30-AB

**Maine**

K1TOL	6757-233-	29-A
K2QE1(A)AG2X,W1AZ FFF OQN		
(ops)	6206-214-	29-AB

**New Hampshire**

A1IT	18,600-251-	62-ABCFD
W1A1TZ	18,524-277-	51-ABCD
W1B1CJT	11,760-206-	48-ABCD
W1C1E	10,850-174-	50-ABCFD
W1EJ	6730-101-	44-ABCFD
W1JSM	3440-172-	20-B
W1A1DR	1,716-52-	13-AB
W1H1H	12,600-132-	16-AB
K1TR(A)K1BA,W1A1 PBU QWF		
(UGJ)	17,199-430-	49-ABCD

**Rhode Island**

W1A1PR	5586-122-	38-ABCD
W1BAY	3460-173-	20-B
W1AJR	3360-120-	28-AB
W14MMP/1	130-13-	10-AB
K1US1(A)K1PAM	2050-79-	25-ABCD

**Vermont**

K1LPS	9600-158-	48-ABCD
K1BF	2451-124-	19-B
W1A1M	2743-72-	27-ABD
K1ASXW	636-87-	8-B
W1WEP/1	392-56-	7-B
W1EXZ	102-17-	6-A
W1TKZ(K1S)DGF TK UR,		
W1DOP,W1PQY,WB1LIM,		
N1AWG,W120R(V,ops)		
(ops)	43,678-993-	69-ABCFD
W1B1QR(A)K1EAN,W1B1WV,		
W1B2BEU/1	12,400-244-	46-ABCD
W1M1AA(A)K1ALC,W1AJEX		
MAG NBU TBV,WB1LHH		
(ops)	6630-195-	34-AB

**Western Massachusetts**

W1AZAM	18,096-327-	52-ABCD
W1RKH	956-148-	18-AB
AG1T	5460-182-	30-AB
W1A1VTA	3920-195-	20-B
W1WLE	3538-128-	29-AB
W1B1ABF	3350-169-	24-AB
W1LP	2975-119-	25-AB
K1NF	1853-9-	29-ABCD
W1P77(A)ADJ2,K1DHP,K2S MM		
TR,W1B1AA(A)W1AZS AAU		
GFP,W1A1USA,W1B1CB,		
W1B2PK,W1B9EAE,ops		
(ops)	160,286-1227-	107-ABCFD E-H

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**Eastern New York**

W2CRS	33,433-293-	73-ABCFD
K2SHB	8657-164-	43-ABCD
W1A1TF	8200-369-	24-AB
W1AZANZ	6300-160-	30-ABCFDEI
W1P1	1070-60-	17-B
W1PKHE	142-24-	13-AB
K2DNR	462-21-	8-C
K2BGU	403-31-	13-AB
W1B2SHE	370-32-	10-B
K2LSA(W1AZ)FSP KYW,W1B2S		
HLM TDB,ops		
(ops)	20,450-383-	50-ABCD

**New York City - L.I.**

W1A2YVP	27,671-403-	59-ABCD
N2B5J	12,800-141-	31-BC
W1B2IAJ	6400-246-	31-AB
K2RIW	6048-126-	24-D
W1B3HNS/2	2669-157-	17-B
W1AZUS	1072-51-	16-ABD
K1ZET	1-1-	1-B
W1AZSLY(W1B2IDP)		
(ops)	8064-223-	37-AB
K2OVS(Multiop)	6450-120-	43-ABD

**Northern New Jersey**

W1B2GQ	18,032-267-	56-ABCD
K2BAH	17,328-238-	48-ABD
W1B2WH	14,016-232-	48-ABCD
W1B2CWA	12,438-301-	38-AB
W1B2TFH	8448-152-	44-ABCD
W1B2V	6180-103-	30-DE

W1B2ONA	5852-131-	38-ABCD
W1A1UJT	4620-132-	35-AB
W1B2CUT	4484-236-	19-B
W1B2NCF	3960-163-	22-ED
K1BNC	2492-94-	27-AB
N1ATZ	1862-98-	19-B
W1B2IKL	1764-98-	18-B
W1A2KZ	180-14-	12-BD
K2R(A)K2S WNE OMR KC27		
W1B2WIK	142,006-1154-	101-ABCFD
W1A2SNA(AG2N,K2S BIG LPG,K2S		
BNF EPL,N2AAR,W1B2V,W1A2S		
W1A2SNA(AG2N,K2S BIG LPG,K2S		
BNF EPL,N2AAR,W1B2V,W1A2S		
LHG RFB UPK WLW,W1A2A1		
(ops)	84,816-949-	76-ABCFD
W1A2ASM/2(K2IBP,W1A2S BMB		
F2W GHA MOL NSD QND,W1B2S		
CLU IXP QYI)		
(ops)	32,064-419-	64-ABCD
N2BOW(A)K2S KEU KEX,		
K2BZF,N2BMP		
(ops)	13,951-304-	41-AB
W1A2VNI(N2B1 PM TKN,K2S		
CHK HOA,N2B1N,W1B2S LVC MUA		
NWV)	12,958-273-	38-BCDE
N2BMM(A)K2S DND,N2B3E		
(ops)	12,751-296-	41-ABD

**Southern New Jersey**

W1B2DPJ	40,870-491-	67-ABCD
W1E1F	20,044-431-	64-ABCFD
W1B2KOK	12,672-271-	48-ABCD
W1B2XUJ/2	12,126-197-	47-BCDE
K2JH	8229-178-	39-AB
W1R1W	28,045-191-	34-AB
K2BWR(A)K2ZJ		
(ops)	23,730-252-	70-ABCFD
W1A2DKB(A)K2S CDF HLL		
(ops)	12,600-164-	37-BCD
K2ZJH,K2H2HO,W1B2S DGJ,G1J		
W1U,W1B2S ANJ OQB QOT WUE,		
W1DZAEM,K3HP		
(ops)	4521-108-	33-ABD

**Western New York**

W1B2BGI	15,176-245-	56-ABCD
W1P2G	7394-148-	38-ABCFD
W1CNS	6279-127-	39-ABD
K2GK	5282-119-	38-ABCD
K1B1V	2218-100-	22-B
K2QR	2163-103-	21-AB
K2OS	1860-93-	20-B
W1A2SDY	1520-76-	20-AB
W1A2SZY	810-64-	15-B
W1ZFB	770-55-	14-B
K2OEQ	90-18-	5-AB
K2QIE(A)K2IDCN,N2HR,W1A2S		
PHA VFX,W1A2S G1J W1V1		
(ops)	28,024-424-	62-ABD
W1A2WVL(A)K2S LDJ MP,W1B2JLR,		
W1V1U)	12,800-218-	50-ABCFD
K2JFV(A)W1TMC)		
(ops)	28,024-424-	62-ABCD
W1A2ZJF(K2RHK,W1A2RQC,W1B2S		
I BP MYZ NFV,ops)		
(ops)	9828-154-	52-ABCD
N2JY(A)W1B2Z		
(ops)	8976-185-	44-ABCD

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**Delaware**

K1SXA	33,994-414-	66-ABCD
K1ACHE/3	19,278-352-	51-ABCD

**Eastern Pennsylvania**

N3AHI	29,953-309-	77-ABCFDEI
K1UIV	22,597-263-	59-ABCD
K1WIK	8816-211-	38-AB
K1WIK	6405-65-	15-ABD
A1E3T	4020-134-	30-AB
W1A2OKT	3059-161-	19-B
W1S3JUF	2076-53-	24-CDE
N3VYs	2808-117-	8-B
K1VYs	2800-118-	20-AB
W1B2TE	2024-79-	22-ABD
W1S1C	1566-63-	18-ABCD
K1KEL	611-	2-A
K1MTK(W1B2YEH,W1A3S KPP LBI		
PUL TUL VUN WAK ZFO,ops)		
(ops)	74,046-764-	82-ABCD
W1B3CZG(A)K1S,K1M2,N1AYC,		
W1B3S CXL IWZ,W1D9DBT)		
(ops)	38,160-461-	72-ABCD
W1B3JYO(A)K1S,K1M2,N1AYC,		
N1S AMB BMY,W1B3JYO		
(ops)	27,534-299-	78-ABCD
K1YTL(K1S FOL MWA,K1A3ED,		
W1A3YON,W1B3S CAI FAF PKG		
FYT JPC YON YON YON		
(ops)	27,132-406-	57-ABCD
W1B3LN7(A)K1V1,K1B3S HLB,IB,		
N1ADQ,W1B3S DJF FRL FXJ		
HV1)	19,918-588-	46-AB
W1L1P(W1B3S GFN JUZ UH,		
W1A3CUQ,ops)		
(ops)	9196-242-	38-AB
1938-107-	19-B	
K1A3AAE(A)K1A3LVJ)		
(ops)	1008-72-	14-B

**Maryland - D.C.**

K1SAKR	16,128-740-	56-ABCD
K1HCE	13,770-236-	51-ABD
W1B3LJK	6723-249-	27-B
W1N1WV/3	6576-159-	38-ABCD
W1B3L	6081-126-	35-BCD
W1H1X	2760-138-	20-B
W1A3RWP	2603-137-	19-B
W1A3IJE	1785-108-	17-AB
N1S1F	1611-92-	13-AB
N1BAP	648-53-	16-A
W1MSN	500-18-	15-ABE
W1USS1K3 Z1 ZR N1S ATH		
BEO,W1D4B1K1G1L,ops)		
(ops)	21,126-499-	42-AB
W1P3GA(K1S CXB FRX PHH,		
K1B3S CV EL NSIT,W1B3S JDF VRD,		
W1B3BIT,ops)		
(ops)	8336-192-	33-AB

**Western Pennsylvania**

W1B3CBB	3356-136-	26-AB
W1A3CSA	1444-76-	19-B
W1C1P	1444-73-	19-ABD
W1K1M	96-2-	8-A
W1B3NRP(K1S PS TFL,K1A3S		
DED DWR,W1A3S BLX FFC JBV		
UK1E,ops)		
(ops)	61-ABCD	
K1HKK(K1B2S,K1A3OBV,		
N1BHH,W1B3S ALE CXR,		
(ops)		

**LA4LN/W3,ops)**

6688-161-	38-ABD
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**Alabama**

W1C1UJF(A)K1B1Y,W1YD,W1D4S		
(XE PV),ops)		
(ops)	2682-149-	18-AB

**Georgia**

W1A4N1P	11,220-238-	45-ABCD
W1A1SS	780-35-	15-BD
N1A1	588-49-	12-AB

**Kentucky**

W1B4NXY/4	967-40-	17-ABCD
W1S1M	418-35-	11-BD
K1C4E(A)K1B4M,N1K4E,F		
W1B4YTI)	5406-140-	34-ABD

**North Carolina**

W1A4A4V	1672-88-	19-AB
W1D4ODS	963-39-	17-AB
N1S1M	476-34-	14-AB
W1A4JF	90-15-	6-AB
W1A4XU/2(A)K1A4HK,W1A4WZP,		
W1A4HRR,W1D4AGUJ		
(ops)	12,839-325-	37-ABCD

**Northern Florida**

W1D4OW	826-68-	12-AB
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**South Carolina**

N1D4T	3075-110-	25-ABCD
W1A4ALDU	2530-100-	23-ABD
N1B4S	184-27-	7-B
W1B4NBK	180-20-	21-AB

**Southern Florida**

W1A4LOX	2310-110-	21-AB
K1FJM/4	294-41-	7-ABD

**Tennessee**

W1B4JGG	10,633-192-	49-ABD
W1A4GYK	1365-57-	21-ABD
W1B4LHD(A)N1SAYD)		
(ops)	5644-158-	33-ABD

**Virginia**

N1D4C	25,336-336-	64-ABCD
W1D4GXN	11,650-208-	50-ABD
K1Q1F	6006-106-	33-BCD
N1K1V/4	4800-149-	37-AB
W1A4S1	2734-119-	29-ABD
W1Y1Y/4	3744-70-	32-ABCD
N1ACNN	1841-101-	18-B
N1ACWP	114-19-	6-B
W1A1G1A44S NC OD,W1A4S BRJ		
DF5 CFP,W1B4L1W,W1D4MBK,		
(ops)	8073-181-	39-ABCD
N1H1B(W1B4VY1)		
(ops)	595-175-	31-AB
K1A4O1/4(A)K1A4WQS,K1B4NT)		
(ops)	630-84-	7-BC

**West Indies**

W1A2ZWH/KP2	75-15-	5-A
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**Arkansas**

W1B5JAR	658-47-	14-AB
N1D5L(W1B5P1E,W1D5S CAN CAP)		
(ops)	13,616-250-	46-ABCD

**Louisiana**

W1A5YOU(W1B5N1F,ops)		
(ops)	576-26-	16-ABCD

**Mississippi**

W1SUCY	441-49-	9-AB
W1P1P5(A)E9N,K1A1KS,W1A9YLB)		
(ops)	40,421-421-	83-ABCD

**New Mexico**

W1ZEA	552-56-	4-BC
N1SAC1	156-37-	3-AB
W1D5GNW(W1WZ YF)		
(ops)	140-27-	5-AB

**Northern Texas**

W1B1VJB	2025-179-	9-ABCDH
K1S1S	54-9-</	

# Operating News

Conducted By John F. Lindholm,\* W1XX

## ORS Revived

Many an old-time traffic handler still proudly retains a battered and faded vintage Official Relay Station (ORS) certificate dating back to the early days of relaying third-party message traffic. Such coveted certificates of proficiency in handling traffic bear the distinctive signature of "Mr. Ham Radio," F. E. Handy, WIBDI, long-time ARRL Communications Manager.

The American Radio Relay League was founded on the principle of providing this necessary and enjoyable public service function — the relaying of third-party message traffic. Radio amateurs have a long history of dedicating a part of their activities for the public good. Our national organization was born of that need with the concept of relaying traffic imbedded in our very name, ARRL. Thus the elite became recognized as Official Relay Stations of the American Radio Relay League.

Before the newcomers reading this conclude that we have gone daffy on nostalgia, it should be pointed out that the title ORS met its demise a few short years ago in a Communications Department reorganization. It was replaced with the more descriptive appointment, Official Traffic Station (OTS). Previously, the ORS designation was reserved for those who displayed traffic handling proficiency on cw, and the Official Phone Station (OPS) appointment came somewhat later in recognition of traffic handling via the voice modes. This dichotomy by mode was not at all in keeping with the central theme espoused by the National Traffic System that no particular mode be given any special recognition or preference. Thus, the all-inclusive OTS appointment presently in force was a giant step forward in bringing all traffic handlers, regardless of mode, under a single roof.

But nostalgia dies hard. In my attendance at several conventions in the past two years, from those active in the trenches of Communications

Department-sponsored traffic and emergency activities, invariably, the question arises: "Why can't we have the ORS appointment instead of OTS?" When a vote on the question is called for, a veritable forest of hands votes "aye" in endorsing the more traditional ORS designation. So, in true democratic fashion, the question was put to the ARRL appointees themselves, in the form of a survey printed in the Communications Department quarterly *QCD*. Thus, those affected had an opportunity to register their preference. The accompanying discourse left no mistake about it, though, that the basic underlying concept of unity of purpose regardless of mode, as was established in the creation of the OTS appointment, was not to be compromised. Segregation by mode had been put behind us. Recognition of unity of purpose in a *single* traffic handling appointment was a progressive step forward in the evolution of the Amateur Radio response to Part 97.1. Therefore, any consideration for reinstatement of the ORS appointment carried the condition that it would pertain to *both* cw and phone handling of traffic (and any other mode as well, such as RTTY, ASCII, packet, etc.).

The volume of response to that survey was gratifying. Those affected most have spoken and have voted overwhelmingly in favor of supporting the ORS appointment to recognize all traffic handling capabilities. As the proponents said, if *Relay* is good enough for ARRL, then it's good enough for ORS. A total of 76.6% of all appointees voted in favor, while those holding the OTS appointment were almost as adamant with 71% responding in the affirmative. Since those poll results were announced to the CD family this past fall, budgets and inventory of present stock of materials have been investigated to ensure such a change would not entail any significant additional expenditure. Since additional funds to

implement will not be needed, the recommendation was made to the Executive Committee to implement such change effective January 1. The Executive Committee has approved, and it is hereby announced, that effective January 1, the OTS appointment is replaced by the Official Relay Station appointment. Section Communications Managers need not submit new appointment cards for such appointees, for the ORS appointment will automatically replace OTS.

In retrospect, it may be easy to criticize past administration for implementing what was a somewhat unpopular appointment designation in the first place. But the reality is that even four years ago, to open the ORS doors to those who operate phone would have been considered sacrilege. With the creation of an integrated National Traffic System, today, traffic originated on cw is passed to those who will relay it on phone, and vice versa. Traffic often meets its destination on 2-meter fm. This approach to handling traffic has been healthy. It has opened a bright new vista of tolerance for alternate modes of handling traffic. The doors to even upper-echelon NTS positions are wide open to newcomers. The suspicions of yesteryear have been laid aside with the realization that we are all in this together.

With this ray of sunshine comes a beam of hope in the future of an expanded traffic-handling capability. It is hard to discern from the crystal ball what lies ahead. But the petty concerns of the past have been cast aside to explore newer modes of operation — satellite, packet, linked repeaters, traffic handling capability spanning the oceans to Europe and Australia, traffic origination in the morning hours for same-day delivery thousands of miles distant. It's an exciting future, one that can be blended with the nostalgia of the Official Relay Station designation, which once again lives.

## SCM ELECTION NOTICE

To all ARRL members in the Alberta, Nevada, Rhode Island, Northern New Jersey, San Joaquin Valley, Utah, Maryland-D.C. and New Hampshire sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL  
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . ZIP . . .)

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 6, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, 1981, returns counted May 19, 1981, and SCMs elected as a result of the above procedures will take office July 1, 1981.

If only one valid petition is received for a section,

that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1981.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July *QST* and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX  
Communications Manager

## Repeat SCM Nominating Solicitations

Since no petitions were received for the Nebraska section as a result of notices in the July and August *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

\*Communications Manager, ARRL

## SCM Appointments

In the Western New York Section, William Thompson, W2MTA, has been appointed to complete the term (until September 30, 1982) of Lonnie J. Keller, WA2AOG (resigned).

In the North Carolina Section, Ed Stephenson, AB4S, has been appointed to complete the term (until March 31, 1982) of Bill Parris, AA4R (resigned).

## SCM Election Results

The following elections were conducted for two-year terms of office beginning January 1, 1981:

**Balloting Results:** In the Missouri Section, L. G. Wilson, KØRWL received 557 votes and Benton C. Smith, KØPCK received 335 votes. Mr. Wilson is declared elected.

In the New York City & Long Island Section, John H. Smale, K2IZ, received 477 votes. Paul A. Lindgren, WA2UWA, received 420 votes and John J. Edwards, WB2IBE, received 147 votes. Mr. Smale is declared elected.

In the Oregon Section, William "Bill" Shrader, W7OMU, received 428 votes, Raicigh A. Munkres, W7HAZ, received 219 votes and Nels Hanson, WB7RAP, received 182 votes. Mr. Shrader is declared elected.

In the Saskatchewan Section, W. C. "Bill" Munday, VE5WM, received 75 votes, Norm F. Waltho, VE5AE, received 26 votes and Eric J. Quiring, VE5HG, received 23 votes. Mr. Munday is declared elected.

In the South Carolina Section, Richard McAbee, W4MTK, received 337 votes and Earle D. Gillian, K4VIA, received 271 votes. Mr. McAbee is declared elected.

## OCTOBER CD PARTY TOP SCORES

CD Field appointees and League Officials are invited to participate in the January CD Party (Jan. 3 phone; Jan. 10 cw). Complete details are in the Winter issue of QCD. The October CD Party produced a slight increase in logs over the year before — up to 179. Participation was pretty good on cw but lacking on phone, perhaps because things had to be scheduled all on one weekend. Competition for the top position was very close on cw, with only a few QSOs or a multiplier making the difference. Top scorers are listed below (call, score, QSOs, multiplier, hours, ARRL section). — Tom Frenaye, K1KI

## Cw

W2GD	26,535-435-61-10-NNJ
W2RQ	25,920-432-60-10-NNJ
N6TR	25,864-424-61-10-SB
K7NHV	25,200-420-60-10-ID
K6LL/7	23,316-402-58-10-AZ
K1XA	20,007-351-57-10-CT
W9OP	18,544-304-61-10-WI
N6OP	18,468-342-54-10-EB
NØTT	17,435-317-55-10-MO
W6JUF	17,100-300-57-10-SD
WB1HIH	16,830-306-55-10-WM
N4KG	15,903-279-57-9-AL
K6WI	14,787-279-53-8-ORE
N6NF	13,886-262-53-8-SCV
N4SA	13,500-250-54-9-NF
N6PE	13,312-256-52-7-ORG
AF2L	12,272-236-52-8-NNJ
N3EE	11,536-206-56-8-WPA
W9NA	10,945-199-55-4-WI
KB7JW	10,296-198-52-10-OR
VE3ATU	10,149-199-51-7-ONT

## Phone

KB6FR/VE3	10,560-220-48-10-ONT
WB1HIH	7515-167-45-9-WM
W2RQ	6040-151-40-5-NNJ
K6LL/7	6027-147-41-4-AZ

## WIAW NOTE

The complete WIAW winter operating schedule appears in October QST, page 90. 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.

## OSCAR Operating Schedule

OSCAR 7				OSCAR 8			
DATE (UTC)	Orbit No.	Time UTC HR MN	Eqx W. Long. Degrees	Orbit No.	Mode	Time UTC HR MN	Eqx W. Long. Degrees
1 Jan.	28,042	0132	98.5	14,402	A	0104	72.5
2 Jan.	28,054	0031	83.3	14,416	A + J	0109	73.7
3 Jan.	28,067	0126	96.9	14,430	J	0114	74.9
4 Jan.	28,079	0025	81.8	14,444	J	0118	76.2
5 Jan.	28,092	0119	95.4	14,458	A	0123	77.4
6 Jan.	28,104	0018	80.2	14,472	A + J	0128	78.6
7 Jan.	28,117	0113	93.8	14,486	X	0133	79.8
8 Jan.	28,129	0012	78.6	14,500	A	0137	81.0
9 Jan.	28,142	0106	92.2	14,514	A + J	0142	82.2
10 Jan.	28,154	0005	77.1	14,527	J	0004	57.7
11 Jan.	28,167	0060	90.7	14,541	J	0008	58.9
12 Jan.	28,180	0154	104.2	14,555	A	0013	60.1
13 Jan.	28,192	0053	89.1	14,569	A + J	0018	61.3
14 Jan.	28,205	0147	102.7	14,583	X	0023	62.5
15 Jan.	28,217	0047	87.5	14,597	A	0027	63.7
16 Jan.	28,230	0141	101.1	14,611	A + J	0032	65.0
17 Jan.	28,242	0040	86.0	14,625	J	0037	66.2
18 Jan.	28,255	0135	99.5	14,639	J	0042	67.4
19 Jan.	28,267	0034	84.4	14,653	A	0046	68.6
20 Jan.	28,280	0128	98.0	14,667	A + J	0051	69.8
21 Jan.	28,292	0027	82.8	14,681	X	0056	71.1
22 Jan.	28,305	0122	96.4	14,695	A	0101	72.3
23 Jan.	28,317	0021	81.3	14,709	A + J	0105	73.5
24 Jan.	28,330	0115	94.8	14,723	J	0110	74.7
25 Jan.	28,342	0015	79.7	14,737	J	0115	75.9
26 Jan.	28,355	0109	93.3	14,751	A	0120	77.1
27 Jan.	28,367	0008	78.1	14,765	A + J	0124	78.4
28 Jan.	28,380	0102	91.7	14,779	X	0129	79.6
29 Jan.	28,392	0002	76.6	14,793	A	0134	80.8
30 Jan.	28,405	0056	90.1	14,807	A + J	0139	82.0
31 Jan.	28,418	0150	103.7	14,820	J	0000	57.4
1 Feb.	28,430	0049	88.6	14,834	J	0005	58.7
2 Feb.	28,443	0144	102.2	14,848	A	0010	59.9
3 Feb.	28,455	0043	87.0	14,862	A + J	0014	61.1
4 Feb.	28,468	0137	100.6	14,876	X	0019	62.3
5 Feb.	28,480	0036	85.4	14,890	A	0024	63.5
6 Feb.	28,493	0131	99.0	14,904	A + J	0029	64.7
7 Feb.	28,505	0030	83.9	14,918	J	0033	66.0

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 MHz on 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 and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7373° W. per orbit in a period of 114.9417 minutes.

O 8 progresses an average of 25.8012° W. in a period of 103.1964 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A, Tuesdays and Friday — Mode A + J, Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J 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.

## Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with \$3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

## OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.



# Public Service

Conducted By Robert J. Halprin,\* K1XA

## Organizing a Training Net

One of the more enjoyable experiences I have had as an Amateur Radio operator is my association with traffic handling, in particular slow-speed cw nets. I formerly managed the Kansas cw Slow Speed Net (QKS-SS), and have been interested in how training nets operate across the country. I began contacting other slow-speed net managers and solicited a few comments on how their nets were organized and things they did to keep up the training level and activity. In the following paragraphs, I have combined my own experiences with others into a guide for slow-speed net managers.

### Purpose of Slow-Speed Training Nets

A slow-speed training net should have one primary function — to train operators in traffic-handling and net procedure, while giving them actual on-the-air experience with live traffic. All activities of the net should be geared with this central theme in mind. Any activity that does not measure up to this goal should be put under serious scrutiny.

As a secondary function, which gives practicality to the primary goal, the net serves as an outlet for traffic from operators who are restricted to the Novice bands. It also provides them contact with higher-class licensees and sets an example of good cw operating practices.

When I first got my ticket, I was relieved to find out that it was possible to have a real conversation in the cw mode. But after several months of the typical RST QTH NAME 73 CUI contacts, I was ready for more challenging operating. Nets provided that for me, and should for every new operator as well.

### Finding Operators

Locating new members for the net is a continuous job. Publicity for the net is extremely important. Get on the phone nets and the local ragchew nets, and talk about the training net. You'll be surprised how many new operators will be informed through these contacts. Some of the best operators on QKS-SS found out about the net via the grapevine (through someone I had talked to on a section phone net).

Some caution must be exercised in inviting net members. It has been my experience that a brand-new Novice is generally not that great an operator. Many newly ticketed Novices are still in the "ohmygodwhatdoIdonow?" syndrome, and are hanging around the 4- to 5-wpm level. After a couple of months on the air, their speed will climb to 8 to 10 wpm, and at that point they are ready to communicate. On our net, we tried to run at that speed, and it was successful.

Contact the clubs in the section. Send them information about the net and some brochures about operating procedure. Go to conventions armed with this information. Find out who the new Novices in the section are (I had an arrangement with my Division director, who sent me a listing of the new Novices in my section. Then I sent a radiogram to each one, inviting them to participate in the net). The manager of one slow net kept track of all the stations who were conducting QSOs on adjacent frequencies during the net session, and

Table 1

### Sample Net Log

DATE (Z)	QTR	QTC	QNI	NCS	QNS	3	4	5	6	7	8
Jan. 16	24	4	5	BCL	FLU	TYK	VEZ	QQQ			
Jan. 17	17	5	8	VS	BCL	VEZ	FLU	DST	YVK	VVA	OYH
Jan. 18											

sent them radiogrammed invitations to participate. This serves a twofold purpose: (a) it helps inform them so as to avoid causing QRM to the net; and (b) it picks up many new participants in the net.

I keep a packet of material and information about the net, and send it to all prospective members. This packet contains information such as CD-218, CD-3, the "Net Directory," and other ARRL operating aids for making traffic handling and net operation easier.

### Net Control Stations and Liaisons

A big headache for the net manager is finding and keeping net control stations (NCS) and arranging for liaison stations to higher-level nets. On our net, I kept a rotation of seven NCS and liaisons with the regular section net. I didn't maintain liaison with the region net directly, so all thru traffic was funneled through the regular section net with liaison to the region net. This avoids confusion at the region level.

The NCS should be a good operator who understands net procedure well. I didn't allow operators to be NCS unless I felt they could already operate well as net members and had handled some traffic. I had a chance to try them out by having them substitute (QNG) for a regular who was unable to perform his/her function.

The NCS should be patient, remembering that he or she is going to be working with newer operators. He should use Q and QN signals properly, but be ready to spell it out in words if there's confusion.

The NCS should learn the capabilities of the operators checking into his session. This brings up another good point. While it is true that on regular cw nets most traffic is passed off-frequency, it is my opinion that as much of the traffic as possible on a slow net should be passed on net frequency. This allows the NCS to be sure that correct procedure is being followed, and gives newer participants a chance to listen to message handling before they try it themselves. Allow new members a chance to pass their traffic on frequency a few times before adding the problem of QNY to their worries. Also, never send weak stations off unless you know that they are good enough to be able to handle it. Above all, remember the primary purpose of the net — training outweighs traffic count.

Much of the traffic coming into the net can't be handled there, and must be taken to a higher level. It is important, therefore, that the net manager sees to it that liaison stations are available each net session to take traffic to the section and/or region net. Try to get a more experienced operator up from the section nets to become active on the slow net. The review on

training won't hurt, and they can build up some liaison points for the Public Service Honor Roll.

### Reports and Record Keeping

Paperwork for a net manager is a necessity. There are variations from net to net, but most managers keep track of the following items:

- 1) traffic listed (QTC)
- 2) traffic cleared (QSP)
- 3) checkins (QNS)
- 4) time in operation
- 5) net control station (NCS)

The way I did this was to have each NCS send me a report of his or her session after its completion. A typical message might be:

NR 14 R W0VS 24 MANHATTAN KS JAN 17 WB0VEZ

QKS SS JAN 17Z QNS BCL VEZ FLU DST YVK VVA W0YH ORLAN IN SHAWNEE VS/NCS QTC 5 QSP 5 IN 17 MINS 73

JIM W0VS

From this message, I learned that this is a report for the January 17 UTC session and that the stations checking in were WD0BCL, WB0VEZ, WD5FLU, WD0DST, WB0YVK, WB0VVA (all regulars) and that a new station, Orlan, W0YH, checked in. He lives in Shawnee, Kansas (state names are omitted if within the section/state). The net control was Jim, W0VS. The net cleared all of the traffic that was listed, and was in directed session for 17 minutes. All of the above information is then placed into the net log, a sample of which is reproduced in Table 1.

Special notes can be made on the log, such as names and QTH of new stations, as well as other special information.

This list can then be totaled easily at the end of the month, and a monthly report can then be sent to the ARRL section traffic manager (STM) or the section communications manager (SCM).

Keeping accurate and legible records is important for a net manager, especially if at a future time the net is to be handed over to someone else. This work is not difficult; typically it involves only a few evenings each week to keep it up to date.

### Daily Operating Hints

In the everyday operating of a slow net, several things can be done to keep things rolling along smoothly. A few minutes prior to net time, get on net frequency and ragchew with other net members. This promotes friendships, gets the members to know each other, and helps clear the frequency in the crowded Novice band. Once the net is underway, of course, the chatter must stop.

Periodically, the manager should initiate a QNC to each member concerning a procedural

\*Assistant Communications Manager, ARRL

problem that may be cropping up. This gets the point across to those concerned, without embarrassing individuals. Also, sending specific messages whose texts discuss traffic procedures is good for education and training. [This info is available from WB2IQJ; see December 1980 QST, page 97 — Ed.]

If there are experienced traffickers in the same town as new members, have the veterans get in touch with the neophytes for some invaluable in-person assistance. One net member net controlled with one hand and held a telephone with another, coaching a new Novice. This particular instance may be unusual, but it is very important for the manager to keep in touch with the net members.

Operating on the training nets is fun and satisfying, as I know I'm helping others to become better hams and helping to further the cause of public service. If your section doesn't have a training net, think about the possibility of establishing one. — Donald S. Inbody, WB0VEZ, Wichita, Kansas

### PUBLIC SERVICE DIARY

□ Pacific Ocean — September 19-20, W6BPS utilized the 14.313 MHz Maritime Mobile Service and Seafarers Net to report a damaged vessel to the Coast Guard in Long Beach, California. Thanks to his efforts, the ship's crew was rescued. (WD4HYH)

□ New Castle, Delaware — October 21. When two large propylene tanks exploded, hams assisted the Red Cross by manning evacuation centers. Amateurs also supplemented commercial communications channels, as telephone lines were overloaded. (W3DKX, 5CM Delaware)

□ Gainesville, Florida — October 28. Members of the Gainesville ARS were called upon by civil defense authorities when high winds caused severe damage to the area. Hams assisted c.d., DES and Red Cross personnel by conducting a street-damage survey. (N4UF, 5CM Northern Florida)

□ Norfolk, Virginia — November 8. When WB4RLQ reported a serious automobile accident on the East Coast Amateur Radio Service net (ECARS) on 7255 kHz, WB4YVC called the Virginia State Police. Assistance arrived at the scene in eight minutes. (WB4YVC)

□ The following amateur groups assisted local police departments by conducting a Halloween "Goblin Patrol": Burlington RACES (MA), Newington Amateur Radio League (CT), Plattsburgh RACES (NY), Runseston ARC (MN), Triangle ARC (OH), Wallingford ARES (CT).

### AMATEUR RADIO EMERGENCY REPORTS

□ Coventry, Rhode Island — October 12-13. The Coventry ARES was alerted by the civil defense director to provide communications for a missing mental patient. Using WC1RAC (220 MHz) and 146.52 simplex, hams linked the police and search parties. (W1YNE, EC Kent Co.)

□ Sept Iles, Quebec — October 25. When the Quebec Provincial Police (OPP) were organizing the search for a missing person, ARES members volunteered their assistance. Using 2 meters, hams coordinated the search teams, ensuring that assigned search patterns were being adhered to. The QPP has requested that amateurs meet with their people to establish permanent liaison for future operations. (VE2NL, EC Sept Iles)

□ North Orange County, California — October 28-30. When the 15,000-acre "owl" fire started in the Santa Ana Canyon, ARES members supplied communications for the Red Cross, fire department and the National Forest Service. Hams handled equipment requests for the official personnel and manned evacuation shelters. At 1515 hours on the 30th, the fire was reported as 100 percent contained and 95 percent controlled. (WB6JBI, EC North Orange Co.)

□ Linden, Michigan — November 2. ARES members provided emergency communications for the local fire and rescue units when two small planes collided in mid-air. Using 2 meters, hams provided the fire department with information regarding the location of paramedic units and assisted in controlling the crowd that had gathered on the scene. (WB8IRO, Asst. EC, Geneseo Co.)

### ARRL SECTION EMERGENCY COORDINATOR REPORTS

□ For October, 33 SEC reports were received, denoting a total ARES membership of 15,015. Sections reporting were Ala., Alta, Ariz., Ark., Colo., Conn., Del., Fla., Ill., Ind., Kans., La., Me., Nev., NH, NC, NFla., Ohio, Okla., Ont., RI, SV, SDgo, SJV, SBar, SCV, SC, SFla., SNJ, Va., Wa., WVa., WMass.

### COMMUNICATIONS SERVICE OF THE MONTH

On May 13, 1980, a tornado watch was issued for southwestern Michigan, including Kalamazoo County. A SKYWARN net was just being activated and spotters were enroute to their locations. WB8CFV noticed a wall cloud and reported that a funnel had just touched down. The tornado passed through Western Kalamazoo township and the city of Kalamazoo, and into Comstock township. The spotters immediately converged on the disaster site. WB8CFV began setting up a command post at the Westwood fire station, where he was joined by K8MPF. Soon after, K8BPL and WD8AXA arrived at the scene; they went from house to house, turning off gas mains in the many damaged and destroyed homes.

WA8KGE, who was on his way home from work, was concerned — his home was in the tornado area. Luckily, the storm missed his house by one block. K8EFO, on the other hand, wasn't so fortunate — his home sustained damage. Amateurs on the scene set up road blocks to limit access to the disaster area until the Sheriff's Reserve arrived.

WD8KBF, WB9GCG, WB8ORZ, KA8AOB, and WD8KGR were stationed at the Comstock Fire Department, which was left without power or telephone service. Only one telephone line was operational, and only incoming calls could be received. Amateurs provided their only link to Consumer's Power, Michigan Bell Telephone, Kalamazoo County Sheriff's Department and the EOC.

WB8EKU, an amateur on the Kalamazoo police force, requested assistance at the police station, for internal communications. WA8PRY and WB8SLR were dispatched, but by the time they arrived the city decided that it didn't require our assistance. This was the only request made by the city for our assistance. Our SKYWARN net was monitored by their civil defense director, however.

The American Red Cross chapter house was also without telephone service and power, as the twister had passed less than a block to the north of them. WB8EMD, WA8PST and WD8EIO went to the chapter house, providing communications with the EOC, sheriff's department and their shelters.

K8OQB operated WC8AAJ at the Kalamazoo EOC on May 13. He handled reports of downed wires and gas leaks, relaying them to Consumer's Power. The Salvation Army and Red Cross both opened shelters for those left homeless as a result of the storm. Both Red Cross shelters were secured shortly after midnight, as it became evident that they wouldn't be needed. The Salvation Army shelter housed the over 400 state police officers who were sent in to provide security for the damaged areas. Once all emergency communications were completed, K8OQB began to handle health-and-welfare traffic for the Red Cross.

On May 14, K8OQB, WA8LSO (now K88SP), K8MPF, WA8PST, WB8EMD, WD8EIO and WA8WVY handled over 500 inquiries. WB8JVP handled H/W traffic from the start of the emergency.

Throughout the emergency, 73 amateurs provided assistance and maintained excellent discipline on the operations frequencies. I wish to thank the Oshtemo ARC for the use of their repeater and the gracious authorization to use it any time for SKYWARN nets or emergencies.

The operation's success can be attributed to the fine participation of dedicated amateurs in the Sunday night ARES net, the Wednesday evening RACES net and the numerous SKYWARN nets. The amateurs in the Kalamazoo area are committed to emergency communications, and participate in weekly and monthly training sessions. Those who participate regularly are the cardinal members of the ARES/RACES system for Kalamazoo County. My appreciation to those amateurs who maintained radio silence in the knowledge that they weren't needed at the time. I hear cooperation was also necessary and deserves acknowledgement. (Alfred F. Nelson, K8OQB, EC/RACES officer, Kalamazoo Co.)

### REPEATER LOG

According to reports received between October 21 and November 21, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Vehicular Emergency	Public Safety and Rescue	Fire	Disasters	Power Failures	Total		
K1DFS						1		1		
K1FFK						1		1		
W1BCG			1	1	1	1		5		
WR1AID			1			1		2		
W2VL	1		10		1	3	4	19		
WR2ADJ						1		1		
WR2AOC				1				1		
W3UER	1	1	1	3	1			8		
WA3KOK						1		1		
K4HXD						1		1		
K4IGB						1		1		
K4SCL	1		1			12		14		
N4CKE						1		1		
W4JNB						1		1		
W4RNX			1					1		
WA4KST				1				1		
WB4TON	1		2			5		8		
WR4AGY	1	1	3	17	3	5		30		
WR4ACZ						1	1	2		
WR4AMJ				1			1	2		
K5DJ						6		6		
K5XY						2		2		
WA5LHL						1		1		
WR5ABA	1		6					7		
WR5ABI	2		2					4		
WR5ABY	1		6					7		
WR5AIB			1					1		
WR5AKZ						1		1		
WR5APK			3					3		
WR5APN			1					1		
K6BDI						1		1		
K6MHE				1		1		2		
WB6RD	1							1		
W6IYY			3			3	7	13		
W6PVR			1		1	7	3	11		
WA6VNV						1		1		
WB6HUK						2		2		
WD6EZX			3			1		4		
WR6AEN		1	22	4				27		
WR6AMH	4		6	1	2	1	1	15		
WR7AEL						1		1		
K7CC	1	2	9			2		14		
VE7RAG						1		1		
VE7RSI						1		1		
K8RO						1		1		
WB8UPV				1				1		
WA8THK				1				1		
WA8ULB			1					1		
WB8UIN				2				2		
WR8AES						7		7		
W8FUL			1			1		2		
W8AUH	1							1		
W8NVK	2							2		
WA8VVM						1		1		
WB8CMC		5	1			3	1	10		
WR8AFT						1		1		
Simplex				1	1	16	15	33		
Total	7	17	7	102	13	9	59	80	7	281

### NATIONAL TRAFFIC SYSTEM

Welcome aboard to new managers WB7WOW (RN7/c2) and WD9JUX (9RN/c2). "SET went well" report area net managers W0HI, WB0MTA, W7EP and K2KIR. A full QST report will be forthcoming.

### October Reports

	1	2	3	4	5	6	7
<b>Cycles One* and Two</b>							
<b>Area Nets</b>							
EAN	33	1266	38.4	920	90.4		
CAN	33	777	23.6	465	100.0		
PAN	45	673	14.9	438	72.6		
<b>Region Nets</b>							
1RN	62	379	6.1	394	72.0	93.9	
2RN	43	180	4.2	298	54.0	96.9	
3RN	43	204	4.7	268	93.0	93.9	
4RN	66	497	15.1	487	74.2	100.0	
HN5	33	499	15.1	391	95.8	100.0	
RN6	75	563	7.5	372	68.7	68.2	
RN7	64	694	10.8	803	100.0	68.2	
8RN	56	257	4.6	325	67.8	90.9	
9RN	66	476	7.2	279	83.3	100.0	
YEN	29	134	4.6	133	70.1	100.0	
ECN	10	49	4.9	322	15.2	66.7	
TWN	51	295	5.8	280	89.8	68.2	
<b>TCC</b>							
TCC Eastern	137 <sup>1</sup>		696				
TCC Central	90 <sup>1</sup>		474				
TCC Pacific	69 <sup>1</sup>		280				
<b>Cycles Three* and Four</b>							
<b>Area Nets</b>							
EAN	33	2312	70.1	1675	95.5		
CAN	33	1137	34.5	943	100.0		
PAN	33	1287	39.0	1079	97.5		
<b>Region Nets</b>							
1RN	63	702	11.1	508	96.8	90.9	
2RN	94	1008	10.7	749	97.4	97.0	

3RN	62	520	8.4	.619	98.9	93.9
4RN	66	991	15.2	.523	89.6	93.9
RN5	66	1030	15.6	.577	95.1	100.0
RN6	66	584	8.8	.466	91.0	95.5
RN7	64	682	10.7	.948	100.0	100.0
BRN	62	525	8.5	.429	91.4	97.0
BRN	66	659	9.9	.481	92.0	100.0
TEB	64	398	6.2	.333	87.4	100.0
ECN	63	282	4.5	.476	82.0	100.0
TWN	66	730	11.1	.354	98.7	97.0

TCC						
TCC Eastern	120 <sup>1</sup>	597				
TCC Central	88 <sup>1</sup>	440				
TCC Pacific	149 <sup>1</sup>	1104				

Sections <sup>2</sup>	6649	35,749	5.4
Summary	8258	59,630	7.2
Record	7177	51,239	16.4

\*Activated for the Simulated Emergency Test.

<sup>1</sup>TCC functions not counted as net sessions.  
<sup>2</sup>Section and local nets reporting (210):ATN (AB), ACN ASN BN SN (AK), AENB AEND AENJ AENM AENS (AL), ARN OZK SCARC (AR), ACT HARC SWN (AZ), NCN NCTN SBARES (CA), CN CPN NVHFTN WESCON (CT), DEPN DTN (DE), DEN FAST FMSN FMTN FPN FPTN MEN NFPN PBTN PEN QFN QFNS SBN SPARC SWFTN TPTN (FL), ARES CGVHF GCN GSN GSSBN (GA), I75MN (IA), CD FARM IMN MT (ID/MT), ILN (IL), ION IPN ITN QIN (IN), QKS (KS), 4ARES SARES BARES KNTN KPON KRN KSN KTN KYN MKPN PAWN (KY), LAN LRN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEPN WMN WMPN (MA/RI), MEPN MMN MTN WRIN (MB), MDD MEPN (MD), AEN MDRN MPNS (ME), MACS MITN MNN QMN SEMTN UPM (MI), MNAWXXN MSN MSPN (MN), ACENEMOE (MO), APN (MR/NFLD), MTN (MS), CMN CNCTN CNN CW JFK M2MEN NCSBPN PCTN RARS THEN (NC), DATA GRN (ND), NSN (NE), GSFM NHH (NH), JSARS NJN NJPN NJSN NJVN OBTN UCN (NJ), NMRRN SWN (NM), NSN (NV), CNYTN EAVTN NYPN NYS OCTEN STAR WDN (NY), BN OSN (OH), OAN OFON OLZ OPEN OTWN STN (OK), KN LN NBN OLN OPN OSN (ON), 16/76TN ARES BSN JCARES LBLARES MPARES OARES OSN PDXARES PTTN (OR), EPA EPAEPTN NWPATMTN PPN PTTN WPA WPAPTN WPATMTN (PA), WQVUHFARECN (PQ), SCNTN SCSSBN (SC), SDEPN SDMN SDN ISWYN (SD), PWXN RARA SATN SKTN SPN (SK), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VNTN VSN VSN (VA), EWNT NTN NWSSBN NWTN PSTS WARTS WIN WNN WSN (WA), BEN BWN WSN (WI), HN RACES WVFN WVN WVNW (WV), CBN JN (WY).

1 — NET	5 — RATE
2 — SESSIONS	6 — % REP.
3 — TRAFFIC	7 — % REP. TO AREA NET
4 — AVERAGE	

### Transcontinental Corps

K0DJ has been appointed TCC Director, Pacific Area/4. The following amateurs received Eastern Area/4 certificates: K4KNP (11th annual), K1BA (fifth annual), K1XA (fourth annual), K1GN (third annual) — first-time certificates to WA3WQP, KB4N, W4JK, WB4PNY, K4YX and VE3CWA.

1	2	3	4	5
Cycles One* and Two				
TCC Eastern	139	91.3	1398	696
TCC Central	93	96.8	739	474
TCC Pacific	29	75.9	167	167
Summary	261	88.0	2304	1337

Cycles Three* and Four				
TCC Eastern	128	93.8	1832	597
TCC Central	98	89.0	836	440
TCC Pacific	146	91.8	1940	970
Summary	372	91.8	4608	2007

\*Activated for the Simulated Emergency Test.

1 — AREA	4 — TRAFFIC
2 — FUNCTIONS	5 — OUT-OF-NET TRAFFIC
3 — % SUCCESSFUL	

### TCC Roster

The TCC Roster (October) Cycle Two — Eastern Area (N2YL, Director) — W1s GYX XX, K1XA, K2PL, N2YL, W2s CQB RQ ZOU, WA2MFV, K3JSZ, N3SJ, WB3GZU, N4AZI, W4JK, WA4CCK, WB4PNY, AF8V, WB8YDZ, W4E3S ATU CWA GOL. Central Area (W9JUU, Director) — W4CGG, WD4HIF, W5KLV, WA5s BHF INJ, WB5s NKC OXE YDD, K5s KJN PE, KA5BN, W9s JNU XNG, WB9WGD, WD9IUX, Pacific Area (W0HXB, Acting Director) — W5JOV, KA5DDW, N5SJ, WB5s EIG MLB PVI, K6OE, K6MI, W7s AK DZ XSE, WB7WQE, W6s EJD HXB LQ HE, WA6OYI, WB6s FV, LFR, MTA, WD6AIT, K0DJ, K0MM, N6s ACW BDE BFH. Cycle Four — Eastern Area (W4SQO, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQO UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, K8C8, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — N4MD, W4ZJY, W5s RB SBE, K5s GM RG, N5s BB BT RB TC, W9s CXY DND NXG, W6s AM HI, K6s CW EZ EVH. Pacific Area (K0DJ, Director) — K5MAT, N5NG, W5KH, N6s GW PZ, W6s EOT JXK OA SX YZT, WB6PVH, K7s HLR KA MC, W7s AK DZ XE GHT LYA VSE, WA7GYQ, K8s BN DJ TER, W8s HXB LQ, WD8AIT, VE7ZK.

### Independent Nets (October 1980)

1	2	3	4
Central Gulf Coast Hurricane Clearing House	31	116	2214
Early Bird	31	447	278
Empire State Slow Hit and Bounce	31	839	412
Hit and Bounce Slow	30	67	425
IMRA	31	426	541
Mission Trail	35	318	113
New England Novice	27	611	1184
New England Teleprinter	31	276	1344
North American SSB Traffic	31	141	257
Southwest Traffic	14	22	46
West Coast Slow Speed	27	93	112
20-Meter ISSB	31	102	1136
75-Meter ISSB	30	85	282
7290 Traffic	27	524	602
	31	1013	434
	52	3092	623

1 — NET  
2 — SESSIONS  
3 — TRAFFIC  
4 — CHECK-INS

### Public Service Honor Roll October 1980

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RITTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RITTY nets, 3 points each, max. 12; (5) Performing assigned NTIS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

826	118	103	W5VMY
KA9CPA	AJ3R	WD9IUX	WA8HGH
222	N2APB	AA4FG	WB3CAI
W0OYH	117	K3JL	90
195	KA3T	WA1UGJ	KA6A
WA4EIC	116	WB7TQF	N4AXN
	182	VE3GT	N5RB
	WB2TQC	102	VE5AE
	WB5NKD	KA1BJY	89
	WA4NFK	101	AK1E
AF8V	WB5JZP	WB1GPF	KB5UL
	115	WB4WYG	KB5X
	WB2EAG	KA4GFU	WACKS
	WA2SPL	100	WA0TNM
	WA4SRD	KA4ASZ	KA2CLY
	114	99	88
	WA4JDH	VE3KK	K0BXF
	KB2HM	WB6PVH	N4WA
	AF2L	WB8PIM	N9AJG
	WB8YRY	VE3HTL	W4MEE
	WA5RVT	W7FJZ	276
	144	WB5NKC	KB7JW
	WB7LNE	W9DM	W7DZX
	KA8CPS	AF00	W4GPL
	WB7WOW	WB8MTD	118
	143	97	0
	WD4HIF	KG5L	W7SOT
	WB2HDU	VE3GOL	AF8V
	K3JSZ	W1HWG	KB2K
	W2CC	WANWM	WB5MMI
	AG2R	WB6XK	W7WSE
	110	96	11
	W1EOF	WA2KQJ	W4SIZ
	WD8KZX	KB5NIX	K4TH
	133	W9OTF	11
	KB7JW	WB2AZW	83
	129	95	WB7TQF
	WA3NAZ	KB5EK	WB4FV
	128	N5BT	WB8MTD
	WD4AWN	VE3DPO	3
	127	W8GGX	16
	W9JUU	W7MEL	29
	W7LRB	W2AHV	26
	KB5TC	94	279
	107	WA7LGN	4
	N6AWH	93	282
	W4MEE	AD7G	3
	126	W4ANK	27
	WB3FEH	WB8SYA	5
	WD8LRT	K2GCE	27
	AA2H	92	256
	124	81	248
	K4SCL	N3AKE	5
	K24K	W7GT	0
	122	W7GTCN	41
	KY4K	80	236
	121	81	215
	K44L NA	N4PL	166
	WA3PXA	W7EP	200
	KA1CGP	WB9JSD	20
	120	W4UTU	26
	W22OJ	80	276
	WA1TBY	K1VSO	19
	119	K4VHT	216
	N4AZI	K2CN	257
		K0T	12
		N6AED	22

79	W7JMH	WB2OWO	WA7DPK
N3AZT	W7LR	WD9GXW	WB8UBR
W2RQ	W8UE	WA2SEL	WD9AJA
W5VMP	W9IOH	67	61
WA5QFD	WD5EUE	K0JCF	N2BDW
WB8QBZ	WD9DYV	K0SI	60
	WD9DVA	K5DY	K6INK
		K01K	N2BQL
		KA1CMXN	WANQL
		KB6YD	WA3VIL
		KN6C	WD6CSL
		KL7JFT	58
		N6GW	WD4SIH/T
		WD4CNQ	AA3B
		WD8RNO	W9JIJ
		W2YJR	WB2OTC
			WB3JYZ
			WB8WTS
			65
			AG9G
			N5CEK
			WA1YNZ
			WA2MIF
			64
			KB6F
			KB6OT
			KF4U
			W4HON
			W4LXB
			WA0TFC
			WA1IOG
			WB7OEX
			WA2EOW
			63
			AB4J
			W4ODE

### Brass Pounders League October 1980

BPL Medallions (see April 1979 QST, page 77) have been awarded to the following amateurs since last month's listing: WA4STO, KB7JW, K9BVE and W0BQP.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
K3NSN	2442	1602	840	762	5646
W3CUL	692	1097	1461	56	3306
N0BQP	0	1266	265	609	2140
KA9CPA	21	944	149	772	1886
W0WYX	34	568	199	367	1166
WD4AWN	3	532	522	27	1084
W9JUU	7	526	528	21	1082
WA0HJZ	25	611	16	424	1076
WA4JDH	1	553	509	8	1071
WD4HF	5	480	413	47	925
WB3GZU	55	347	437	45	884
K4SCL	1	512	341	8	862
W4MEE	1	373	411	18	803
W3VR	276	190	302	10	778
KB7JW	13	361	325	55	754
W7DZX	43	339	350	2	734
W4GPL	118	247	257	108	730
W7SOT	0	428	0	295	723
AF8V	82	277	278	60	697
K4ZK	31	301	321	5	658
W7WSE	5	351	250	48	654
W4SIZ	11	314	297	17	639
K4TH	11	283	142	186	622
WB7TQF	83	225	269	39	616
WB4FV	3	316	239	45	603
WB8MTD	1	431	188	3	603
W3AVJ	16	298	290	1	595
W4OWD	391	26	158	17	592
VE3ATU	3	279	296	7	585
WB2EAG	4	282	269	169	584
W5KLV	3	270	291	19	583
W7LYA	0	300	242	0	542
W6JXK	27	256	248	8	539
WB8NYN	5	268	255	6	534
VE3CWA	0	236	268	10	514
WA2SPL	41	236	224	12	513
K3JSZ	24	215	267	6	512
KA8CPS	85	166	200	60	511
VE3GOL	19	216	246	29	510
AJ3R	12	257	223	17	509
K4GCN	0	286	221	1	508
WB7WOW	24	239	206	38	507
WD8KZX	42	262	129	73	506
N5AMK	3	257	239	3	502
WA1MJE	18	236	221	26	501

Multioperator stations:

W4IZ	1016	45	747	32	1840
WB6PVH	2	253	251	10	516

BPL for 100 or more originations plus deliveries:

WD4RNI	315	W0OYH	127
W4LX	163	WD4COL	111
KF2T	153	WA7LGN	109
W8LCU	144		

1 — CALL	4 — SENT
2 — ORIG.	5 — DEL.
3 — RCVD.	6 — TOTAL

# Contest Corral

## A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye, \*K1KI



### JANUARY

**1**  
**ARRL Straight Key Night**, Dec. QST, page 100.

**3**  
**ARRL CD Party**, phone  
**Zero District QSO Party**, Dec. QST, page 100.

**6**  
**West Coast Qualifying Run** (W6OWP prime, W6ZRI alternate), 10-35 wpm at 0500Z Jan. 7 (9 P.M. PST Jan. 6). Frequencies are approximately 3590/7090. 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/endorsement. The complete WIAW schedule appears on page 90 of Oct. QST, or is available for an s.a.s.c. to ARRL.

**10**  
**ARRL CD Party**, cw

**12**  
**WIAW Qualifying Run**, 35-10 wpm at 0300Z Jan. 13 (10 P.M. EST Jan. 12). Note: code speed starts at 35 wpm and goes down. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 30.08 147.555 MHz. See Jan. 6 listing for more details.

**17-18**  
**ARRL VHF Sweepstakes**, Dec. QST, page 93.  
**FRACAP (Central America) Worldwide Contest**, Dec. QST, page 100.

**International 160 Meter Phone Contest**, Dec. QST, page 100.  
**QRP Winter Contest**, Dec. QST, page 100.  
**QRP ARC SSB QSO Party**, Dec. QST, page 100.  
**West Virginia QSO Party**, Dec. QST, page 100.

**24-25**  
**CQWW 160 Meter Contest**, sponsored by CQ Magazine, from 2200Z Jan. 23 until 1600Z Jan. 25. Cw only (phone Feb. 28-Mar. 1). W/VE stations count 2 points per W/VE QSO and 10 points for DX QSOs. DX stations count 2 points for QSO with own country, 5 points other country, except 10 points for W/VE QSOs. Multiply by sum of U.S. states, Canadian provinces and DXCC countries (includes KH6/KL7). Exchange signal report and serial number; W/VE stations also send state/province. Avoid the DX window — 1825-1830 kHz. Mail entry by Feb. 28 (Mar. 31 for phone) to Don McLenon, N4IN, 3075 Florida Ave., Melbourne, FL 32901.

**Classic Radio Exchange**, sponsored by the Southeast ARC (Cleveland), from 2100Z Jan. 25 until 0400Z Jan. 26. Object is to restore and operate and enjoy equipment built since 1945 but at least 10 years old. Call CQ CX or CQ Exchange. Exchange your name, signal report, state/province/country, receiver and transmitter type. The same station may be worked with different equipment combinations and on each mode on each band. Suggested frequencies: cw — 60 kHz from low end; Phone — 3910 7280 14,280 21,380 28,580; Novice/tech: 3720 7120 21,120 28,120. Add the number of different transmitters, receivers and states/provinces/countries worked for each band. Multiply by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). S.a.s.c. for results. Send logs, comments, anecdotes, etc., to Stu Stephens, K8SJ, 1407 Hollywood Rd., Sandusky, OH 44870.

**Texas QSO Party**, sponsored by the West Texas ARC, 48-hour period UTC. Exchange serial number and country (TX only) or state/province/country. TX stations count 1 point per QSO, except 2 points on cw, multiply by sum of states/provinces/countries. Others count 1 point for cw and 2 for phone QSOs, except 5

points for TX mobiles on phone, 7 points for TX mobiles on cw. Multiply QSO points by number of TX counties worked (254 max.) for final score. Plaques. Suggested frequencies: cw — 3575 7055 14,070 28,090; phone — 3940 7260 14,280 21,370 28,600; Novice — 3710 7110 21,110 28,110. Logs must be received by Mar. 15. Send to WTARC c/o Tom Horton, K5HD, 2708 Halifax, Odessa, TX 79762.

**27**  
**WIAW Qualifying Run**, 10-35 wpm at 2400Z (7 P.M. EST). See Jan. 12 listing for more details.

**31**  
**French Contest**, sponsored by Réseau des Emetteurs Français, 48-hour period UTC. Cw only (phone Feb. 28-Mar. 1). Single-operator stations operate 36 hours only. Work French stations, including overseas territories and DA1/2 French military stations. Exchange signal report and serial number. Count 3 points for QSOs on your continent, 10 points on other continents. Multiplier is 95 French departments (F6GGG/76 is in Department 76), DA1/2, and French overseas countries. Mail within 30 days to REF French Contest, 2 Square Trudaine, 75009 Paris, France.

### FEBRUARY

**Jan. 31-Feb. 8**  
**ARRL Novice Roundup**, this issue, page 80.

**4**  
**West Coast Qualifying Run**, 0500Z Feb. 5 (9 P.M. PST Feb. 4). See Jan. 6 listing for more details.

**7-8**  
**CWSP International DX Competition**, sponsored by CWSP (Brazil), 48 hours UTC, cw only. Single-operator, QRP (10 watts input), and multioperator (club-station, single-transmitter only) categories. Exchange signal report and serial number. CWSP members will sign /CWSP, QRP operator also send power. Count 1 point for QSOs with own country, 2 points your continent, 3 points other continent. Multiplier is DXCC countries plus Brazilian prefixes. Mail entry by Mar. 15 to CWSP Contest Committee, Box 15098, 01000 Sao Paulo, SP, Brazil.

**7 MHz Contest**, sponsored by the RSGB, from 1200Z Feb. 7 until 0900Z Feb. 8. Phone only (cw Feb. 28 — Mar. 1). Single-operator only. Exchange signal report and serial number. Non-European stations count 15 points per QSO with G, GD, GI, GJ, GM, GU, GW stations (not GB). Multiplier is G prefixes. Mail entry to arrive by April 4 (April 25 for cw) to RSGB HF Contests Committee, c/o P. A. Miles, 28 Scotch Orchard, Lichfield, Staffs WS13 6DE England.

**North American Sprint**, sponsored by the National Contest Journal, from 0100Z until 0500Z Feb. 8. Single operator, cw, 80-40-20 meters only. Suggested frequencies: 3530-3550, 7030-7050, 14,030-14,050. Stations outside of North America work NA stations only. Stations may be worked once per band. Exchange his call, your call, serial number, your name, state (or VE province) or country. Proper logging requires the time for each QSO. Serial numbers start with 001 and must be consecutive. An operator may only use one call sign during the contest. Multiply total valid QSOs by the sum of states, VE provinces and other North American countries to get final score. USA and Canada don't count as countries. KH6 not counted as state or country. VE multipliers are Maritime (VE1, VO1, VO2) and VE2 through VE8. Non-North American countries do not count as multipliers. Special QSY rule: If any station solicits a call by sending CQ, QRZ? QRZ, etc., he is permitted to work only one station in response to that solicitation. He must then move at least 1 kHz before working another station, or at least 5 kHz before soliciting other calls. Team competition: Each team has a maximum of 10 members. To qualify as a team, the name, call sign of each operator, and call sign of the station operated should the operator be a guest at a station other than his own, must be registered with N6SF. The team information may be contained in a letter, which must be received before the start of the Sprint, or be contained in a Western Union Mailgram dated at least 24 hours before the start of the Sprint. No distance/meeting requirements for a team entry. Entries should be mailed in time to reach N6SF no

later than Mar. 3. A complete entry consists of a summary sheet showing name, address, score computation, etc., and a log (including dupes marked as such with new multipliers numbered. Separate dupe sheets for each band. Send to Rusty Epps, W6OAT, 5-A Buena Vista Terr., San Francisco, CA 94117.

**Two-Land QSO Party**, sponsored by the South Jersey Contest Coalition, from 2100Z Feb. 7 until 0800Z Feb. 8 and 1300Z February 8 until 0300Z Feb. 9. 160-10 meters. Exchange signal report and county (NJ and NY) or state/province/country. Each QSO counts two points. NJ/NY stations multiply QSO points by sum of NJ/NY counties, states, provinces and countries for final score. Others multiply by NJ/NY counties worked by band. Suggested frequencies: cw — 1805 3560 7060 14,060 21,060 28,060; phone — 1815 3900 7230 14,280 21,355 28,600; Novice — 3725 7125 21,125 28,125. Awards. Dupe sheets required if more than 200 QSOs. S.a.s.c. for results. Mail logs to South Jersey Contest Coalition, John Hokoles, W2KI, 270 Landing Rd., Clarksboro, NJ 08020.

**New Hampshire QSO Party**, sponsored by the Concord Brassfounders, from 2000Z Feb. 7 until 0500Z Feb. 8 and 1400Z Feb. 8 until 0200Z Feb. 9. Exchange signal report and county (NH only) or ARRL section/country. Suggested frequencies: cw — 1810 and 35 kHz from low end; phone — 1820 3935 3975 7235 14,280 21,380 28,575 30,115 145.015; Novice — 3730 7130 21,130 28,130. Count five points per NH QSO, multiply by number of NH counties worked for final score. NH stations multiply QSOs by sum of ARRL sections, NH counties and countries. Mail entry by Mar. 16 to O. W. H. Johnson, Box 63, Bristol, NH 03222.

**Vermont QSO Party**, sponsored by the Central Vermont Amateur Radio Club from 2100Z Feb. 7 until 0100Z Feb. 8. Exchange signal report, serial number and county (VT only)/ARRL section. VT stations count 1 point per QSO and multiply by the number of ARRL sections plus DXCC countries worked. Others count 3 points per QSO and multiply by sum of VT counties worked on all bands. Suggested frequencies: cw — 3685 7060 14,060 21,060 28,100 144.1 MHz; Phone — 3932 3909 7265 7290 14,290 14,325 21,375 28,600 50,260 50,360 145.8. Send s.a.s.c. for results. Awards. "Worked VT" Award for working 13 of the 14 counties. Mail entry by Mar. 31 to Gerald Benedict, W1BD, 23 Foster St., Montpelier, VT 05602.

**14**  
**ARRL Frequency Measuring Test**, begins with a call-up at 0300 and 0600Z Feb. 15 (10 P.M. EST Feb. 14 and 1 A.M. EST Feb. 15). WIAW transmitters will be on the air simultaneously on 20, 40 and 80 meters for the duration of the test but, to correlate your readings with those of the umpire, measurements should be made during the specified periods. Approximate frequencies and measuring periods for the early run are 14,065 kHz between 0107 and 0312Z, 7055 kHz between 0315 and 0320Z and 3500 kHz between 0323 and 0328Z. For the late run, 14,015 kHz between 0607 and 0612Z, 7130 kHz between 0615 and 0620Z and 3555 kHz between 0623 and 0628Z. Submit your averages for each period to be compared with the umpire, a professional frequency measuring laboratory. Indicate how many readings you took to form your average. Your report must be received at ARRL HQ by Feb. 25. WIAW will transmit official results in an ARRL bulletin beginning Feb. 27.

**14-15**  
**PACC (Netherlands) Contest**  
**YL-OM Contest**, phone

**21-22**  
**ARRL International DX Contest**, cw

**25**  
**WIAW Qualifying Run**

**MARCH**  
Feb. 28-March 1  
**CQWW 160 Meter Contest**, phone  
**RSGB 7 MHz Contest**, cw  
**YL-OM Contest**, cw

**7-8**  
**ARRL International DX Contest**, phone

# Section Activities

A-1 OPR ✕ EC ✕ DXCC ✕ RCC ✕ WAS ✕ STM ✕ OES ✕ OTS ✕ NM  
SCM ✕ ARES ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕

## CANADIAN DIVISION

**ALBERTA:** SCM, E. Roy Ellis, VE6XG — SEC: VE6XG, Asst. SCM: VE6AMM, STM: VE6ABC, NMS: IAFSN; VE6AFO, (ATN) VE6ABC. Radio clubs are getting back into the hamming business for another season. The SET was not a success this year and we are still trying to determine why. A housecleaning of delinquent ECs is underway. ATN QNI 187, QTC 18. Traffic: VE6GHK 201, VE6ABC 38, VE6HO 33, VE6XC 11, VE6CE 8, VE6ON 7, VE6AFO 6, VE6AMM 5, VE6CFO 5, VE6CAA 2, VE6YW 1.  
**BRITISH COLUMBIA:** SCM, H. E. Savage, VE7FB — B.C. Public Service Phone Net, VE7QC, NM, reports a high of 180 check-ins and total for month 4302. BCEN VE7COA, NM, reports cw net is improving, with QNI's. VE7FAZ is printing an Op-Man. This booklet covers all info in traffic handling. Contact him on BCEN. Burnaby ARC is the QSL Bureau and they urgently need your envelope with stamps. Delta ARC is our newest club, hope we hear from them. Vancouver ARC: VE7APT, pres.; VE7ARR, secy. They have new quarters, and code theory class will be conducted there on Tuesdays, Traffic (Oct.): VE7FB 102, VE7ZK 77, VE7COA 53, VE7CJ 47, VE7BLO 14, VE7BZ 8. (Sept.) VE7FB 44, VE7ZK 41, VE7COA 39, VE7BLO 26, VE7CJ 26.

**MANITOBA:** SCM, Peter Guenther, VE4QP — Asst./SCM: VE4JP, SEC: VE4TR, STM: VE4RO, NMs: VE4s VJ NM. AEJ TE. SET was a complete success in October and new OECs came thru with good participation. A RTTY net is on a trial basis at 8:30 P.M. local time on Tuesdays and Thursdays. VE4AFO is handling the net. MMN: QNI 347, QTC 31, sess. 33, MTN: QNI 217, QTC 70, sess. 31, MEPN: QNI 980, QTC 25, sess. 31; WRIN: QNI 113, QTC 29, sess. 4. Traffic: VE4QP 75, VE4AEJ 63, VE4TE 34, VE4HR 29, VE4JA 26, VE4FK 18, VE4FC 14, VE4ADS 12, VE4AAD 10, VE4LB 5, VE4AFO 4, VE4AX 4, VE4NM 4, VE4OE 4, VE4AAT 2, VE4DT 1, VE4GM 1.

**MARITIME — Nfld:** SCM, D. R. Wellington, VE1WF — A/SCM: VE1FG, NMS: VO1JN, VE1WF, SEC: VE1EI, STM: Open. Hosp. VE1RC VE1APG & VE1BJF. New WAVO Award Rules Work 20 VO stns 1 of which must be VO2. Send log list cert. by 2 amateurs to VO1FG. No change for VO stns. Congrats to VE1BZC & VE1AQP new Advanced amateurs. Good article by VE1BC on call signs in Kings Co. (N.S.) ARC Bulletin. VE1BC might be RO on New Zealand ship "BOUNTY" this winter. New Exec. Pictou Co. ARC: VE1SK, pres.; VE1HH, vice pres.; VE1BM, secy. VE1YF & VE1CT. VE1W. Visit to VE1 clubs. Give me some lead time. SET activities poor this year. APN — 37 sessions, QNI 217, QTC 81, Time 813; NPN — 31 sessions, QNI 1258, QTC 4, Time 589. Traffic: VE1WF 309, VE1LCRI 70, VE1XF 16, VE1BA 9, VE1ASW 3, VE1OG 2.

**ONTARIO:** SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL, SEC: VE3VG, STM: VE3ATU. With 15 stations and 17 amateurs on the job, the KWARC controlled the recent Oktoberfest Parade. Amid numerous snafus, breakdowns, late floats and the Minister of Culture arriving late, KWARC handled everything in stride. The Parade Marshall was VE3JXC who kept things rolling. Much publicity was received from the efficient operation. It was informed that the RCAG could not have done better. I regret to report that VE3JJA, VE3JL and VE3JZ have become Silent Keys. VE3LJN, who teaches code classes for the Scarborough ARC, vacationed in VE1-Land and the NE states. For the ex-GS, GBVVV recently became the 25,000th current member of the RSGB. Total UK amateur licenses now exceeds 28,000, a doubling of the number in the past 12 years. VE3BS now VE7RG and VE3BSZ is VE3MX. VE3FGU enjoys DX on 6 running 80 watts to a 4 element beam. New members of OCWA are VE3s AGW BZA DZF GT LJA and VH. VE3BWL new EC for the 500 and VE3LJY for Oshawa. The section is looking for prospective ECs throughout the province — contact SEC VE3GOL for details. Or, if you're interested in station appointments, contact VE3JJA. VE3DKZ active again with a new open wire fed antenna. The Open Line Net, sponsored by the TFMCOS Inc., reached an all time high with 102 QTC and a QNI of 599, exclusive of SET. This local 2-meter net receives heavy support in the Toronto area. VE3EFX, with 6 ARES members provided communications at the Muskoka air rally. VE3LJN is the QSL manager for the Niagara-Penninsula ARC call VE3VM. Club project for the OVMRC is a two-metre amplifier. Oakville ARC presented a radio display at the Hopedale Mall and VE3s DKQ AJF LJF ITK IAK XM LVK and JIJZ participated, creating quite a bit of interest. Traffic (Oct.): VE3ATU 698, VE3JJA 514, VE3GOL 510, VE3JK 363, VE3DPO 257, VE3GT 204, VE3GNW 163, VE3JIS 155, VE3HTL 154, VE3JWM 128, VE3JLL 123, VE3DUK 108, VE3FGU 92, VE3GFN 68, VE3CYR 59, VE3JXB 58, VE3JEU 50, VE3BVG 45, VE3JKB 42, VE3JAW 34, VE3BB 34, VE3JFP 33, VE3JAN 32, VE3DVE 32, VE3JAN 28, K86FR/VE3 24, VE3FPI 19, VE3BZ 17, VE3WD 10, VE3VG 10, VE3DKZ 5, VE3EFX 5, VE3MKJ 5. (Sept.) VE3BZ 19. (Aug.) VE3FGV 8.

**QUEBEC:** SCM, Harold Moreau, VE2BP — SEC: VE2DEA, STM: VE2FFE. New appointee is VE2AQU as OVS. Congratulations to VE2CBS (Sorel-Tracy) for being the leader of our division in class Ia for Field Day. Let's all come back again next year. VE2KJ, a regular on the QSL, is also active on RTTY. VE2DY, together with a TS130s, VE2FJ went to obtain sonnet certificate. Amateur à l'âge de 13 ans. Trois DXers Maskoutains sort actifs sur le 15 et 20 mètres, VE28NN (ATB34), VE2AZC (TH5DX), VE2EKC (TH5DX). Traffic: (Oct.) VE2BP 28, VE2FC 24, VE2FK 19, VE2EKC 18, VE2FFE 9, VE2FSA 9. (Sept.) VE2FK 37, VE2FE 33, VE2FSA 14.

**SASKATCHEWAN:** SCM, Norm Walton, VE5AE — SEC: VE5WM, STM: VE5XC, NMS: VE5HG, VE5EF, VE5DC, VE5WM, SATN 388 QNI, 20 QTC, SPN 1154 QNI, 81 QTC, SKTN 2M 147 QNI, 2 QTC, PWXN 360 QNI. A new vhf repeater is being planned for the city of Estevan on 147.78/18, and another one is planned for the Sonningdale area with future linking planned to SKTN and it will be on 147.1070 for starting. VE5AN is now back from Holland after a good holiday. Regina club will be doing some communications for the Optimist parade coming up. Sask was well represented in the past CQWW test with VE5AAO VE5AE VE5GF making most of the noise.

Traffic: VE5WM 46, VE5AE 39, VE5HG 29, VE5MP 16, VE5KS 8, VE5UX 4, VE5HF 3, VE5NJ 3, VE5BR 2, VE5PD 2.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DKX — SEC: W3QF, STM: W3AWY, PSHR: K3JL 103, W3AWY 100, W3DKX 91, N3AKC 82, W3ADM 67, K3ADP 42. DARC officers: WA3JLA, pres. K3AKC, vice pres. AE3H, secy.: N3AWP, treas. W3FUP is new EC for New Castle County. Amateurs rendered Public Service to each area of Del. during October. New Castle Co. emergency communications during Amoco explosion and at an Enduro Run. Kent Co. at the Kiwanis Parade in Dover, and in Sussex at the Georgetown Crop Walk. Thanks to all who participated. The Dover 146.377 repeater is back on the air. For the 1st time in a decade, DE reported tics. has topped one thousand. DEPN: QNI 51, QTC 18, DTN: QNI 399, QTC 88. Traffic: W3QF 252, W3QD 28, N3AKC 94, W3AWY 81, W3DKX 78, K3ADP 72, W3BDJ 59, K3JL 51, W3BFC 37, W3ADM 17, W3BFP 15, W3AZB 10, W3WV, K3ZPV.

**EASTERN PENNSYLVANIA:** SCM, Karl W. Pfeil, W3VA — SEC: W3AZC, STM: W3BJU  
Net Freq. Time QNI QTC Sess. Mgr.  
EPAEPTN 3917 6 P.M. Dy 507 250 31 AJ3R  
EPA 3610 710 P.M. Dy 569 357 61 AA3B  
PFN 3956 5 P.M. M-S 307 388 27 WA3WQP  
PTTN 3610 6:30 P.M. Dy 294 108 27 AG3R

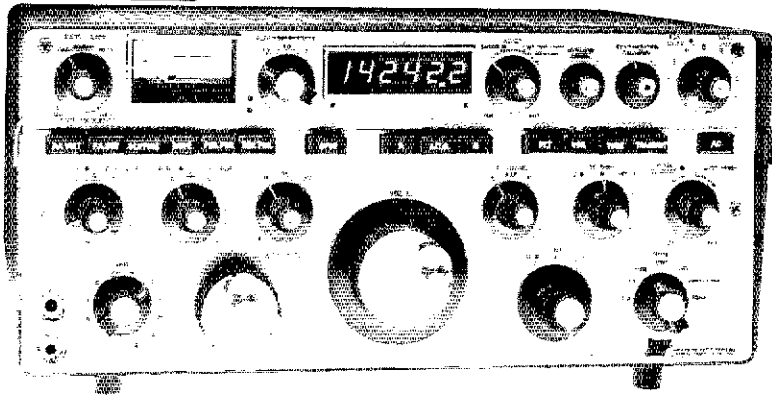
Local and vhf nets reports: WBJOIE/IE Mtg Co AREC and ATN(2) with a total of 235 QNI, OCT 8, 32 sess. OBS reports: K3EBZ W3TI, OO reports: W3FAP and W3GVR. OVS reports: W3GOA K3ADZD and N3CP. PSHR reports: W3GOA K3ADZD N3AZT K3JSE N3BFL W3GAI AJ3R K3JL K3RHJ W3DP W3JFH W3BAZE W3AVJ W3AWQV W3WASH W3GZV W3BJVZ and AA3B. BPL: K3JSE W3AJV K3NSN and AJ3R. New appointments: AG3R K3BJA N3AYK W3B3JM and N3AIA to OES, congrats. PTTN welcomes N3AQO K3AEAA and W3B3HCW. New gear dept: WA3JFD and W3GAI 2 el tri-band beams. WA3ZPO reports meeting with National Weather Service a good one and that Skywarn programs exist in Cumberland Area, and vicinity, Williamsport and Bethlehem areas. K3ADZD reports Cumberland ARC operated message booth at Dillsburg Farmer's Fair and handled lots of traffic. K3ARR and XYL welcome a new harmonic. K3JSE makes BPL for first time and sez it's a lot of hard work. W3B3K working on 6-mtr link for 01/61 machine. W3GCR net repeater in Scranton on 147.6505. AJ3R working for 5B3DX. W3F3AA expects to be on "the band" for coming winter months, sounds like a good idea, hi. HARC finished 2nd in PA QSO Party, FB gang. Congrats to K3FMF on his marriage to K3ACAT's cousin. K3JL has new Rohm 25 tower. WA3JUT new Novice op in Glenside. Congrats to W3BBS group for achieving first place EPA in June VHF QSO Party. N3AVV moved to the Allentown area. N3BHF misses the EPAEPTN gang. K3BFL sez RF and TVI problems will be resolved when he moves to new QTH. K3AKN reports hams active in mock disaster drill at East Juniata High School. W3DP sez number of msgs handled should give points to PSHR because they require more time and effort than JOP. AJ3R working for 5B3DX. W3F3AA expects to be on "the band" for coming winter months, sounds like a good idea, hi. HARC finished 2nd in PA QSO Party, FB gang. Congrats to K3FMF on his marriage to K3ACAT's cousin. K3JL has new Rohm 25 tower. WA3JUT new Novice op in Glenside. 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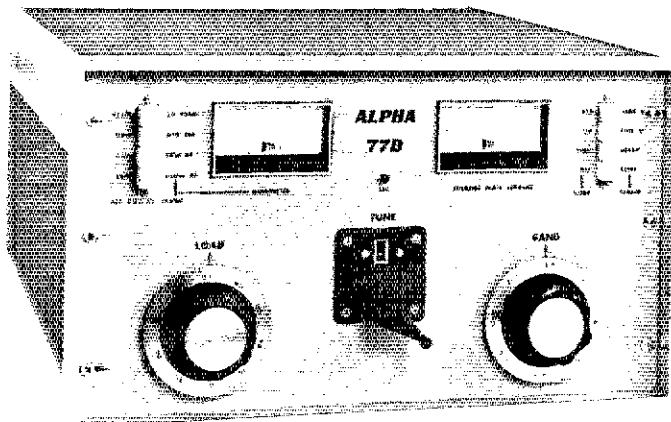
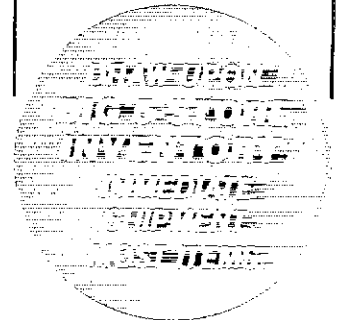
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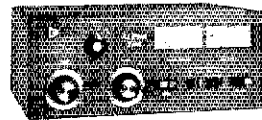


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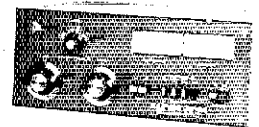
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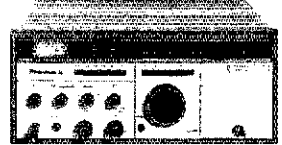


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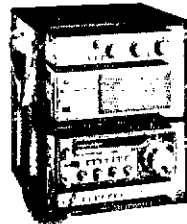
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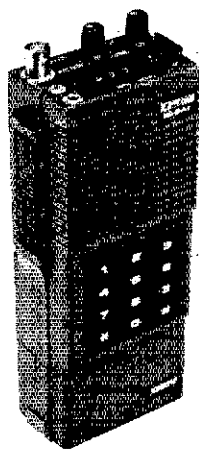
Mon. thru Sat. 10AM to 5:30PM

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON  
• BANTON • BENCHER • BERK-TEK • BIRD • B&W • CALLBOOK • CDE  
• COLLINS • CURTIS • CUSHCRAE • DAIWA • DATONG • DENTRON  
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### IC-720 HF, ALL-BAND TRANS CEIVER



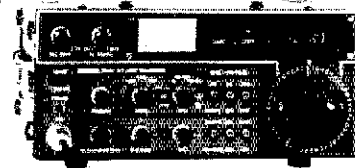
- All 9 HF bands w/100kHz (min) each end.
- All solid state. Broadband tuned and LP filter.
- Digitally synthesized. Tuning resolution 10Hz.
- Passband tuning CW, SSB, RTTY modes.
- Two VFO's. Simplex and duplex and RT.
- RF speech processor.
- CW filter plus narrow CW. Fast, semi-break in.
- Noise blanker, fast and slow AGC.
- 20db RF attenuator.
- Matched mic., metered ALC, excellent TX audio.
- Press-to-talk or VOX.
- WWV reception, 2.5, 5, 10, 15 and 20MHz.
- GENERAL COVERAGE RECEIVER! 0.1 to 30MHz. (No transmit in general coverage.)
- Power output: SSB-10, 100W p.e.p. AM-10, 40W. CW, RTTY-10, 100W.
- Receiver sensitivity: Less than 0.25µV.
- Operating voltage: 13.5VDC @ 20 amps.



### IC-2AT SYNTHESIZED, 2M HAND-HELD TRANSCEIVER

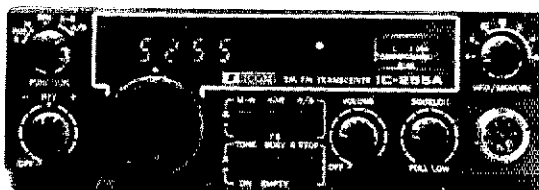
- TOUCH TONE<sup>®</sup> pad
- 800 T/R Channels
- 1.5 watts output • Hi/Lo battery saving switch • Separate built-in speaker and microphone • Quality receiver (0.2µV/20db typical)
- Small! About size of a dollar bill!
- Slip-off bottom NiCd pak. 3 sizes available (250ma standard). Complete w/BP3 Ni Cd pack, wall charger, flexible ant, belt clip.

### IC-551 6 METER TRANSCEIVER



Only set w/capability for scanning on SSB! Invaluable for checking on 6M band openings. • Cont. tunable, 50-53.999MHz. Dual VFO's. • SSB w/USB, LSB, CW, AM, FM\*. • 3 chan. memory w/scan stop all modes. • CW monitor. Speech comp. • Band scan (any portion) all modes. • Digital, freq./mode readout. • AC/DC supply. Options: \*FM, pass band tuning, VOX. • Rec: SSB, CW, AM: 0.5µV for 10db S+N/N. FM: 0.6db for 20db quieting.

### IC-255A 2 METER FM TRANSCEIVER.



- 25 watts power output. Current drain only 5.5A.
- 5 channel memory w/memory scan.
- Full coverage plus overlaps, 143.8 to 148.2MHz.
- Dual, built-in VFO's. Tuning in 5 or 15kHz steps.
- An outstanding receiver.
- Standard ± 600kHz splits but can be programmed for any split between 143.8 and 148.2MHz.

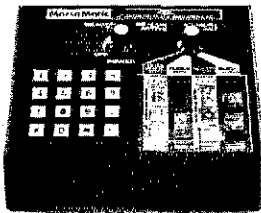
**FREE SHIPMENT, ALL OF THE ABOVE ITEMS, UPS (Brown)**



# MORE KEYSER FEATURES FOR LESS COST

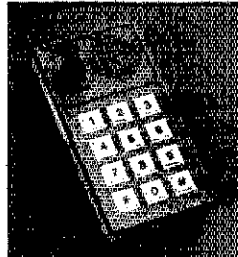
AEA Invites You to Compare the AEA Keyser Features  
to Other Popular Keyers on the Market.

MM-1



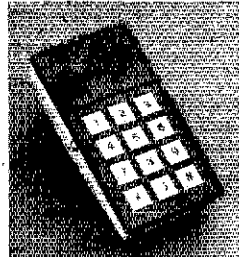
MorseMatic™

KT-1



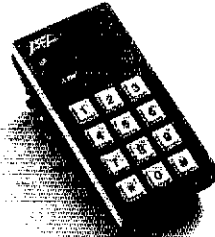
Keyer Trainer

MT-1



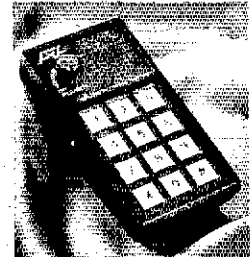
Morse Trainer

CK-1



Contest Keyer

MK-1



Morse Keyer

IMPORTANT KEYSER AND/OR TRAINER FEATURES	AEA	AEA	AEA	AEA	AEA	A	COMPETITOR		
	MM-1	KT-1	MT-1	CK-1	MK-1		B	C	D
Speed Range (WPM)	2-99	1-99	1-99	1-99	2-99	8-50	5-50+	?	8-50
Memory Capacity (Total Characters)	500			500		400	100/400	400	
Message Partitioning	Soft			Soft		Hard	Hard	Hard	
Automatic Contest Serial Number	Yes			Yes		No	No	No	
Selectable Dot and Dash Memory	Yes	Yes		Yes	Yes	No	No	No	No
Independent Dot & Dash (Full) Weighting	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Calibrated Speed, 1 WPM Resolution	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
Calibrated Beacon Mode	Yes			No		No	No	No	
Repeat Message Mode	Yes			No		Yes	Yes	Yes	
Front Panel Variable Monitor Frequency	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Message Resume After Paddle Interrupt	Yes			Yes		No	No	Yes	
Semi-Automatic (Bug) Mode	Yes	Yes		Yes	Yes	No	No	No	No
Real-Time Memory Loading Mode	Yes			Yes		Yes	Yes	No	
Automatic Word Space Memory Load	Yes			Yes		No	No	Yes	
Instant Start From Memory	Yes			Yes		No	No	Yes	
Message Editing	Yes			Yes		No	No	No	
Automatic Stepped Variable Speed	No	No	No	Yes	No	No	No	No	No
2 Presettable Speeds, Instant Recall	No	No	No	Yes	No	No	No	No	No
Automatic Trainer Speed Increase	Yes	Yes	Yes						No
Five Letter or Random Word Length	Yes	Yes	Yes						No
Test Mode With Answers	Yes	Yes	Yes						No
Random Practice Mode	Yes	Yes	Yes						Yes
Standard Letters, Numbers, Punctuation	Yes	Yes	Yes						Yes
All Morse Characters	Yes	Yes	Yes						No
Advertised Price	\$199.95	\$129.95	\$99.95	\$129.95	\$79.95	\$139.95	\$ 99.50/ \$139.50	\$229.00	\$129.95

**OPTIONS:**

- MT-1P (portable version of MT-1) with batteries, charger, earphone **\$139.95**
- ME-1 2000 character plug-in memory expansion for MM-1 **\$ 59.95**
- AC-1 600 Ma. 12 Volt wall adaptor for MM-1 with ME-1 **\$ 14.95**
- AC-2 350 Ma. 12 Volt wall adaptor for all AEA keyer and trainer products except MM-1 w/ ME-1 **\$ 9.95**
- DC-1 Cigarette lighter cord for all AEA keyers and trainers except MT-1P **\$ 5.95**
- MT-1K Factory conversion of MT-1 to KT-1 **\$ 40.00**

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

All our keyers (except the MT-1) will operate with any popular single lever or lambic squeeze paddle and will key any type of modern amateur transmitter with no external circuitry required. AEA keyers are as easy to operate as a four function calculator. The internal AEA computers are all pre-programmed for the features shown above. Each AEA product is fully RF protected and receives a complete elevated temperature burn-in and test before it is shipped from the factory.

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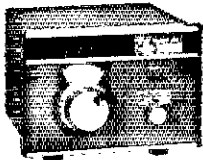
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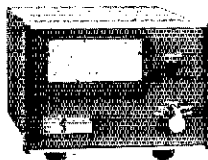
get your 7-line quote from **AES Today.**



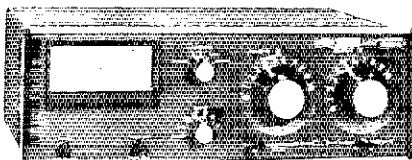
TR-7/DR-7 HF Transceiver



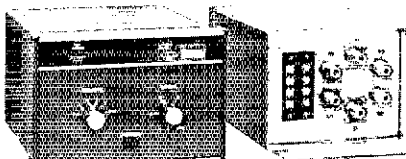
RV-7 Remote VFO



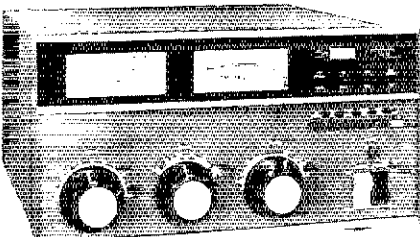
WH-7 Wattmeter



MN-7 Antenna tuner



CS-7 Console & remote antenna switch



L-7 Linear amplifier

- TR-7/DR-7 Digital HF Transceiver.... \$1549.00
- PS-7 110/220V AC power supply ..... 299.00
- PS-75 15A power supply..... 199.00
- MS-7 Speaker ..... 39.00
- RV-7 Remote VFO ..... 195.00
- FA-7 Fan for TR-7 or PS-7 ..... 29.00
- NB-7 Noise blander ..... 90.00
- SL-300 300 Hz CW filter ..... 55.00
- SL-500 500 Hz CW filter..... 55.00
- SL-1800 1.8 KHz SSB/RTTY filter ..... 55.00
- SL-6000 6 KHz AM filter ..... 55.00
- MMK-7 Mobile-mounting kit ..... 49.95
- MN-7 160-10m 250w antenna tuner... 175.00
- MN-2700 160-10m 1kw ant tuner ..... 299.00
- B-1000 4:1 balun-MN-7/MN-2700... 26.95
- SP-75 Speech processor ..... 159.00
- WH-7 160-10m wattmeter..... 99.00
- 7073 Hand microphone w/plug ..... 24.50
- 7077 Desk microphone w/plug ..... 49.00
- AUX-7 Range program board ..... 45.00
- RRM-7 Range receive module ..... 8.50
- RTM-7 Range transceive module..... 8.50
- 7037 TR-7 service kit/ext. boards... 50.00
- 100-7804 TR-7 service manual ..... 30.00
- R-7/DR-7 0-30 MHz digital Rcvr ..... 1449.00
- MS-7 Speaker ..... 39.00
- NB-7A Noise blander ..... 90.00
- SL-300 300 Hz CW filter ..... 55.00
- SL-500 500 Hz CW filter ..... 55.00
- SL-1800 1.8 KHz SSB/RTTY filter ..... 55.00
- SL-4000 4 KHz AM filter ..... 55.00
- SL-6000 6 KHz AM filter ..... 55.00
- 1548 R-7/TR-7 cable interface kit... 29.50
- 100-7805 R-7 service manual ..... 30.00
- AK-75 Multiband antenna ..... 29.95
- AA-75 Antenna insulator kit ..... 3.49
- CS-7 1533 Remote antenna switch ..... 169.00
- 1534 Control console only ..... 102.00
- 1535 Remote switch only for CS-7... 67.00
- DL-300 300w dry dummy load ..... 26.95
- DL-1000 1kw dry dummy load ..... 53.00
- FA-7 Fan for DL-1000 ..... 29.00
- L-7 2kw PEP linear (less tubes)..... 1090.00
- Ermac 3-500Z (2 required) ..... each 102.00
- RP-700 Receiver front end protector... 90.00
- TV-42-LP 100w 80-10m low-pass filter... 14.60
- TV-3300-LP 1kw 80-10m low-pass filt... 26.60
- TV-300-HP 300 ohm high-pass filter... 10.60
- TV-75-HP 75 ohm high-pass filter... 13.25
- 1980 World Radio/TV Handbook ..... 15.95

WA3PXA 307, W3EGJ 287, N3EE 266, K3CH 243, KR3DT 221, W3SMV 174, W3AS 116, N3FM 101, AC3N 94, WA3JUNX 92, N3VWS 84, WB3GUK 69, W3MML 61, W3KMZ 49, K3SMB 48, W3KUN 38, W3NGO 33, WB3JDI 30, W3HDH 29, K3VQV 29, WB3JGD 27, W3LXC 24, WB3IAB 22, W3RUL 19, W3TTN 19, N3BKV 10, KA3BGC 9, W3SN 6, N3KB 5, K3HCT 4, AB3X 2, W3LOD 1. (Sept.) W3HDH 7.

**CENTRAL DIVISION**

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst SCM: W9RYU SEC: W9QBH, NMS: WASKFK and WB9JSR, Cook County EC: W9HPG.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3590	0030/0400	404	64
Ill Phone	3915	2130 Dy	219	33
NCPN	3915	1200/1700 Dy	51	28
ICN	3940	1400 Su	5	4

W9VEV Mem Stn 2mtr 8

This column's sympathy to the families and friends of W9BRJ, W9BTE, W9DMA and W9JCF (formerly W9ERE) who recently joined the ranks of the Silent Keys: W9DAFF, W9BYLO, W9DFBC, K9AJK and W9BYJF are the new officers of the Illinois Repeater System. The Chicago Suburban Radio Association, at its October 8th meeting, was presented a special 50 year certificate of ARRL affiliation. The club was founded in 1924 and was affiliated in July 1930. N9ANW is now an Extra Class licensee. W9IKE celebrated his upcoming retirement with a new TenTec Omni WA9PVS's new QTH in DesPlaines. W9BML will be joining the USNS MISPELLION in W6-Land in February. The Great Lakes ARC K9NBH is on the air (80-2 Mtrs). Contact RM G. J. Harris, 348 Oswego St., Park Forest, IL 60466 for further info. K9QO KA9HTF and KA9HZA have upgraded their licenses. The 9RN Daytime Net during 62 sessions passed 403 messages with Illinois participating 100 percent and W9JJ WB9WGD W9HOT W9NXG W9DFDB and W9JFR checking in. W9NJP is now back in Illinois. His new QTH is St. Charles. The Macon County Amateur Radio Club has moved their repeater back to their old site and hopefully some improvement will be noticed. W9SYN is recuperating from surgery. W9HOW has a new Kenwood TS-520SE with a TH3MKK on a 40 ft. tower. The new officers of the Macon County Amateur Radio Club are: W9QO N9AKW W9IWI W9SFE and W9KQ. K9BI K9BK K9Y and K9SD are the newly elected officers of the McHenry County Wireless Association. New appointees include: K9BAM as EC of Ford County and W9YK as EC of Adams County. New license upgrades are: K9IOV KA9HFF W9YJF W9GSW and KA9HWA. iratic: W9NXG 437, K9PNG 304, WB9JSR 276, W9JJ 271, K9XK 135, K9BAM 95, K9BVE 85, K9ETA 82, W9TLU 77, KA9EGW 78, W9QBH 69, W9HOT 68, W9HPG 63, W9DFB 52, W9BHI 47, W9OYI 44, W9OK 42, W9RJV 22, W9ZL 18, W9PRN 18, W9KR 17, KA9DUJ 8, W9JZF 6, WA9VLK 6, WA9AQN 2, K9DQU 2, W9BDD 2.

INDIANA: SCM, Bruce Woodward, W9JMH — SEC: W9JMH, STM: W9JL, NMS: ITN, W9OYV, OIN, W9GKW, ICN, N9AEI, VHF: W9PMT, IWN, K9DCX, IPN, W9DIF. September net reports:

Net	Freq.	Time/UTC	QNI	QTC	Sess.
ITN	3910	1330/2300 Dy	2484	556	82
QIN	3656	1430/0100/1400 Dy	892	453	26
ICN	3708	0014 Dy	104	36	27
IPN	3910	2130 Dy	1390	262	31
IWN	3910	1315 Dy	832	31	31

Hoosier vhf net reports for Oct: QNI 3795, QTC 259, Bulletin 34, Time 7138 for 22 nets. Indiana 100% for Oct. 9RN stations: W9JLJ K9CGS W9DLF W9QLW W9JFO W9BML 100% 9RN stations: W9JUY W9JLJ W9JMW K9YJL N9AEI W9EJ W9QLW W9QCF W9GKW W9XD W9HZ 100% GAND stations: W9DF K9CGS W9QI W9JLJ. IPON for Oct: QNI 108, QTC 7, Time 120, sess 4. Apprs: OTS — W9DBU W9LJK KA9BLN; Endorsements: OTS — W9CAM A9S; OBS — K9TKE. ECs — WA9BLA Dearborn City, K9YKX Fountain City, W9GCTB Harrison City, W9LIZ Hendricks City, W9AZJ Martin City, W9JKU Ohio City, K9VCM Stark City, K9TKE Warrick City. Silent Keys: W9GMT W9DZC K9JLZ W9LTV W9BWF. EC reports: W9BYV W9BHR W9AZH W9DYA W9BWB N9AST W9DIX W9QW W9QVI W9GLN W9RTH W9BKA K9BJK W9MJL K9AMQ K9JDF K9LX W9JGF W9BNCF N9AHP W9JLT N9AJM W9BZLN. Thanks in W9HQJ for starting a six-meter ssb net. The Interstate Six-Meter ssb net on 50.150 at 0100 UTC daily. Net Manager W9HQJ lives in Decatur, IN. We sure need this activity on six. Good luck to the net. Thanks to W9SRI, W9QTX, W9JNC and others. The Ripley County Repeater is at 180 feet. Give the 146 805/205 repeater a try if you are in the area. Congrats to the new Extra Class hams in Hebron: K9KLR K9WZB and W9GCI. Governor Otis H. Bowen declared the week of October 13-19, 1980 Amateur Radio Appreciation Week in Indiana. This helped highlight the 50th week-end providing extra media support for our efforts. Congrats go to W9PEV W9MOY and W9WVD for this proclamation. Congrats to all stations active in the 1980 SET. I appreciated all the QTS who handled traffic during SET, many for the first time. Traffic: (Oct.) W9JLJ 1082, W9FC 233, W9GKW 166, W9LOD 161, W9PMT 138, W9JUY 136, W9QLW 132, N9AEI 121, W9WRC 96, W9ZQE 95, K9KTB 88, W9XD 87, N9PS 65, W9JEM 63, W9EJ 59, W9FZX 57, W9QCF 54, W9DWD 44, K9DCX 42, W9JCN 37, W9JFO 37, W9EAP 36, K9BT 36, W9DLF 32, WA9JG 32, W9SAW 32, W9OKK 32, W9JAA 31, W9BAJ 30, W9WEI 29, W9RTH 28, W9JZT 28, W9SZW 28, W9OZJ 22, K9DIY 17, N9AST 15, W9DKP 15, W9BFI 15, N9AUJ 14, K9CGS 14, W9KMY 12, W9BZHL 11, W9DART 10, W9BHU 10, WA9YJ 8, K9FVN 7, W9HUF 7, W9BQT 7, K9OUP 7, W9YAY 7, W9LJU 6, W9BOP 6, W9UIP 6, W9R0U 5, WA9TJ 5, W9ZGC 2, W9NAX 1. (Sept.) W9B9U 112, W9DWD 6, K9ET 1.

WISCONSIN: SCM, Roy A. Pedersen, K9PHI — SEC: W9OAK, STM: K9UTO, NM: RWN, W9BYPY, QNI 1006, QTC 1036; BEN W9BESM, QNI 719, QTC 157; W9BN W9BICQ, QNI 1113, QTC 296; WNN N9AJG, QNI 217, QTC 33; WIN-E W9DM, QNI 383, QTC 98; WIN-L K9IG, QNI 299, QTC 93; EXPO W9ANIX, QNI 460, QTC 37. KA9EY has General. W9B9I has Advanced and now K9B9C. WA9AVO W9B9IG W9B9VM K9F KF W9D9EE W9H9LI has Advanced. K9B9C, KA9EY has Generals. Very happy to see that W9GUX has been appointed manager of 9RN (cycle 2), congrats. K9BNM has Extra. W9B9CQ now K9B9L. W9NGT's son is now a ham, no call at this time. Green Bay 2-meter Net had 12 QNI and 1 QTC. By the time you read this it will be close to New Years or after; hope everyone had a good Thanksgiving and

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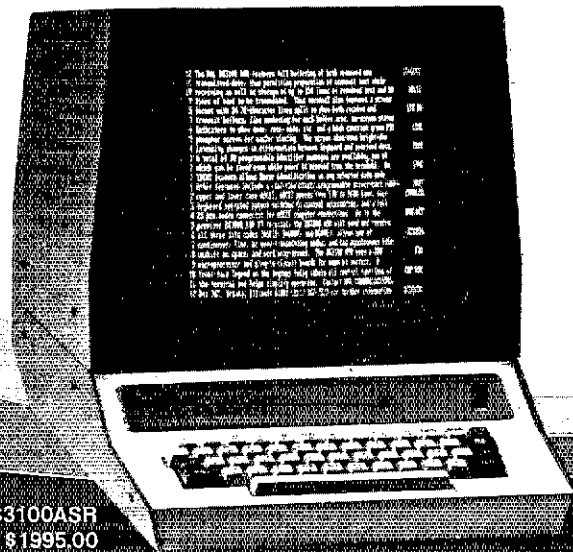
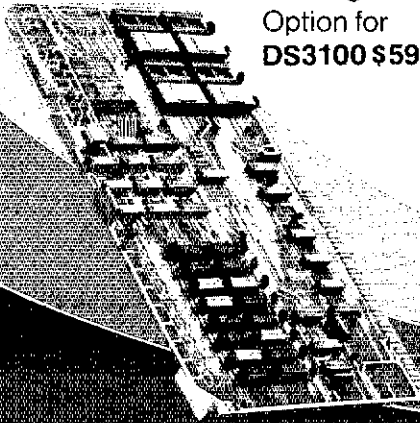
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621 Commonwealth Avenue  
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- KY2OFF
- PRINTON
- PRINTOFF
- QBF
- READF
- RYS
- WRITEF

**MSO-3100**  
 Message Storage  
 Option for  
**DS3100 \$595.00**



**DS3100ASR**  
 \$1995.00

The DS3100 Super Terminal is now even more versatile with the addition of the new MSO-3100.

The Message Storage Option (MSO) adds mass storage to the DS3100 so that relatively long messages may now be stored and replayed at will. For example, the MSO-3100 will provide more than 32,000 characters of additional storage—approximately 450 lines for messages. Messages are stored in variable length files with user-assigned file names and pass-words for file protection if desired.

The MSO feature may be accessed from either the DS3100 keyboard or by other users through the WRU feature of the ASR terminal. Thus, messages can be written, played, and relayed with either remote or local control.

Automatic TX/RX relay control, CW ID, and user help messages make the "electronic mailbox" easy for all to use. This factory installed option may also be used for brag-tape and net bulletin preparation and storage.

Write or call us for more details.

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TBR-160	160 mtr Coil Kit	\$ 33
RM Kit	Roof Mount Kit	\$ 33
STR Kit	80-mtr Stub Tuned Radial Kit	\$ 20

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TH5DX	New 5-El. Triband Beam	\$209
TH6DXX	6-El. Triband Beam	\$229
TH3MK3	3-El. Triband Beam	\$179
TH3JR	3-El. Triband Beam	\$129
TH2MK3	2-El. Triband Beam	\$109
HY-QUAD	2-El. Triband Quad	\$209
402BA	2-El. 40-mtr. Beam	\$175
205BA	5-El. 20-mtr. "Long John"	\$229
155BA	5-El. 15-mtr. "Long John"	\$145
105BA	5-El. 10-mtr. "Long John"	\$ 94
204BA	4-El. 20-mtr. Beam	\$175
203BA	3-El. 20-mtr. Beam	\$ 99
153BA	3-El. 15-mtr. Beam	\$ 64
103BA	3-El. 10-mtr. Beam	\$ 54
DB1015A	3-El. 10/15 mtr. Beam	\$129
64B	4-El. 6-mtr. Beam	\$ 42
66B	6-El. 6-mtr. Beam	\$ 89
18HT	Hy-Tower 80-10 mtr Vert.	\$279
18AVT/WB	80-10 mtr. Trap Vert.	\$ 85
214	14-El. 2 mtr. Beam	\$ 29
28DQ	80/40 mtr. Trap Dipole	\$ 49
5BQ	80-10 mtr. Trap Dipole	\$ 89
8N86	80-10 mtr. KW Balun	\$ 14

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KT34A	4-El. Triband Beam	\$319
KT34XA	New 6-El. Triband Beam	\$479
7.0-7.3-4A	4-El. 40-mtr. Beam	\$629
7.2-1	40-mtr Rotatable Dipole	\$149
144-148-13LB	13-El. 2 mtr. Long Boomer	\$ 79
432-161.B	16-El. 432 MHz Long Boomer	\$ 69
144-150-16C	16 El. 2 mtr "Oscar" Ant.	\$ 89
420-450-18C	18-El. 435 MHz "Oscar" ant.	\$ 49

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Alliance U-100 (Elevation Rotor)	\$ 39
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15-3CD	3-El. 15 mtr. "Skywalker"	\$ 82
15-4CD	4-El. 15 mtr. "Skywalker"	\$ 98
10-3CD	3-El. 10 mtr. "Skywalker"	\$ 99
10-4CD	4-El. 10 mtr. "Skywalker"	\$ 75
A50-5	5-El. 6 mtr. Beam	\$ 59
617-6B	6-El. 6 mtr "Boomer"	\$169
32-19	19-El. 2 mtr "Boomer"	\$ 75
214B	14-El. 2 mtr "Boomer"	\$ 59
214FB	14-El. 2 mtr FM "Boomer"	\$ 59
228FB	28-El. 2 mtr FM "Power Pack"	\$188
220B	17-El. 220 MHz "Boomer"	\$ 69
A147-11	11-El. 2 mtr Beam	\$ 34
A147-22	22-El. 2 mtr "Power Pack"	\$ 98
ARX-2	2 mtr "Ringo Ranger"	\$ 34
ARX-450	450 MHz "Ringo Ranger"	\$ 30
A147-20T	2 mtr Vert. & Horiz. Beam	\$ 59
A144-10T	10-El. 2 mtr "Oscar" Ant.	\$ 37
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Christmas. Don't forget, this is the time you do your antenna work. HI, KA9CPA made BPL, NWTN had 533 QNI, 44 QTC. Please tell us and gals, I need more input from you for this column. Thanks to W9IEM WD9DHF WD9IUX KA9CPA WB9PKL for participating in D9RN. New Novice Wausau, KA9IJK WD9ESU was accepted into ARRL DX Century Club. KA9EHU is now N9BM. Traffic: (Oct.) KA9CPA 1886, WD9IUX 484, W9CXY 190, W9VCV 184, W9BYU 152, WD9ESZ 118, K9H1 110, W9IEM 109, W9CXY 98, KA9IJK 85, WD9BCM 69, WB9NRK 57, K9L GU 51, WB9ESB 50, N9CXY 48, W9LDO 47, WB9ICB 46, W9UCL 46, K9A0 45, A9GG 45, K9AKG 44, K9JPS 43, W9WYU 40, W9IUX 35, WD9DHF 33, W9FDY 33, K9ASC 28, N9CP 28, K9B9N 27, WB9WHQ 27, WB9YPZ 27, WA9ZTY 27, KA9EMF 24, K9HDF 26, W9AYK 23, K9KSA 23, W9SQJ 23, K9UJ 23, WD9AJA 19, W9CJE 19, W9IHW 18, WB9JSW 17, K9BFM 15, WB9BRE 14, K9UTQ 13, WB9PAW 12, WD9GJV 5. (Sept.) KA9IHR 5. (Aug.) KA9IHR 2.

## DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB0HOX - SEC: WB0QUT, STM: AF00. Due to the absence of WB0HOX, our SCM, who is in the Methodist Hospital in Rochester, following shoulder surgery, this column is being written by AF00, and I'm afraid it's apt to be a little short on news items. My thanks to all the stations who have cooperated so well in getting their reports in on time. Things get a little hectic when the SCM is among the missing, and I know we all wish her a speedy recovery. When K9JCF last asked her how she was feeling, her answer was "like she had been hit by a truck twice!" Very descriptive! Our congratulations to KB0JA of St. Charles, son of K9JCF, who upgraded recently to Extra Class. Also congrats to WB0ZJ of Two Harbors who made it to Advanced Class and the FCC's recent visit to Duluth and is now awaiting a new call sign. SEC, WA0QUIT, is still looking for EC's in several counties. If your county does not have an EC, why not fill the primary purpose of Amateur Radio (i.e. Public Service) and volunteer your services. We are also in need of more dedicated traffic handling stations. If you need any information regarding traffic handling, contact our STM, AF00, found on most any NTS net. The MSN/2 has a new NM in K9JCF and likewise, the MNAMWXX's new NM is WD9CGM.

Net Mar. Time Freq. QNI QTC  
MSPNN WA0AIN 1902Z 557 62  
MSPNF KC0T 2342Z 3929 803 162  
MSN1 AF00 0030Z 3685 241 89  
MSN2 K9JCF 0400Z 3685 185 58  
MSSN KC0Z 2315Z 3710 109 7  
MNAMWXX WD9CGM 0015Z 3929 248 289

Traffic: WA0TFC 385, W0HZU 211, AF00 137, KB0JF 87, WD9CGM 85, KC0T 83, W0DFX 73, K0PZ 69, KC0Z 66, KH0MB 57, W0NZB 55, WA0AIN 40, KC0CE 25, W0GTHZ 25, A0Y 24, WA0YVT 22, WB9SCN 18, KB0N 17, W0HIO 11, W0WVXU 8, W0GVR 6, N9JP 5.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WA0RWM - SEC: WB0TEE, OBS: W0DM, NM: WA0GRH, CO: WD9GLB. The SET of 18-19 from the clubs report was well organized and participation was excellent. Oct. 22 we got our first storm so activated the W0X Net to help the NWS. Some gear was donated to the W0X Net to WB0TEE for his Public Service Award from the NOAA for his work in SKYWARR. Congrats to Novice KA0IHW KA0JJR. Those upgrading to General are WD9HOP KA0JGL. Adv: W0VQL. Some clubs gave their time and place of their meeting so if in area feel free to visit them. Fargo: 3rd Sat. at WDA; Bismarck: 4th Tues. Town House Inn; Minot: 2nd Monday County Court House; Williston: 3rd Tues. First Union Church. All meet at nite except Fargo at 1:30. Traffic: WA0RWM 72.

SOUTH DAKOTA: SCM, Erwin C. Heimback Jr., K00TZ Congrats to Jim for again making PSNR. Hot Springs AR: WB0JH KA0PFP WD0CD WA0TFS K00R KA0FUI KA0GIV participated in the SET and all reports indicate that a line job was done. WB0HJ, Eor of Fergus County, reported that they did learn a great deal. SET reports were received from Sisseton and Rapid City also. Topic of the month is emergency preparedness. Much work needs to be done to insure intercity communications. 75 meters is not going to work all of the time. ECs and clubs should give thought to linking repeaters, and to establishing repeaters in the areas that are void. Work is progressing on the Midland repeater. ECs - let's plan for a meeting during the SD Picnic. Net reports QNI: QTC (Sept) SDN: 84, 52, 30. Evening: Net: 1303, 51, 31. Mon net: 754, 95, 27. NJO: 523, 11. Tri State W0 (RM): 65, 5. Traffic: WA0BMR 217, W0HJO 95, K0PFE 96, W0DVB 94, WA0VRE 72, W0M21 65, WA0TNM 36, W0KJZ 38, W0COMF 30.

## DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU - SEC: K5TML, NMs: WA5LGN W5MYZ W5POH WA5ZWZ. Nets: ARN 3:995 0300dy 1104 94 WA5LGN; OZK 3:780 0100dy 169 26 W0MYZ; APN 3:307 1200M-S W5POH; M-Bird 3:28 2330M-F 782 32 WA5ZWZ; SCARC 5:8 755 0230M-2 78 12 WA5VSV. Our best 19 members of CAREN assisted in providing emergency communications at Children's Hospital, Little Rock. Treatment teams were stationed at various points in hospital with doctors and staff accompanied by amateurs using HTs. Participating were KA5NH KA5HBJ WD5SEJ WB5HXX WB5GF A KA5FNG WD5BIV, WD5BIV now Extra. KA5IYN now Gen. KA5HBJ KA5FNS now Tech. W5KL has phased verticals on 40. W5RUX has compiled Razorback Net roster with name, call, add, lei. CAREN will have Xmas party Dec. 12. NWAARC will have annual Xmas party Nov. 15. CAREN sponsored booth at Ark State Fair manned by WB5AFU, KA5JZ, KA5IK, KA5IK, WD5BZQ, WD5AHP, WD5FBY, WD5DLH, W5SD, W5ASAM, KA5FNG, WA5VSB, AD5T, W5SW, N5BPU, N5BZB, KA5HVJ, W5IGM, WA5VNV. OBS WA5LGN 3, WB5KUI 7, Traffic: W5OFU 47, N6AEN 41, KA5CFB 39, W5UAU 25, W5TJB 20, K5BIL 19, W5KYU 14, WB5KUI 2, WB5GQH 1.

LOUISIANA: SCM, Jim Giammanco, N5IB - Many thanks to all the stations who participated in SET. And thanks also to all stations who are helping to keep LA well represented on RN5 and DRN5. The Mayor of Springhill joined K5WOD to observe hams in action during SET. Scout Troop 3, visiting N5ADF during the Jamboree On the Air, was treated to a QSO with Canadian Scout Headquarters, and an on-the-air interview with an Ottawa newspaper. WB5QD, K5XV, K5BPN and W5EFL at the LA Baptist disaster relief effort during Hurricane Allen. Lew Carter, of WRKF-FM, gave a fascinating program on radio nostalgia at the BRARC meeting. WB5MHU headed up a very enjoyable hamfest by the Twin City hams. Don't forget the SELARC

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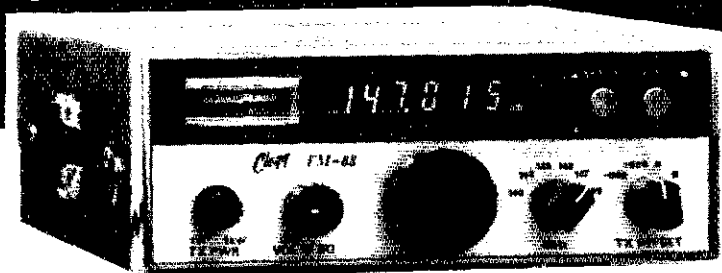
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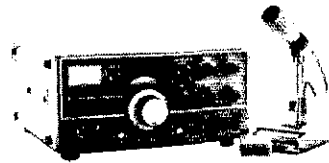
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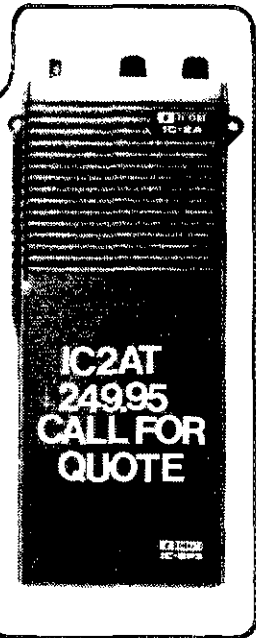
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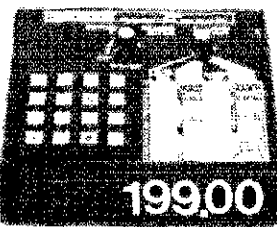
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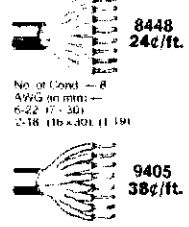
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		450	1.6	2.8	
RG8/u Foam B1VF		55	12	19	
	8214	100	1.8	3.2	
		200	0.8	1.5	
		300	0.6	1.1	
		400	0.5	0.9	
RG8/u Regular 66VF		55	12	19	
	8237	100	2.0	3.6	
		200	1.0	1.8	
		300	0.7	1.2	
		400	0.6	1.0	
RG8/u Non-contaminating		100	2.0	3.6	
	8267	200	1.0	1.8	
		300	0.7	1.2	
		400	0.6	1.0	



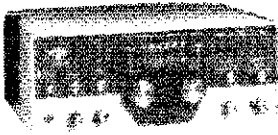
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A fun and educational board game based on answering amateur radio license questions. Includes board, die, markers, questions and answers.

- Amateur Upgrade** - \$3.95

### Gold Label

- The Mysterious Ionosphere** - By Jim Gray, W1XU. Learn how to take advantage of the ionized layers that make long-distance communication possible. \$6.95
- Sounds of Shortwave** - By Bob Grove, WA4PYO. Listen to and hear explanations of mysterious signals heard across the radio spectrum. \$6.95
- Ins and Outs of Running Your Own Ham Station** - By Paul Passman, WB0BBC. A two-tape set that lets you in on the protocol used by experienced hams. \$11.95
- Choosing the Best Antenna** - By Jim Gray, W1XU. Find out how the right antenna can dramatically increase your station's abilities. \$6.95

### Super Tapes

Kantronics' Super tapes generate characters sent at higher speeds with longer spaces for easier copying. Great for learning code and breaking copying barriers! Transcripts included

- Super 5 WPM** - Instructor teaches code from characters to words and sentences. \$4.95
- Super QSO 13** - QSO format with enhanced code at 13 WPM. \$4.95

### Random Code

Random letters, numbers and punctuation generated by computer in groups of five. Transcripts included for self-testing.

- Novice Random** - \$4.95
- General Random** - \$4.95
- Extra Random** - \$4.95

### Bookshelf

- Novice-Class Amateur Radio License Manual** - By Phil Anderson, W0XI. \$3.95
- General-Class Amateur License Study Guide** - By Phil Anderson, W0XI. \$6.50
- Federal Frequency Directory** - \$12.95

### Combos

- Novice** - Includes Novice manual, Super 5 WPM tape, Novice Study Tape and QSO Tape. \$14.95
- General** - Includes General manual, General Study Tape set and QSO-2 Tape. \$19.95

## Yes, I want to upgrade faster!

Name \_\_\_\_\_  
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 Master Charge  Visa  Check  
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 Signature \_\_\_\_\_ Expiration date \_\_\_\_\_

Please include \$1 shipping/handling for single tapes and manuals or \$2 for other orders.

ORDERS

**Kantronics** (913) 842-7745  
 1202 E. 23rd Street  
 Lawrence, Kansas 66044

Hamfest in Hammond on the third weekend in January. The LA Council of ARC will have a board meeting during the hamfest. A slide program on the ARRL DX QSL Bureaus has been added to the video tape library. Write for details. 73, Merry Christmas and Happy New Year to all.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M.	Dy	288	152 N5RB
LTN	3910 kHz	6:30 P.M.	Dy	267	89 N5EK
LSN	3703 kHz	7:30 P.M.	M-F	156	93 WD5EAE
LBN	3587.5 kHz	6:30 P.Su	P.W	13	4 N5RB
LEN	3910 kHz	8:00 P.M.	Sun		

Traffic: (Oct.) N5RB 245, W5VMY 147, WD5EAE 102, N5IB 89, K5TL 89, N5BFV 76, K5WOD 74, W5JZP 62, W5BUX 35, W5FLM 34, K5TTC 32, W55ODJ 29, W55TPG 22, W5DCWK 18, W55GJB 10, W55IKT 5. (Sept.) KA3BER/5 & W55GJB 6.

**MISSISSIPPI:** SCM, E. Ed Robinson, W5XT — SEC: W5FXA. The Mississippi Slow Net continues under the leading hand of KA5GGG, and doing a fine job. He needs the support of you QTs as well as the encouragement of you new hams. MSBN with W5EYM doing well. MTN with K5OAF needs all our support. We all know cw, let's use it more. Oct. SET seemed less enthusiastic than usual with major support by N5AMK. Some harsher language being heard around 3987, this is not the kind of reputation we want for this freq. (and it may well get someone an FCC reprimand). CANI (W5KLV) sess 33, QTC 775. ARNS rep 100% by MS station N5AMK. DRN5 (W5SNKD) sess 33, QTC 499 with MS rep 100% by KA5AFT N5AMK KA5BJV W5EDT W5EYM GA5Z CGCHN (K5SNX) sess 31, QNI 2214, QTC 116, MSBN (W5EYM) sess 31, QNI 2008, QTC 64, MTN (K5OAF) sess 31, QNI 86, QTC 41, MSN (KA5GGG) sess 14, QNI 41, QTC 4, Capital AEN (KA5AGD) sess 4, QNI 94, QTC 0, RACES (N5AMK) sess 4, QNI 140, QTC 1, Traffic: N5AMK 502, K5OAF 206, W5EDT 87, W55SNB 43, W5T 19, W5EYM 15, KA5AFT 5, KA5AGD 5, KA5GGG 5.

### GREAT LAKES DIVISION

KENTUCKY: SCM Joseph E. Miller, K4DZM — SEC: W54ZML. STM: KZAG. Nets reporting (section \*):

KTN*	1467	245	BARES	175	47
MKPN*	1031	54	4ARES	64	19
KNTN*	552	233	5ARES	77	4
KYN*	318	200	PAWTN	390	52
KSN*	201	66	TRI-ST	375	50
KRN*	527	26	CARN	172	19
KPON	61	2	9PN-D	—	403
EWPN	239	1	CAN-D	100%	777

Congrats to K4JLX, new NM of KYN whose first month included SET. Our thanks to WA4WSM retired NM of KYN for the good job he has done. The most active traffic family award goes to the Vest's KZAG KA4AZT KA4MBF. Their combined total of 21 KZAG for three operators and one net is amazing. Traffic: K4JLX 283, K84OZ 178, WA4SWF 159, W5BAT 159, K4DZM 136, W4DLX 126, KA4GFU 122, WA4JTE 115, W4BSC 110, KZAG 90, WA4AGH 78, KA4MBF 68, WA4AV 63, WA4EBN 61, K54V 57, KA4AZT 53, W4QNV 50, K4HOF 48, WA4GAL 47, KA4IKH 42, KA4MZ 41, WA4JTO 37, W4BALN 36, WA4OMH 36, W4PKX 34, W4BAPC 33, WA4YPO 30, KA4FJR 23, WA4JAV 19, WA4KLN 18, W4CDA 12, W4CJO 12, N4OAF 11, K4MHL 9, W4D4CF 8, WA4NOG 8, K4AVX 7, W4D4LD 5, WA4IGD 4, KU4A 2, W4TPB 2.

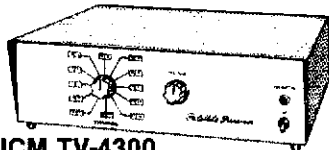
**MICHIGAN:** SCM, James R. Seeley, W8BMTD — ASCM: W8DHB. SEC: W8EFK. STM: W8BYRY. DECS: W8BFLK K8RCT W8VWY. NMS: W8BBHE W8DHB K8LNE K8KMQ W8LRT W8APM. W8SCW W8ARNB W8DRNQ W8SCW AF8V W8BYDZ W8YIQ K8ZIU.

Net	Time	QNI	QTC	Spss.
OMN*	3663	1800/2200 Dy	1553	677
MITN*	3953	1900 Dy	711	852
MACS*	3953	1100 Dy	877	585
GLETN	3932	2100 Dy	1052	248
UPN*	3922	1700 Dy	717	202
MNN*	3722	1730/2000 Dy	505	118
SEMTN*	146.64	2045 Dy	155	56
WSSBN	3935	1900 Dy	561	30
BR	3930	1730 M/S	482	25
MEN	3930	0900 Su	153	7

VHF Activity 9 reports 524 345 39  
 \*NTS nets. Times local. 3932 kHz is the Mich. emergency frequency. Traffic workshop Sun 3953 kHz at 1800. ARES Net Sun 3932 kHz at 1730. ARES (J.U.) Thurs 3922 kHz at 1730. QD reports: K8J K8NKB W8JG K8X CBS reports: K8NKB W8BYA W8ARNB Silent Keys with deep regret: N8AJK (ex-W8BJV) W8FYH W8LZY K8RNP. Preliminary reports for SET point to record breaking traffic totals and possibly a higher level of ARES activity than last year. Congrats to Mich. GRP Club for earning MCRC's annual Ivory Olinghouse Field Day award (total points divided by transmitter class). Upgrades: to Tech, K8BBX K8CFE W8BIB K8KKA K8IKC K8AYKR; to General, N8AMU W88RY; to Advanced, K8ABU N8BIB N8BIF W8BKO W8BZK W8LHT W8LFX W8QMS; to Extra, W8BOY K8SAK. K8BEPK now K8BZ. A recent question I was asked: "Can an ARES group elect their EC?" They certainly can. If the SEC and SCM find the person qualified (ARRL member, Tech or higher license, residence, acceptability with local officials, plus interest and willingness), the appointment will be made, with my blessings. ARES is a local activity, and however an EC is chosen, he or she should have the approval and support of the local group. I deplore the kind of internal strife which divides a club or ARES group and detracts from our public service functioning and from the image we hold of ourselves as amateurs. BPL: K8CPS W8BKZ W8LCU W8BMTD AF8V. Traffic: AF8V 697, W8BMTD 603, K8CPS 511, W8BKZ 506, W8BZ 417, W8DHB 346, W8LRT 319, W8BPM 295, W8JRT 290, W8RY 287, W8LCU 271, W8OAF 197, W8RHU 164, W8UE 142, K8KMO 127, W8BMB 123, W8BZY 113, K8UPE 107, W8YIQ 107, W8EOI 102, W8DRNQ 99, WA0TAQ 93, K8BZ 89, K8IHX 87, K8GXV 83, W8BSYA 83, KE8X 83, W8BYA 81, W8BHE 77, K8DD 76, K8BGT 74, W8VPW 72, N8BNC 68, W8VIZ 66, K8ZJU 59, K8BXM 55, N8ABA 53, K8OCP 51, W8CUP 50, W8EIB 50, W8SCW 50, W8BLP 48, N8AUL 43, W8BNT 42, W8JX 40, K8LNE 40, K8BZ 39, W8AXF 38, W8BILV 34, W8BPD 34, N8ACL 33, W8BROK 33, W8TBP 32, W8HIN 30, W8BOS 28, W8RWR 28, W8BUH 28, W8JFF 26, W8MOF 21, W8OY 21, K8ED 20, W8BTT 16, K8ATV 15, W8UJM 15, W8JGU 14, AC8V 13, W8BLL 13, W8JUL 12, K8NKB 12, W8BVT 12, K8RY 11, W8VWY 9, W8BDS 8, W8BYP 7, W8NXD 6, W8WVL 5, W8SDB 3, K8BFK 2. OHIO: SCM, Allan L. Severson, AB6P — Asst SCMs: W8MOK — SEC: K8SN; NMs: K8AAZ W8B5W W8BKWD K8OZ W8QMF W8YGW. Net reports:



# SATELLITE TV FROM LONG'S!

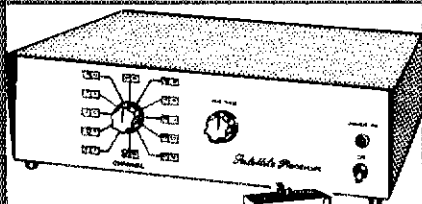


## ICM TV-4300

### Satellite receiver

International's TV-4300 is a high performance receiver that tunes all channels within the 3.7-4.2 GHz band. Standard dual output provided at 6.2 and 6.8 MHz. Complete with a built-in LNA power supply, built-in AFC, tuner control circuitry and power cable. All output levels compatible with video monitor and VTR input. Easy to use! Simple tuning!

**995.00**

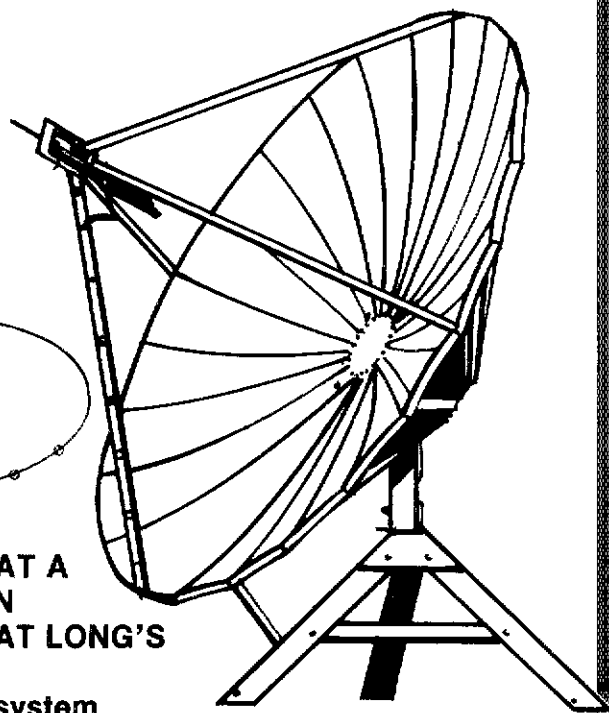
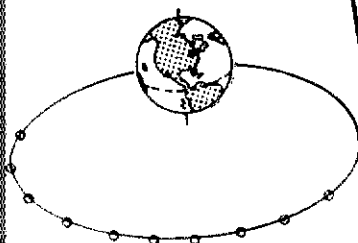


## ICM TV-4300A

### Satellite receiver with remote control

Same features as the TV-4300 but supplied with remote control unit and six frequency, crystal control, audio with stereo output.

**1149.00**



## SATELLITE TV AT A PRICE YOU CAN AFFORD NOW AT LONG'S Save \$800 on a TVRO antenna system

Super-efficient 11 foot polar mount antenna (includes remote controlled polarization rotation system as well!). A super TVRO antenna system. High quality panelized aluminum 11 foot dish and steel polar mount. Dish weighs approximately 200 pounds, mount 265 pounds. Precision designed, easy installation, zinc chromate base primed and heavy duty white top finish. The rotating feed is standard! Easily shipped and installed.

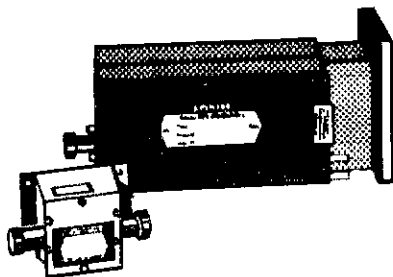
**1995.00** List Price 2795.00



## AVCOM COM 3 satellite receiver

Satellite receiver developed for low cost reception of wide band FM video carriers. The Scan-Tune feature sweeps 3.7 to 4.2 GHz. First IF frequency of 880 MHz and a second IF frequency of 70 MHz. Features include switch selectable tuning, AFC, optional remote control capability, and excellent threshold.

**2775.00**



## AVANTEK 4215 LNA with DCB-42 power block

120° uncooled satellite earth terminal low noise amplifier.

**795.00**



## AVCOM RG-217 84 ft. cable

Only 14 dB loss nominal for 84 ft. assembly. With extra flexible pigtail for rotating feedhorn and weather-proof microwave quick-connects. Mates with type N female connectors at LNA receiver. Fully assembled and tested. All connectors included.

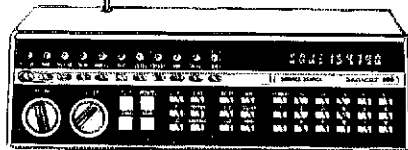
**118.00**



# Long's Electronics



# BEARCAT FROM LONG'S!



## BEARCAT 300 Service Search 50-channel 5-band scanner

The Bearcat 300 has 11 Service Search categories that arrange stored frequencies into "interest" groups for one button scanning. Such as police, fire, marine, Ham, emergency, telephone, Gov't, forestry, industrial, transportation, and aircraft. With memory, quartz clock and AC/DC operation.

**399.95** List Price 519.95

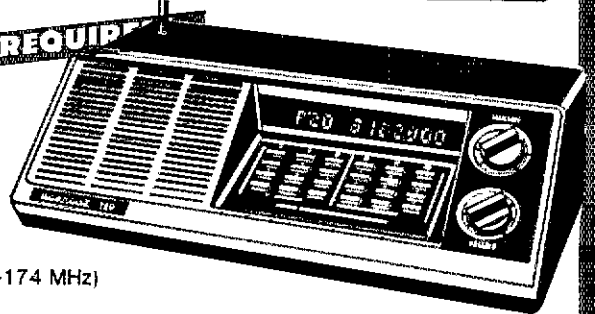
**NO CRYSTALS REQUIRED!**

## BEARCAT 220 scanning radio

Receive:

- Air (118-136 MHz)
- Land (32-50 MHz) (144-174 MHz)
- UHF (420-512 MHz)

Now a 20-channel crystalless scanner that covers 7 bands including Low, High, UHF, UHF-Gov't, and UHF-T public service bands, 2-meter Ham bands plus aircraft and marine bands. Scans air marine bands at the touch of a button with no reprogramming. AC/DC operation. No crystals required!



**Bearcat**

**299.95**

List Price 419.95



## BEARCAT 210XL scanning radio

An 18 channel crystalless scanner that covers 6 public service bands. Features automatic squelch and scans 5 or 15 channels per second. Freq. range: Low 32-50 MHz, 2-meter "Ham" 144-148 MHz, High 148-174, 75cm "Ham" 420-450 MHz, UHF 450-470 MHz, and "T" 470-512 MHz. Requires 117 AC-138 V DC. No crystals required.

**219.95** List Price 319.95



## BEARCAT 250 5-band scanning radio

A 50-channel crystalless scanner that covers Low (32-50 MHz) "Ham" (146-148 MHz), High (148-174 MHz), UHF (420-470 MHz), and "T" (470-512 MHz). With search/store, search/recall, decimal display, selective scan display and more. Includes a digital clock, AC/DC operation.

**299.95** List Price 419.95



## BEARCAT 160 crystalless scanning radio

The Bearcat 160 features 16-channel monitoring of the five most popular public service bands. Features manual search, priority, direct channel lockout, scan delay and auxiliary. Covers: Low 32-50 MHz, Ham 144-148 MHz, High 144-148 MHz, UHF 440-470 MHz and "T" 470-512 MHz. Size 9 1/2" W x 2 3/4" H x 8 3/4" D. AC operation. Crystal certificates available \$3 each.

**189.95** List Price 279.95

## BEARCAT 2-4 Thinscan handheld scanning radio

This hand-held 4-channel scanner weighs only 10 oz. and scans 8 channels per sec. Battery operation. Crystals required. Specify freq. ranges-L/H covers 33-47 MHz, HU covers 152-164, 450-508 MHz, AC covers 118-136 MHz aircraft band and 450-470 MHz.

**99.95** List Price 149.95



## BEARCAT BC-5 scanning radio

A lot more scanner for a lot less price. Value packed crystal scanner features 8-channel scanning across the 4 most popular public service bands. Frequency reception range: Low Band 33-50 MHz, High Band 146-174 MHz, UHF Band 450-470 MHz and "T" Band 470-508 MHz. Weighs only 3 lbs. Crystal certificates available \$3 ea.

**89.95** List Price 129.95



## Betty Bearcat Frequency Directory



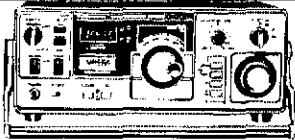
Frequencies listed by listening areas for easier use - police, fire, ambulance, government, transportation - plus many others. Includes cross reference section, fold-out FCC allocation chart, reference data and log pages. Specify Eastern USA or Western USA edition when you order.

**12.95**

Call  
Toll Free **1-800-633-3410**

IN ALABAMA CALL 1-800-292-8668 9 AM TIL 5:30 PM CST, MONDAY THRU FRIDAY

# HAM EQUIPMENT FROM LONG'S



## KENWOOD R-1000 compact communications receiver

Covers 30 bands from 200kHz to 30 MHz. Features PLL synthesizer, digital display quartz digital clock with timer, RF attenuator, noise blanker, IF filter, and built-in speaker. AC power 100, 120, 220 or 240 VO. Has calibrated S meter and AF gain control. LSB/CW, USB, narrow AM or wide AM.

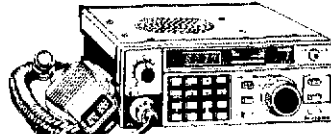
**449.95** List Price 499.95

## KENWOOD

### KENWOOD TR-2400 synthesized 2m hand-held transceiver

Features LCD digital readout, 10 memories, auto and manual scanning and mode switch for standard repeater  $\pm 600$  kHz, offset, simplex, and nonstandard repeater splits. Has touch tone pad selection of 5 kHz chs. from 144 to 148 MHz., MARS 1.5 W., RF output, NiCad battery pack and AC wall charger.

**349.10** List Price 395.00



### KENWOOD TR-7800 2-meter FM mobile transceiver

Features 15 memory channels, priority alert, built-in autopatch DTMF Touch-Tone encoder, auto-scan, digital readouts, up and down manual scan mic, and repeater reverse switch. Covers 143.900-148.995 MHz, 5KHz or 10 KHz steps. Output 25 W. Hi/5W. Low.

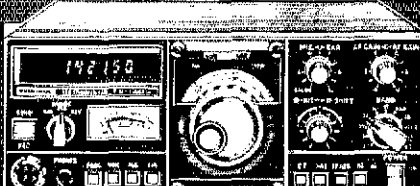
**359.95** List Price 399.95



### KENWOOD TR-9000 2-meter all-mode transceiver

Covers all 2m freq. plus MARS and CAP freq. 143.90 thru 148.99. Features digital dual VFOs with selectable tuning of 100Hz, 5kHz and 10kHz, 5 memories; auto busy stop scan and free scan, RIT, noise blanker and AGC. RF power outpt: Hi (SSB, FM, CW) - 10W, Lo (FM, CW) - 1W. Requires 13.8 VDC at 2.9 A.

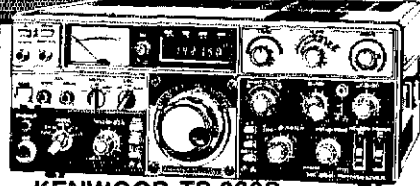
**449.95** List Price 499.95



### KENWOOD TS-130 S HF SSB transceiver

This compact, solid state transceiver covers 80 thru 10 meters (including 3 new bands) on SSB and CW. Has built-in speech processor, IF shift, noise blanker, X-tal calibrator, VOX, RF attenuator, and analog and digital readout. Weighs only 12 lbs. 13 V DC.

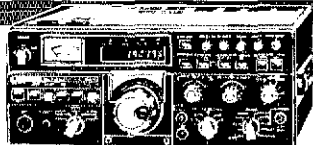
**683.95** List Price 759.95



### KENWOOD TS-830S high performance SSB/CW transceiver

Covers 160-10 meters (SSB and CW) including 10, 18, and 24 MHz bands. Features variable bandwidth tuning, IF filter and IF shift, noise blanker, speech processor, digital freq. readout and 6146B final tubes. Self-contained AC power supply runs off 110 or 220 V. 220 watts PEP.

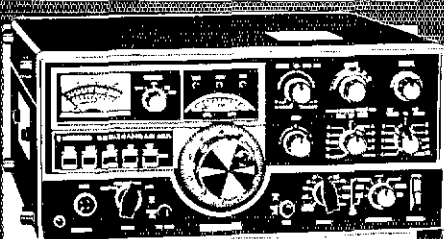
**836.95** List Price 929.95



### KENWOOD TS-180S HF SSB transceiver with digital frequency control

This all solid-state transceiver covers 160-10 meters and features 4 memories that can be tuned in 20 Hz steps. Has a built-in microprocessor, RF speech processor, dual IF filter, dual RIT, tunable noise blanker, and VOX. Adaptable to 3 new bands. Requires 13.8 VDC @ 20A. Modes: SSB/CW/FSK. 200 W. PEP.

**939.95** List Price 1140.95



### KENWOOD TS-520SE HF transceiver

200W. PEP SSB, 160W., DC CW, 160-10 meters, noise blanker, AGC, RIT, 8 pole crystal filter, built-in calibrator, VOX, PTT, speech processor, semi-break-in CW with sidetone, 20 dB RF attenuator and built-in speaker.

**566.96** List Price 629.95

### DRAKE WH-7 directional RF wattmeter

Covers 1.8-30 MHz. Power range 0-20, 200, & 2000 W. Direct scale readout VSWR, 50-239 connector, imp. 50 ohms.

**89.10** List Price 99.00



### DRAKE MN-2700 2kW antenna matching network

Covers 160-60m., MARS & future expansions for coax or random wire. B-1000 balun req. for bal. line, 2000W PEP, 1000 W. cont. RF watt-meter/VSWR bridge, by-pass switching and low-pass filter.

**269.10** List Price 299.00



VISA

# Long's Electronics



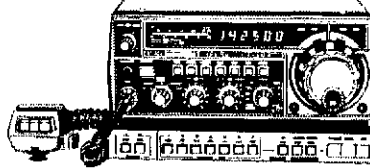
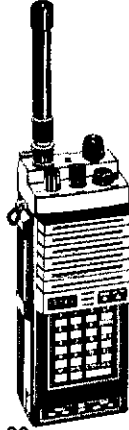
# MORE HAM GEAR FROM LONG'S

## YAESU

### YAESU FT-207R Synthesized handie-talkie with NiCad and charger

A CPU controlled handie-talkie covering 144-148 MHz with up/down manual or auto scan in 5 or 10 kHz steps. Has 4 channels of freq. memory, and  $\pm 600$  kHz or odd repeater splits. RF output 2.5 W. Hi 200 mW Low...

**315.00** List Price 399.00



### YAESU FT-707 "Wayfarer" HF SSB transceiver

Offers a full 100W. on 80-10 meters and operates SSB, CW, and AM. With IF filtering, variable bandwidth and optional crystal filters for 600 Hz or 350 Hz. Features fast/slow AGC, noise blanker, WWV/JJY digital readout, 3 WARC bands, fixed crystal position, and 2 auxiliary bands.

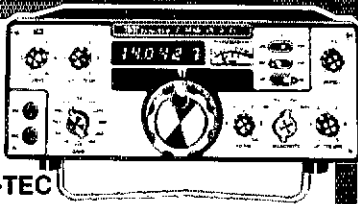
**729.00** List Price 810.00



### YAESU FT-101ZD high performance HF transceiver

Covers 160-10 meters on SSB and CW with WWV/JJY (receive only). Features built-in AC power supply, digital plus IF bandwidth, 8146B final tubes, auto semi-break-in CW with sidetone, freq. counter, VOX and WARC bands.

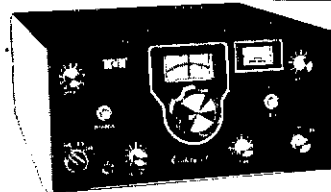
**847.80** List Price 942.00



### TEN-TEC Delta 580 9 band all-solid HF transceiver

Covers the new WARC bands at 10, 18, and 25 MHz, SSB or CW, RTTY or SSTV. Features 160-10 meters in 9 bands, 10.0 to 10.5 MHz, QSK, VOX and PTT, built-in notch filter, and built-in SWR meter. Max. input 200 W SSB and CW. Power required: 12-14 VDC @ 18.5 A.

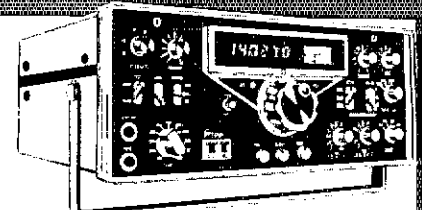
**764.10** List Price 849.00



### TEN-TEC model 570 Century 21 CW transceiver

Features 70W input, full break-in, all solid-state, built-in speaker and VFO overload protection. Receives CW or SSB but transmits CW only. Adjustable sidetone and built-in power supply. Crystals provided for 80 thru 10 meters.

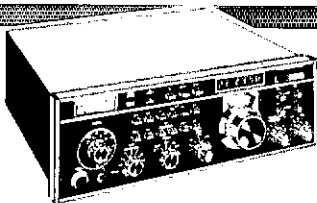
**314.10** List Price 349.00



### TEN-TEC 546 Omni Series C HF transceiver

This solid-state transceiver covers (160 thru 10 meters). Features digital readout, optimized bandwidth, S:SWR meter, VOX, notch filter, noise blanker, speaker and full break-in on CW with 200 W input. Power 12-14 VDC. AC operation with optional power supply.

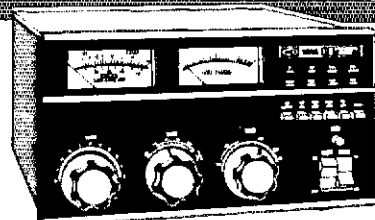
**1070.00** List Price 1189.00



### DRAKE TR-7/DR-7 general coverage digital readout transceiver

Covers 160 thru 10 meters and receives 1.5 thru 30 MHz continuous and 0-30 MHz with the optional Aux-7. Modes: USB, CW, RTTY and AM. Features RIT, built-in RF wattmeter/VSWR bridge, SSB 250 W PEP, CW 250 W, and AM 80 W.

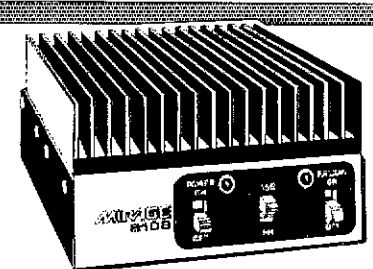
**1394.10** List Price 1549.00



### DRAKE L-7 2kW linear amplifier

Covers 160-15 meters plus ranges for future band expansions. 2kW PEP, 1kW, CW, RTTY, SSTV continuous, RF wattmeter, by pass switching, temperature controlled. Operates from 120/240 VAC. 50/60 Hz primary line voltage.

**1197.00** List Price 1330.00



### MIRAGE B108 2M amplifier

Features built-in receiver preamp, adjustable delay for SSB and auto relay keying. Freq. 144-148 MHz. Output 10W in/80W out. 13.6 V DC @ 12A. Optional RC-1 remote control 24.95.

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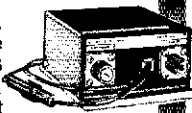
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50-ohm dummy load**  
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RPS-4 power supply**  
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**MIRAGE B23 2-meter  
all-mode amplifier**  
Features FM, SSB, CW, auto antenna change over, freq. 144-148 Mhz, RF output 30W. (2 in. - 30 out), Input 100 mw to 2w, 13.6 V DC @ 5A.  
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**KENWOOD TR-2200A** ..... 139.00  
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**KENWOOD DG5** ..... 99.00  
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**DRAKE T-4xC** ..... 399.00  
**DRAKE R-4C** ..... 399.00  
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**DRAKE R-4B** ..... 349.00  
**DRAKE AC-10** ..... 39.00  
**DRAKE 7075 mic** ..... 20.00

### YAESU

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**COLLINS 516E-1** ..... 89.00  
**COLLINS 312B-4** ..... 199.00  
**COLLINS PM-2 AC** ..... 125.00  
**COLLINS KWM-2 round** ..... 575.00  
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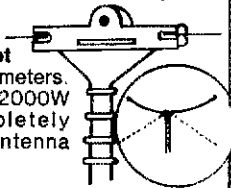
### TURNER 450 D dynamic mic

This low impedance (200 ohms) noise cancelling mic has a freq. response of 100 to 8,000 Hz, 4-conductor, and 5 ft. coiled cord.  
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### DENTRON All-band doublet

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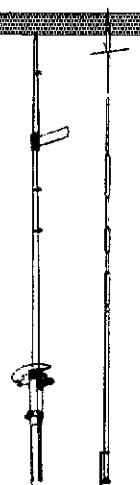


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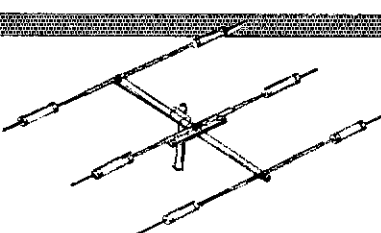
### CUSHCRAFT ARX2B VHF AM/FM antenna

Omnidirectional with 1/2 wavelength decoupling section. Freq. 137-160 MHz. VSWR 2:1 Power rating 100W. 50 ohm feedline.  
**44.95**



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25 ft. vertical covers 80-10 meters, automatic switching. 2:1 or lower SWR. 50 ohms input imp.  
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### MOSLEY CL-33

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- ★ Easiest five-band vertical to assemble and adjust.
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BNR	92	3	27	6 P.M.	3.605
ONN	158	40	31	6:30 P.M.	3.708
OSN	235	169	31	6:10 P.M.	3.577
OSSBN	2834	1097	104	10:30 A.M.	3.9725

09mN	341	52	34	4:15 & 8:45pm	80.180
BN				9 P.M.	3.577
				8:45/10pm	

First, I wish to thank every member of the Ohio Section for allowing me the privilege of writing for and with them in the months of my term. And, judging by the amount of goodwill and cooperation I've experienced during my first month as SCM, the coming months promise to be productive and enjoyable. I also want to express my gratitude to WB8JGW for his kind support and wise counsel over the past few months, and for his indispensable assistance in making a smooth transition. Congratulations to WA8EYF (Cars) and WA8MAA (Lear) for providing outstanding communications for the Cleveland Air Show and the original Heart-a-Thon, respectively. And speaking of public service events, I wonder how many of those involved in organizing communications for them notice that we are being called upon increasingly often to participate. Some members feel that if we are to maintain our current high standards we will need to reduce the number of these activities in the future. Some of us don't agree. For instance, by Nov. 23, 1980, WB8OK and COARES will have completed an even 40 events, large and small. Club Editors: please put me on your mailing list so special items can be shared throughout the section.

Local Nets	ONI	QTC	Sess.
BARF	93	21	26
BRTN	383	259	35
COARES	108	9	4
FRCN	68	24	5
LCNWOARES	469	219	36

Appointments: DEC-WA8GMT/Cuyahoga; EC-WB8SGL/Putnam, WD8AME/Warren, WD8AYH/Cuyahoga. Newly elected club officers: Canton ARC: WARADA, pres.; WB8VUN, vice pres.; WB8LFC, secy/treas. Greater Toledo ARC: KF8G, pres.; W8VPL, vice pres.; WBCBA, secy.; KA8FKR, treas. Traffic: K8OZ 386, WA8GMT 331, WD8DMF 307, W8PMJ 298, WB8JGW 297, W8DKFN 202, W8KRW 177, W8MEK 161, W8RTQ 155, W8JMD 153, W8OCM 144, W8BWS 142, K8BYR 113, W8DZYW 111, K8P 110, W8UBR 109, W8QZK 108, KA8DJZ 105, W8TF 98, W8SIO 95, W8DQY 93, A88B 93, W8AOK 83, W8SSJ 83, W8PMW 77, KF8J 74, W8NEC 73, W8YUS 71, K8DL 70, K8CKY 66, N8AKS 55, W8OMP 52, W8BDE 51, W8TKU 50, N8XX 50, W8BVL 48, K8YUW 47, W8DLX 46, W8WEG 45, N8CW 42, W8QAC 41, K8JC 41, W8BYG 41, W8KQJ 32, W8WHF 32, W8MRL 31, W8HVA 30, N8JR 30, W8UQY 30, N8CDO 29, W8INK 25, W8OQL 24, W8WAV 22, W8MGA 17, W8QXN 17, W8EK 16, W8MAZ 16, W8PID 16, W8PIY 15, W8BH 14, K8BIK 14, W8BOYK 14, W8IM 11, W8QHV 11, W8BLZ 10, W8RG 10, W8DP 9, W8AJC 8, W8SCH 8, W8RKT 8, N8AUH 7, W8ROV 7, K8KNL 6, N8AJU 5, W8KN 5, W8PQL 5, W8NHV 3, W8NTR 3, W8DYF 2, W8EDU 2, K8JA 2.

### HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VJK — SEC: K82TM, STM: WA2SPL, ASCM: K2AV, W2IT, K2KW, NM: W2WSS, W2IXR, N2BDW, WB2ZCM, WB2EAG, WA2SPL, WB2HDU. Nets: EPN 6 P.M. 3902; NYPON 5 P.M. 3913; ESS (slow) 6 P.M. 3590; NYSPTEN 6 P.M. 3925; NYS 7 P.M. 10 P.M. 3677; CON (Troy) 6:30 P.M. 3494; HVN (Beacon) 7:30 P.M. M-F 3797; SDN (White Plains) 9:30 P.M. SAT 6805 MW/F 615015; SCRN (Catskill) 9 P.M. 135735. Good luck to new net, Southern Catskill Repeater Net on 147.135/735 under N2WJDU. New net manager for SDN-WB2IXR. Good luck. Missed N2EF for some time but has rig fixed and is back on air. WA2EQW reports good group in license classes at Linton H.S. in Schenectady. They can't wait to get on the air. New classes to begin in January. Many good comments on SET/PD but no results yet. Several were late in getting in results. New month, full report will appear. PD in March? Reports from Mt. Beacon, WEGA and PEARL indicate a good year of public service activities. Would like to hear from MARS members with comments on liaison with NYS. Drop me a line on your thoughts. ONI: WB2EL, W2SPL, W2BDW, WB2EAG, WA2SPL, W2VJR, WB2ZCM. Traffic: WB2EAG 584, WA2SPL 513, WB2ZCM 244, W2EFU 204, N2JK 128, W2JBO 123, WB2HDU 122, K2KW 112, WB2CMO 101, K2MI 66, WB2GOJ 63, W2IQK 59, N2BDW 58, W2JVR 56, WA2EQW 30, K2AMU 25, K2HNV 12, WB2CJY 11.

NEW YORK CITY—LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst SCM: NYC Dwight Ernest KA2CNN. STM: WB2BNY. The following are traffic nets in and around the section.

Net	Time/Date	Freq.	NM
NLI*	1900 2200 Dy	3630	WB2TQC
NSPN*	1815 Dy	3928	WA2SEL
BAVIN*	2030 M-F	147.315	WB2EAG
ESS	1800 Dy	3590	W2WSS

Nets marked with an asterisk are section nets. High ONI: NLI, WB2TQC, WA2HV, KA2GLY, W2LWB and WB2EUF. EC report from N2EM. Congratulations to our new EC for Queens County, N2AJK. Please give him your support. NYC ARES very active during the SET with very few problems during our simulated hurricane. The lack of interest by the rest of the section seems a reason for concern. Perhaps in the next two years we can improve the situation. If you want to help by joining ARES, please contact me or one of the current ECs, Queens N2AJK, Babylon WA2SJB, Shelter Island WA2LBJ, N2EM, N2FM, other NYC, KA2CNN. Best wishes to WA2DHF who has moved to New Jersey. Anyone wishing to be an emergency coordinator and not living in one of the covered areas, please volunteer, we need you. Holiday greetings to all. Traffic: KA2CNN 248, WA2UWA 217, WA2HV 139, W2MLC 90, KA2GLY 82, WR2IDP 65, WB2TQC 62, WB2EUF 58, K2GCE 47, WA2SEL 43, W2BQ 24, W2GP 8.

NORTHERN NEW JERSEY: SCM, Robert E. Neukomm, WA2MVO — SEC: WB2VUF, STM: W2XP, NMS: N2CR, K2QW, W2PSJ, KA2GQ, W2TCA, W2JEZ, WB2IQJ.

Net	Freq.	Time/Days	Sess.	ONI	QSP
NJNE	3695	7 P.M. Dy	31	456	271
NJNL	3695	10 P.M. Dy	31	306	165
NJNP	3935	6 P.M. Dy/8 A.M. Sun	36	514	429
NJSN	3735	6:30 P.M. Dy	29	259	125
NJVN	4949	10:30 P.M. Dy	33	363	145
GRTN	7212	8 P.M. Dy	37	578	254
UCETN	085/685	7:30 P.M. Dy	36	269	89
NJ-RATT	147.51	Autostart			

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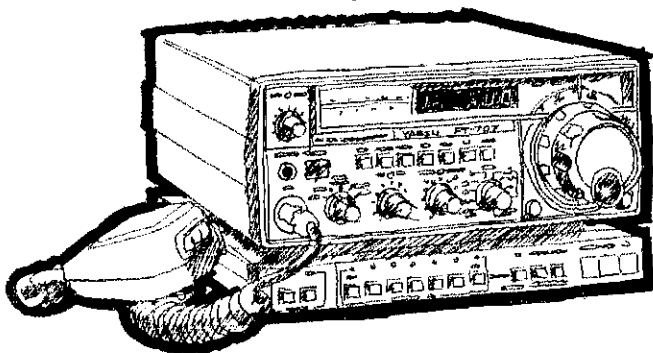
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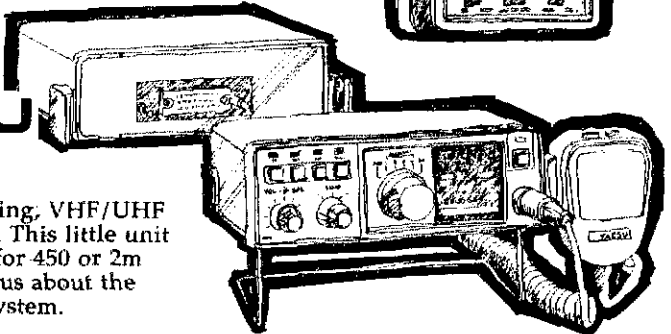
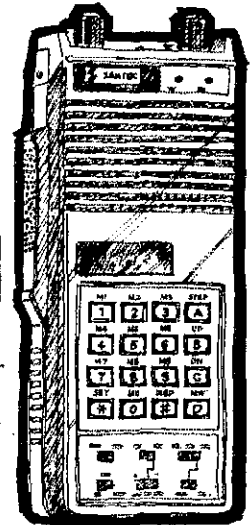
## YAESU FT-720

Flexible mounting, VHF/UHF FM transceiver. This little unit is synthesized for 450 or 2m operation. Ask us about the complete 720 system.



## HT-1200

Big-rig features and big power output. 4 W high, 1 W low. Fully integrated keyboard input with 10 memories and 4-mode scanning.



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CDE T2X	\$219
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### HY-GAIN

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TH5DX	\$195
TH3MK3	\$174
TH3JR	\$125
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105BA	\$ 86
115BA	\$133
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204BA	\$166
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18AVT	\$ 78
14AVQ	\$ 46

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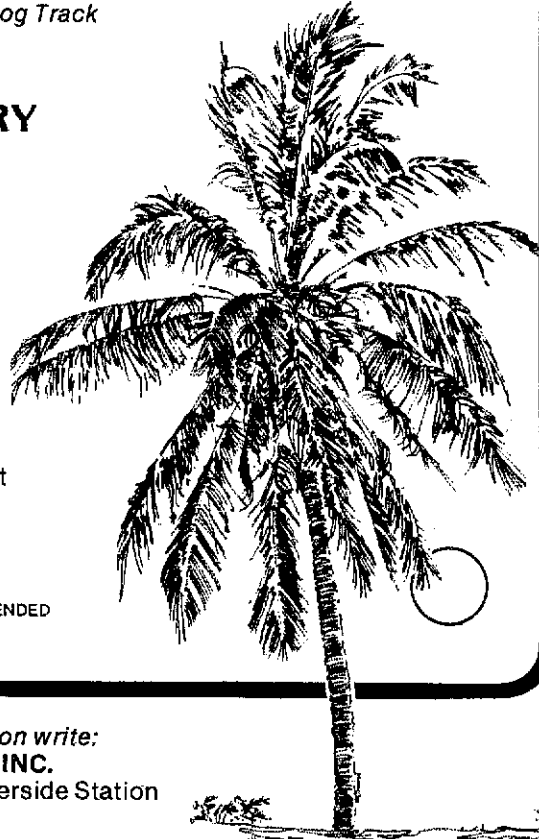
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OO report received from WA2QZD. BPL cards to KF2T and W2CC (his 50th card). New tickets: KA2KJH, KA2KJG, KA2KJF, KA2KKG, KA2KKD, KA2KKF. Upgrading: KA2ILD to General, KA2ETA to General, KA2CXG to Technician, WA2SLG now KB2JG, KA2ETA now N2CCD, W2NR is running code practice on Greenbrook repeater 34/94 at 9 P.M. Mon Tues, Thurs and Fri. The NJ QSO Party results went into the mail with W2RO as top NJ station. KA2FXA turned 14 and joined Army MARS. W2CC received DXCC 310 sticker and AF2L DXCC 200 sticker. W2IHA spoke at Bell Labs Holmdel ARC. N2SU received his rig back from the factory and N2BC is rebuilding his shack. N2BNB was a guest operator at W6RO while on a business trip. NJSN has 15 new stations and is running a FB training course. N2ATT operated from VP9-Land. All nets were active for the October SET. New tri-county Radio Association officers: W2QJ, pres.; W2HWW, vice pres.; W2RHM, secy.; W2DQA, treas. Ramapo Mountain ARC will participate in March of Dimes Bike-a-Thon and Boy Scout Jamboree-on-the-Air. WA2WFF and AG2N assisted teacher WA2YOS to present Amateur Radio at Newark's Speedway School. WA2PSU has a new tri-bandner. WA2VEX was selected as Net Command Station on NJVN. During the SET, WA2DSY called in with a real emergency from the Rockaway Scout Camp. Sussex County ARC and Ramapo Mountain ARC have been holding hidden transmitter hunts. Remember that refunds are available from the FCC for those that paid \$3 for amateur license fees between 8/70 and 2/28/81. This column was written by W2CC. Traffic: (Oct.) W2HC 350, KF2T 32, W2JF 334, AF2L 256, K8NCV2 246, K2VX 233, AG2R 222, W2CC 209, W2SQ 202, W2TGA 191, N2BOP 170, W2XD 164, N2CR 154, KB2HM 127, WB2RMJ 108, N2BNB 84, N2XJ-72, KA2GTY 71, WA7DPK 44, WA2MIF 44, W5DTR 41, WA2MVQ 39, KA2HNO 30, KA2EEQ 27, N2BQL 22, W2UH 18, KA2FXA 16, WB2KLF 14, KP6BC 9, WA2CLP 6, N2SU 5, WB2KNS 4, W2ZEP 3. (Sept.) N2SU 2.

## MIDWEST DIVISION

IOWA: SCM, Bob McCallrey, K0CY — SEC: W0RPK, SEC: W0QAVV, W0FQ, K0MST, W0QURB, W0BYVG. Snowstorms and tornadoes struck Iowa during the SET weekend but the ARES groups in District I, District VI, Linn, Jasper, Dennison reported very successful emergency operations. A SET 75-m emergency net initiated by W0TWW on Saturday produced QNI 17 and QTC 22. W0SS reported that TEN had little problem in handling SET traffic of 108 in 6 sessions. Hats off to W0YLS for leading W0SS A0R KA0X K0GP W0UPE N0SM N0BLA A0EVH in representing Iowa 100% in TEN for the W0VXK in no time. W0GNS now N0CAV, KA0BGP to General and KA0CAL to Technician. New officers in Mt. Pleasant: W0QVHB, KA0BTE, W0DENR and W0KLR. Good sig on OSCAR 7B is W0NNMV. Central Iowa Radio Amateur Society is the new corporate name for the Marshalltown groups. Hats off to K0PGG for outstanding interview with W6AM in the STATIC SHEET. K0LUZ new secretary for the EIDXA. W0TQG receiving many requests for this program on noise interference. The Davenport group participated 1980 ILLOWA BSA encampment. Demos at BSA Mitigwa camp by Story and Polk groups. The Iowa Code Net has been reactivated with W0PHND as new net manager. HAPPY NEW YEAR!!!!

Net IUTC Days Freq QNI QTC Sess. Mgr.  
Iowa 75m 1830 M-S 3970 1197 43 27 W0QAVV  
Iowa 75m 2330 M-S 3970 1005 51 27 W0B8VV  
ILCN (0030-0400) Dv 3560 379 134 62 W0YLS  
Traffic: WA0AUX 356, W0YLS 168, W0SS 116, K0YK 108, KA0X 98, A0R 60, K0GP 56, W0HPK 37, W0QAVV 21, W0UPE 20, W0BW 13, W0LFF 10, K0HCO 2.

KANSAS: SCM, Robert Summers, K0BFX — SEC: W0KLL, NMs: cw W0FT, phone W0OTH. Still need a slow speed net manager, contact me if you are interested in the hospital at the time of this report, WA0LBB and W0TII. Get well fast fellas. October net results are as follows: QNI/QTC: KWVN 790/480; K5BN 1496/535; KPN 396/250; QK5 233/153; C5S 1640/76. Hope you all receive a new bug or keyer for X-mas, we need more QNI on the city traffic network. 3610 kHz daily at 7 and 10 P.M. Pilot Knob ARC provided communication from the County Court House to the various points in the city and county needing the election results as they were received from the various precincts. WA0HUJ N0SF W0NYG W0FJE W0CGH K0FT W0JGU K0DOP W0VNE W0PRA and W0RNR participating. Results: good PR and exposure to the public. PKARC also elected officers for 1981 — W0DOT, pres.; W0PRA, treas.; KA0DJR, secy. Johnson County current officers are W0AIF, pres.; W0BTX, vice pres.; KA0DRG, secy.; K0GG, treas. New editor of W0BAC is W0DGS. Douglas County ARC elected WA0RGU, pres.; W0XJ, vice pres.; W0G8V, secy.; W0SIM, treas. If you happen to be in the Wichita area on a Saturday morning, hungry and needing someone to talk to, drop by La Murra's Pancake House on East Kellogg and visit with the Wichita hams. Traffic: W0OYH 486, K0BFX 187, W0FIR 150, W0HI 128, W0YLP 99, W0FT 93, W0AM 88, K0FPC 40, W0CHJ 32, W0FDJ 19, W0RO 15, W0OAG 10, W0PB 7, W0KL 4.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM: Joe Flowers, W0OTF. SEC: W0BPKY. Congratulations to KA0IST on upgrading to Tech and W0VXV on upgrading to Extra. Six new TS-830's have appeared in the shacks of W0JU W0VWVW AK0A WA0ZHY K0BX and K0RWL. At least 6 100K plus scores were reported during 85 CW from Missouri stations. CW 2 million A0BQ scores were turned in by the following: 8.2 million A0BQ, multi-multi; 702K-K0RWL single op.; 285K-A0B 15 meters; 71K-W0BLFY; 10 meters and 8K-K0BU, 40 meters.

Net	QNI	QTC	Net	QNI	QTC
MOSSBN	732	68	ACE	34	6
NEMOE	128	31	CENT MO	156	96
HBN	381	51	MON	167	123
MON2	139	72			

SE messages were received from W0JTX KA0FKL W0SIO K0G8V W0PHDW KA0E W0UDU K0PNK W0BKUJ and N0AAP. The start of American Radio Club finishing 2nd in Field Day 2nd category and the Ozark Amateur Radio Society finishing 13th in the same class. It looks like competition will be building next year. Congratulations to W0LT on retirement from Missouri Pacific Railroad after 31 years. W0VWVW is in the hospital and hopefully next month we will report that he is home and recovering rapidly. Our deepest sympathy to the families and friends of W0JXJ and WA0TA who joined the ranks of the Silent Keys. Traffic: K0ONK 487, W0BMA 254, W0UD 148, W0SV 143, W0OTF 109, K0PCK 85, K0SI 63, KA0E 63, K0BM 33, KA0P 27, K0RWL 12.

NEBRASKA: SCM, Shirley M. Rice, KA0BCB — SEC: WA0ASM. Many thanks to the Lincoln ARC for a JOB

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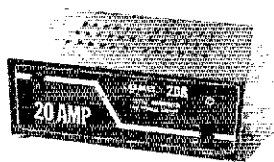
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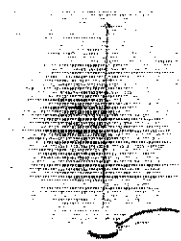
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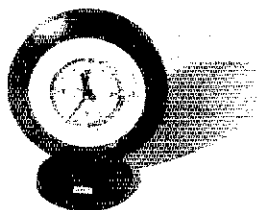
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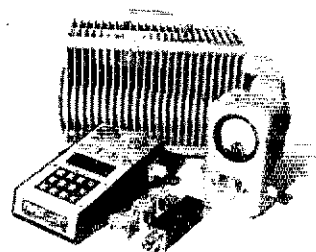
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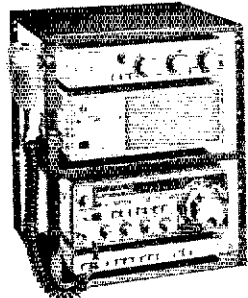
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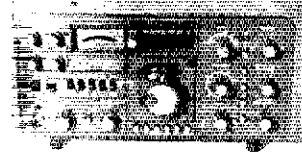


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- ← FP-707
- ← FT-707
- ← FV-707DM
- ← MR-7

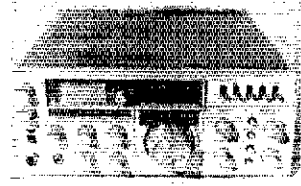
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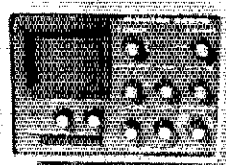
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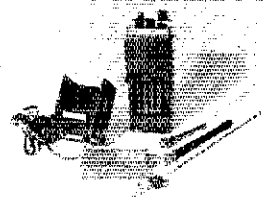
**FRG 7**  
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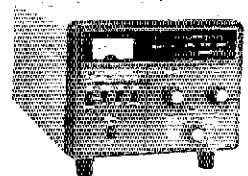
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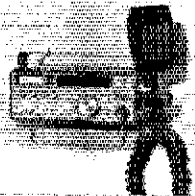
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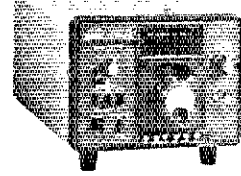
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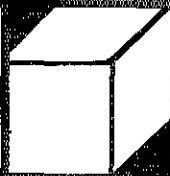


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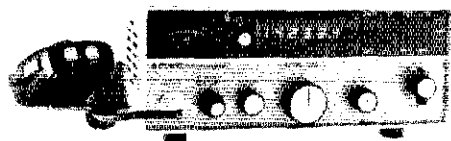


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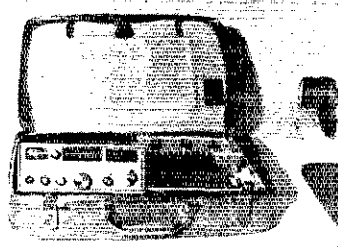
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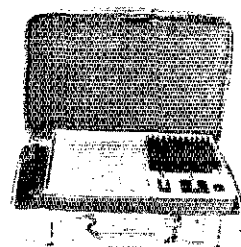
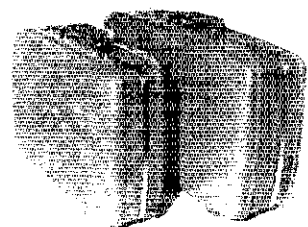


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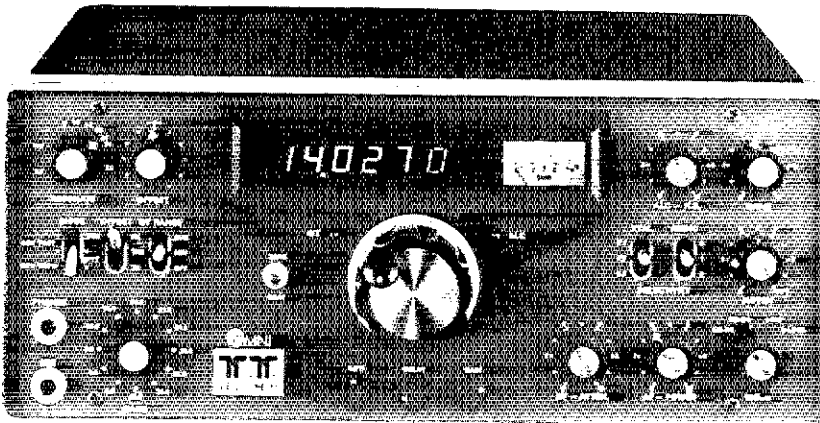
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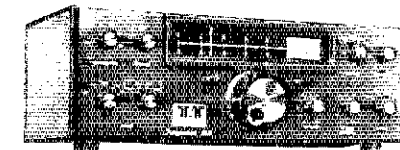
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- 219 250 Hz 6 pole CW filter ..... 50.00
- 645 Dual paddle ultramatic keyer ..... 85.00
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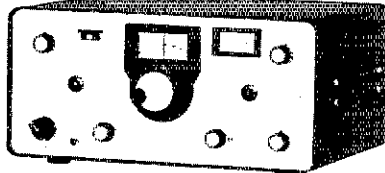
- 580 Delta 200w 9-band Xcvr ..... 849.00
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- 670 Single paddle keyer ..... 34.50



- 570 Century/21 80-10m 70w CW Xcvr ..... \$349.00
- 276 25 KHz external calibrator ..... 29.00
- 277 1.8-30 MHz 200w tuner/SWR ..... 85.00
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WELL DONE hosting the Midwest Division Convention. I was pleased for opportunity to meet my boss W1XX & K1CE from the ARRL. Both swell guys and everyone agreed that they were real HAMS! Always good to see and visit with W0FIR & W0JCP. Congrats to K0GND for 'Amateur of the Year Award'. FB on K0JFN winning the Grand Prize. Congrats to KA0BAK & WD0DLN on their new female harmonic. Sure was glad N0ACN stood in for me in the Woutif Hong initiation. Thanks! Hi. If traveling near North Platte be sure to stop and see WD0SXM & WD0SXN's new console station.

Net	Freq	UT	NM	QNI	QTC
NE Cornhusker	3980	1830 Dy	WB0GMO	829	21
Morning Phone	3982	1330 Dy	WB0GWR	1382	66
NE P.M.	3978	2130 M-F	WA0AUX	109	5
NE Storm	3982	0030 Dy	WA0LOY		
NE 75 ARES	3982	1430 Sn	W0IRZ	165	4
Pawnee 2-Mtr	0464	1230 M-F	WB0MKD	163	0
PV 2-Mtr	3494	0200 M	KA0ASD	50	0
QCWA	3980	1500 S	W0EUT	61	0
Western NE	3950	1400 Dy	W0NIK	532	47

Traffic: WD0BQG 166, WD0CID 155, KA0BCB 78, W0F0B 73, W0H0T 29, W0WKP 29, W0BSXM 23, W0ZNI 21, W0BRS 18, W0BFCG 15, W0B0GWR 14, W0B0EX 10, KA0ASD 8, W0B0GMO 8, W0NIK 7, W0LJD 6, W0YFR 6, KA0BWM 4, WD0BQM 3, K0SFA 2, WD0APY 1, W0JUF 1.

## NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzapa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq	EST	Sex	QTC	QNI
CPN	3640	1900 + 2200	68	275	333
NENN	3720	1800/1000 Sn	39	233	383
Nutmeg	3720	1815	31	121	214
RASON	1373	2100 MWF	32	144	452
WESCON	78/18	2030	34	130	424

Hi Traffic CPN: KA0QE, KA1EJF, WB2PJU, HI QNI CN: WB1CPF, WB1ESJ, K1GF, WB2PJU, WA1FSM, NM of RASON, became a Silent Key. He was a founder and leader of RASON and will be missed by all. WB1CPF was appointed interim NM of RASON. New 6-meter repeater in Burlington, WA1LMVR on 52.01/53.01, is being worked all over the state. Southington ARS's participation in Apple Harvest Festival was very successful. Upgrading: twice KA1FZG, Technician WA1ZXU, General KA1DZV, KA1EJF, Technician WA1FBO, Advanced KA1BEJ, Extra WB1GEB, New Candlewood ARS officers: WA1GSO, pres., KA1ECL, vice pres., WB2OSY, secy/treas, W1LCK and W1FB hammed it up in VP2, Land. W1TKG running combined General, Advanced and Extra upgrade classes in the Ir-City ARC area. W1OV now has 305 countries confirmed out of 310 worked! New appointees: OTS: KA1DZV and WB1ESJ. K1WJ planted new tower to work more rare ones. WB1GDI and WB1GDO found fox in 19 minutes at the Greater Fairfield ARS's October hunt. WINJM will be portable 4 during winter. K1EFL eyeing the linear to go along with new tower and beam. To all the hams in the Nutmeg State: Happy Holidays from your SCM, Traffic: (Oct.) WB1CPF 26, WB2PJU 282, W1EJF 242, W1EJF 147, WB1CRH 142, K1XA 128, WINJM 101, KA0E 88, WB1ESJ 79, WB1DN 76, KA1CMX 57, WA1WCG 56, KA1BHT 45, WB1DGR 45, KA1KP 39, W1GVT 37, W1WV 32, K1EUW 30, WA1LOU 28, KA1DZV 20, KA1KD 18, K7OOQ 13, K7CE 8, W1QV 8, W1ICE 5, W1GUC 3. (Sept.) W1EWF 183, WB1CPF 155.

## EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD

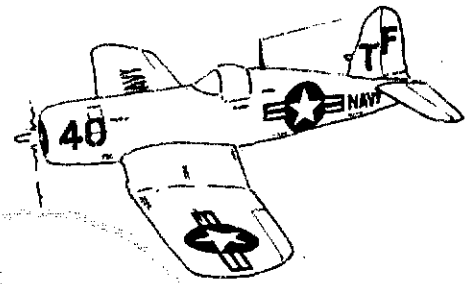
— STM: WA1TB. SEC: WA1BLG. ASCM: WA9NW.

Net	Mgr.	Freq.	Time/loc/DY	QNI	QTC
EMRI	N1GO	3.658	1900/2200/DY	371	290
EMRIPN	KA1BJY	3.898	1730/DY	446	301
EMZMN	KA1CGP	90/30	2000/MWF	141	55
EMZMN	KA1GGP	145.8	2000/TTh	—	—
NEEPN	K1BZD	3.182	0830/SU	52	21
HHTN	K1BZO	04/64	200/DY	606	181
HHTN	WB1EZT	23/63	1815/DY	175	76
EMRIS	WB1DHW	3.715	2030/DY	365	190

I have received quite a bit of input from people who are unhappy about the recent increase in the fees for call letter license plates. So am I. The Massachusetts State Legislature saw fit to allow all licensing agencies in the state to set their own rates. One of these is the Motor Veh Dept. As a result, all registrations for vehicles in Mass went from \$7 to \$10. But in addition to that, the additional charge for a call letter plate went from \$2 to \$10, for a total of \$12 per year. As a result I have gotten in touch with Michael Rea who is my representative. He has agreed to file legislation to fix the problem. Fortunately he got reelected. hi. I have sent letters with more detail to all clubs and spelled out in detail in the Cross-bander what form this will take. If you feel strongly about this as I do, please let your own state elected official know how you feel. More later when I have a bill number and know when public hearings will start. I'm gonna need all of your help on this one. I have been in touch with the Boston FCC as a result of a meeting at the convention and I have formulated a plan with them to reduce the time involved in reacting to malicious interference. I'm working with individuals in certain parts of East Mass to help me with this. W1JPS's antenna problems have reappeared it seems. The 19-79 repeater has been relocated from Malden to Chelsea and much has been going on to make the installation top notch. Massanut Club has changed its meeting night to the third Wed of the month at the Parish Hall Center in Bridgewater. Chelmsford Club has W4HMV talk on his trip to Britain. WA1TB gave terrific talk at the Middlesex Club. Much fall antenna work has been keeping Billerica Club members off the streets. Wellesley Club has speakers on pay TV. Mire-Bedford Club applied for DXCC Witham Club is now printing a bulletin — Intermod. Framingham station W1FY now the 531 Schaltenbrand Mem Stn (Traffic: (Oct.) WA1TB, 531, WA1UG, 512, WB1DHW 440, KA1CGP 390, KA1BJY 272, K4YX 166, K1BSO 108, K1GN 108, WB1GWS 87, N8TM 73, WB1E2T 49, WA9NEW 60, K1BZD 55, K1PJ 51, WB7TPX 48, WA1X 47, W1DMH 41, K9HI 36, KA1CMR 34, K1LCO 29, WA1VSY 27, WA2ORV 26, KA1EMB 22, WA1IDA 20, W1AOG 16, W1CF 16, W1GEX 13, WA1DXT 8, W1PJ 8, N1EE 7, WA1FNM 7, W1LE 1. (Sept.) WB1GEX 3.

MAINE: SCM, Cliff Lavery, W1RWG — STM: W1KX. SEC: K1JUG. The SET is history and commendations go to the STM and SEC for a fine cooperative effort. W1YNZ and Arcostook Emergency Net gave a good demonstration of the value of two meters in emergency condx. K1YFV has completed 450 MHz link between Streaked and Camden giving 28/88 fantastic coverage. PSHR: AK1W 109, W1RWG 97, WA1YNZ 65. Sessions/

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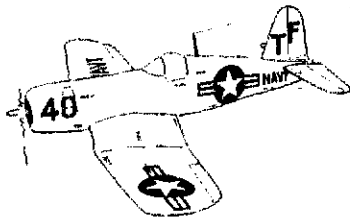
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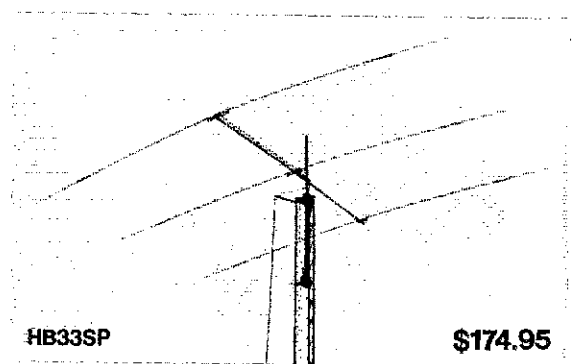
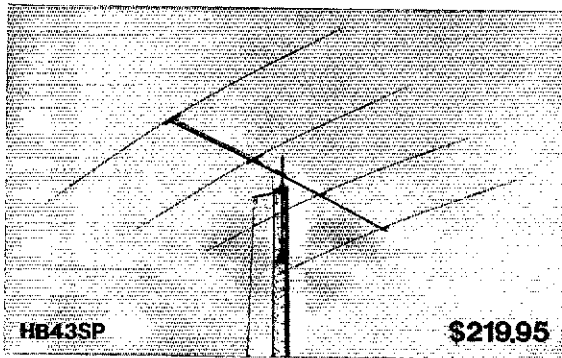
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Yaesu	FRG-7	299.00
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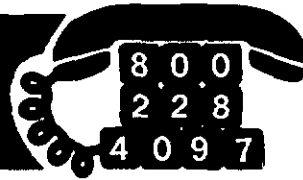


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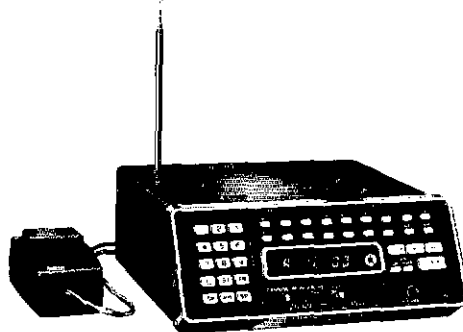
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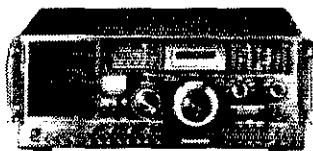
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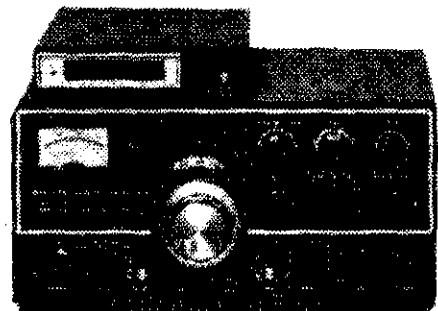


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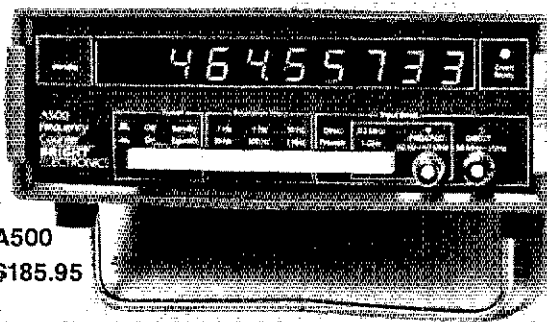
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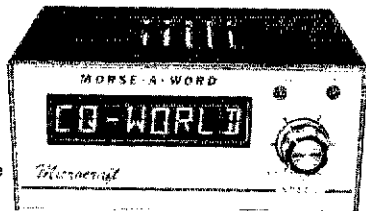
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**NEW HAMPSHIRE:** SCM, Robert C. Mitchell, W1NH — STM, W1TN, N1MS: N1NH AK1E. This report from Scranton PA. Thanks to all that helped in this years SET. The GSPN has 302 check-ins and 31 traffic. Seen on Hwy45 and byway WAC to W1EJ. W1A1QGR and K1THG. New 50 MHz WAC to W1EJ. His QSO with EL2FY did the trick. W1BYS back in Florida and dropped the WB4BCP call. Enjoyed meeting many NH hams at Boxboro. The GSPM Net had 505 check-ins and 187 traffic. Cw man N1NH heard checking into lone net. W1HGO now Extra. He ready advanced warning - NH QSO Party sponsored by Concord Brasspounders on Feb 7 and 8. How about volunteers to go to Belknap and Coos Counties? W1CUE is liaison to Daytime First Region Net. KA1FT spoke at the Nashua Area Club. Rumors heard - ARRL convention at Boxboro again next year? My thanks to K1RSC who is retiring as SEC. He has done a fine job and says he will be available to help whenever needed. K1MFQ vacationed in Canada. The Great Bay Radio Association is planning a DXpedition next year. Watch for details. Traffic: AK1E 177, K1OSM 146, N1NH 111, W1HGO 72, KA1BBI 70, K1UOX 49, W1MHX 44, W1GLA 37, KA1CXP 34, W1CUE 33, N1ALM 31, KA1BA 27, W1ALE 22, W1DSW 21, N1BAP 8, KA1JA 7, W1NH 7, WA1PEL 7.

**RHODE ISLAND:** SCM, J. Titterington, W1EOF — The SET was a huge success here. The RIEM 2-mtr Tfc Net report: sess. 24, QNI 250, QTC 50. Fidelity ARC elects N2ACE, pres.; AA1T, vice pres.; AD1P, secy; WA1UHT, Treas. Most meetings now held at home of W1MB. The Pine Hill AR Rptr Grp elects W1RQP, pres.; WA1PQX, vice pres.; K1EZN, secy; WA1UZZ, Treas. K1IU and WA1SUB, dir. W1FMB is a new EC in Middletown. Congrats to KA1FBR on making General — also, new Novices at Sub Signal — KA1FVZ, KA1FYA and KA1GAJ. All Novices are invited to participate in EMRI Slow Speed Net on 3715 kHz daily at 0130Z. It's a good training ground. Traffic: W1EOF 340, KA1BTU 292, KA1FE 120, N1RI 38, K1DT 15, KA1FBR 7, AE1S 4.

**VERMONT:** SCM, Bob Scott, W1RNA — SEC: W1VSA. W1AIM reports WAC on 6 meters. He wonders if this is a VT first — any VT stn hold a WAC on 6? Please advise. Tnx. W1ABQ is back in the amateur bands & expects to be active on our V1 nets. We are hearing more stns are becoming on 6 mtrs — anyone care to report their activities on that band? GMN 27/530/47; Carrier 27/507/53; VPN 4/59/4. No rpt V1SB or RFD rcvd. Coverage by W1KOO repeater has a changed pattern due to having to relocate antenna. It is good to hear K1ington repeater back with a good sig. WAZCEP, Net Mgr GMN, rushed to hosp. Now is in the Plattsburg Hosp. with undetermined problem, but is understood to be recovering — must be a virus!?! Traffic: W1RNA 17, W1ABQ 4.

**WESTERN MASSACHUSETTS:** SCM, Art Zavarella, W1KK — ASCMs: W1BYR K1BE, STM: W1TM, SEC: W1JP, NMS: WA1MJE W1UPH W1UD. No Worcester ARES provided comm for Fitchburg YMCA 10-mile Road Race with W1UD WA1DWS WB1FCV WA1KPO N1AZG K1JHC/EC as NCS. A similar FB radio support by the Mt. Tom repeater group led by W1GJK plus WA1GZO WA1SDY WB1FK KA1EGS KA1DCU WA1GX WA1OZX WA1THR KA1AGE K1ESN with the Intl. Women's Regatta on the Conn. River. So, Hadley. Congrats WB1DSO made General at Boxboro. Kudos to our SEC and the many participants that made SET a big success and fun weekend. The NTS gang was in full cycle, likewise the ARES nets are beginning to do some substantial tlc biz, along with 442 QNI in Oct. PSHR: WA1MJE 92, K1JHC 86. Traffic: WA1MJE 501, K1SSH 131, W1ZPR 92, K1JHC 64, W1KK 63, W1JP 60, W1Y1 58, K1JUV 52, W1TM 46, WA1OPN 38, W1EFC 30, WA1YYW 25, W1ABF 21, W1UPH 19, W1ICWH 8, WA1DNB 8, W1HKN 2.

### NORTHWESTERN DIVISION

**ALASKA:** SCM, Lem Allen, W7JMH — It was great to hear from Elmore County ARC again; they manned check points at a Hike-Bike, N7AYL and KA7GOI upgraded to Advanced. KA7FNX has new Heath 2 M rig. WB7QYU has HW-16. The club has 26 hams to date, is sponsoring a fall Novice class. K7JV is new IMN Net Mgr. WB7VAO is new Farm Net Mgr. Congrats to you both. My special thanks to those of you who participated in the SET. Congrats to N7AGP, who upgraded to Extra.

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Net Freq Time Sess. QNI QTC  
FARM 3826 ssb 7P Dy 30 1261 34  
IMN 3635 on 8P M-F 22 247 117  
CD 3990 ssb 810A M-F 23 639 4  
Traffic: W7GHT 243, W7JMH 107, K7JV 34.  
**MONTANA:** SCM, Robert Leo, W7LR — MTN: Sept QNI 886, QTC 98, Oct QNI 974, QTC 122, W7YTN 2, secn, N7AMZ, QSY to Oregon. FB job as SEC. We need new SEC — candidates? W7LKB reports 9 in Laurel AREC. WB7UTJ 40-Mtr Net QNI 171, QTC 10R 1P, N7AFE had 2-Mtr Nets QNI 123, QTC 2P, KB7AO N7AFE used 2 mtrs to help fire comm. W7JMX reports new 2-mtr rpt nr Howe Idaho 25/85. WB7UTJ describes ham role in finding lost girl in MT; also suggests award for working all MT counties. MT QSO Party a success with 37 logs, results next month. KB7O QSO Japan on 6 mtrs. IMN QTC 117, QNI 247. Libby, who quitted in Oct for the PSHR, with 74 points, is back in SEC. She is the first MT ham on PSHR since I've been SCM. G4818. G4HRK Bozeman issued certificates for QSO's with Ghost Town DXpedition, Bannack. IMN report by W7GHT: new IMN mgr K7JV, big SET effort, & more CW nets: IMN 3635 03Z, RN7 033Z, PAN 0430Z, RN7 0530Z; SSB nets: MTN 0030 Farm 02 Id CD 15 DRN7 19 MSN 1630 DPAN 1930 DRN7 2030, 2-mtr rpters: KB7KB 93/33 Billings; proposed: KA7DLC 31/91 Livingston, WB7QZE 0161 Fallon. Traffic:



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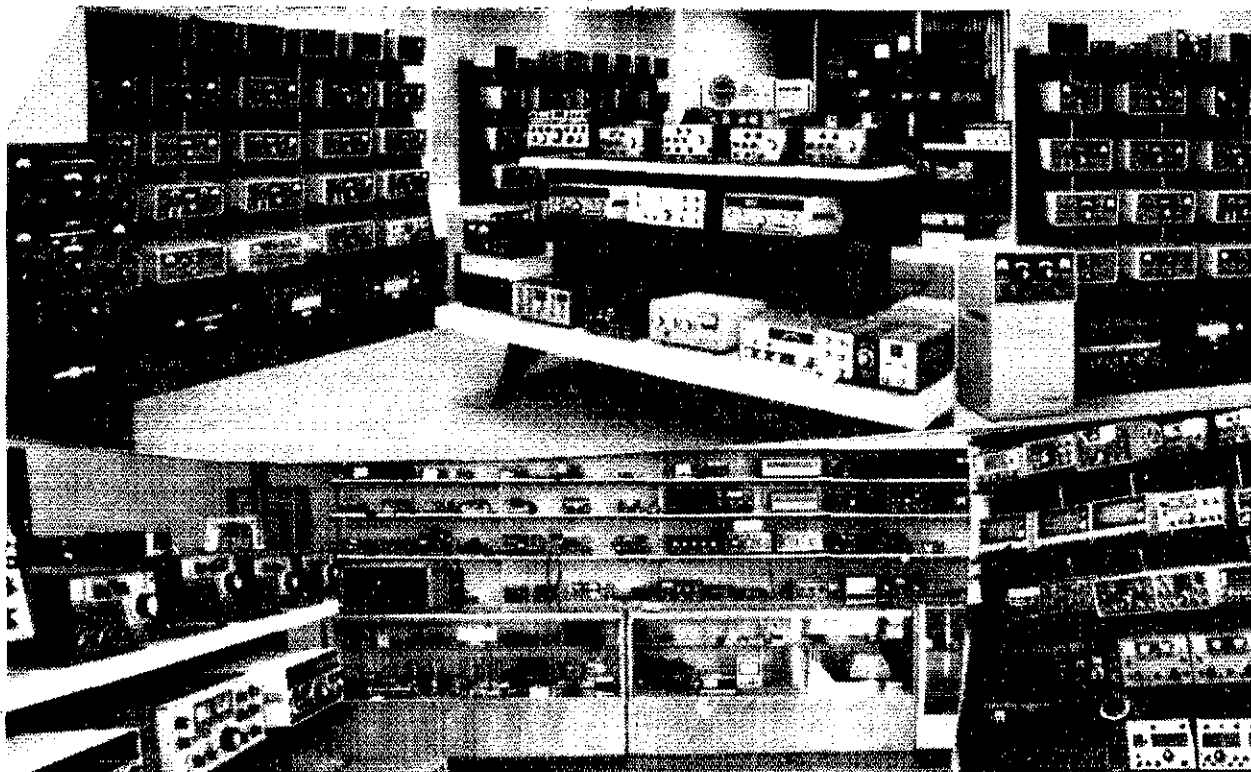
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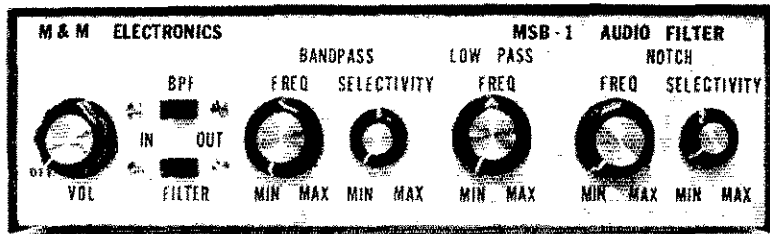
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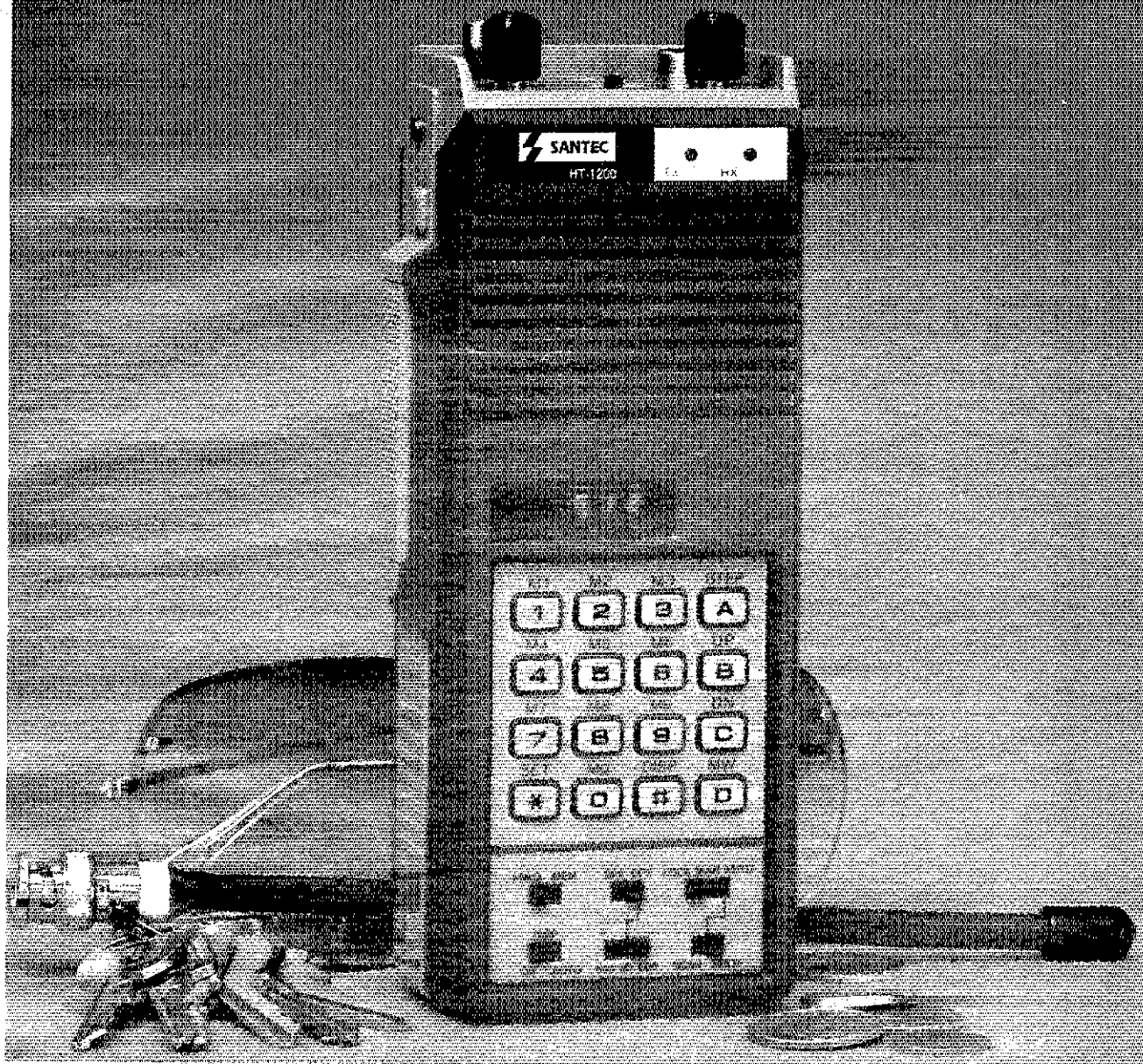
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The Santec HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

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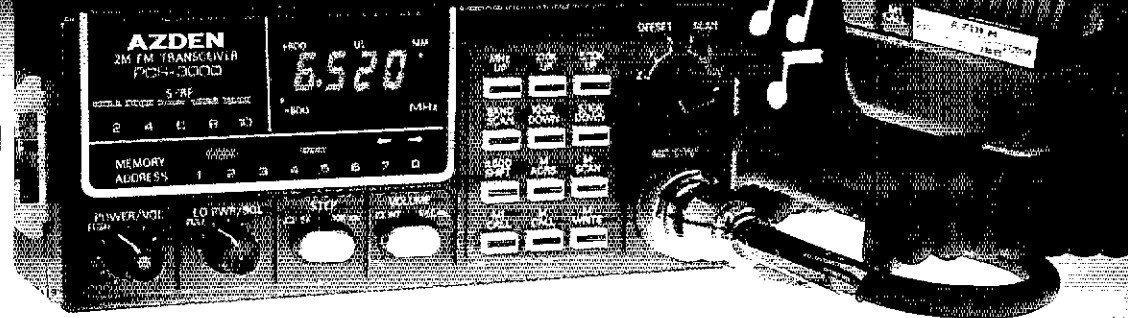
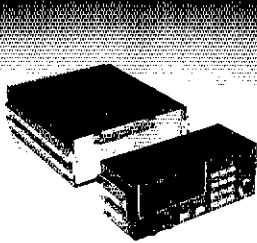
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- **8 MHz FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN:** Receive and transmit 142,000 to 149,995 MHz in selectable steps of 5 or 10 kHz. **COMPARE!**
- **SIZE:** Unbelievable! Only 6 3/4" by 2 3/8" by 9 3/4". **COMPARE!**
- **MICROCOMPUTER CONTROL:** All frequency control is carried out by a microcomputer.
- **MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES:** When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. **COMPARE!**
- **PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL:** Frequency is selected by buttons on the front panel or microphone.
- **8 CHANNEL MEMORY:** Each memory channel is programmable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- **INSTANT MEMORY 1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- **MEMORY SCAN:** Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- **PROGRAMMABLE BAND SCAN:** Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- **DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT):** The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. **COMPARE** this with other units that claim to scan in 5-kHz steps!
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- **REMOVABLE HEAD:** The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. **COMPARE!**
- **PL TONE OSCILLATOR BUILT IN:** Frequency is adjustable to access PL repeaters.
- **MICROPHONE VOLUME/SQUELCH CONTROL:** Both functions may be adjusted from either the microphone or front panel.
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- **25 WATTS OUTPUT:** Also 5 watts low power to conserve batteries in portable use.
- **GREEN FREQUENCY DISPLAY:** Frequency numerals are green LEDs for superior visibility.
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- **SUPERIOR RECEIVER:** Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. **COMPARE!**
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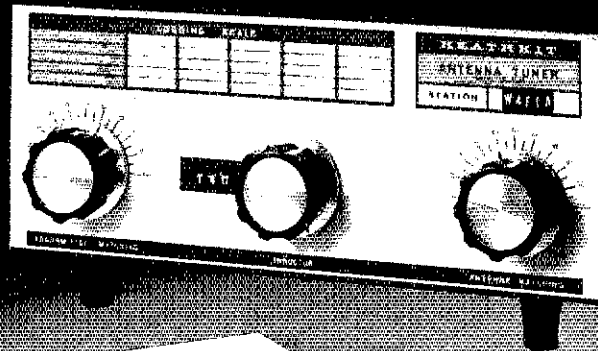
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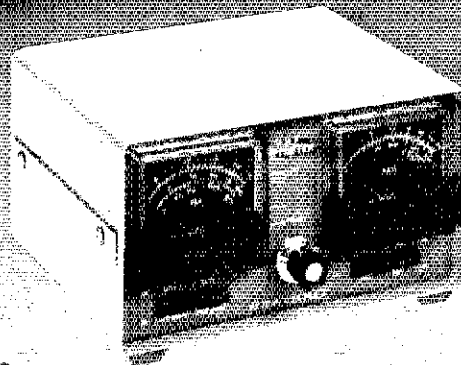
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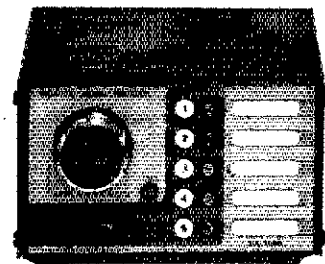


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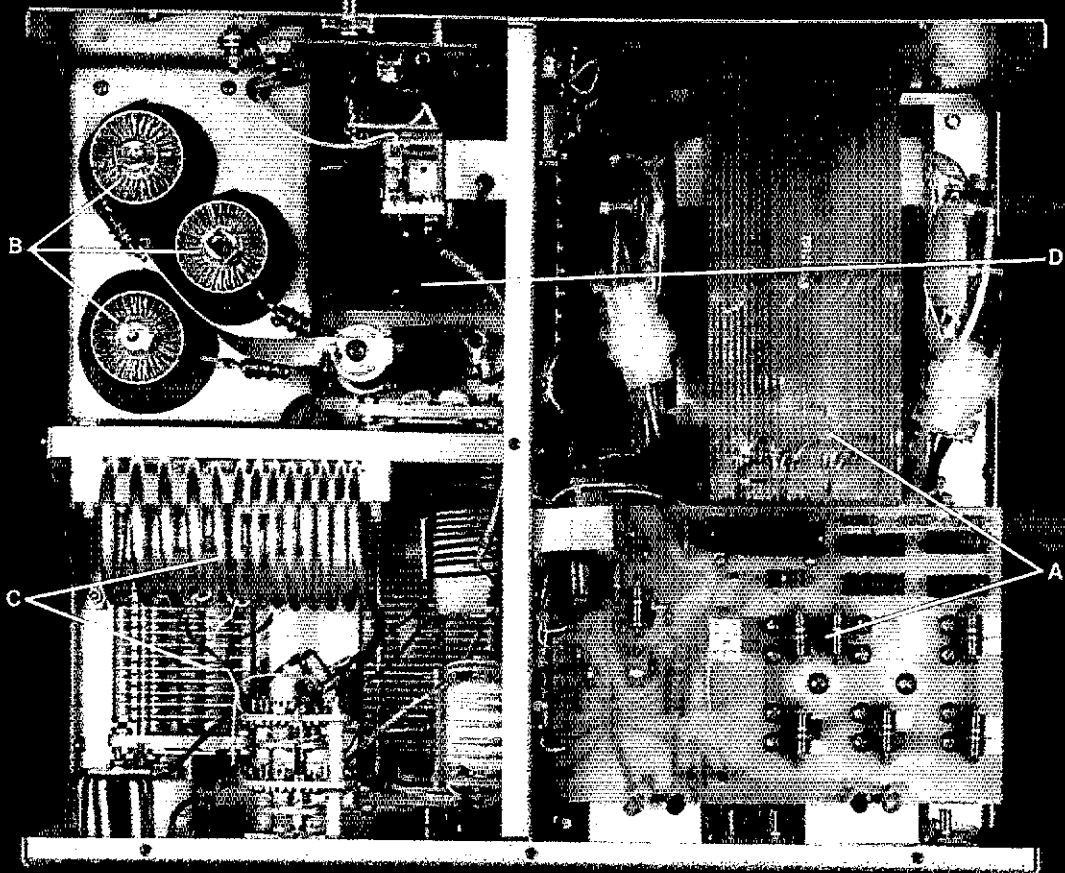
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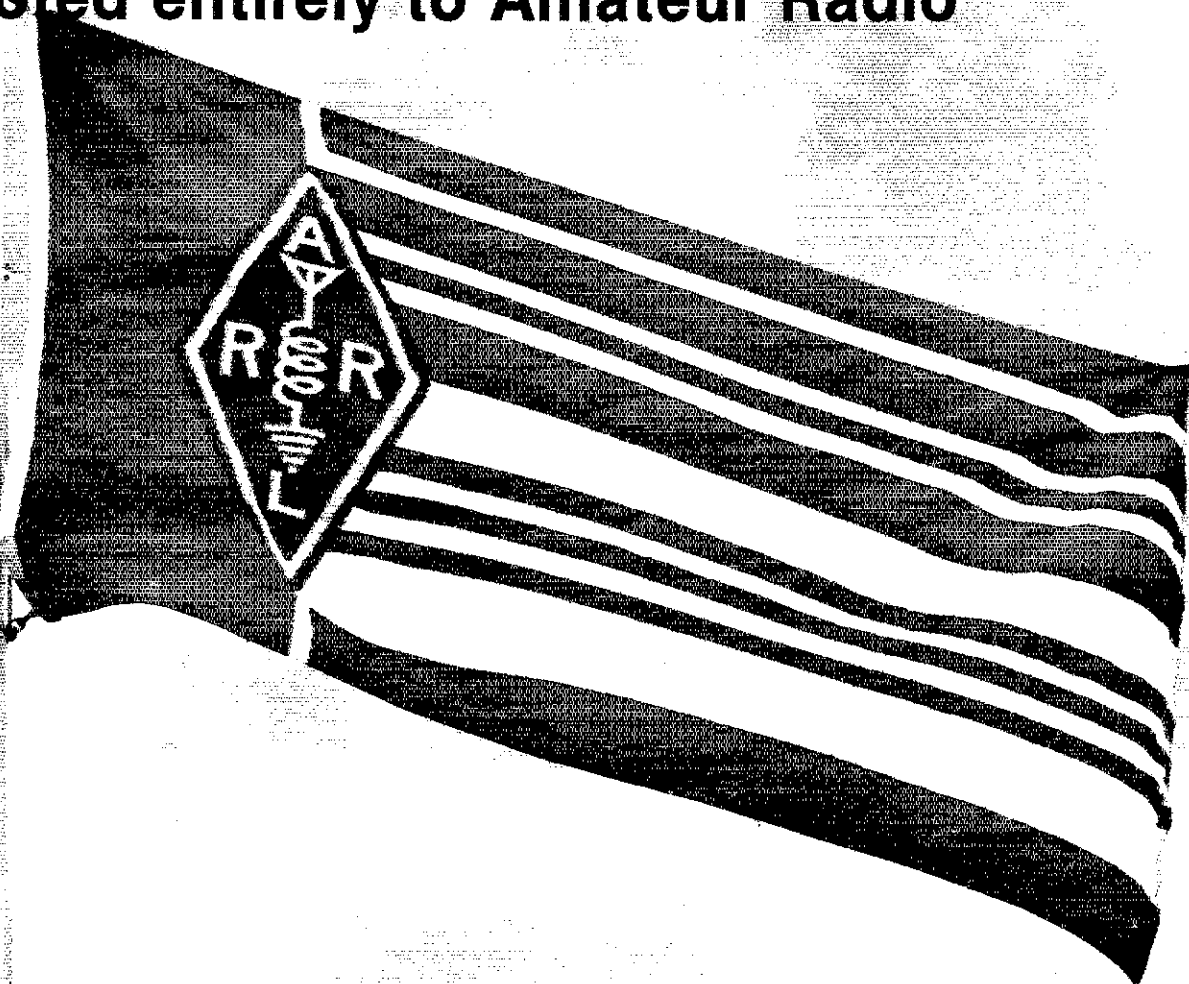
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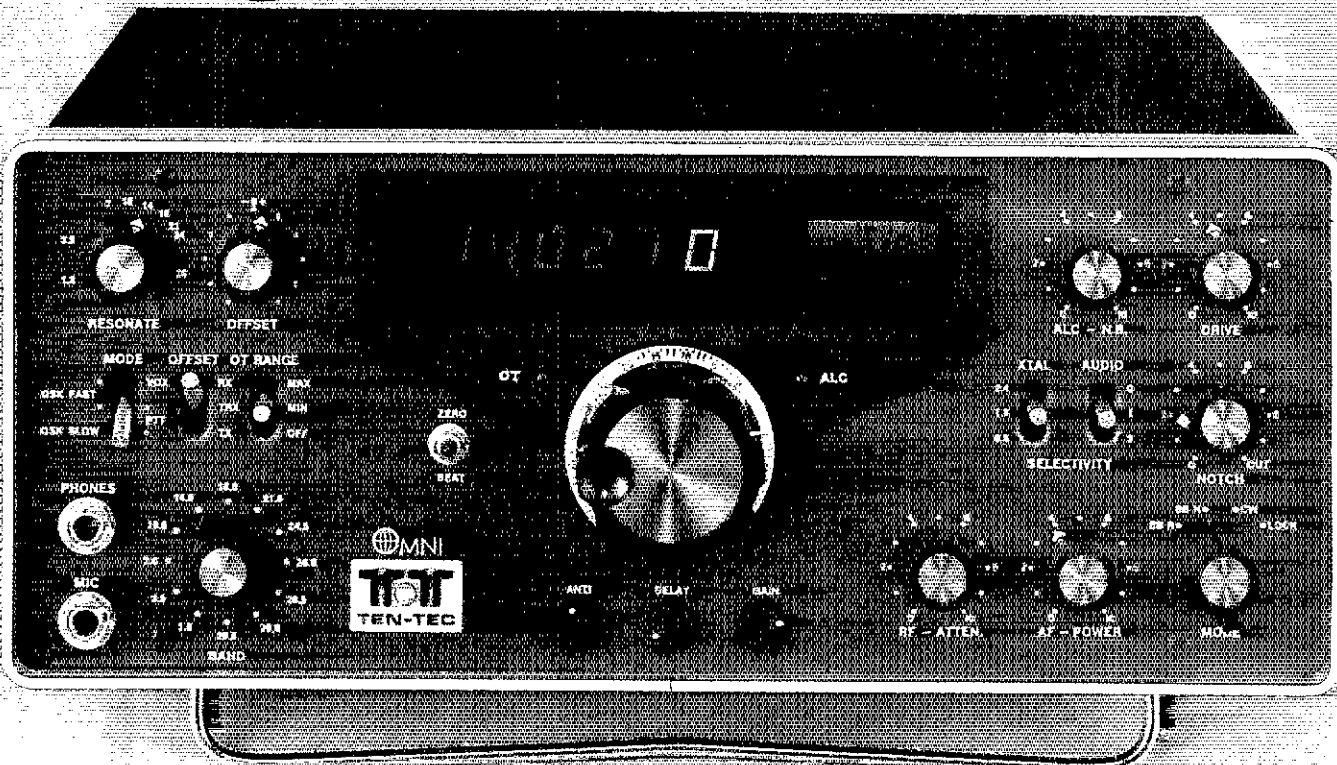
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**BROADBANDED.** From the pioneer.

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**OPTIMIZED RECEIVER SENSITIVITY.** For an ideal balance between dynamic range and sensitivity... from  $2 \mu\text{V}$  on 160 to  $0.3 \mu\text{V}$  on 10 Meters.

**NEW OPTIMIZED BANDWIDTH.** Seven response curves—four for SSB, three for CW. Standard i-f filter is an 8-pole 2.4 kHz crystal ladder type. Options include a 1.8 kHz 8-pole crystal ladder type, a 500 Hz 8-pole CW filter and a 250 Hz 6 pole CW filter. Switch an optional filter from the front panel to put it in series for up to 16 poles of filtering. And the standard CW active audio filter has 450 and 150 Hz bandwidths for added attenuation. New toggle switches select i-f and audio filtering. Selectivity for any situation.

**BUILT-IN NOTCH FILTER.** Variable null eliminates unwanted signals and carriers in a pass band from 200 Hz to 3.5 kHz with a notch depth of more than 50 dB.

**NEW BUILT-IN NOISE BLANKER.** Standard equipment. New filter handles big signals easily, makes impossible locations usable.

**GREATER DYNAMIC RANGE.** Better than 90 dB, typically. Reduces front-end overload and distortion. Plus a PIN diode switchable 18 dB attenuator on the RF gain control.

**NEW "HANG" AGC.** Smoother operation. **2-SPEED BREAK-IN.** "Fast" or "Slow" speeds. "Fast" for instant, full break-in. "Slow" has a longer mute time before receiver is actuated for working crowded bands with heavy QRM and for mobile.

**WWV RECEPTION.** On the 10 MHz band. **DIGITAL READOUT.** 6 shielded 0.43" LEDs with 5 in red, the 6th (100 Hz) in green.

**SEPARATE RECEIVING ANTENNA CAPABILITY.** Use with separate components, instant break-in linears, or transverters. **"S"/SWR METER.** Easy-to-read. Electronically switched.

**200 WATTS INPUT.** On all bands, when used with 50 ohm load. Proven, conservatively rated design. Fully warranted for first year, pro-rata warranty for five extra years!

**100% DUTY CYCLE.** Ideal for RTTY, SSTV or any hard usage. Up to 20 minutes key down time.

**BUILT-IN VOX AND PTT.** Smooth VOX with 3 front panel controls. And PTT control at both front and rear panel jacks.

**BUILT-IN PHONE PATCH JACKS.** Easy interface to speaker and microphone signals.

**BUILT-IN CW ZERO-BEAT SWITCH.** Puts you on exact frequency of a station being worked without being on the air.

**BUILT-IN ADJUSTABLE SIDETONE.** Vary pitch and volume for easy listening.

**ADJUSTABLE THRESHOLD AUTOMATIC LEVEL CONTROL.** From low power to full output with full ALC control.

**FRONT PANEL CONTROL OF LINEAR OR ANTENNA.** Auxiliary bandswitch terminals on rear panel permit simultaneous control of external relays or circuits. Designed to interface with new TEN-TEC solid-state kW Linear.

**AUTOMATIC SIDEBAND SELECTION.** And you can reverse it with the mode switch.

**SUPER AUDIO.** A TEN-TEC trademark. Proper shaping plus low distortion.

**IMPECCABLE SIGNAL.** Clean. Easily exceeding FCC requirements, thanks to meticulous design, fine components, and conservative ratings.

**HIGH STABILITY.** Deviation is no more than 15 cycles per degree temperature change after warm-up.

**HIGH ARTICULATION KEYING.** 2½ msec rise and decay time for sharp, clean keying.

**BUILT-IN SPEAKER.** Built into the bottom of the cabinet shell. Compression-loaded for better quality and higher efficiency. External speaker connections on rear panel.

**PLUG-IN CIRCUIT BOARDS.** For easy removal if needed.

**FUNCTIONAL STYLING.** Dark front panel, convenient control groupings, "clamshell" cabinet, full shielding, and easier-to-use size: 5¼" h x 14¼" w x 14" d.

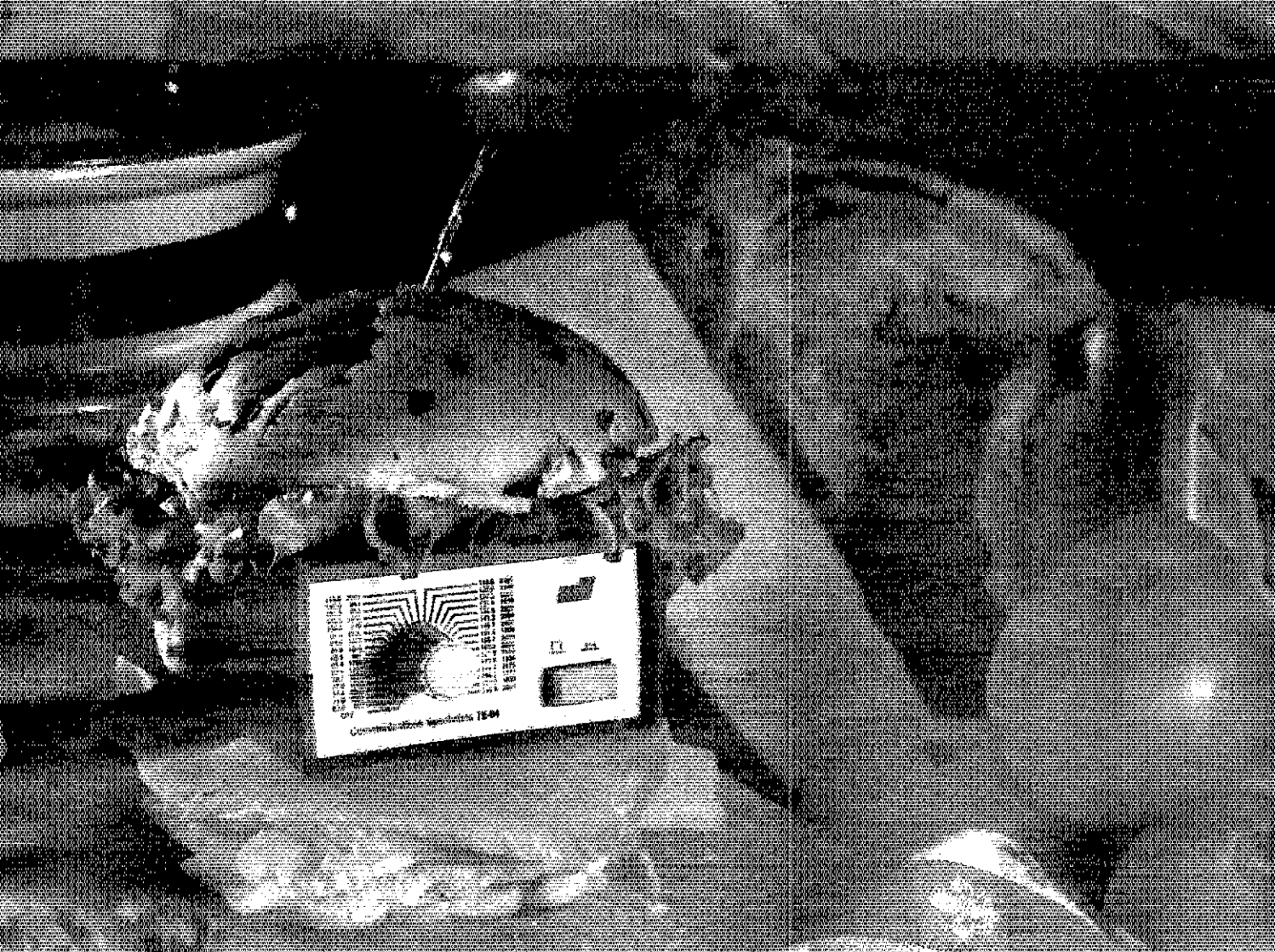
**POWER.** Operates on 12-14 VDC for mobile or storage battery use. For 117 VAC use, an external supply is required.

**FULL ACCESSORY LINE.** Model 217 500 Hz CW filter \$55, Model 219 250 Hz CW filter \$55, Model 218 1.8 kHz SSB filter \$55, Model 243 Remote VFO \$189, Model 255 Power Supply/Speaker \$199, Model 280 Power Supply \$169, Model 645 Dual Paddle Keyer \$85, Model 670 Single Paddle Keyer \$39.00, Model 234/214 Speech Processor & Condenser Microphone \$178, Model 247 Antenna Tuner \$69. All in matching color.

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# Food for thought.

Our new Universal Tone Encoder lends it's versatility to all tastes. The menu includes all CTCSS, as well as Burst Tones, Touch Tones, and Test Tones. No counter or test equipment required to set frequency—just dial it in. While traveling, use it on your Amateur transceiver to access tone operated systems, or in your service van to check out your customers repeaters; also, as a piece of test equipment to modulate your Service Monitor or signal generator. It can even operate off an internal nine volt battery, and is available for one day delivery, backed by our one year warranty.

- All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- Immune to RF
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
- Instant start-up.
- Off position for no tone output.
- Reverse polarity protection built-in.

## Group A

67.0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 IZ	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

- Frequency accuracy,  $\pm .1$  Hz maximum - 40°C to + 85°C
- Frequencies to 250 Hz available on special order
- Continuous tone

## Group B

TEST-TONES:	TOUCH-TONES:	BURST TONES:			
600	697 1209	1600	1850	2150	2400
1000	770 1336	1650	1900	2200	2450
1500	852 1477	1700	1950	2250	2500
2175	941 1633	1750	2000	2300	2550
2805		1800	2100	2350	

- Frequency accuracy,  $\pm 1$  Hz maximum - 40°C to + 85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

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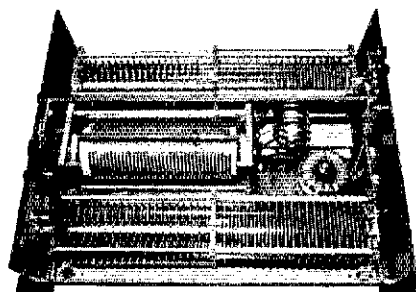
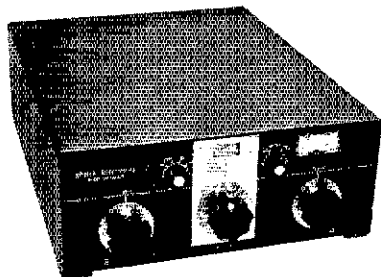
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- \*Handles any antenna system, dipoles, random wires, verticals, whips, beams, open wire line
- \*Built in heavy duty 4 to 1 balun, 3 cores
- \*Ceramic rotary inductor, #8 gauge wire
- \*Turns counter for precise tuning
- \*4000 volt capacitors
- \*Built in line sampler- no external bridge needed
- \*Full legal power on all bands
- \*Provides an SWR of 1 to 1 to the transmitter
- \*Gray cabinet, dark gray panel
- \*12" w x 15" d x 5" h
- \*Shipping weight, 13 lbs
- \*Price: \$248.50 & shipping

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UT2000A - 10-80 meters - \$159.95 & shipping  
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(Oct.) W7TGU 313, WB7DZX 170, W7NEG 15, WB7UTJ 11, W7LRL 10, N7AFF 2, W7LBN 1. (Sept.) W77GU 436.

**OREGON:** SCM, Dale T. Justice, K7WWR — SEC; K7OLN. STM: W7VSE Section nets:

Net	Time/Days	Freq.	QNI	QTC	Mgr.
BSN	0145Z Dy	3908	866	35	K7WPC
OSN	0230Z Dy	3587	358	701	KB7JW
	0600Z Dy				
OARES	0115Z Dy	3993.5	378	98	W7HLF
WGN	0300Z Dy	3702	282	85	K7ZIG
PTTN	0300Z Dy	146.76	632	142	W7LRL
LBLARES	0300Z Dy	146.76	812	10	WB7QCH
PdxAARES	0330Z Dy	147.32	697	8	K7WWR
JCARES	0315Z Th-Sa	147.06	147	25	W7VSE
MPARES	0300Z Mo	146.85	144	2	WA7ZAF
	0300Z Th	147.02			
SOFM	0230Z Mo	146.64			W7FDU

The Marion-Polk ARES may meet on 147.02 if the 146.85 repeater is off. Fine net reports are coming in and are greatly appreciated. The Salem ARC held their annual auction this month. N7BJL made WAS. OTVARG received their affiliation charter from K7BT, Vice Director. W7ZDI gave a QRP presentation at the Oct. OTVARG meeting. K7WPC has taken over as BSN mgr. N7DB had a good month on six meters. A Spook Patrol was held in Hillsboro with 14 local amateurs helping the local authorities on Halloween. Many of the net listed above were on for the SET weekend, handling lots of traffic. Traffic: KB7JW 754, W7VSE 654, WA7LGN 373, W7LNE 248, K7NTS 175, WB7QEX 164, W7LRL 86, K7WWR 41, K7QPW 24, W7LT 9. (Sept.) W7DAN 8, W7LT 7.

**WASHINGTON:** SCM, Bob Klepper, W7IEU — STM; W7DZX. SEC: WA7RWK. Nets reporting this month: NTN QNI 1382, QTC 76; WARTS QNI 3299, QTC 241; NWSSBN QNI 621, QTC 42; WSN QNI 738, QTC 168; PSTS QNI 171, QTC 101; EWTN QNI 80, QTC 31; SCARES QNI 77, QTC 2. Sorry to report that W7ZCJ, WA7BJM, W7HUC have become SKs. Weather conditions is a new Public Service being provided by amateurs in the Puget Sound area. Seattle Area Amateur Radio Weather Reporting System with W7AF as NCS meets at 6 A.M. on BEARS Rpt. (145.33). Info is passed on to local radio clubs and incorporated in local WX forecasts. SEC, WA7RWK, is NCS for ARES National Weather Service Net on 3910 at 10:15 A.M. and is passed to NWS in Seattle. Both of these nets welcome your help. WA7WB and San Juan City ARES had successful SET, new antenna on medical center worked especially well. W7ERM was NCS for ARES during SET. Set was down this year as far as we can tell, but we've been alerted so many times due to Mt. St. Helens that SET sort of lost its appeal. DES, KD7G, ex WB7QWCJ has established liaison frequency to link ECs of District 3 together. W7GB is NM again, GB is Mgr in 82 and 71-72, he is looking for support from cw ops and there is possibility there will be a slow speed session of WSN. W7FJZ now active on 2 m. RC of Tacoma received letter from ARRL for the excellent work the club did in set up and operation of the League booth at SEANARC DEC. K7SH, working close with Red Cross on plans for handling evacuations in case of flooding on the rivers in Mt. St Helens area. K6UWR is waiting for a 7 call sign and will be operating from the Richland area. New traffic net now in operation in the Spokane area, Inland Empire Traffic Net on 147.30, KA7CSP is NM. Any more? W7CDM is monitoring propagation on 2-mtr to determine reliability of distant repeaters during emergencies. No problems on Halloween Punkin' Patrol. 10 mobiles in the area. W7VSE was good host of new antenna on City Hall. K7EXJ and XYL, KATENF, mobiling around Puget Sound in their sailboat preparing for trip to various parts of the world. Please watch the simplex fm operating in the 144-145 subband, am and fm are not compatible and that portion of the band, according to the 2-mtr band plan, is for weak signal am, cw and ssb. Traffic: W7DZX 734, WB7IQF 616, WB7WOW 607, K7GKZ 267, W7FJZ 244, K7CTP 159, N7AFZ 138, W7IEU 107, WA7BDD 75, AD7G 73, W7GB 70, WB7CFM 48, N7AFY 44, W7BUN 43, W7LG 21, WA7RCH 20, WA7TWB 20, W7ERH 14, W7APS 11, WA7EDQ 10, KD7G 7, K7RBT 6, W7CDM 2.

### PACIFIC DIVISION

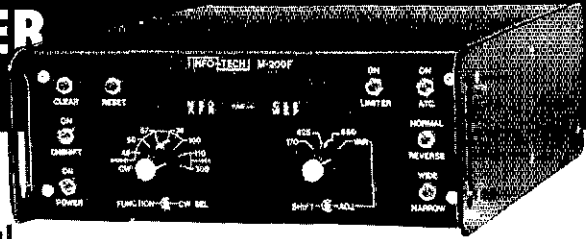
**EAST BAY:** SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF VE2AQV/W6. SEC: W6KQU. His EC organization is participating in the NWS Skywarn program. There is an EC Net on 7273 the 4th Sat of each month at 0830 local for any who wish to find out more about this and other emergency communications programs in the section. W6JXK has his \*21? beam going and handling t/c with W1XX on Mon. mornings. The beam must really be working because he has made BPL again! WA8JVZ has completed his AA degree in electronics, and credits his Amateur Radio experience with helping along. WB6DHI involved with new job and finding little time for radio at this time. SBARA participated in the Fremont Pathfinders Parade in a borrowed "olde tyme" car and succeeded in advertising their club and in winning 3rd place in their category! LARK members mourn their late member, N6OV. EBARC members provided communications for an American Cancer Society Bike-a-thon. Alameda Country RACES provided communications for an American Cancer Society "Move-a-thon" and for the Hayward Area Recreation District Half-Marathon. Traffic: W6JXK 539, W6QA 141, K6UGS 62, W6OA 51, WB6JXZ 35, KA6ERF 18, WA6BOB 17.

**PACIFIC:** SCM, Pat Corrigan, KH6DD — SEC, KH6KJ. STM: W6KON. ECs: Honolulu, KH6DD. Maui, KH6HI, Hawaii, KH6D. Coconino, KH6ER. Gert, KH6ET. Hilar, KH6H. HARC saw W6NSD as speaker at its Nov. meeting. KH6HKJ trying to revive the western part of Pac. TIC. Net. He spent a month in Baltimore over the holidays. Maui Emerg. Net meets Mon, 0700 UTC on 7120 kHz. Big Isl. Emerg. Net meets Wed. 0530 UTC on 7125 kHz. K5KT (ex-KH6GJ) now in S. Cal. Flew to Seattle to help K7MX (ex-KH6HHX) in COWW contest. AH6C in Virginia, expected to return to KH6 for visit soon. Congrats to KH6CIZ and company for super efforts in D.F.-ing and developing equip for that purpose. This year license plates change, see your local Civ. Del. Office. Hawaii Makahiki Hou, All the best in '81. Traffic: KH6HIJ 113, KH6D 30, KH6DD 14.

**SACRAMENTO VALLEY:** SCM, Norman Wilson, N6JV — SCM, W6GFC, W6GEB. STM: North Hills. Radio Club's 1st annual "Old Timers Nite" was held on Oct. 21 in Carmichael. The oldest ham present was W6RF at 84 years old. Longest licensed ham was W6NS, who was a mere kid of 80, but who came with me since 1916. Youngest ham was YL KAGNEN (15) who with her sister KAGNEM was licensed that day. Over 200 were in attendance. Sacramento ARES and the Yuba/Sutter ARES

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were active in the SET. KB6MD has a new linear amp. KB6OZ has a KT 34. KA6BDU has upgraded to General. N6JV has a Drake B line. The weather bureau credited Skywarn amateurs with two reports. N6JW has extended his QST collection to 157. W6SUN/W6KRIHD has a rotatable dipole for 40 meters. Traffic: W6SX 51, W66GFJ 20, W6DEF 10, W6RSP 3.

**SAN FRANCISCO:** SCM, Art Samuelson, W6VU — SEC: W6BZPK, STM: K6TP, Fuddy Duddy Telephoneers (W6FDT/W66ACI) celebrated their tenth anniversary. New officers of San Francisco HC are W6BZPK, pres.; WA6DQP, vice pres.; W6VU, secy.; K9AI, treas. KB6LO acquired Wouff Hong presented at 1938 ARRL National Convention. Sonoma County RA reports holding a breakfast and a picnic. W6RO is observing sunspots and writing about them in QRZ DX. Humboldt ARC active in March of Dimes Bikeathon and Humboldt Redwoods Marathon; San Francisco RC in Greenpeace Walkathon. EC WA6ICB now a Captain in Humboldt County Sheriff's Dept. W6SLX a Silent Key, thanks to all who participated in SET. PSHR, W6RNL Traffic: (Oct.) W6IPL 195, K6TP 137, W6RNL 92, W66PYN 3, W6GGR 2, (Sept.) W6BRT 46, (Aug.) W6BRT 19.

**SAN JOAQUIN VALLEY:** SCM, Charles McConnell, W6DPD — SEC: WA6YAB, Asst SCMS: W6TRP WA6YAK WA6HIN. New officers of QJWA Central Valley Chapter #99 are W6BYM, pres.; W6MEL, 1st vice pres.; W6IFC, 2nd vice pres.; W6BYH, secy.; W6TRP, treas. W6SF beat all W6's except 1 in FD class 3A. For the 2nd consecutive year W6SF had the best FD score of SJV affiliated clubs. Congrats again!! W6VYR on 146.925 is a new repeater in Oakdale. RTTY users are invited to use the 145.25 repeater. W6DERK is KR6F. WA6CPR has a 2BASR. K6YK and WA6EXV have ASCII. WA6UOR has a KWM 300. W6UJB has 120s. KA6LAB is a Novice. KA6VY is a Tech. There are 5 months until the 1981 ARRL Pacific Division and 39th Fresno Hamfest May 15-17, 1981 at the Hacienda. Get your registrations in to Fresno ARC, P.O. Box 783, Fresno, CA 93712. A big program is planned with Roy Neal, K6DUE, as the banquet speaker. Happy New Year to all. Traffic: N6AWH 164, W66TTP 148, WA6YAB 25, N6AMA 13, W6DPD 10, W66FRS 8.

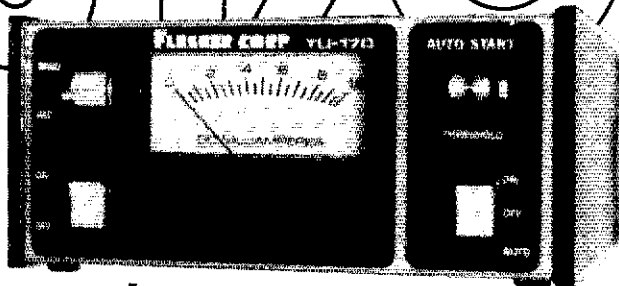
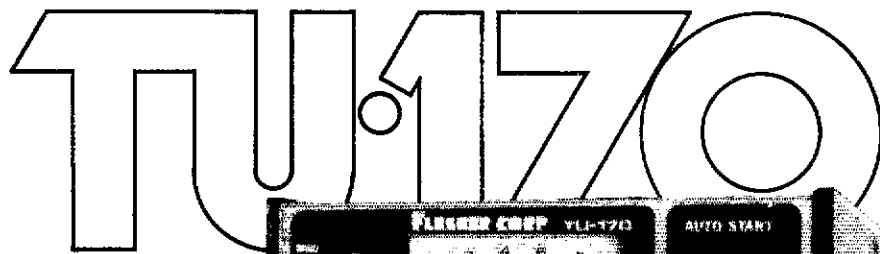
**SANTA CLARA VALLEY:** SCM, Jettie Hill, W6RFF — SEC: W66IZF. SPECS was presented with a Charter of Affiliation for ARES in SCV Section. W6ASH of SPECS published an impressive report on the SET. W6ZRJ reports more activity and is busy on NCN, Mission Trail, WPS and WCARS Nets. N6AU operated several rare counties during Calif. QSO Party. W6RFF had eye-ball QSO with W6OII after many yrs. of on-the-air QSOs. W6OII busy on San Joaquin Mission Trail and NavMars Nets. W6KJZ active with NCN, RN6 and PA6 skeds and a good traffic total. W6BYV also active on the NTS nets and leads the traffic total as usual! W6MMG busy with DX and contests and rpts. W6DERA is now Extra Class and has a new beam, and that W6QA has moved to Santa Rosa. W6HBL works DX and contests as well as skate-boarding and surf-boarding (and girls?). W6AUC QRL with five net skeds and good traffic total. W66IZF was mentioned in a Salinas paper, in an article on a weather spotter network. The Williams Hill AHRSS celebrated W66JOA's 80th birthday at a recent outing. A talk on contesting was given to FARS by N6BT. K6JD will speak on San Joaquin Mission Trail banquet. N6NF active's OO. W6PGP bought the S. Matato RC up-to-date on Slow Scan Amateur TV and their group had an enjoyable time at the annual picnic. The Memorex ARC had a showing of The World of Amateur Radio. Dr. Bob Wallace, U.S. Geological Survey, talked about Earthquakes to SCVRS. KA6IAJ and WA6HKP are the new parents of a baby boy. Congrats. New members of NCCC are N6BSU and WA6HKP. W6OXT showed slides and gave a talk on a trip to Kenya to the SCCARA. Those involved in Prinsedam/Alaska emergency tlc were W6ASH K6IIL, W6JZU and W6RFF. Traffic: W6YBV 316, W6KJZ 117, W6AUC 66, W6ASH 50, W6RFF 32, W6OII 17, W6ZRJ 7.

### ROANOKE DIVISION

**NORTH CAROLINA:** SCM, Bill Parris, AA4R — Asst SCM: NA4UE, STM: W6BNYN, SEC: WA4BFT, NMs: CN AB4S, AMN W6BNYN, THEN WD4CNR, JFK WD4CNR, NCSSBN WB4CES, CNN WD4JJK. I would like to thank all the amateurs of North Carolina for their support during the past 4-1/2 years that I have been fortunate to serve as your SCM. Due to personal reasons however, I must resign from this position and turn the job over to AB4S, Ed Stenerson. I know you will give him the fine support you have given me. Congrats to the fine traffic count this month... we went over 8500. This exceeded the highest "non Christmas" month by over 3000. Terrific effort from everyone. Involvement during the 1980 SET far exceeded any during the past 5 years. This became obvious when looking at the traffic count and the number of stations participating. Good turnout all over the section... thanks to our SEC WA4BFT and his fine crew of EC's. The Mecklenburg ARS group that is now operating the W4KIN-4 QSL Bureau has really generated the traffic during the past month and the cooperation from all of our section nets has been superb. Thanks to all who are handling this big workload. Congrats to the Western Carolina ARS for the fine Asheville Hamfest again this year, and thanks to all who attended too. Congrats to W4OWD W6BNYN K4GCN and AB4J for making BPL this month. Traffic: W4OWD 592, W6BNYN 534, K4GCN 508, AB4J 498, WB4WII 351, WD4CNR 310, WA4UTC 261, WD4CNR 240, WD4JJK 237, WA4BFT 226, WA4SRD 215, K4VHT 215, KP4R 201, W4EAT 171, N4CJJ 160, WA4HK 158, W6BOTS 143, KU4W 143, AA4R 111, K4NLK 104, K4FT 93, K2ZA 90, AB4V 90, AF4S 89, K4VHO 83, NE4J 61, K4DIX 60, W6BYN 58, W4FMN 56, W6PJS 36, W4EHT 32, WA4CY 31, WA4OBR 27, WD4IE 25, W6O 20, WA4IHG 16, N4ARY 14, W64HFF 14, W64BGS 14, WD4LOO 12, K4XE 12, W4WXZ 10, N4BEX 9, N4UE 8, WD4CFZ 7, KA4KJ 6, KA4DX 5, K4HF 2.

**SOUTH CAROLINA:** SCM, Richard McAbee, W4MTK — SEC: WD4HLZ, STM: WA4NK. Congrats to new Novices KA4RVL & KA4RWT, Swamp Fox ARC provided comm. for Harvest of the Arts Road Race. Spartanburg ARC busy putting up 100 ft tower for American Red Cross & furnishing comm. for March of Dimes Walkathon. Columbia ARC provided comm. for Governors Cup Race. A good turnout for SET, tnx for a job well done. I would like to thank all for the many reports received during the year. Check-ins/traffic: SCSSN 1599/199; Blue Ridge 2-Meter Net 104/60; SCNTN 387/132; Lancaster County 2-Meter Net 211/5; Western SC Emergency Net 143/14; Newberry County ARES Net 88/8; Carolina State Line

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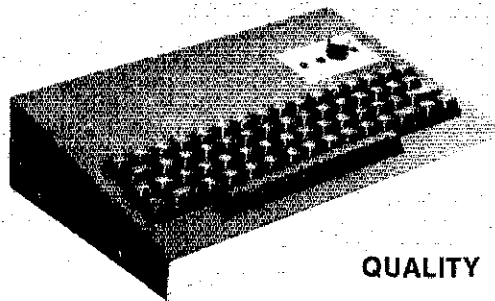


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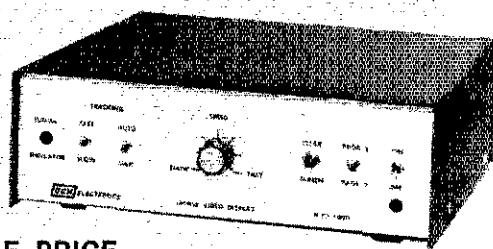
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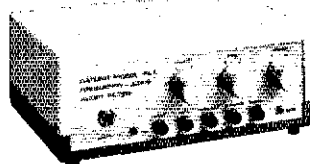
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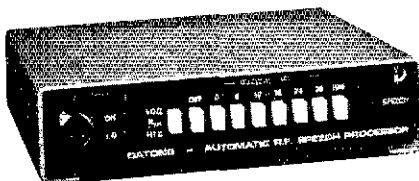
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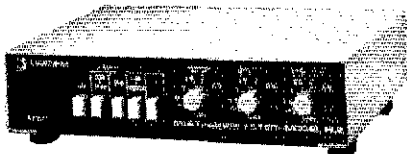
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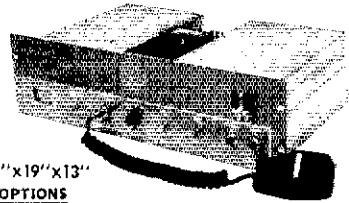
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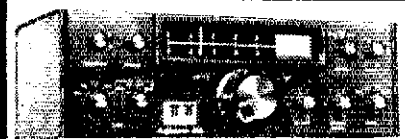
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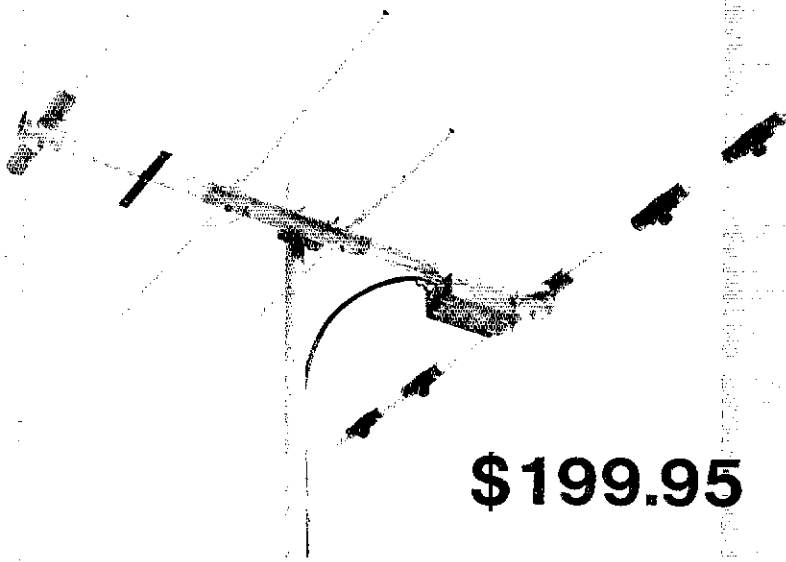
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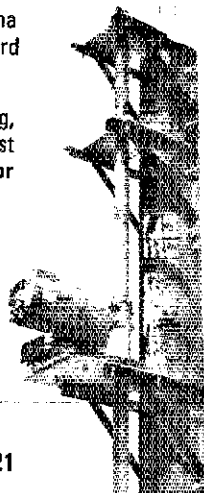
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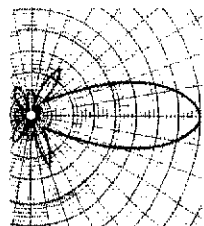
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Net 453; Dillon County ARES Net 25/6; CNN 247/54; Tri-Net ARC ARES Net 130/0; Dixie 8-Meter SSB 19/0; SC 2-Meter SSB 45/0; Traffic: (Oct.) K4ZN 441, W4ANK 284, W4OFE 212, W4NTO 164, W4FPM 123, W4OCX 105, W4NQL 55, W4FRX 53, W4MTK 31, W4DPM 30, W4MMY 24, K4A4UR 22, AF4E 21, W4AUDK 20, W4D4EM 17, K4LYU 17, W4AZSO 16, NC4F 14, W4AOLV 8, W4BCTC 3, W44VYS 7, N4EE 6, W4DRF 5, NC4Y 3, W4QHF 2, (Sept.) N4EE 10, K4LYU 10.

**VIRGINIA:** SCM, Richard L. Genter, K4BKX — ASCM: W4YE N4NK & W44FDV, SEC: N4AZI, STM: W44STO, Chief OO: W4HU, Chief OVS: N4CD

Net	kHz	Time (PM)	Sess	ONI	QTC	Mgr.
VSRN	3947	8:00	31	706	407	KY4K
VSN	3680	6:30	31	353	180	W4KSG
VN						Non-reporting
VLN	3947	10:15	30	489	226	W44YIU
VNTN	3907	Noon	30	299	115	N4LE

KA4ERP is a new OTS and is geared up for RTTY. WB4BAT is home recovering from a heart attack but in the process made BPL and PSRR. Congrats, and we all are wishing you a speedy recovery. K4HLI sends his greetings from school in New Hampshire. K4JM has retired after 42 years with Ma Bell. K4JH has a new VN roster available for an s.a.s.e. and is continuing his work on the Virginia Routing Guide with exact locations of over 1200 VA towns. W4NWM is still working on 5BWAS and reports it's the hardest on-the-air activity ever attempted. Good luck. K4JST reports that the Williamsburg ARC Net is going strong on Sunday Mornings at 8:30 on 3748 kHz. EC KM4X advises that Smyth Co. amateurs participated in their first SET coordinated with the local agencies and after seeing what formal traffic handling was about, Amateur Radio was well received. N3RC will be at the Federal Executive Institute in Charlottesville for all of Nov. and Dec. WB4FDT and N4YE managed a whopping 790 QSOs in the cw SS. The Virginia Section Training Program, developed last year by W4SQQ, is now being distributed and implemented. This program provides opportunities for both experienced and inexperienced Virginia Section amateurs to achieve proficiency in NCS and liaison functions with supervision and a constructive criticism mechanism. Contact STM, W44STO, for more information. Traffic: W44FNY 813, W44JK 521, W44STO 518, W44CCK 511, K44KP 449, WB4BAT 339, K4ZK 280, W44DUU 234, N4AZI 227, W4BBN 215, W44LT 202, W44FTK 200, KY4K 194, W44LJ 137, K4EJ 132, K4CF 119, W44S 113, W4LXB 102, WB4ZTJ 97, K4JM 84, W4KSG 81, K4DHB 75, W44YIU 72, W44DQZ 71, W44YVG 70, N4CIR 63, WB4FDT 66, N4BJX 56, W44ODZ 55, K44WT 53, W43BO 52, W44LAB 52, W4NWM 52, W44SVG 51, W4KXE 42, KM4X 42, W44SHK 41, K4JST 34, W44KIT 32, W44QWC 31, N4LE 27, W44RWY 27, W44VRL 26, K44ETG 24, W44UHC 23, W44RVQ 22, KA4ERP 16, K44GBL 15, W43ATQ 12, W44KOJ 12, W44MAE 12, K44OF 12, K44VWK 12, W44MWC 11, W44WDT 10, N4CJL 10, K44HN 10, W44ZNB 8, W44EGW 6, N3RC 3, N4OT 2, W44RTS 2, W44TZC 2, K4JRT 1.

**WEST VIRGINIA:** SCM, Karl S. Thompson, K8KT — STM: K8RG, SEC: K8QEW, NMS: K8MHR, W8FZP, KD8G, WB8TJN, WB8L. has worked all WV counties on 2-M, qualifying for the SCM award. Plateau Area Hams were active at New River Gorge Bridge Celebration. W8GADY has his tower back up and is active on hf. WV QSO party will be Jan 17 & 18, 1981. See Contest Corral for details. Fayetteville H.F. will be Feb. 15, 1981. W88YMJ is NM for KFC 2-M Net. W88ITA now has DXCC.

Net	Freq	Time(2)	ONI	QTC	Sess.
Hillbilly	14290	1600 Su	170	64	4
WV Phone	3990	3300 Dy	495	87	31
Phone-MD	3990	1700 Dy	258	24	30
WVH	3567	2400 Dy	311	36	29
NOVICE	3730	2330 Dy	27	12	13
Bk Dia.	3785	0200 Wed	24	3	4
KFC	8747	0100 Tu	82	14	4

Traffic: K8RG 118, N8AJC 54, K8MHR 33, W8CJQ 31, W8HZV 28, K8KT 27, W8RPOG 27, K8QEW 25, W8FZP 22, K8EIV 18, K8BX 14, A8IL 14, W8BDDY 12, K8A8T 9, W8YP 9, K8ZDY 9, W8CNF 5, W8AFW 4, N8AIT 2.

## ROCKY MOUNTAIN DIVISION

**COLORADO:** SCM, Robert W. Pomer, K0DJ — SEC: W0ACD, STM: W0MCL, NMS: K0CNV, W0HE, W0HXB, K0BZ, W0AIT, CCARC planning a division convention for sometime in late 1981. Much bitter controversy surrounding the proposed "DX window" from 7070-7100 kHz for Extra phone. Your support to SCG is encouraged with respect to this proposal. NTS and several ARES groups active in SET W0WYX back from enjoyable vacation. VHF RTTY activity on the increase with a new repeater for that mode being proposed on the Rampart Range. By the time you read this, a new SCM will be writing this activity report. Time limitations and serving as TCC director for the Pacific area of NTS has made it too difficult to continue as your SCM. Send your reports to W0ACD who will be serving the rest of my term. It has been a great pleasure to have served you for the last two years and I hope you give W0ACD the same great cooperation you gave me. Nets: Columbine 27 sess, ONI 1025, QTC 95, informals 189, ONF 183, HN1 31 sess, ONI 1827, QTC 124, informals 249, ONF 1173, Traffic: (Oct.) N0BOP 2140, W0WYX 1166, W0HJZ 1076, W0JAI 344, K0DJ 321, W0HXB 237, W0EJD 151, W0LQ 84, N0BLU 82, K0DM 77, W0LAF 83, W0YNP 60, W0RE 55, W0GO 37, W0NFW 15, W0GW 2, (Sept.) W0HXB 125, W0LQ 48, (Aug.) W0HXB 105.

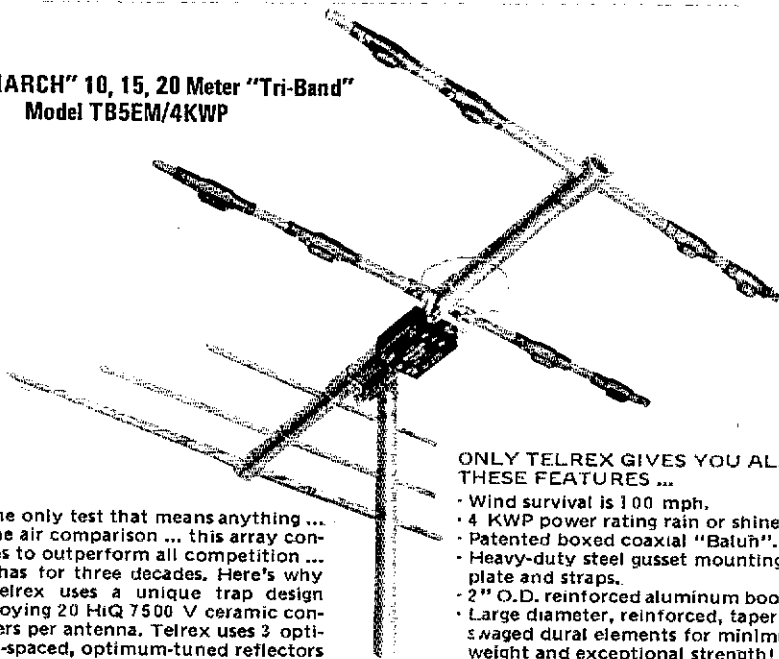
**NEW MEXICO:** SCM, Joe T. Knight, W5PDU — SEC: W5ALR, NMS: W5BNG & K5SL, Southwest Net (SWN) meets daily on 3583 kHz, at 19:30 local and handled 193 msgs with 220 stations in New Mexico Roadrunner Net (NMRN) meets daily on 3939 kHz at 1800 local and handled 178 msgs with 186 stations in New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 90 msgs with 744 checkins. Yucca 2-Mtr Net handled 13 with 589 checkins. W5RRP in VA hospital for surgery and is improving. W5TCC, Socorro, delivering lecture on VLA at Harvard. ABQ clubs did FB job on helping with November 4th elections. Socorro club reports good reception at VLA "Open House". W5WVY made quick recovery from surgery. Alamo club still trying to complete club house. ABQ DX club gaining. Traffic: W5LH 344, W5DAD 298, W5JOV 195, N5NG 142, W5ENI 132, K5SL 122, K5DDW 98, W5VTL 19, W5MMY 18.

**UTAH:** SCM, Royce Henningson, K7QEQ — SEC: W57CB, STM: W7OCX, W4NVO reports Weber County ARES Net held 4 sessions with 73 checkins and that the Ogden-SLC area hams aided the Ogden Valley Marathon on October 11 in Huntsville by providing com-

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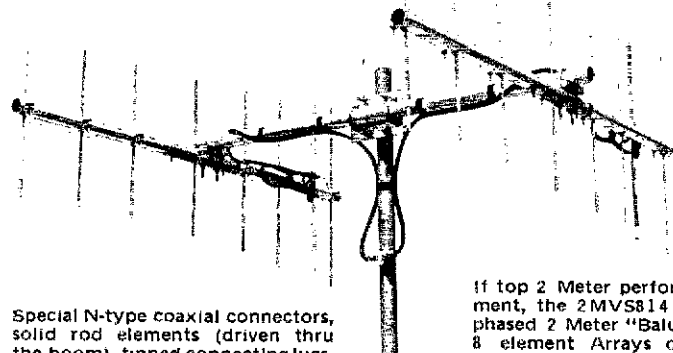
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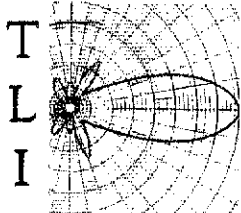
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munications over a 26.2 mi course. Amateurs participating were WB4NVO WA7JLJ WA7KHE KN8KAZ WA7KJ N7BR0 WB7NMM N7LL WB7RLW and K7AHD. WA7MEL reports that the Snowbird repeater, 7818, was linked to Casper City and operating thru the 3494 machine. Traffic: K7HLR 180, WA7KRE 166, WA7MEL 93, W7DCK 38, WA7JRC 28, W7RO 18.

WYOMING: SCM, Chester C. Stanwatt, W7SDA — The Sky-Wy Amateur Radio Club participated in SET '80 from both the city/county and state emergency operations centers. They report 33 check-ins, 20 from around state and 13 locals. The Casper ARC also participated, but received no report on number participating. W7LPI now residing in Lovell. The Carbon County ARC elected the following officers: KA7FK1, pres.; WB7NHR, vice pres.; WB7BGJ, secy/treas. Jackalope Net: 27 sessions, 549 QNI, 3 QTC reported by WA0PFJ, Wyo. Cowhoy Net 23 sessions, 678 QNI, 28 QTC reported by WB7NHR. Traffic: W7BOT 723, W7LYA 542, WA7GYQ 299, WB7NHR 178, K7VVA 70, K7TFW 28.

### SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Ronner, K4UMD — SEC: W4IBU. The Alabama SET was a great success, all clubs participated. Our EC and DEC had good plans set up. These plans worked very well, but as each of you know there is always room for improvement, and the SET is for that purpose. We are looking for EC's and DEC's in counties that aren't covered. If you serve as an EC, contact W4IBU. The SEC of the state, Ala. had four stations for PSNR this month: K4HJX KA4NXX, W4AJDH and W4CK5. AENM Net had QNI 2651, 217 traffic; the net manager, N4AWW, is getting good participation into the net. Net Manager WA4JDH reports AENB Net QNI 271, traffic 102, he reports a hefty increase in check-ins and traffic. W4CK5, AEND Net, reports QNI 174 with 96 messages. Ala. 96.9 percent into DNR5 by W4CK5 WA4JDH N4MD KA4MKH and WA4RAJ. Again Ala. 100 percent into Gull States Net, stations were N4AZO KA4DJY KA4EEE KB4GA KA4IBI KB4KZ WD4LYX KA4NSV WD4ODO WD4ODW W4JUS and W4VDL. Ala. 100 percent into GAND Net. K4OIV presented W4EFF a new Apple II for Christmas. Computers are on the increase in Ala. Several stations are taking on the air, ask a ham who owns an W4CVS says there is an increase in Fast-Scan ATV, several in the state are using this mode. Contact W4CVS, he will be happy to tell you how simple and easy to get into ATV. HAYLARC, the YL arm of HARC, has embarked on a school program to extend interest in Amateur Radio. I'm sure they will be successful. AENJ, WA4JPK manager reports QNI 677, 17 messages. New members of BARC: N4DSL K0PYV KA4RUW and WA4OLA. Traffic: WA4JDH 1071, W4CK5 180, K4AOZ 86, W4IBU 79, K4UMD 64, WA4PI7 40, K4HJX 36, A4AJ 27, WD4DHI 25, KA4NXX 19, WA4JPK 18, W4RMP 10, KC4GS 8, WB4TYV 7.

GEORGIA: SCM, Eddy Knobucki, K4JNL — ASCEM/SEC: K4VHC. STM: W4WXA. Chief OBS: W4BIA.

Net	freq	time (All EST)	Mgr.
GCN	3995	1000 Dy 0800-10	W4HON
GSN	3585	1900 & 2200 Dy	W4PIM
GTN	1718	1815 M-W-F	WA4ZBR
GSSBN	3975	1830 Dy	WB4ZVX
ARF5	3975	1700 Su	K4VHC
GA 1FC	7243	1200 Dy	W4GH
GERN	3620	2030 Fri	WA4ZHC

Many tnx to K4SWJ while serving the section as SEC. Due to new business activities he rendered his resignation as SEC effective Oct 31st. K4VHC assumes the duties, so please give him your utmost cooperation so we can continue to have the solid emergency communications systems we've had. The 1980-81 GSSBN Association officers are: WB4ZVX, pres.; W4HON, vice pres.; K4VHC, secy/treas.; K4YGI & K4ZYK, directors. GCN elected W4HON, pres. & NM; WA4IKU, secy/treas. All the forums at the Warner Robins hamfest were well attended & CGARC had another success. Participation in the recent SET proves that the section is ready in any emergency. KB4IT probably still resting from DXpedition to PY0-Land. He was looking to the trip for a long time. WA4ZBR has volunteered to take over GTN. The net will meet on Mon, Wed & Fri at the same time. If you want to get that code speed up & learn how to handle the net on our net line group, STM, W4WXA has discontinued the 3951 net so please support us on the noontime 7243 net. (there is no roll call, so if you have traffic or not, check in, as this net is very important to the section. Repeater groups that conduct regular nets please send me info on the NM as well as time net meets, etc. 1980 has been a great year for the GA Section and I do indeed appreciate the support all of you have given me. Have a Happy New Year. Traffic: (Oct) W4WXA 313, K4JNL 264, WA3NAZ74 194, K4VHC 169, K4AZM 108, W4FLO 98, K4EV 94, WA4PUP 78, KA4ATM 70, WA4DJY 58, WB4LBM 55, AK4T 53, W4CXM 51, N4UZ 49, W4BIA 41, W4HON 38, WA4GPy 34, AA4EI 24, K4PIK 14, K4BAI 7, WB4RUJ 7, WA4PUO 5, W4GH 2. (Sept.) WB4ZVX 64.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. NM: N4BZH. WD4DNC. ASCEM: WD4ASW. WB4QBB. WA4CRI. WA4OEM. W4BSP. Despite losing their 2282 repeater when an airplane crashed into the WUFT-TV tower, Gainesville hams quickly responded with simplex communications when heavy wind damage occurred near the Univ. of Fla. KA4GIJ W4TKE WA4UFO WA4HFR WD4ASW N4GMP W4KFA among those assisting at the request of Alachua Co. 2nd Members of SHARC active with messages at Crystal River. Art Show, W4UEA, WD4HD & W4NEV teach classes for SARC near Ocala. OPARC beat NOFARS at softball — 28-14 in real slugfest. Panama City ARC officers are: WA4AVP, pres.; WD4MAF, vice pres.; WR4YKV, secy.; N4AVA, treas. Jax RANGE officers are: N4UF, pres.; WD4IWD, vice pres.; WB4EEK, secy.; WB4YJJ, treas.; KH6MD N4BFX WD4BIW K4YLX KB4B, hd mem. W3EFG gave ATV demo at DBARA and planning underway for 1981 hamfest in Daytona Beach. W4MGO gave talk on lightning protection at Halifax OCWA meeting. BARS members recognized by ARC for hurricane work. FD results show Fla. standings: Hogtown Hammers first with 11 FK, NOFARS 2nd with 9 FK, LMARS 3rd with 8K and FFARA 4th with 7.9K. LMARS has new repeater on 615.015 with WD4RMM as trustee. WA4EY active as QV5. WA4EYU appointed QTS. WA4VRY now proud papa. WD4LJY & KA4IQI upgraded to Gen. K7BT and WB4QBB building big stations in Pens. WA4Z operation at Jax Fair went well with 1,016 messages. Clubs reporting this month are PCARC, BARS, NOFARS, LMARS, FFARA, DBARA, RANGE, OPARC, SHARC, HCARC, SARC, BARS, TARS, ACARC. Appreciate the many fine club bulletins: Traffic: WA4Z 1840, WD4HIF 925, W4SIZ 639, N4PL 469, WA4EYU 416, W4JL 394,



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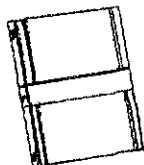
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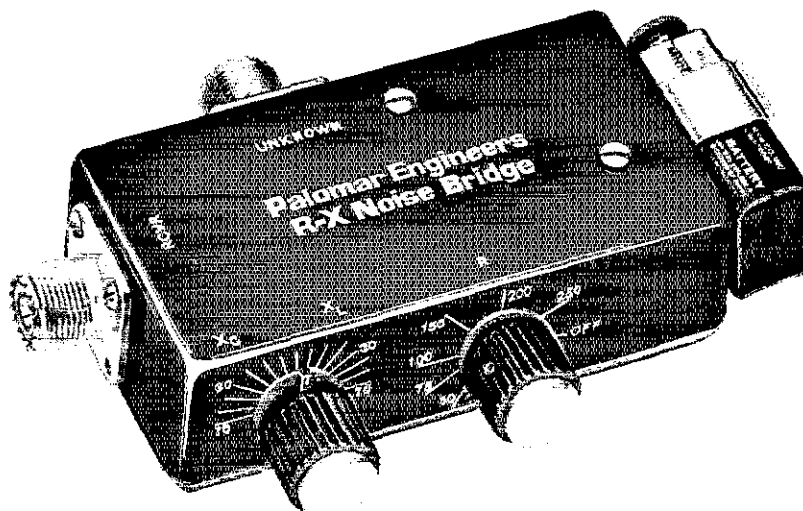
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# WILSON SYSTEMS TOWERS

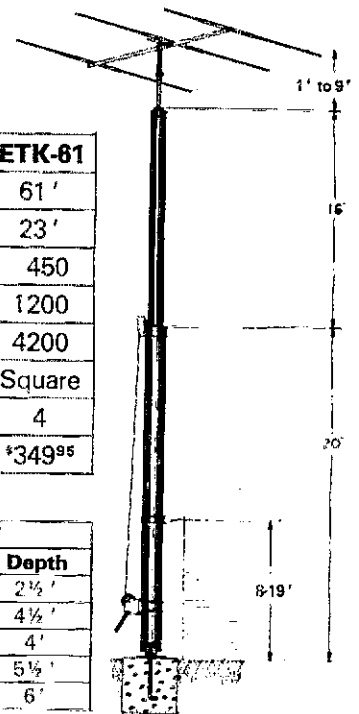
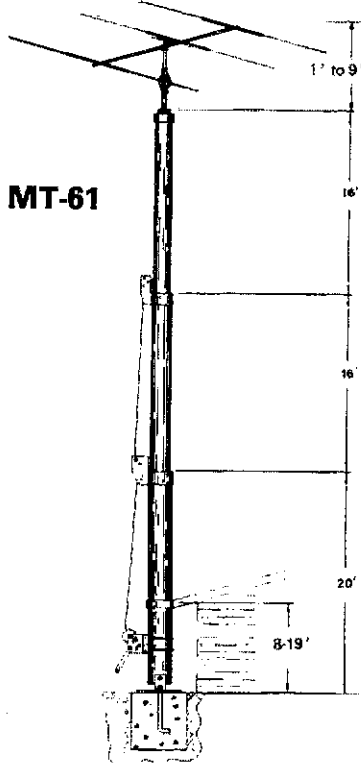
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## ECONOMICAL TOWER KIT FOR 45' & 61' TOWERS

MT-61



MODEL	TT-45	ETK-45	MT-61	ETK-61
Max. Height . .	45'	45'	61'	61'
Min. Height . .	22'	22'	23'	23'
Weight (lbs.) . .	250	250	450	450
Winch (lbs.) . .	1200	1200	1200	1200
Cable (lbs.) . . .	4200	4200	4200	4200
Tubing . . . . .	Round	Square	Round	Square
Sections . . . . .	3	3	4	4
Price . . . . .	\$399 <sup>95</sup>	\$249 <sup>95</sup>	\$614 <sup>95</sup>	\$349 <sup>95</sup>

Wind Loading		
Tower	Height	Sq. Ft.*
ETK-45	37	15
	45	10
TT-45B	37	18
	45	12
ETK-61	53	15
	61	10
MT-61B	53	18
	61	12
ST-77B	69	16
	77	10

BASE CHART		
Tower	Width	Depth
45'	12" x 12"	2 1/4'
FB/RB	30" x 30"	4 1/2'
61'	18" x 18"	4'
FB/RB	36" x 36"	5 1/2'
77 + RB	42" x 42"	6'

\* Square Footage Based on 50 MPH Wind.

The ETK towers offer the ham a chance to have a 45 or 61 ft. tower at a very economical price. The tower is shipped to you in kit form. You do the final assembly and painting. You do not have to do any welding, just bolting together the parts. We supply you with the cold galvanizing compound to put the protective coating on the tower. This is not just paint, but the full galvanizing coating that will give your tower years of service.

Using square tubing, the assembly is fast and easy. It can still be mounted against the house for a non-guyed installation. Or you may use the fixed base for away from the house and completely free-standing installation.

### TT-45, MT-61, ST-77

Wilson Systems uses a 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 1/4"-.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 free-standing installation, use either of the tilt-over bases shown below.

The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

## WILSON ELECTRIC WINCH

Now you can raise and lower your Wilson Tower electrically. The electric winch will replace the hand operated winch. Available for use on the TT-45, MT-61 and ST-77 towers.

EW-45 (TT-45)  
EW-61 (MT-61)  
EW-77 (ST-77)

**\$249<sup>95</sup>**

Remote Switch. **\$24<sup>95</sup>**

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### FIXED BASE

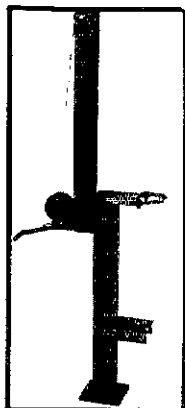
The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

FB-45 ... 112 lbs. ... **\*189<sup>95</sup>**

ETB-45 ... 112 lbs. ... **\*164<sup>95</sup>**

FB-61 ... 169 lbs. ... **\*269<sup>95</sup>**

ETB-61 ... 169 lbs. ... **\*244<sup>95</sup>**



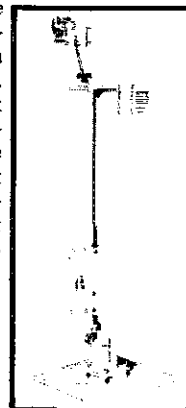
### ROTATING BASE

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. ... **\*259<sup>95</sup>**

RB-61B ... 229 lbs. ... **\*344<sup>95</sup>**

RB-77B ... 300 lbs. ... **\*514<sup>95</sup>**



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

Prices Effective 1-1-81 thru 1-31-81

**W S I WILSON SYSTEMS, INC.**

4286 S. Polaris Ave., Las Vegas, Nevada 89103

# WILSON SYSTEMS, INC. MULTIBAND ANTENNAS

## WV-1A **\$59<sup>95</sup>** FACTORY DIRECT 4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

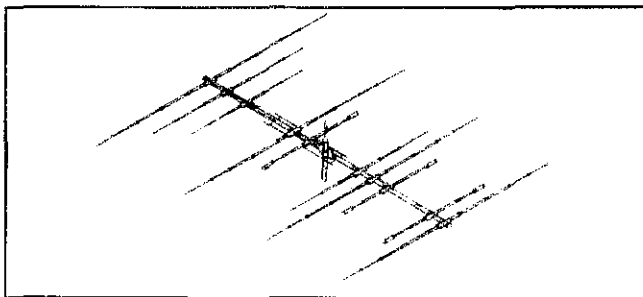
NOTE: Radials are required for peak operation. (See GR-1 below)

### SPECIFICATIONS

- 19' total height
- Self supporting - no guys required
- Weight - 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

## SY-40A **\$337<sup>95</sup>**

- ★ 3 MONOBANDERS on 1 Boom
- 4 elements on 20 mtrs FULL SIZE
- 4 elements on 15 mtrs
- 5 elements on 10 mtrs



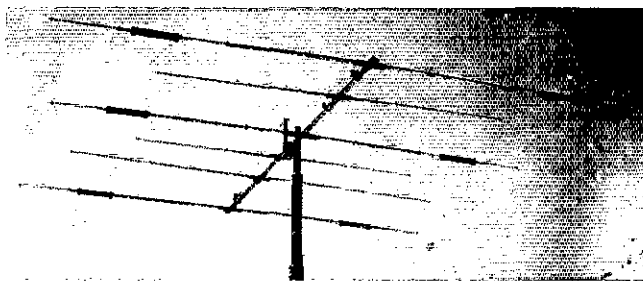
The System 40A is the answer to the DXer who does not have space to stack monobanders yet wants the advantages they offer. Through the use of a switchable matching unit, only one feed line is required and complete coverage of both the phone and cw bands are available with only one setting.

### SPECIFICATIONS

Max. Pwr. Input.....	Legal Limit	Matching Method.....	Split Beta	Surface Area.....	12.1 sq.ft.
VSWR @ Res.....	1.2:1	F/B Ratio.....	CALL FACTORY	Wind Loading @ 80 mph.....	309 lbs.
Impedance.....	50 ohm	Boom.....	2" x 26'	Assem. Weight.....	75 lbs.
Feed Method.....	Balun Supplied	Longest Element.....	36'	Shipping Weight.....	84 lbs.
Gain.....	CALL FACTORY	Turning Radius.....	22'6"		

## SY-36 **\$199<sup>95</sup>**

A trap loaded antenna that performs like a mono-bander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on



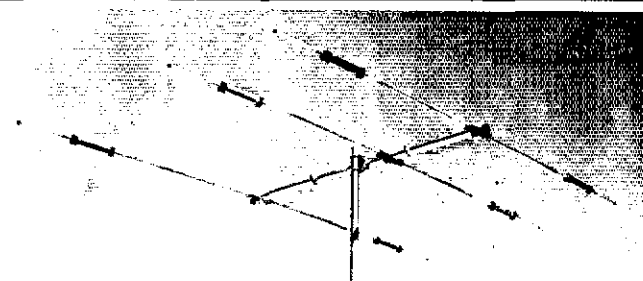
20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

### SPECIFICATIONS

Band MHz.....	14-21-28	Boom I.O.D. x Length.....	2' x 24'2 1/2"	Wind Loading @ 80 mph.....	215 lbs.
Maximum Power Input.....	Legal Limit	Number of Elements.....	6	Maximum Wind Survival.....	100 mph
Gain (dBd).....	CALL FACTORY	Longest Element.....	29 5/8"	Feed Method.....	Coaxial Balun (Supplied)
VSWR @ Resonance.....	1.3:1	Turning Radius.....	18'6"	Assembled Weight (approx.).....	53 lbs.
Impedance.....	50 ohm	Maximum Mast Diameter.....	2"	Shipping Weight (approx.).....	62 lbs.
F/B Ratio.....	CALL FACTORY	Surface Area.....	8.6 sq. ft.		

## SY-33 **\$149<sup>95</sup>**

Capable of handling the Legal Limit, the SYSTEM 33 is the finest compact tribander 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 performance tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the SYSTEM 33 quick and simple.



### SPECIFICATIONS

Band MHz.....	14-21-28	Boom I.O.D. x Length.....	2' x 14'4"	Wind Loading @ 80 mph.....	114 lbs.
Maximum Power Input.....	Legal Limit	Number of Elements.....	3	Assembled Weight (approx.).....	37 lbs.
Gain (dBd).....	CALL FACTORY	Longest Element.....	27'4"	Shipping Weight (approx.).....	42 lbs.
VSWR at Resonance.....	1.3:1	Turning Radius.....	15'9"	Direct 52 ohm feed.....	No Balun Required
Impedance.....	50 ohm	Maximum Mast Diameter.....	2" O.D.	Maximum Wind Survival.....	100 mph
F/B Ratio.....	CALL FACTORY	Surface Area.....	5.7 sq. ft.		

## GR-1 **\$12<sup>95</sup>**

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150' of 7/14 stranded aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

## 33-6 MK **\$59<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 at less than 2:1 SWR. The new 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 to 6 feet. This addition will offer an effective rotatable dipole at the same height of your beam.

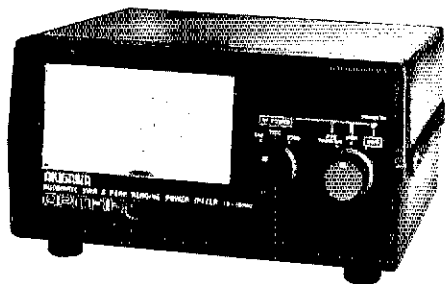
**ORDER  
FACTORY DIRECT  
1-800-634-6898**

**W S I WILSON  
SYSTEMS, INC.**

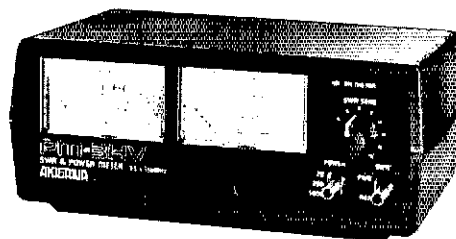
4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices Effective 1-1-81 to 1-31-81

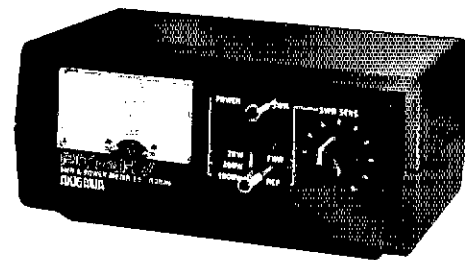
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**AUTOMATIC SWR & PEAK READING  
HF POWER METER  
MODEL APM-1H \$99.95**  
Frequency Coverage: 1.8 - 60 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 200, 1000, 2000W  
SWR Range: 1:1 - 10:1  
Power Modes: Average & PEP  
Accuracy:  $\pm 10\%$   
Power Requirements: 117 VAC 60 Hz



**SWR & POWER METER FOR HF/VHF  
MODEL PM-3HV \$54.95**  
Frequency Coverage: 3 - 150 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 20, 200, 1000W  
SWR Range: 1:1 - 5:1  
Accuracy:  $\pm 10\%$   
Power Requirements: 12 VDC  
Illuminated meters for mobile operator



**SWR & POWER METER FOR HF/VHF  
MODEL PM-4HV \$44.95**  
Frequency Coverage: 3 - 150 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 20, 200, 1000W  
SWR Range: 1:1 - 3:1  
Accuracy:  $\pm 10\%$   
Power Requirements: None  
Vercro for mobile mounting

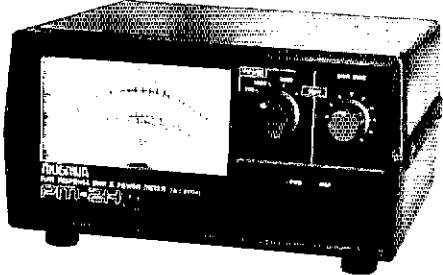


**AUTOMATIC SWR & PEAK READING  
VHF POWER METER  
MODEL APM-1V \$99.95**  
Frequency Coverage: 50 - 150 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 20, 200W  
SWR Range: 1:1 - 10:1  
Power Modes: Average & PEP  
Accuracy:  $\pm 10\%$   
Power Requirements: 117 VAC 60 Hz

# Best Amateur Radio Accessories



**MIKE COMPRESSOR WITH LINEAR  
AMPLIFIER  
MODEL MCLA-1 \$89.95**  
Compressor Section  
Frequency Range: 100 - 10000 Hz  
Distortion: Within 0.4%  
Linear Amplifier Section  
Frequency Range: 300 - 10000 Hz  
Gain: 25 dB (12V)  
Power Requirements: 9 VDC



**FLAT RESPONSE SWR & POWER METER  
FOR HF  
MODEL PM-2H \$89.95**  
Frequency Coverage: 1.8 - 60 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 200, 1000, 2000W  
SWR Range: 1:1 - 3:1  
Accuracy:  $\pm 10\%$   
Power Requirements: None

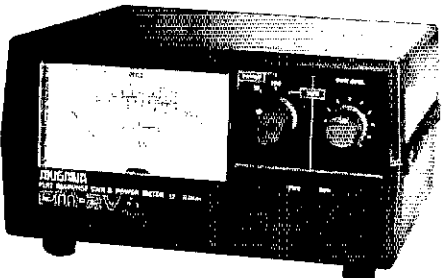
**Manufactured By:  
AKIGAWA ELECTRONICS CORPORATION**

**Distributed Exclusively By:  
MACAW ELECTRONICS INCORPORATED**

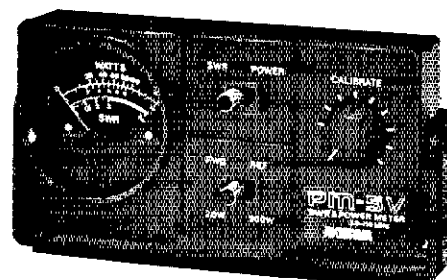
P.O. Box 66, Carlsbad, Calif, 92008  
Phone (714) -434 - 1078  
Telex 181743 MACAW CSBD



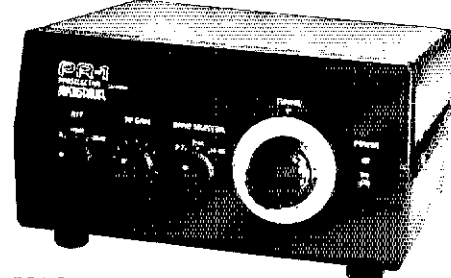
**ACTIVE AUDIO FILTER  
MODEL AAF-1 \$89.95**  
Filters: Band Pass+Notch  
Center Frequency  
Shift Width: 200 - 2500 Hz  
Input Impedance: 8 - 600 ohms  
Output Impedance: 8 ohms  
Output Power: 1W max.  
Power Requirements: 9 VDC 150 mA



**FLAT RESPONSE SWR & POWER METER  
FOR VHF  
MODEL PM-2V \$89.95**  
Frequency Coverage: 50 - 150 MHz  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 20, 200W  
SWR Range: 1:1 - 3:1  
Accuracy:  $\pm 10\%$   
Power Requirements: None



**SWR & POWER METER FOR MOBILE  
MODEL PM-5H (HF) \$49.95  
MODEL PM-5V (VHF) \$49.95**  
Frequency Coverage: 1.8 - 30 MHz (PM-5H)  
50 - 150 MHz (PM-5V)  
Input Impedance: 50 - 52 ohms  
Power Range: 0 - 20, 200 W  $\pm 10\%$   
Power Requirements: 12V DC  
Complete with directional coupler unit



**PRESELECTOR  
MODEL PR-1 \$109.95**  
Frequency Coverage: 3 - 30 MHz  
Gain: 20 dB at 7 MHz,  
Variable  
RF Attenuation: -20 dB & -10 dB  
Input/Output  
Impedance: 50 - 75 ohms  
Relay Power  
Capability: 200W CW  
Power Requirements: 117 VAC 60 Hz

# 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.



## XV4 UHF KIT — ONLY \$99.95

28-30 MHz in, 435-437 MHz out; 1W p.e.p. on ssb, up to 1/2W 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

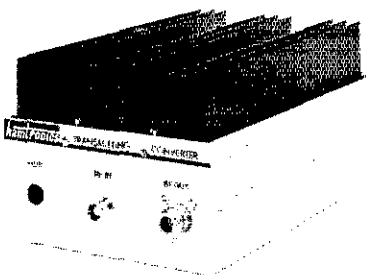
2W p.e.p. output with as little as 1mW input. Use simple external attenuator. Many freq. ranges available.

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.



## NEW! COMPLETE TRANSMITTING CONVERTER AND PA IN ATTRACTIVE CABINET

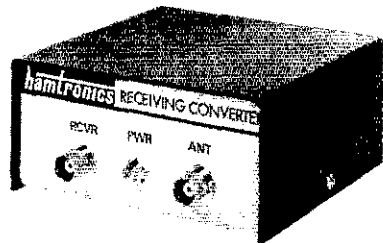
Far less than the cost of many 10W units!

Now, the popular Hamtronics® Transmitting Converters and heavy duty Linear Power Amplifiers are available as complete units in attractive, shielded cabinets with BNC receptacles for exciter and antenna connections. Perfect setup for versatile terrestrial and OSCAR operations! Just right for phase 3! You save \$30 when you buy complete unit with cabinet under cost of individual items. Run 40-45 Watts on VHF or 30-40 Watts on UHF with one integrated unit! Call for more details.

MODEL	KIT	WIRED and TESTED
XV2/LPA2-45/Cabt (6M or 2M)	\$199.95	\$299.95
XV4/LPA4-30/Cabt (for UHF)	\$229.95	\$349.95

# Easy to Build FET RECEIVING CONVERTERS

Let you receive OSCAR and other exciting VHF and UHF signals on your present HF or 2M receiver



- NEW LOW-NOISE DESIGN
- ATTRACTIVE WOODGRAIN CASE
- Less than 2dB noise figure, 20dB gain

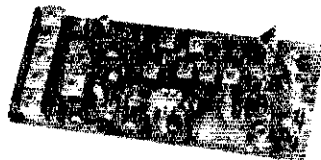
MODEL	RF RANGE	OUTPUT RANGE
CA28	28-32 MHz	144-148 MHz
CA50	50-52	28-30
CA50-2	50-54	144-148
CA144	144-146	28-30
CA145	145-147 or 144-144.4	28-30 27-27.4 (CB)
CA146	146-148	28-30
CA220	220-222	28-30
CA220-2	220-224	144-148
CA110	Any 2MHz of Aircraft Band	26-28 or 28-30
CA432-2	432-434	28-30
CA432-5	435-437	28-30
CA432-4	432-436	144-148

Easily modified for other rf and if ranges.

STYLE	VHF	UHF
Kit less case	\$34.95	\$49.95
Kit with case	\$39.95	\$54.95
Wired/Tested in case	\$54.95	\$64.95

## Professional Quality VHF/UHF FM/CW EXCITERS

- Fully shielded designs
- 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, 1/2W Kit.....	\$44.95

## See our Complete Line of VHF & UHF Linear PA's

- Use as linear or class C PA
- For use with SSB Xmitg Converters, FM Exciters, etc.

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; 30-40W.....	\$119.95

See catalog for complete specifications

## FAMOUS HAMTRONICS PREAMPS

Let you hear the weak ones too!  
Great for OSCAR, SSB, FM, ATV. Over 14,000 in use throughout the world on all types of receivers.



- NEW LOW-NOISE DESIGN
- Less than 2 dB noise figure, 20 dB gain
- Case only 2 inches square
- Specify operating frequency when ordering

MODEL P-30 VHF PREAMP, available in many versions to cover bands 18-300 MHz.

MODEL P432 UHF PREAMP, available in versions to cover bands 300-650 MHz.

STYLE	VHF	UHF
Kit less case	\$12.95	\$16.95
Kit with case	\$18.95	\$26.95
Wired/Tested in Case	\$27.95	\$32.95

## NEW VHF/UHF FM RCVR'S

Offer Unprecedented Range of Selectivity Options

- New generation
- More sensitive
- More selective
- Low cross mod
- Uses crystal filters
- Smaller
- Easy to align



R75A\* VHF Kit for monitor or weather satellite service. Uses wide L-C filter. -60dB at ±30 kHz..... \$69.95

R75B\* VHF Kit for normal nbfm service. Equivalent to most transceivers. -60dB at ±17 kHz, -80dB at ±25 kHz... \$74.95

R75C\* VHF Kit for repeater service or high rf density area. -60dB at ±14kHz, -80dB ±22kHz, -100dB ±30kHz... \$84.95

R75D\* VHF Kit for split channel operation or repeater in high density area. Uses 8-pole crystal filter. -80dB at ±9 kHz, -100dB at ±15 kHz. The ultimate receiver!... \$99.95

\* Specify band: 10M, 6M, 2M, or 220 MHz. May also be used for adjacent commercial bands. Use 2M version for 137 MHz WX satellites.

R450( ) UHF FM Receiver Kits, similar to R75, but for UHF band. New low-noise front end. Add \$10 to above prices. (Add selectivity letter to model number as on R75.)

A14 5 Channel Adapter for Receivers..... \$9.95

## NEW R110 VHF AM RCVR

AM monitor receiver kit similar to R75A, but AM. Available for 10-11M, 6M, 2M, 220 MHz, and 110-130 MHz aircraft band \$74.95. (Also available in UHF version.)

## IT'S EASY TO ORDER!

- Write or phone 716-392-9430
- (Electronic answering service evenings & weekends)
- Use Credit Card, UPS COD, Check, Money Order
- Add \$2.00 shipping & handling per order

Call or Write to get  
**FREE CATALOG**  
With Complete Details

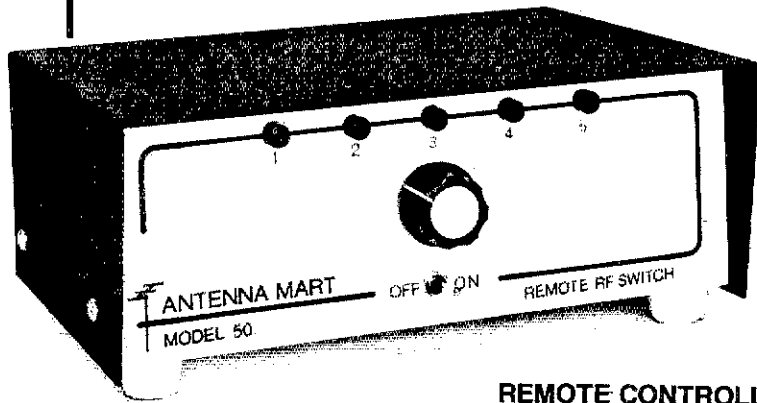
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# ANTENNA MART



**REMOTE CONTROLLED  
ANTENNA SWITCHING ALLOWS YOUR FEEDLINE  
TO WORK FIVE TIMES HARDER**

Antenna Mart's Model 50 allows instant switch selection of up to five antennas with a single feedline and a control cable between the operating position and the remote switch location. Eliminate the tangle of feedlines and manual switches usually associated

with multiple antennas. Antenna Mart's Model 50 has a 3KW power rating, high-speed low-loss operation, rugged weather-proof construction and LED indication of antenna in use. Order factory-direct or write for complete information on our line of available models.

**MODEL 50  
Remote Antenna Switch  
\$150.00 + \$3.00 shipping**

**ANTENNA MART**

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ISU Station  
AMES, IOWA 50010  
(515) 292-7114



WB4EXA 240, N4WA 183, WD4IO 168, N4BZH 131, WA4CRI 114, W4MGO 110, N4UJF 97, WB4ADL 82, N4AXN 72, AA4FG 71, KF4U 68, WB4TZR 62, W4BSP 57, WD4PGS 51, WA4SZ 45, N4ARJ 44, WB4QBB 42, W4KIX 41, W3IDO 23, N4BBY 11, KB4T 10, WB4DTS 7, WB8USE 7, K4RNS 5.

**SOUTHERN FLORIDA:** SCM, Woodrow Huddleston, K4SCL — Asst SCM; W4KGJ SEC; AA4WJ, STM; K4TH. As most of you know, W4WYR is Asst SEC, in addition to Vice Director, S.E. Div. Now we have a second Asst SEC, KB4CW. Congratulations. We are proud to have you and know you will do an outstanding job. The big event of October was, of course, the Simulated Emergency Test. More than ever before NTS operating both days, in a heart-warming spirit of cooperation. Northern and Southern Florida banded together with all section-level nets covering all Florida with 20 sessions each day giving essentially continuous coverage from 7 A.M. to 11:30 P.M. and providing liaison to 8 sessions of 4RN and 8 sessions of RN5. In addition to normal plus S.E. traffic, we had Jacksonville Fair traffic running into the thousands. Section stations reported total traffic count of 13,759 — rivaling some of the busiest Christmas rush months in past years. A bumper crop of 11 BPL certificates were handed out. We believe that ARES activity at the local level was rather low-key in most counties compared to the greatly increased NTS activity, but a few counties had "biggest ever" drills. Notable were Dade, Broward, Pinellas and Polk. Have received very few comments on our combined Northern/Southern Florida plan for net operations in widespread emergency. Let me know if you like it or what should be changed. Otherwise we will consider it ready to be implemented at any time a widespread emergency indicates need for it. I was especially pleased to hear the various Net Managers getting together to work out details of how their nets would dovetail to provide the coverage needed during SET. The Suncoast Convention in St. Petersburg November 1 and 2 was fairly nice, but spoiled by owner refusing to honor a promised free parking. W4MML reports he needs help with apartment antenna problem. How about you experienced experts contacting him. W4BK is enjoying a new Yaesu CPU-2500R, WA4RLV sporting a new Kenwood TR-2400. Several new TR 2400s popping on the air since the Suncoast Convention. SPARC team members placed into service 27 new Clegg FM-76 sets, swelling the population of the 5 state 224.66 MHz repeater K4ZK with traffic total of 558 reports it is his highest month ever. WB4AD reports antenna improvements to give wider coverage both on hi and whi as an emergency power system going in soon NAUF is developing an OUTSTANDING PUBLIC SERVICE award which will probably be adopted for use in both Florida Sections. Criteria for award, now being developed, will probably include traffic handled, net activity, ARES drills, public service events, actual emergencies, PSHR, etc. Any more ideas on what constitutes all-around outstanding public service? Traffic: (Oct.) W3CUL 3306, WD4AWN 1084, K4SCL 862, W4MEE 803, W3VR 778, W4GPL 730, K4ZK 658, K4TH 622, WB4FVY 603, W4NFK 464, WA4PK 449, W4LK 333, WD4CQL 308, W4WYR 280, KY4U 224, K4WIT 191, K4SZZ 182, K4LNA 182, WA4EIC 180, AA4WJ 169, K4ELK 162, WB4YNG 162, WB4AID 146, WB4PIB 139, KB4CW 128, NC4H 101, W4LYI 66, W4DVO 45, W4ESH 40, WB4GCK 37, AE4E 36, N4APE 34, WA4FKE 34, W4IRA 31, W4SMK 26, WD4LWT 23, W4AZJ 21, WA4HXU 20, WB4SNX 17, AA4RN 16, WB4NJU 16, KA4BBA 15, WB4FVN 10, WA1IOG 8, W4MML 8, W4JM 4. (Sept.) W4BK 18, WB4AID 14, W4MML 6.

**WEST INDIES:** SCM, Julio Negroni, KP4CV — SET was an unqualified success. ARES under SEC, KP4BSQ geared into unprecedented message handling. This year's SET highlight was its incorporation on the nationwide NTS SET. W4MMS and liaisons KP4U and KP4DJ did an excellent job. Perhaps our best still KP4EMX, liaison between W4NS and ARES, handled numerous messages on 146.25/85. Civil Defense liaison, KP4JZ, as usual provided the equipment at the c.d. Central Headquarters. c.d. has promised new equipment to be ready for next SET. PRYLC had a very nice get together at Guaiacata. Among others KP4EJ, KP4BL, KP4CL, KP4CK, KP4ABN, KP4FHC, KP4CV, KP4EQL, KP4HY, KP4DC met during the weekend Oct 3-5. Traffic: KP4U 218, NP4D 204, KP4DJ 185, KP4EMX 121, KP4FBT 62, KP4EMY 40.

**SOUTHWESTERN DIVISION**  
ARIZONA: SCM, W. L. Haskell, AC7D — STM; W7EP; SEC: N7EH. CC ARC rpts that W7YS took 1st place (AZ) in the 160-Mtr World Wide DX contest and WA7NXL recently made DXCC Congrats to both of you! KA7BHF has erected a new Quad with the assistance of CCARC members-Gud DX! WB7QON is recovering from a fall; has 2 compressed, cracked lumbar vertebra — speedy recovery — let the XYL, 700M wait on you, Hi! New rpt. on 144.750-145.350, Wild Flower Mtn., NW of Phnx. Believe the owner is WB6GOL. As of further interest, the 1979 rpt is now the property of K7CC. N7DD has honored all of us in AZ by winning 1st place in the World-Wide DX Contest — 3,113,788 points — an all-time U.S. record (also established a new record in the 10-Mtr. ARRL contest for the world!). Metropolitan ARC, Tucson, puts out an extraordinary new letter — extremely well composed, full of club activities and many impressive pictures the officers and chairpersons are to be congratulated! W7EAH has really been under the weather for some time in and out of the hosp. numerous times. A speedy recovery. Our SIM rpts that the AZ Cactus Net will soon be part of the NTS network. Sure happy about that news!! W7CEN became a Silent Key on Oct 11th. He leaves a large void here in AZ, as he was involved in so many amateur activities. We will miss him dearly. Nets: A-10-QNI 949, CTC 246, SWN-QNI 220, CTC 193. Traffic: W7EP 224, W7AMM 104, W7VJ 81, WA7KQE 64, K6NMQ 37, K7JKM 34, K7NTG 30, W7OLF 25, KA6DDW 22, W6RQI 16, W6OPX 10, WA7NXL 7, W7LBW 3, W7VON 3, K7GLA 1.

**LOS ANGELES:** SCM, Stan Brokl, N2YQ — ASCM; N6UK. SEC: WB6FAK. STM: W6INH. Oct was a busy month with the San Fernando Valley ARC supporting Earthquake Awareness Week and all ARES groups supporting SET. The traffic totals were up this month because of the SET. The JPL ARC, W6VIO, started the Saturn Encounter celebration with many members working hard in Oct. putting up new antennas, KT34XZ, and new verticals, and completing the station. SSTV, ash, cw, 2 M and 1.4-M fm will be operating for the event. KBASK N6VI AK6Y and W6RO K6CDD all reported various activities during the month. QOs WB5YID K6CJL, K6KA and W6TOG all sent in reports this month. K6INK

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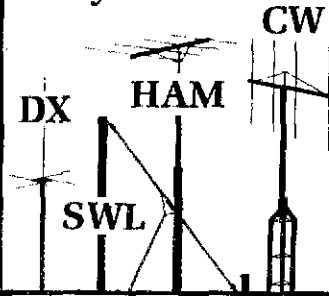


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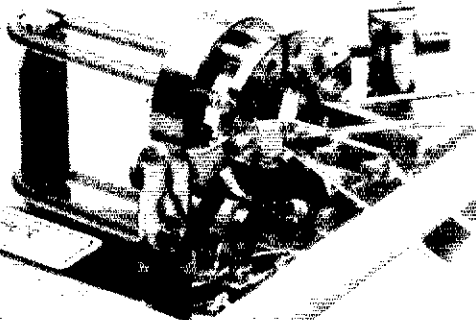
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informs me she was elected receiving treasurer for YLRL and not Cecelia, as previously reported. The Long Beach ARC W6RC supported communications for the British-American Naval Cadet exchange class at the RMS Queen Mary. Traffic: (Oct) K6B0 188, K5DY 173, W6INH 152, K6INK 114, K6BFC 98, W6LVO 69, W6BRO 66, N6P7 29, W6BWG 27, W6NKE 23, K6C71 21, K6GL 15, W6OCM 5 (Sent 1 K6INK 56).

**ORANGE:** SCM, Fried Heyn: W6WZO — A5CM: W6BWN SEC: W6UBQ, STM, KA6A, NMs: W6BAKR (wv), W6CPB (ssbl), K6J1 (RTTY), W6QCA (fm), W6WZP (ASCL). New appointments: W6BI (GTS & QFS), N6CJO (QVS), W6IKH (QFS), K6GC (QIS), N6AFD (QIS), N6BVU (QVS), K6AHJK (QTS), W6MBE (QFS), K6SLX (QFS), W6GSL (QIS). In the week of FD much PR gained by time spent covering with many cities declaring AR Week — W6RZE gets credit for 12 cities including HB where XYL is mayor!! Citrus Belt ARC new officers: W6HDY, pres., K6GGS, vice pres., W6JUC, secy/treas., YLRC of LA new officers: W6QVD, pres., K6MGS, vice pres., K6RUS, treas., K6HNN, secy., W6UUV, editor. Congrats to new YLRL officers: K6INK, treas., W6WZN, secy., W6UUV, 6 District chairman. Congrats to STM KA6A on making PSRR for last 14 months! EC N6BXY appointed RACES HO for District 6; he is doing a fantastic job with support from the Victor Valley ARC. Outstanding EC, W6QMW, of Riverside ARES is re-owning from kidney transplant. OICARC has novice hotline running by W6BIB, K6BEC 275, N6ALD 273, KA6A 117, K6J1 94, KA6FDX 81, K6GCS 78, W6RZE 61, W6E 80, W6QCA 61, K6RJK 42, W6UBO 38, W6WZO 30, W6LGL 24, W6GSI 17, W6LKN 14, W6WZN 8, N6AGO 2.

**SAN DIEGO:** SCM, Arthur R. Smith, W6INI — ILM: N6GW SEC: W6INI, ASST SEC: N6RD. Forty ARES members participated in five Red Flag Alerts in October. Alerts are called by the Calif Dept of Forestry during severe fire hazard conditions. As a fire prevention measure patrols are set up to observe activity in wildland areas. ARES is responsible for 11 routes. More volunteers are needed to reduce the load on a few "regulars." Contact W6INI, 273-1120. North County Inactive Net held 30 sessions with 51 msgs handled. An October BPL award was the 10th for W6PFIH. Congratulations: NIS 4-4 radio check, SCM 2 1st, 388 kHz, 2015 Pacific Time; RN6ID daily, 725 kHz, 1045-1045, 1530 Pacific Time. Upgraded: W6PVIH to Extra. New ARES members: N6COW, K6MPLV, K6MMP, W6LOX, K6DGR. San Diego Police Dept's Community Radio Watch needs active hams with mobile equipment for its crime prevention program. Contact W6INI, 273-1120, for info. W6CDE is active with Golden Bear Net. N6AT's activity severely limited by power line QRM. W6HUJ has a new 25-watt 2-meter rig, W6DEY's ham activity hampered by mobile home park rules. Traffic: W6PVIH 516, N6GW 273, K6B1 134, W6HUJ 131, K6HAP 78, N6AT 34, K6DZ 74, W6YF 19.

**SANTA BARBARA:** SCM, Robert N. Druff, W6POU — SBAR. Staff reported 10 "scin" SET "earthquake disaster." Multiple objectives included tactical and section-wide H&W (to Ventura) held 36 ops, SLO 26, SBAR No. 4, SBAR Su. 4. Ht nets relieved vhf overload. Hc handling procedures poor. Little crossover between ARES/INTS. Only portion of originated hts got thru. RTTY vlns swamped and vhf links marginal. Much work needed. Bright spots were Ventura and SLO Counties. Pub 500, Ventura Hill and So. Mtn. tires consumed 12,000 acres. 50 ARES ops acted as spotters and AHC shelter communicators over 2 days. Detailed quake potential presentation made by SBAR Club. News was sombre forecast. Strong ARES cadre needed. PSRR, K6B 77. Traffic: W6MBE 360, K6YU 118, W6TRP 56, K6DZ 16.

### WEST GULF DIVISION

**NORTHERN TEXAS:** SCM, Phil Clements, K5PS — A4ST SCM: A4SC, SEC: W5GPO, SIM: W5VMP, NMs: A4S1, A4SJ, N5BT, W5HMR, and K558. Our section has been divided into ARES districts, and the District Emergency Coordinators (DECO) have been appointed for each. Perhaps the new system will persuade those folks heretofore reluctant to taking a county FIC post to go ahead now, as they will be working for the local District FIC Districts and Dist #1WAGCY, Dist #2W5C1, Dist #3W5DUJ, Dist #6WAGCY, Dist #7W5B5, Dist #8W5B5, Dist #10W5AF, Dist #11W5B5, Dist #12K5MWC, Dist #13AD5Z, Dist #14W5K5Z, Dist #15A5EU, Dist #16W5DTC, Dist #17W5EY, Dist #18K5HT, Dist #19K5HSZ, Dist #20W5U5Z. We still have many counties without a resident EC, and one of the goals of ARES for 1981 will be to recruit at least 50 new ones. Under the new leadership of W5GPO, you can expect a vast improvement in our efficiency and preparedness in ARES here in N. TX. There will be a Texas QSO Party, sponsored by the West Texas Amateur Radio Club of Odessa, beginning 0000 hrs Jan. 24th to 2400 hrs Jan. 25th. Special QSOs and special awards for fixed, mobile, and Canadian stations, both phone and CW. Notice K5ID: 2708 Halitax, Odessa, TX 79767 for all details. DIFW QN1 425, QTC 11047 in 36 sess, TSN: N61 257, OTC 60, in 31 sess, PSRR: K5AGV, W5D5JY, N5B1, W5QFD, W5ASIH, W5C7Z, K5SUL, A5AJ, K5GFP, W5EUE, W5VMP, K55B, and N5GEC. Our feature club of the month is the West Texas Amateur Radio Club, of Odessa. The club meets on the first Thursday of each month @ 8:00 P.M. @ Bronco Chevrolet, 500 W. 2nd in Odessa. There is an "on the air" meeting each Tuesday evening @ 8:00 P.M. on the 147.63/03 repeater. Officers are: K5MTC, pres., W5D5T, vice pres., N5AQJ, secy/treas., W5WV, K5SL, W5SHSG, dir. The club features a full line of activities and services, and a Novice class will begin in January. K5ID has recently been appointed Emergency Coordinator for Ector Co., and we are expecting great things in the way of ARES activity in the immediate future. The club newsletter, "THE RELAY," keeps all members informed on all coming activities and functions. For details on the club, contact The West Texas ARC, P.O. Box 7033, Odessa, TX 79760. Traffic: N5BT 268, A4SJ 203, W5T1 203, W5B5KM

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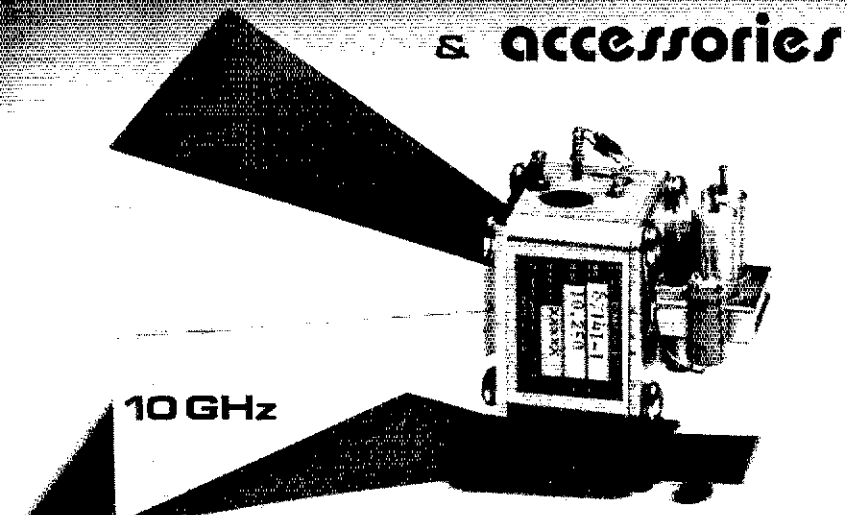
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**OKLAHOMA:** SCM, Leonard Hollar, W4SFSN — 40 QTS reports showing 2200 QTC handled 200 reports and 1 QVS report received this past month. Only 1 local net report received. Have some excellent SET reports and other PSA reports on hand Stillwater provided comm for a Collegiate Air Show. OPN covers 58 towns in Oklahoma on an average Sun sess. The evening nets could provide essentially the same or better coverage with just a little more effort. The QJWN averaged 10 WX reports each night; this could easily be expanded to 20 or 25. Operation "Sky Warn" does not die in wintertime. Be alert! monitor 3900 and your local repeater during unusual WX, particularly possible blizzard conx. Someone will be available at NWS if things get bad. Along this line, N.V. Okla. Texas panhandle and S.W. Kansas moving along on repeater linking plans. Use of these links should expand normal traffic outlets. WBSLGG recovering and back on the nets. We regret very much to see K5OWK moving south, but know that he will be heard on the nets. Beaver and Texma Hamrama both seemed smaller but very active this year. Clubs get your annual reports in; it makes it easier on all. Traffic: W5NKO 343, W5NKC 327, W5REC 224, W5RB 140, K5CXP 134, K5FEK 120, W5B5Y 106, W4SFSN 94, K5OWK 91, W5IDL 85, W5UYH 87, K5FA 65, W4SOJY 63, W5NRR 59, W5SIE 45, W5SIG 38, W5VXU 37, W5AS 31, W5VLW 29, K5CAY 25, W4VOR 23, W5EAY 21, K5MGD 18, W5SIRH 13, WBSLGG 11, W5AXH 9, W4SUT 9, W5FKL 8, N5JN 5, W5JJ 2.

**SOUTHERN TEXAS:** SCM, Roger Corlay, N5FN — Ass't COMSTIM, N5ICG, K5G, AK5N, OTC, AK5L, reporting this month. This was a good month for activities in the section with 29 stations reporting traffic and 12 making PSHR. The Harlingen area group did their usual good job communicating for the Confederate AF show in Harlingen as reported by K5DG. It was nice to see and visit with many of you at the Houston HamCon. K5RG worked SET with emergency power. He also reports that he gave a talk on NTS at Ham-comm. KA5GJY helped with the air show communications in Harlingen. W5BIM had a busy month passing extra exam, getting on RTTY, and being appointed QTS — congrats. W5AAH reports good SET activity for the Southern part of Brazoria City. K5BIB is now operational on RTTY. Several others are also operating up in Brazoria City, including N5FN, W5AAH and W5BPHO. W4SHTV now has his M80 interface operational for cw on his IHS 80 computer. New officers for Santa Houston ARL are: K5FU, pres.; K5YC, vice pres.; W5RUI, secv.; N5AF, treas. W4SNT, activities dir.; K5SNX, AAD. N5CDX, W5NYH, W5WKA have new 2 Mir. H's. The Cleveland 146.31/91 machine has been moved to a new 200 ft tower at QTH of W4SNN. W5EJJ just made DXCC with 113 confirmed. N5AF, QVS has been sending in some good reports of late on vhl activity. Traffic (Oct): W5KLV 583, W5YDD 460, K5SIG 251, W5EAY 188, N5ICG 183, W5SBE 151, W5STN 140, W5SHN 116, W5MMI 101, K5PE 98, K5BSN 87, K5SNX 78, W5CGK 61, K5RG 56, W5RYV 39, W4SHTV 36, W4DDOR 31, W4AAH 30, N5N 23, W5JIM 23, W5EJJ 19, K1ZO 18, AK5M 15, K1P 10, K4GVJ 8, K5HVF 6, K5O 2, K4OCSM 7. (Sept) W5CIT 48.

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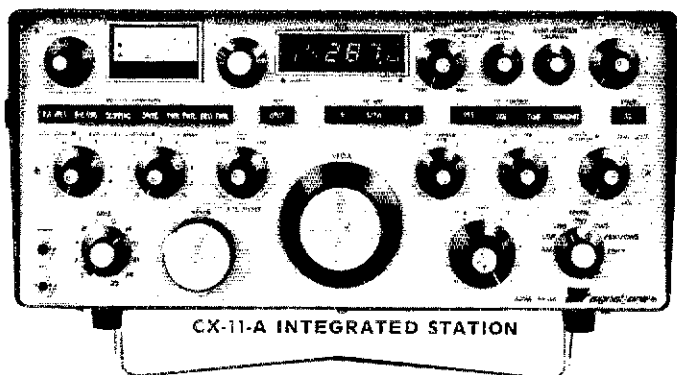
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... If You Want The Finest

**SIGNAL/ONE CX-11A**



- POWER OUTPUT: 150 watts CW/SSB output all bands (2) MRF 422 Finals.
- OPTIONAL POWER OUTPUT: 200 to 225 watts CW/SSB output.
- SYNTHESIZED FREQUENCY COVERAGE: All amateur bands 1.8-30 MHz in full 1 MHz bands, plus 4 additional 1 MHz bands for future expansion.
- TWO PTO'S: Dual receiving, transceive on either, or split operation
- QSK CW: Full break in, vacuum relays.
- SELECTIVITY: Two 8 pole plus one 4 pole filter deliver 20 pole 1.4:1 shape factor (6dB/60dB), plus post detection 1.5, 1.0, .4 and .1 KHz band width.
- BUILT-IN: A/C supply, 115/230V, 50/400 Hz, Hypersil  $\oplus$  transformer, IF shift, noise blanker, RF clipping, CW keyer, notch/peak filter.
- SERVICING: Self service easiest of any transceiver by using gold-plated sockets for transistor and IC replacement.
- RELIABILITY: Less than 1% failure. 99% of problems resolved in field.
- QUALITY: All military and computer grade. 100% American made.
- PRICE: \$5900, mfg by Signal/one Corp., Phoenix, AZ 85021.
- LIMITED WARRANTY: 12 MOS.



- Alpha 77DX: The ultimate amplifier for those who demand the finest.
- Tube: Eimac 8077 - 1500 watts of plate dissipation
- Transformer: 4.4 KVA Hypersil  $\oplus$ , removable, plug-in
- Filter Capacitor: oil-filled, 25 mfd
- Bandwidth: 20 AMP-6KV
- Teflon - Insulated Toroid Inductors
- QSK CW: Full break-in, (2) vacuum relays
- Tuning Capacitor: Vacuum
- Cooling: Ducted air, large, quiet blower, computer grade
- Price: \$4495, limited warranty 24 months, tube by Eimac
- Other Alphas: 78-\$2895, 76CA-\$2195, 76PA-\$1995, 76A-\$1695, 374A-\$2195
- 77 SX-\$5395 (EXPORT ONLY)

Phone Don Payne, K4TD, for SPECIAL WINTER PRICES.  
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Plug-in, solid state tube replacements

- S-line performance—solid state!
- Heat dissipation reduced 60%
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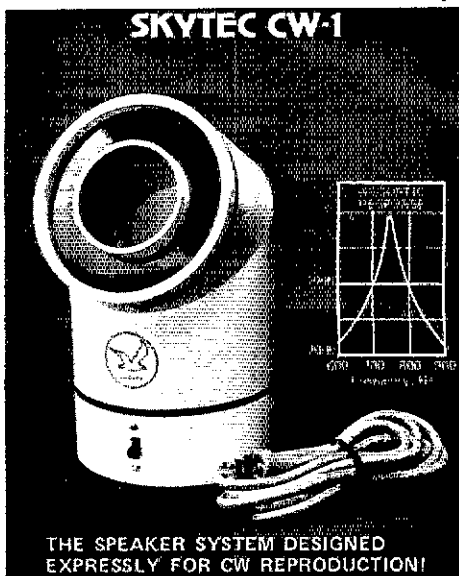
TUBESTERS cost less than two tubes, and are guaranteed for so long as you own your S-line.

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Write or phone for  
specs and prices.  
(707) 462-6882

**CW OPERATORS,**  
**SKYTEC CW-1**



THE SPEAKER SYSTEM DESIGNED EXPRESSLY FOR CW REPRODUCTION!

Using a resonant acoustic filter, the CW-1 combines good "single frequency" selectivity with a pleasant tone shaping characteristic, giving the most comfortable listening ever attained for lengthy CW operation.

A valuable addition to any ham station: Without a sharp electronic filter, the selectivity added by the CW-1 is amazing. And with a sharp filter in the receiver for the tough QRM, the CW-1 still gives the most pleasant, "just right" band pass for most QSO's, net operations and band scanning.

"Using the CW-1 on my Kenwood TS-520. Absolutely Remarkable! Order enclosed for another one for my Drake R4B" ... Bill, W4\*\*

"That little unit is tops. The tone is just right for my ears. I'm amazed at how I can separate the signals in the pile ups" ... Ned, K6\*\*

"Congratulations, Skytec for pleasant CW! I didn't know what odd tones and grinding I had become used to. The clear tone of the CW-1 makes it the best addition I have made to my rig" ... Reed, WA6\*\*

"Terrific performance, careful construction, nice style - an excellent unit" ... John, W3\*\*

\*\*Complete calls furnished on request.

**\$19.95. Include \$2 UPS, \$3 UPS AIR or \$3 USPP shipment. W6's add \$1.20. Size 3 1/2" by 6 1/2". Cable included. A front switch and second jack at the rear provide bypassing to another speaker for phone reception.**

**SKYTEC**

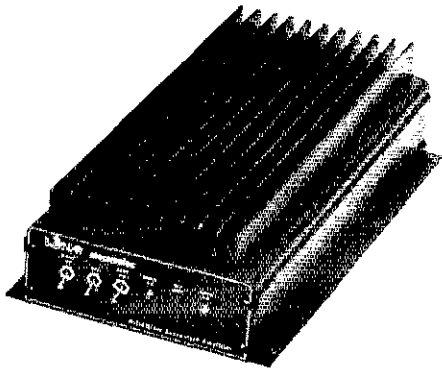
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(any time, 7 days)

# Lunar's amplifiers give you far more useable power...but cost only \$20 more!

## BECAUSE THEY ARE BI-LINEARIZED!



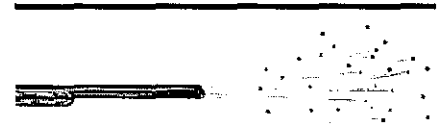
transmitting frequency. This side splatter not only interferes with your fellow hams, but also subtracts a significant amount of power from your signal strength. In other words you are paying for power that is unusable.

### **Lunar's Bi-Linearized Amplifiers give you far more usable power.**

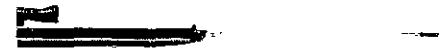
The output signal from bi-linearized amplifiers give you an almost exact reproduction of the input signal. The only change is increase in the power level. And that's what you're paying for!

Here are photographs of the Lunar Bi-Linear amplifier's output signal and that of another

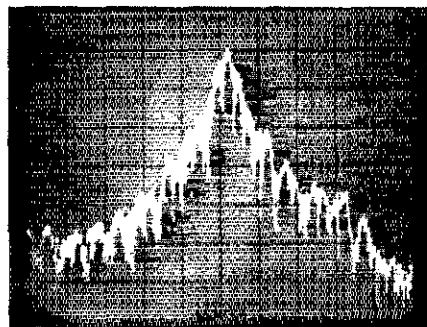
The purpose in using an amplifier is not just to get more power. It is to increase the strength and readability of your signal on the transmitting frequency you are using. The stronger you can make your signal on your transmitting frequency the farther your signal will reach and the greater



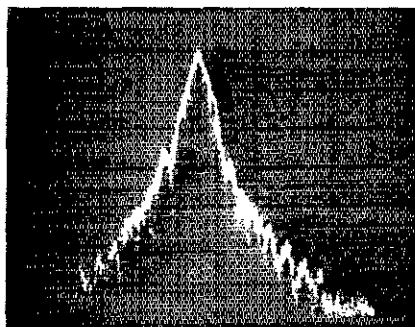
Many amplifiers "spray" their power over the band, much like shotgun pellets spray a wide area.



Lunar's Bi-Linearized Amp's power is targeted directly on the transmitting frequency.



Model "x"



Lunar Bi-Linearized Amp

readability it will have at the receiving end. This is why you use an amplifier.

### **Many amplifiers have impressive numbers on power output.**

But because of poor design or inferior quality components their output is splattered as much as 25 KHz on either side of the

well known brand when both were measured with a spectrum

analyzer. Notice the tremendous amount of side splatter of amplifier "x" as compared with the Lunar. According to the specs of amplifier "x" they claim the same power output as the Lunar. But as the photograph shows, a significant part of its power is going out on adjacent frequencies. So you're not getting all the usable power you're paying for.

It doesn't make sense to pay \$179 for an inefficient amplifier when for \$20 more you can have a Lunar Bi-Linearized Amplifier that gives you all the usable power output you pay for.

**When buying your next amplifier, SPECIFY THAT YOU WANT A LUNAR BI-LINEARIZED AMPLIFIER.**

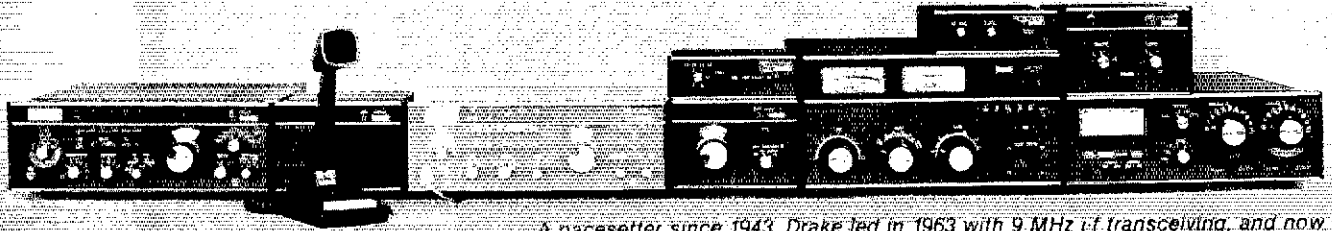


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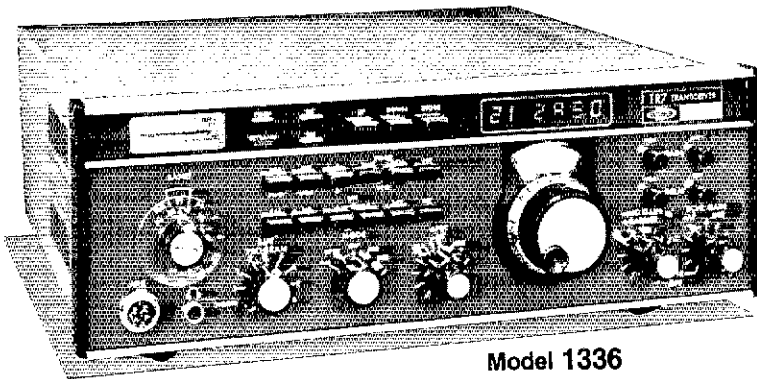
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WB6NMT



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*A pacesetter since 1943, Drake led in 1963 with 9 MHz i-f transceiving, and now with 48 MHz i-f "Up Conversion". Drake brings you tomorrow's state of the art today.*



Model 1336

# TR7

**solid state  
continuous coverage  
synthesized hf system**

**Continuous Frequency Coverage**—The TR7 provides continuous coverage in receive from 1.5 to 30 MHz. Transmit coverage is provided for all amateur bands from 160 through 10 meters. The optional AUX7 Range Program Board allows out-of-band transmit coverage for MARS, Embassy, Government and Commercial services as well as future band expansions in the 1.8 through 30 MHz range.\* The AUX7 Board also provides 0 through 1.5 MHz receive coverage and crystal-controlled fixed-channel operation for Government, Amateur or Commercial applications anywhere in the 1.8 to 30 MHz range.

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

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

**True Passband Tuning**—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by

allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

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

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

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

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

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

# TR7

## ACCESSORIES

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

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

## TR7 SPECIFICATIONS

### GENERAL

#### Receive

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

#### Transmit

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

#### Modes of Operation

Usb, Lsb, Cw, RTTY, A-m equiv. (A-3H).

#### Frequency Stability

Less than 1 kHz first hour. Less than 150 Hz per hour after 1 hour warm up. Less than 100 Hz for  $\pm 10\%$  line voltage change.

#### Frequency Readout Accuracy

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

#### External Counter Mode

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

#### Power Supply Requirements

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

#### Dimensions

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

### RECEIVER

#### Sensitivity

Ssb, Cw	Less than $0.5 \mu\text{V}$ for 10 dB (S+N)/N.
A-m (30% Mod.)	Less than $2.0 \mu\text{V}$ for 10 dB (S+N)/N.

#### Selectivity

2.3 kHz at -6 dB and 4.4 kHz at -60 dB (1.8:1 shape factor).

#### Ultimate Selectivity

Greater than 100 dB.

#### Agc

Less than 4 dB output variation for 100 dB input signal change, referenced to agc threshold.

#### Intermodulation

Intercept Point, +20 dBm. Two-tone Dynamic Range, 99 dB (at spacings of 100 kHz and greater).

#### I-f Frequency

First i-f—48.05 MHz.  
Second i-f—5.645 MHz.

#### Image and I-f Rejection

Greater than 80 dB.

#### Spurious Response

Greater than 60 dB down.

#### Internally Generated Spurious

Less than  $1 \mu\text{V}$  equivalent, except  $3 \mu\text{V}$  equivalent from 5 to 6 MHz (reduced specs on internal osc frequencies).

#### Audio Output

2.0 watts @ less than 10% THD (4 ohm load).

### TRANSMITTER

#### Power Input (Nominal)

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

#### Load Impedance

50 ohms, nominal.

#### Spurious Output

Greater than 50 dB down.

#### Harmonic Output

Greater than 45 dB down.

#### Intermodulation Distortion

30 dB below PEP (24 dB below one of two tones).

#### Undesired Sideband Suppression

Greater than 60 dB @ 1 kHz.

#### Duty Cycle

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

#### Wattmeter Accuracy

$\pm 5\%$  @ 100 watts (50 ohm load).

#### Carrier Suppression

Greater than 50 dB.

#### Microphone Input

High Impedance.

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

**R. L. DRAKE COMPANY**



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- \* Deluxe straight key
- \* Anti-tip bracket. Can't tip
- \* Heavy base. No need to attach to desk

Model AT-B anti-tip bracket only, to convert any HK-3 to HK-3M. \$1.50 Postpaid

CC-3P shielded cable & plug for HK-3M \$1.50  
Add \$ .50 Shipping & Handling.



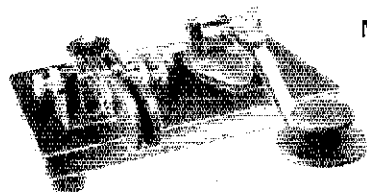
Model **HK-1** ~~\$29.95~~ **Now \$24.95**

Add \$2.00 Shipping & Handling.

- \* Dual lever squeeze paddle
- \* For use with all electronic keys
- \* Heavy base with non-slip rubber feet
- \* Paddles reversible for wide or close finger spacing

Model HK-2, same as HK-1 but less base for incorporation in your own keyer. \$16.95

Add \$1.00 Shipping & Handling  
CC-1P shielded cable & plug for HK-1 \$2.00  
Add \$ .50 Shipping & Handling.



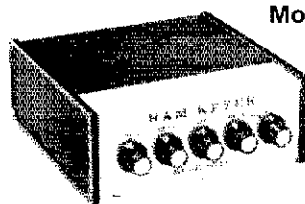
Model **HK-4** ~~\$44.00~~

**Now \$37.95**

Add \$2.00 Shipping & Handling.

- \* Combination HK-1 & HK-3 on same base
- \* Straight key may be used conventionally or as a switch to trigger a memory.

CC-1/3P Shielded cable with plugs for HK-4 \$3.50  
Add \$1.00 Shipping & Handling



Model **HK-5A** Electronic Keyer

~~\$89.95~~ **Now \$54.95**

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- \* Iambic circuit for squeeze keying
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- \* Dot & dash memory
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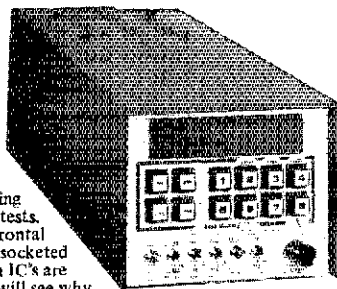
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Order now!  
Contest season is here!

- Eight Message Memory Keyer
- 6 Digit — 24 Hour Clock
- Digital Speed Readout
- One Year Limited Warranty (Parts and Labor)

The Accu-Memory II is an improved version of the original Accu-Memory as described in the ARRL Handbook and now in use by thousands of amateurs. These improvements were made by the designer, WB4VVF, based on requests from DX'ers and contest users for additional capabilities and for an assembled version. Features such as large computer grade pushbuttons, not small round ones, and easy memory loading allow the memory to be used and not fought with during contests. An all metal case, 4x5x13 inches, was designed for minimum frontal area and maximum EMI protection. Plug-in main boards with socketed IC's and LED's assure easy maintenance. No expensive custom IC's are used. Compare these features and those listed below and you will see why your friends are using Accu-Memories!



- Iambic Operation
- Dot and Dash Memories
- Automatic Character Space
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- Messages May Be Combined (up to full 8 message length)
- Keyed Clock (messages may be loaded one word at a time)
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- Digital Speed Readout
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- Provisions Provided for Remote (remote available soon)
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Price..... \$229.00  
Assembled and tested

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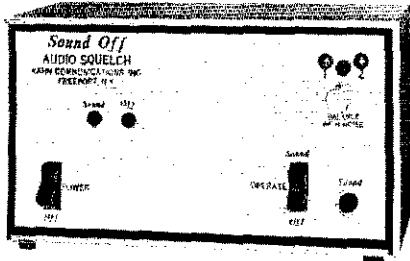
Our 18th Year



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AUDIO SQUELCH  
WITH PATENTED SIGNAL-TO-NOISE  
RATIO EVALUATION SYSTEM

MODELS SO-1 and SO-1-X



## FEATURES

- QUIETS NOISE WHEN CIRCUIT IS IDLE
- QUICKLY IDENTIFIES SIGNAL AND ACTIVATES CIRCUIT
- CAN BE INSERTED ANYWHERE IN AUDIO LINE
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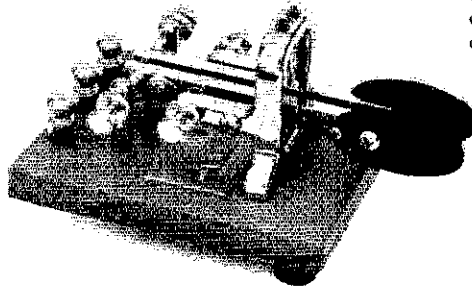
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Features include: adjustable jeweled bearings ("Deluxe" only) • tension and contact spacing fully adjustable • large, solid, coin silver contact points • 2 1/2 lb. chrome plated steel base rests on non-skid feet • lifetime guarantee against manufacturing defects. "Standard" model with textured gray base: \$49.50; "Deluxe" model with chrome plated base: \$65.00. Available at dealers or through the factory. Send check, money order or use Master Charge or VISA. Vibroplex pays all shipping charges within the continental U.S.



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THE NEWEST &  
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INCLUDING 12, 17, & 3  
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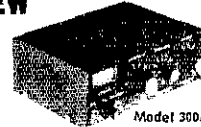
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# MFJ

## NEW PRODUCTS

exciting new ideas from the world's leading manufacturer of amateur radio accessories

### NEW MFJ/BENCHER Keyer-Paddle Combo — "The Pacesetter"



MFJ-422  
Combo  
\$99<sup>95</sup> (+\$4)



MFJ-422X Keyer only  
\$69<sup>95</sup> (+\$4)

The best of all CW worlds — a deluxe MFJ keyer in a compact configuration that fits right on the BENCHER iambic paddle! And you can buy the combination or just the keyer to fit on your BENCHER.

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

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

Beautiful functional engineering. The keyer mounts on the paddle base to form a small (4 1/4" x 2 1/4" x 5 1/2" L) attractive combination that's a pleasure to look at and use. The BENCHER paddle is a best seller. Fully adjustable; gold-plated silver contacts; lucite paddles; chrome plated brass; heavy steel base with non-skid feet.

### NEW MFJ Shortwave Accessories

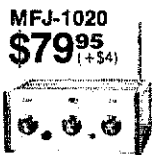


MFJ-1040  
\$99<sup>95</sup> (+\$4)

#### MFJ-1040 Receiver Preselector

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

Built-in 20 dB attenuator prevents receiver overload. Also includes auto-bypass, delay control, PTT jack. Operates on 9 V battery,



MFJ-1020  
\$79<sup>95</sup> (+\$4)

9-18 VDC, or 110 VAC with optional AC adapter. \$7.95 + \$2.

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

#### MFJ-1020 Indoor Active Antenna

"World grabber," rivaling or exceeding reception of outside long wires.

Unique tuned circuitry with amplification minimizes intermod distortion, improves selectivity, reduces noise outside the tuned band, even functions as a preselector with an external antenna. Covers 0.3-30 MHz in 5 bands. Telescoping ant.; tune, band, gain, on-off-bypass; Uses 9 V battery, 9-18 VDC, or 110 VAC, with optional AC adapter at \$7.95 + \$2. 5x2x6".

### NEW MFJ 4 & 8-Band Mobile Shortwave Converters



MFJ-304 \$59<sup>95</sup> (+\$4)

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

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

Compact and sensitive. The 4-band model



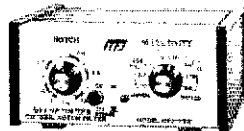
MFJ-308 \$79<sup>95</sup> (+\$4)

measures just 5 1/4" x 1 1/4" x 4" D to fit anywhere in your vehicle (the 8-band version is just 1" wider and 1" deeper). Two dual-gate MOSFETS give these converters excellent sensitivity and selectivity when combined with your automotive receiver.

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

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

### NEW MFJ Active CW/SSB/Notch Filters



MFJ-722  
\$69<sup>95</sup> (+\$4)

MFJ-723  
\$49<sup>95</sup> (+\$4)

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

The 8-pole (4-stage) active IC filter gives CW performance no tunable filter can match. (80 Hz bandwidth gives -60 dB response one octave from center and up to 15 dB noise reduction). The 8-pole SSB audio bandwidth

is optimized for reduced sideband splatter and less QRM (375 Hz highpass cutoff plus selectable lowpass cutoffs at 2.5, 2.0, and 1.5 kHz, 36 dB/octave rolloff). Size: 5x2x6".

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

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

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

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

MFJ-262  
\$49<sup>95</sup> (+\$4)



MFJ-260  
\$26<sup>95</sup> (+\$4)

Air Cooled, non-inductive 50-ohm resistors in perforated metal housings with SO-239

connectors; both rated to full load for 30 seconds; de-rating curves to 5 minutes included. Just right for tests and fast tune up.

Low VSWR. 300W: 1.1:1 max to 30 MHz, 1.5:1 max. 30-160 MHz. 1 kW: 1.5:1 max to 30 MHz. MFJ-260 (300W) is just 2 1/2 x 2 1/2 x 7"; MFJ-262 (1 kW) is 3 x 3 x 13".

TO ORDER PRODUCTS, CALL TOLL FREE



800-647-1800



For tech. info., order or repair status, or calls outside continental U.S. and inside Miss., call 601-323-5869.

- All MFJ products unconditionally guaranteed for one year (except as noted)
- Products ordered from MFJ are returnable within 30 days for full refund (less shipping)
- Add shipping & handling charges in amounts shown in parentheses

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**MFJ ENTERPRISES**  
INCORPORATED

Box 494; Mississippi State, MS 39762

## NEW MFJ-102 24/12 Hour Digital Clock/ID Timer



MFJ-102  
**\$32<sup>95</sup>**  
 (+\$4)

The latest in time keeping convenience. Now you can switch to either 24 hour GMT time or 12 hour format! Double usefulness—great for your operating position and great for other family members to use. Switch to "seconds" readout. For the times when you need the utmost accuracy. Switch to ID timer. Alerts every 9 minutes after you tap the button (also functions as a snooze alarm). Switch to "observed" timing. Just start clock from zero and note end time of event; counts up to 24 hours and repeats. (requires resetting clock time after use). Switch to regular alarm. For skeds reminder or wake-up use (has alarm-on indicator).

Synchronize with WWV. Now you can adjust the MFJ clock to WWV accuracy. Fast/Slow set buttons for easy setting of time and alarm. Big, bright, blue digits are 0.6" for easy-on-the-eyes, across-the-room viewing. Lock function prevents missetting. Solid-state circuitry for long life. Operates on 110VAC, 60 Hz (50 Hz with simple modification). UL approved. Handsome styling with rugged black plastic case with brushed aluminum top and front. Front has sloping surface for easy viewing. Cabinet measures 6x2x3". Put this new improved MFJ digital clock to work in your shack.

# MFJ

## NEW PRODUCTS

exciting new ideas from the world's leading manufacturer of amateur radio accessories

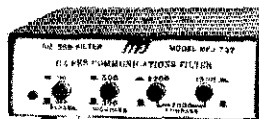
### NEW MFJ VHF SWR/ Wattmeter/Field Strength Meters



MFJ-812 **\$29<sup>95</sup>** (+\$4) MFJ-810 **\$24<sup>95</sup>** (+\$4)

New low cost VHF operating aids. MFJ-812: Reads SWR from 14-170 MHz to keep you informed about antenna/feedlines. SO-239 coax conn. Reads forward & reflected power at 2 Meters (144-148 MHz) 2 scales (.30 & 300W). Reads field strength levels from 1-170 MHz. Binding posts provided for antenna. Easy push-button switch operation. MFJ-810, similar less field strength function.

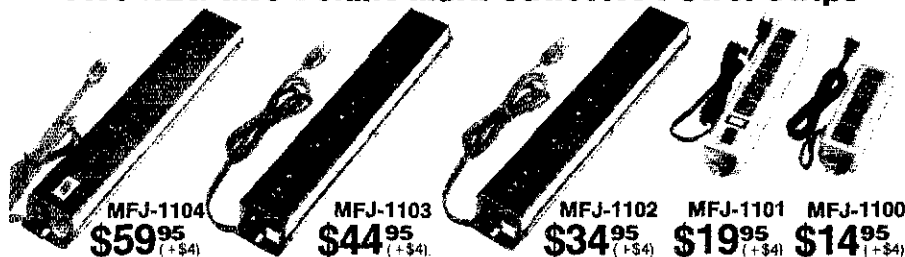
### NEW MFJ DXer's Communications Filter



MFJ-732  
**\$79<sup>95</sup>**  
 (+\$4)

MFJ-732 Puts more presence in SSB/AM/FM voice communications, brings more signals out of the "mud." Easy to use, just push up to 4 buttons. 10-pole (5-stage) circuit with Chebyshev superfast roll-off (up to 58 dB/octave). First button: On/Off-Bypass, response 300-3000 Hz; second: 500 Hz lower cutoff; third: 2200 Hz upper cutoff; fourth: 1500 Hz upper cutoff. Built-in speaker, 2 watt amplifier, LED, 9-18 VDC or 110VAC with optional AC adapter (\$7.95+\$2), 5x6x1 1/2".

### Five NEW MFJ Deluxe Multi-Outlet AC Power Strips



MFJ-1104  
**\$59<sup>95</sup>**  
 (+\$4)

MFJ-1103  
**\$44<sup>95</sup>**  
 (+\$4)

MFJ-1102  
**\$34<sup>95</sup>**  
 (+\$4)

MFJ-1101  
**\$19<sup>95</sup>**  
 (+\$4)

MFJ-1100  
**\$14<sup>95</sup>**  
 (+\$4)

Here's the most convenient, most protected way to power-up radio and computer gear. MFJ-1104: Varistor protects against voltage spikes (worth the investment alone to guard your transceiver, computer, or SWL radios). Individual double-pi RFI filters for each of 3 pairs of outlets to completely isolate radios, computers, and computer peripherals from interference. 8 sockets, 4 pairs, all 3-prong; the fourth pair is unisolated and unswitched. Pop-Out fuse for easy changing (15A, 125VAC), heavy duty 3-wire 6' power cord. Lighted switch shows circuits are "on."

Deluxe heavy-gauge .063 aluminum case, finished in black, has easy mounting slots. Measures 18"Lx2 1/4"Wx1 7/8"H. MFJ-1103, similar but 12 sockets (2 unswitched), one RFI filter for all. MFJ-1102, similar to 1103 but no RFI filter. MFJ-1101: 6 sockets, all 3-prong type. Fuse protected, 15A, 125VAC. On-off switch. Lighted "On" indicator. 3-wire 6' power cord. Steel case, finished in gray hammer-tone, has mounting slots, measures 13 1/2"L x 2 3/8"Wx1 1/2"H. MFJ-1100, similar to 1101 but 5 sockets, less switch, light, and is 8 1/2"L.

### NEW MFJ Compact 3 KW Antenna Tuner Has Roller Inductor



MFJ-989  
**\$279<sup>95</sup>**  
 (+\$10)

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs — only 10 1/2"Wx4 1/2"Hx14 1/2"D. Matches coax, balanced lines, random wires 1.8-30 MHz.

3 KW PEP — the power rating you won't outgrow. (250 pf-6KV caps). Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time. Built-in 300 watt, 50 ohm dummy load. Built-in 4:1 ferrite balun. Built-in lighted 2% meter reads SWR plus forward and reflected power in 2 ranges (200 & 2000 w). 6-position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 coax conn., ceramic feed-throughs, binding post ground. Deluxe aluminum low-profile cabinet with sub chassis for RFI protection, black finish, black panel with raised letters; tilt bail; requires 12 VDC for meter light.

### TO ORDER PRODUCTS, CALL TOLL FREE



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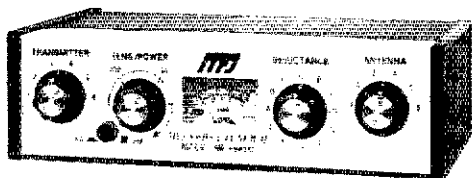
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## MFJ ENTERPRISES INCORPORATED

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## MFJ 941C Versa Tuner II

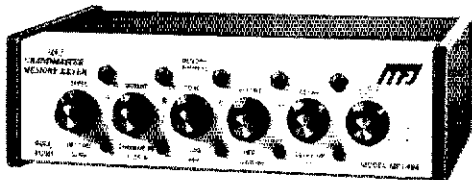


MFJ-941C  
\$89<sup>95</sup> (+\$4)

**Fastest selling MFJ tuner** . . . because it has the most wanted features at the best price. **SWR + dual range wattmeter** (300 & 30 watts full scale, forward and reflected power). *Sensitive meter* measures SWR down to 5 watts output. **More flexible antenna switch** selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load. **12 position efficient airwound inductor** for lower losses, more watts out.

**Built-in 4:1 balun** for balanced lines. 1000v capacitor spacing. **Matches everything from 160-10 meters:** dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines. **Easy to use, anywhere.** Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides. **MFJ-945, \$79.95**, like model 941C but less ant. switch. Optional mobile bracket for either model is \$3.

## MFJ 484 "Grandmaster" Memory Keyer

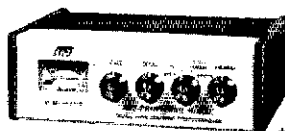


MFJ-484  
\$139<sup>95</sup> (+\$4)

**Up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages** (4096 bits). **Repeat any message continuously or with pauses** of up to 2 min. LEDs show use. **Record, playback, or change messages instantly** at touch of a button. Memories are resettable with button or touch of the paddle. **Built-in memory saver** — 9 V battery takes over when power is lost. **Iambic operation** with squeeze key. Dot-dash insertion. Optional BENCHER paddle \$42.95 + \$4. **Dot-Dash memories**, self-completing, jam-proof spacing, instant start.

**Panel controls:** Speed (8-50wpm)/Record; Weight/Memories Combined; Tone/Tune; Delay (0-2 min.)/Repeat; rotary Vol/On-Off; Memory Select; Message Buttons select desired 25 ch. messages; Memory Reset button. **Ultra reliable solid state keying:** grid block, cathode, solid state transmitters (-300 V, 10 mA max; +300 V, 100 mA max). Operates 12-15 VDC or 110 VAC with optional adapter, \$7.95 + \$2. Size 8x2x6". **MFJ-482, \$99.95**, four 25 or 50 + two 25 ch. messages; **MFJ-481, \$89.95**, two 50 ch. messages. **Get the best seller keyers-MFJ "Grandmasters."**

## MFJ 410 "Professor Morse" Code Generator/Keyer



**NEW LOW PRICE Save \$20**  
MFJ-410 Now Only \$129<sup>95</sup> (+\$4)

**Use it to learn, use it to operate.** It sends *unlimited random code* in random groups for practice; *never repeats* sequences. And when you're on the air, it's a *full feature keyer*. **Vary speed from 5-50 wpm;** meter readout. **Vary spacing;** give fast sound to low speed. **Alpha or alphanumeric** with punctuation. **Built-in speaker** and phone jack; tone and vol. Ideal for classroom or private use. **Full feature keyer** includes vol., speed, tone and weight controls, tune switch, dot-dash memories, keys grid block, cathode, solid-state rigs. Optional BENCHER paddle \$42.95 + \$4. Operates on 9-18 VDC, two 9 V batteries or 110 VAC with optional adapter \$7.95 + \$2. Size 7x2x6". **Get "Professor Morse"** — you'll never outgrow it.

## MFJ Dual Tunable SSB/CW Filter "Signal Enhancer"



MFJ-752B \$89<sup>95</sup> (+\$4)

**Dual filters** give unmatched performance. **The primary filter** lets you *peak, notch, low pass or high pass* with extra steep skirts. **Auxiliary filter;** 70 dB notch, 40 Hz peak. **Both filters tune from 300 to 3000 Hz** with variable bandwidth from 40 Hz to nearly flat. **Constant output** as bandwidth is varied; linear frequency control. **Switchable noise limiter** for impulse noise. **Simulated stereo sound** for CW lets ears and mind reject QRM. **Inputs for 2 rigs,** switch selectable. Plugs into phone jack. Two watts for speaker. OFF bypasses filter. 9-18 VDC, 300 mA or 110 VAC with optional adapter \$7.95 + \$2. 10x2 x6". **MFJ 751, \$69.95**, similar, primary filter only, less high pass & noise limiter.

# MFJ

## BEST SELLERS

favorite products from the world's leading manufacturer of amateur radio accessories

## GMT Clock/ID Timer



MFJ-102  
\$32<sup>95</sup> (+\$4)

**NEW 12/24 Hour Digital Clock/ID Timer** Switch from 12 hr. to GMT, to "seconds" readout, ID timer or elapsed timer. WWV sync, solid-state, blue 0.6" digits, reg. alarm + indicators. 110 VAC, 60 Hz, 6x2x3".

## KW Dummy Load With Oil



MFJ-250  
\$29<sup>95</sup> (+\$4)

**Rated at 1 kW CW or 2 kW PEP** for 10 min., half that for 20 min., cont. at 200 W CW, 400 W PEP, non-inductive 50 ohm resistor, quality transformer oil (no PCB), VSWR under 1.2:1 to 30 MHz, 1.5:1, 30-300 MHz, 2:1, 300-400 MHz. Coax conn., vent cap., 7 1/2" h x 6 5/8" diam.

## 300 Watt Antenna Tuner



MFJ-949B  
\$139<sup>95</sup> (+\$4)

**Does it all!** Built-in dummy load, SWR, forward and reflected power meter, antenna switch, balun, matches everything from 1.8-30 MHz (coax, random wires, balanced lines), coax conn., binding post, 10x3x7".

TO ORDER PRODUCTS, CALL TOLL FREE



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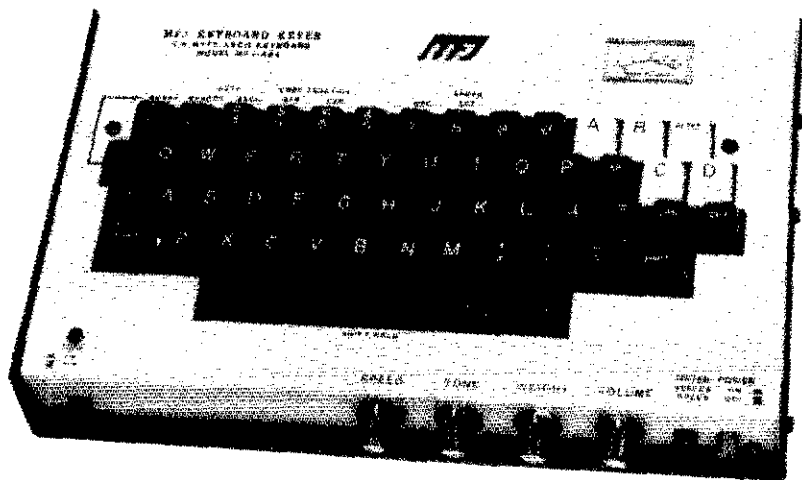
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**MFJ ENTERPRISES INCORPORATED**

Box 494; Mississippi State, MS 39762



# MFJ Super Keyboard

*For \$279.95 you get: CW, Baudot, ASCII, buffer, programmable and automatic messages. Morse code practice, full featured keyer, human engineering.*

Sending CW has always been a task, especially when you get a little tired. Electronic keyers help, but it's still too much work.

Now MFJ has a Super Keyboard that makes sending perfect CW effortless. It also sends Baudot RTTY and ASCII.

"Big deal," you say. "What's so special about that. There are lots of keyboards." Yes, but this one is different.

## HUMAN ENGINEERED

A lot of thought has gone into human engineering the MFJ-494 Super Keyboard.

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

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

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings.

A meter gives continuous readout of buffer memory and speed. Two characters before full, the meter lights up red and the sidetone changes pitch.

## PROGRAMMABLE, AUTOMATIC MESSAGES

Four automatic messages and two programmable message memories (A and B) are provided. Messages A and B can be a total of 30 characters. B starts where A ends.

When recalled, each message takes only one character of the buffer. They may be chained and/or repeated via the buffer.

"Well," you say, "that sure is not much memory." But it's more than it seems because of the built in automatic messages.

For example, type your call into message A. Then by pressing the CO button you send CO CO DE (message A). Press twice to send twice, etc.

The other automatic messages work the same way: CO TEST DE (message A), DE (message A), QRZ (message A).

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

## TEXT BUFFER

The 50 character text buffer sends smooth perfect code even if you "hunt and peck."

Since each automatic or programmable message takes only one buffer character, this gives a far larger effective buffer.

You can preload a message into the buffer. Then when you are ready to transmit press the control key.

You can hold the buffer by pressing the shift key and space bar.

With the buffer in hold, you can send a comment with an external paddle as a keyer. To resume sending buffer, press the control key.

Simply backspace to delete errors.

## RTTY: BAUDOT, ASCII

5 level Baudot is transmitted at 60 WPM. RTTY and CW ID are provided via message A.

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

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

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

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

## MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable list. With answer list.

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

Select alphabetic only or alphanumeric plus punctuation. Pause function lets you stop and then resume.

## IT'S A KEYSER, TOO

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

## MORE FEATURES

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

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

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

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"D x 7"W x 1 1/4"H (front) x 3 1/2"H (back).

9-12 VDC or 110 VAC with optional adapter.

## OPTIONS

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

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

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

**110 VAC ADAPTER.** \$7.95 (+ \$3).

## A PERSONAL TEST

Give the MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC or mail check or money order for **\$279.95** for MFJ-494 Super Keyboard, **\$39.95** for MFJ-53 AFSK module, **\$29.95** for the MFJ-54 loop keying module, **\$42.95** for Bencher Paddle, and **\$7.95** for the 110 VAC adapter. Include \$5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today.

**TO ORDER OR FOR YOUR NEAREST DEALER  
CALL TOLL FREE . . . . 800-647-1800**

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

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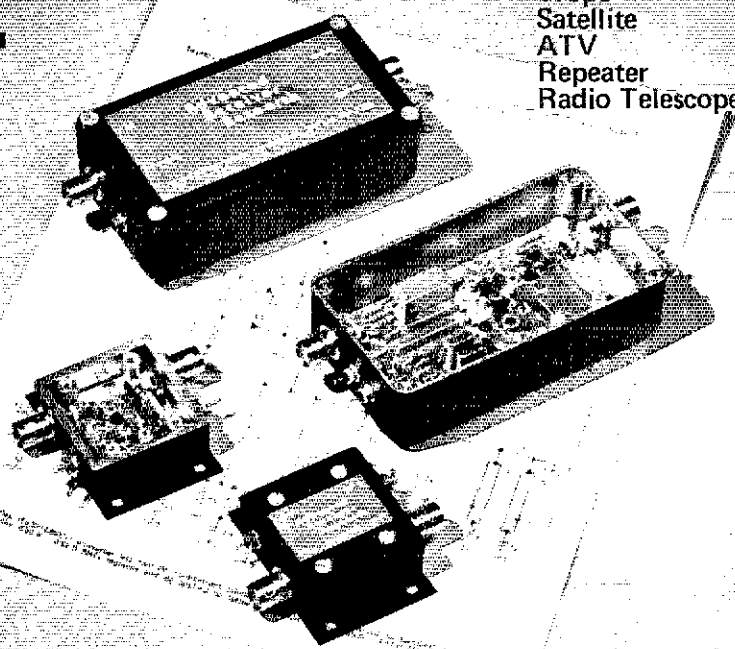
Box 494, Mississippi State, MS 39762

# vhf/uhf converters & preamps

EME  
Scatter  
Tropo  
Satellite  
ATV  
Repeater  
Radio Telescope

Factory aligned for optimum noise figure  
Full one year warranty  
Rugged aluminum enclosures  
Quality components and construction  
Converters feature 28 - 30 MHz i-f

CONVERTERS	FREQ. RANGE (MHz)	N.F.(dB)	PRICE
RA0VD	40-52	< 1.5	\$57.95
RA14VD	144-148	< 1.8	\$57.95
RA20VD	220-222	< 2.0	\$59.95
RA33VD	432-434	< 2.2	\$67.95
RA35VD	435-437	< 2.2	\$67.95
RA12485VD	482-484 & 485-487	< 2.2	\$77.95
PREAMPS			
RA0VD	40-52	< 1.1	\$29.95
RA0VD	50-54	< 1.3	\$29.95
RA14VD	144-148	< 1.5	\$29.95
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RA33VDA	432-434	< 1.8	\$37.95
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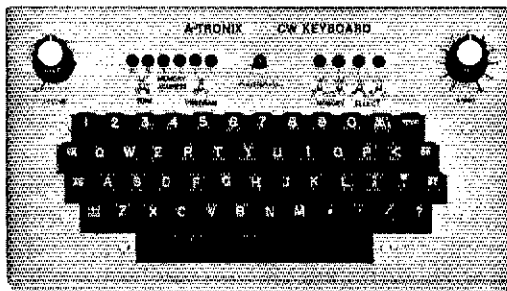
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## NEW — 64 CHARACTER BUFFER

# CW KEYBOARD

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ERASABLE  
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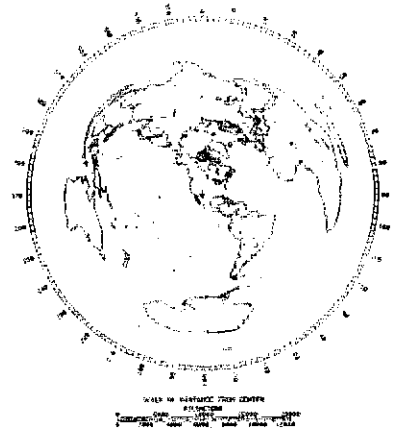


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- Beam Heading Printout with bearings to 660 locations, only \$4.50
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Las Cruces, New Mexico 88001

# 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 vouch 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 — W7GAG/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievements added upon request. \$2 brings TAD data sheet. W6LA 2814 Empire, Burbank, CA 92504

YAESU equipment owners — present or prospective. Join the 4600-member, 46-country, International Fox Tango Club and receive valuable newsletters monthly, money-saving purchasing service and catalog, technical committee consultation, free advertisements. Fox-Tango Net, more. To join the Club send \$7 (annual dues) to receive all 1980 Newsletters or \$14 for 1980 and 1981. For airmail to U.S., Canada, and Mexico add \$1 per year; for overseas add \$3 per year. Or for complete information and sample Newsletter, send \$1 (creditable towards dues) to Mill Lowens N4ML, Box 15944, W. Palm Beach, FL 33406.

ANNUAL Flemington, N.J. Hamfest Saturday March 21 from 8:30 to 3:00 at the Hunterdon Central High School Field House. 20,000 square feet of heated indoor area. Gigantic flea market, 200 tables, major manufacturers, informative seminars. Bring the NYL, kids and friends. Flemington is located between NYC and Philadelphia at intersection of routes 202 and 31 just 10 miles south of I78, and is tourist area. Talk in 146.52, 147.375, 147.015, 224.12. Admission \$3. donation. For reservations or info call 201-788-4080 or write Cherryville Repeater Ass. C/O W2FCW, Box 76, Farview Ave., Annandale, N.J. 08801.

## QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynant-skil NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch; will give quote. Little Print Shop, Box 9848, Austin TX 78766.

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.

QSLs, Catalog 45c N & S Print, P. O. Box 11184 Phoenix AZ 85061.

QSLs with class! Unbeatable quality, reasonable price. Samples, 50c refundable. QSLs Unlimited, P. O. Box 27553, Atlanta, Georgia 30327

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

# desk & hand microphones



**These mics are a luxury that you deserve**

AMB 77

AMM 46

Serious amateurs deserve the very best equipment they can afford and one person's luxury may be another's necessity. These mics are a little like that. If you deserve a microphone with extra high output, a frequency response carefully tailored to the voice range, and made of high quality materials, then here are three new desk mics and three new hand mics from which to choose. The desk mics are heavy die cast metal with an attractive black, textured finish and a lock lever on the push-to-talk bar for VOX operation. The hand mics are high impact resistant Cylolac® with extra long, high quality, neoprene coil cords. Most models are dual impedance.

ELEMENT TYPE	DESK MICROPHONES			HAND MICROPHONES		
	AMB 76	AMB 76	AMB 77	AMM 45	AMM 46	AMM 47
POLAR PATTERN	OMNI	CARDIOID	CARDIOID (AMPLIFIED)	OMNI	NOISE CANC.	OMNI
IMPEDANCE (HIGH Z)	50K ohms	50K ohms	4000 ohms	50K ohms	50K ohms	200 ohms
IMPEDANCE (LOW Z)	200 ohms	200 ohms	470 ohms	470 ohms	470 ohms	200 ohms
OUTPUT LEVEL (HIGH Z)	55 dB	58 dB	ADJUSTABLE TO 29 dB	54 dB	54 dB	
OUTPUT LEVEL (LOW Z)	75 dB	80 dB		75 dB	75 dB	45 dB
FREQUENCY RESPONSE	200-8000 Hz	100-13000 Hz	150-5000 Hz	200-4000 Hz	200-4000 Hz	200-5000 Hz
CABLE	5 cond. 1 shield	5 cond. 1 shield	5 cond. 1 shield	6 cond. 2 shield	6 cond. 2 shield	5 cond. 1 shield
POWER SOURCE			BATTERY PROVIDED			EXTERNAL DC

OUTPUT LEVEL MEASURED (0 dB = 1 Volt Per Microbar)

# TELEX

# hy-gain

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.  
Europe: 22, rue de la Légion-d'Honneur, 93200 St. Denis, France.

# RF TRANSISTORS

WATTS	MHz	VOLTAGE	CASE	GAIN	PRICE
2N2876	18	200	TO60	12.35	
2N3375	3	400	TO60	4.8	6.30
2N3553	2.5	175	TO39	10	1.40
2N3866	1	400	TO39	10	1.25
2N5924	4	175	TO39	6.0	2.20
2N4227	1	175	TO39	10	1.35
2N429	1	750	TO39	10	1.75
2N430	7.5	1000	TO117	5.0	7.65
2N431	5	1000	TO129	5.0	14.50
2N5109	CATV	1200	TO39		2.50
2N5641	7	175	MT71	8.4	3.40
2N5642	20	175	MT72	8.2	10.45
2N5643	40	175	MT72	7.6	14.35
2N5945	4	500	MT90	8.0	11.75
2N5946	10	500	MT90	10	13.90
2N5989	7	175	MT71	8.2	6.75
2N5990	10	175	MT72	5.2	7.80
2N5991	25	175	MT72	4.4	11.50
2N5913	1.75	175	TO39	12	2.45
2N5945	4	500	MT90	8	10.75
2N5946	10	500	MT90	6	12.80
2N6080	4	175	MT72	12	6.90
2N6081	15	175	MT72	6.3	9.75
2N6082	25	175	MT72	6.2	10.95
2N6083	30	175	MT72	5.7	12.30
2N6084	40	175	MT72	4.5	14.35
2N6094	4	175	3804FL	12	6.95
2N6095	15	175	3804FL	6.3	9.95
2N6096	30	175	3804FL	5.7	12.95
2N6097	40	175	3804FL	4.5	24.95

WATTS	MHz	VOLTAGE	CASE	GAIN	PRICE	
MRF237	4	175	TO39	12	2.55	
MRF238	30	160	145A09	9.0	9.50	
MRF245	80	175	211-01	6.4	32.50	
MRF247	75	175	316-01	7.0	31.50	
MRF449	30	30	211-07	12	10.50	
MRF450	30	30	145A09	12	10.50	
MRF451	50	30	211-09	11	11.75	
MRF452	50	30	145A09	11	11.75	
MRF453A	60	30	211-11	13	16.95	
MRF454	60	30	145A10	13	16.95	
MRF454A	60	30	211-11	12	24.40	
MRF455	60	30	211-07	13	24.40	
MRF455A	60	30	145A09	13	15.35	
MRF458	80	30	211-11	12	20.60	
MRF472	4	30	ASE77-03	10	2.45	
MRF901		1000	317-01	10	3.95	
SD1018-6	40	175	28		14.50	
SD1019-5	100	175	28		24.75	
SD1074	50	30	12.5	5004LFL	11	21.15
SD1076	70	30	12.5	5004LFL	13	24.00
SD1088	25	450	12.5	5004LFL	6	23.25
SD1089	40	450	12.5	5004LFL	5	27.15
SD1127	4	175	12.5	TO39	17	7.55
SD1143	13	220	12.5	MT72	10	8.25
SD1158	12	220	12.5	MT59	5.3	12.40
SD1272	30	220	12.5	MT72	6	9.60
SD1278	50	30	12.5	MT72	10	14.30
SD1288	50	30	12.5	5005OE	10	19.75
SD1405	75	50	12.5	5004LFL	9	19.10
SD1451	50	50	12.5	5004LFL	5	18.10

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- Provision for Attachment of Memory for DX or Contest Work

Revised version of the Accukeyer featured in the ARRL Handbook. Has more logical IC Layout and ON Board sidetone Oscillator. Includes PC Board, TTL ICs, 556 Timer, IC Sockets, Switch, Speaker, Transistors, capacitors and resistors. Requires 5 VDC.

**\$21.95**

Use our PS-5 Power supply kit to power keyer & Memory. only **\$8.95**

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- EXPANDABLE TO 4096 BITS
- Same size PC Board as Accukeyer
- Supplied with one 2102 Memory Chip
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- LED indicator for Programming
- Adaptable to other keyers
- Requires 5 volts DC

**\$21.95**

INCLUDES PC BOARD AND PARTS

### MEMORY EXPANSION KIT

Includes four position switch, knob, sockets, 3-2102's and Resistors **\$5.00**

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- 5.15 Volts 500 MA Model PS5 ..... **\$8.95**
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- 600 MHz Prescaler Kit. Includes PC Board, Diodes, Resistors, Capacitors, 11C90 & Instructions. .... **\$29.95**

SEVEN DIGIT PORTABLE FREQUENCY COUNTER KIT 55 Mv @ 1MHz to 10 Mv @ 135 MHz. Reads typically to 148 MHz. Requires 5VDC, uses 4 AA Nicads, has Charger input. Accuracy ± 0.002%. Gate times switchable 1 or .1 seconds. Board measures 2-7/8" x 4". Easy to assemble (case & batteries not included.) Uses 1 calculator type readout. PC board, parts & instructions. .... Only **\$49.95**

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6852	5.95
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76477	2.95
8080A	7.95
8212	3.95
8214	3.75
8228	4.55

#### BFO 85 MICROWAVE TRANSISTOR

1.5 GHZ 2.2 DB **\$2.95**

12 or 24 HOUR DIGITAL CLOCK KIT  
Uses D.5 Display LED 5514 Clock Chip  
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CONTENTS

- 8 Fiberglass Arms, 1 pc. White 13 ft.
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- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

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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.

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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.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

QSLs samples and catalog 50c. Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

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QSLs — handcrafted one or two color, several designs available. Samples 35c, postage stamps accepted. Old Craftsmen Print Shop, 111 Hoffman St., Torrington, CT 06790.

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FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

QSL ECONOMY: 1000 for \$12. s.a.s.e. for samples. W4TG, Drawer F, Gray, GA 31032.

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QSL cards by reliable company with 15 years experience. Amateur QSL cards (standard designs and design your own). Also available are our own designed State Cards. Top quality, reasonable prices. Free catalog and samples. Write Mail Order Express, Inc., Dept. M, Box 703, Lexington, NC 27292.

CONTESTERS-DXers QSL cards, low price s.a.s.e. for samples and price list. A1 QSL KB5RH — 1310A Avenue M, Plano, TX 75074.

QSL's same day service 1000 only \$30. Free sample upon request. Cards West WB7DSU, Box 9771 Ogden UT 84409.

C. FRITZ — Still printing? Yes!! Samples 50c. or \$1 (refundable), Box 1684, Scottsdale, AZ 85252.

QSLs since 1934. Satisfaction guaranteed or money back. Send 30c postage for catalogue. VP5QED Press, Box 1523, Boca Raton, FL 33432.

CALL LETTERS. Bold, white on 2 x 8 desk plate — red, black or walnut, \$2.75 K2KJ Engraving, 37 Zeek Road, Morris Plains, N.J. 07950.

BEAUTIFUL redwood plaques (6" x 16") Specialty lettering (max 6) engraved \$9.95 raised plastic \$8.95. Save. Order any 2 for \$12.95. Tony Vitolo, 1967 Tanglewood Drive, Snellville GA 30278.

CADILLAC of QSL cards, 3 to 4 colors, send \$1. for samples (refundable). Mac's Shack P.O. Box 43175, Seven Points, TX 75143.

A SPECIAL Seasons Greetings to the many hams who recommended our QSLs to friends. This vote of confidence is overwhelming. Look for an exciting new announcement next month. 73 and Happy Holidays QSLs by W4MDY.

PICTURE QSL cards of your shack, etc. from your photograph or black ink art work: 500/\$18; 1000/\$26.50. Also unusual non-picture designs. Generous sample pack, 75c, half-pound of samples, \$1.25. Customized cards, send specifications for estimate. Paum's, 4154 Fifth Street, Philadelphia, PA 19140 Phone 1-215-BA8-5460.

#### General

CANADIAN. Collins 75S-3B recently factory reconditioned, with 2:1 mechanical filter, in excellent shape. \$650 U.S. or equivalent. VE3BX, Burrows, 4200 Mount Carmel, Windsor, Ont. Phone 519-966-3222 after 5 P.M.

SPIDERS for boomless quads. Heliarc welded aluminum. All's Antennas, 1339 South Washington

# hy-gain<sup>®</sup>

## HG-52SS Self-Supporting Crank-Up Tower

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.

Antenna shown  
is Hy-Gain  
**TH6DX**  
Tri-Band Beam



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Diamond Web  
Bracing for the  
ultimate in  
structural  
strength.

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### Key-Touch Tuning

To tune a station manually, you simply punch in the station frequency numerals on the direct-access, digital tuning keyboard. Press the "Execute" key and the command is entered, the station is received and LCD readout confirms tuning. If you punch in an incorrect frequency by mistake, the ICF-2001 tells you to "Try Again" by flashing those words on the display. The instant, fingertip tuning provides total accuracy and convenience. And the LCD digital frequency display confirms the exact, drift-free signal reception.

### Automatic Scanning

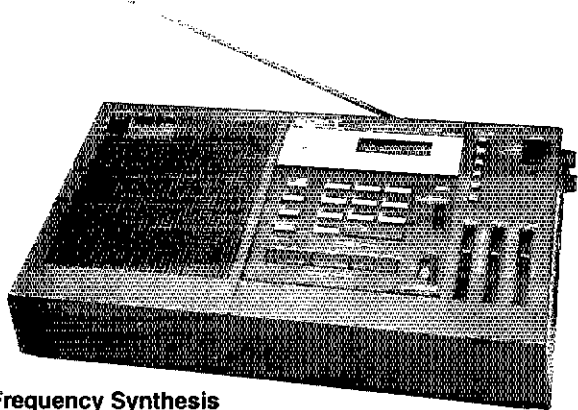
In auto-scan mode, the tuner can be set for continuous scanning of a given frequency range, which you set by means of upper and lower limit keys designated "L<sub>1</sub>" and "L<sub>2</sub>." You may want to scan an entire frequency range. For instance, the 76 to 108 MHz FM spectrum. If you want scanning to stop at any strong signal—one that reads "4" or "5" on the LED signal-strength indicator—switch on "Scan Auto Stop." For continuous scanning, leave the switch off, and just press the "Start/Stop" key to listen to a station or resume scanning.

### Manual Tuning

Like the auto-scanning mode, manual tuning is useful for quick signal searching when you don't know particular station frequencies within a given range. You simply press the "Up" or "Down" key, and the tuner does the searching for you. And if you press the "Fast" key at the same time, the scanning rate increases for especially rapid station location. When you hear a broadcast you want to receive, just release the keys for instant reception, pressing the "Up" or "Down" key again if necessary for exact tuning.

### Memory Presets

After you've tuned a station using punch-in, key-touch tuning or either scanning mode, you can enter it in the 2001's memory for instant, one-touch preset reception. Which means no retuning hard-to-find foreign broadcasts. Plus instant access to your favorite local stations for music and news. Six preset buttons allow up to six stations—in any wave range—to be memorized. And there's LCD digital readout of the memory buttons being used on each band. What's more, the upper and lower limit keys can be used as memory presets when they're not being used for scanning, allowing a total of eight frequencies to be memorized for instant, one-touch reception.



### Frequency Synthesis

The 2001's direct-access tuning and outstanding reception quality are made possible by the unit's all-band quartz-crystal, PLL frequency synthesis. Instead of the conventional analog tuning system, with its variable tuning capacitor, the 2001 incorporates an LSI and a quartz-crystal reference oscillator. Which means that the local-oscillator frequencies used in superheterodyning are locked to the "synthesized" quartz reference frequencies. The result is the utmost in tuning stability, without a trace of tuning drift. In addition, dual-conversion superheterodyning for AM assures exceptionally clear, clear reception across the entire 150-to-29,999kHz spectrum.

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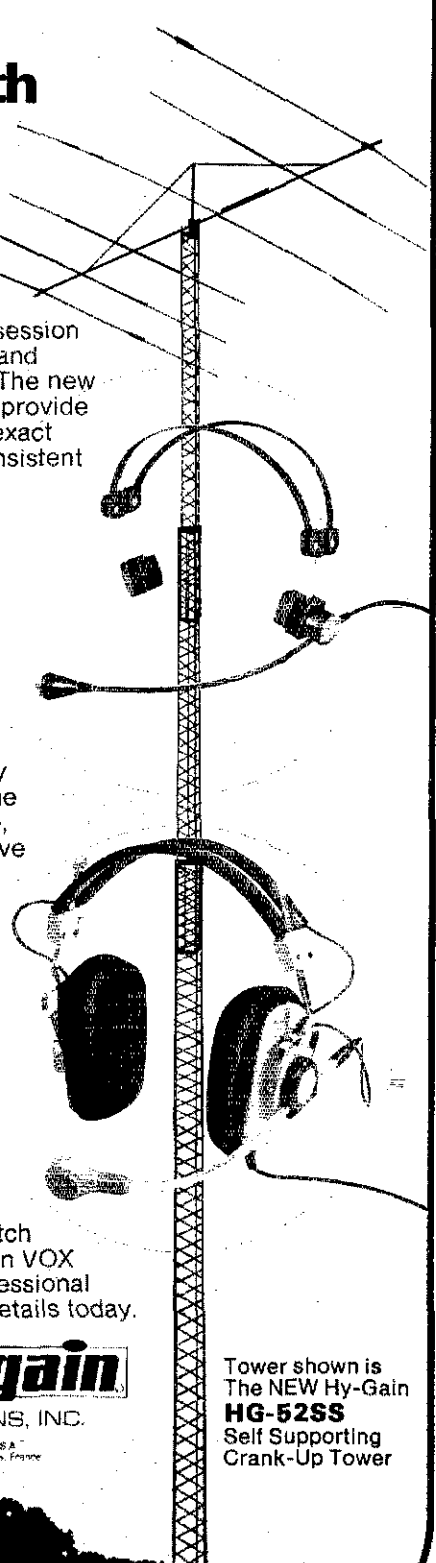
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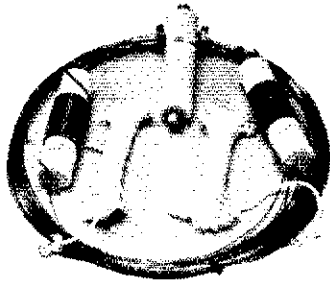
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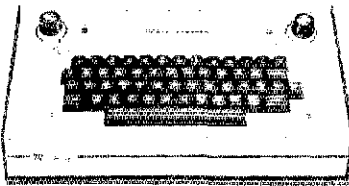


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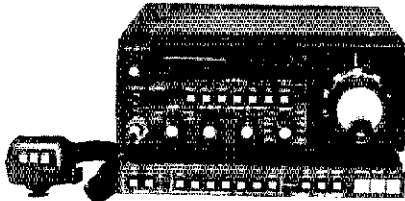
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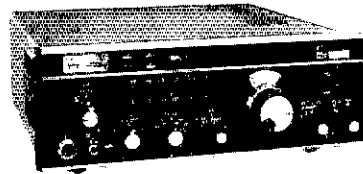
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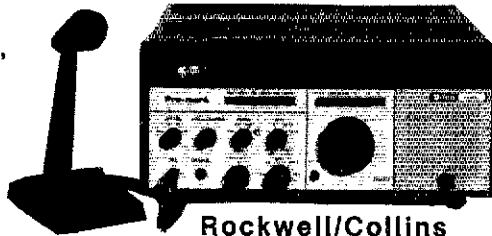
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FT-480R, FT-720R, FT-720RV/RVH,  
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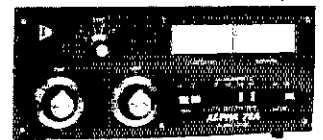
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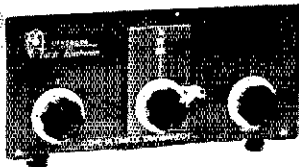
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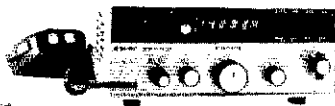
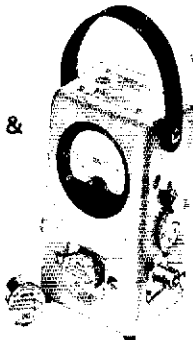
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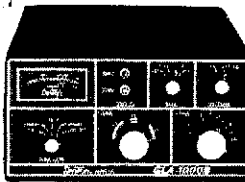
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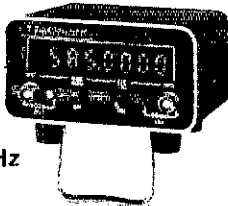
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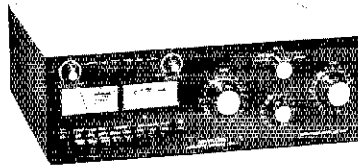


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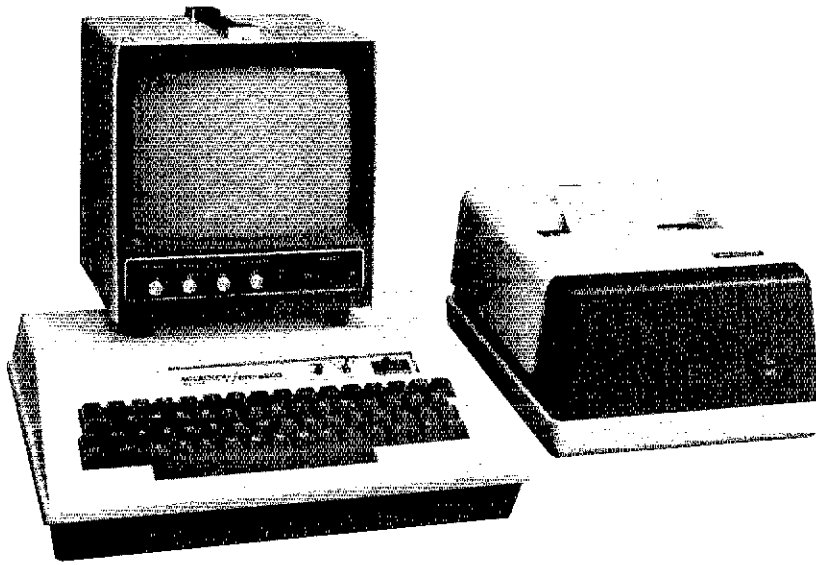
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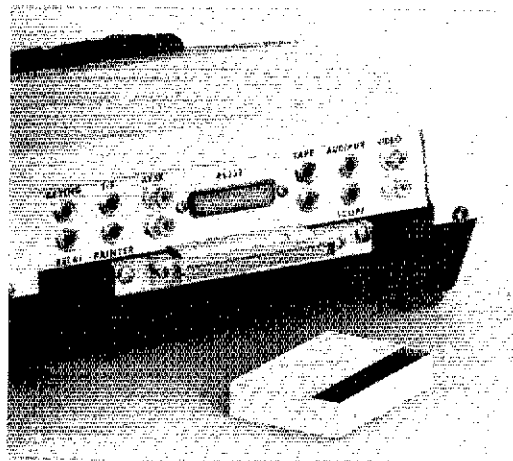
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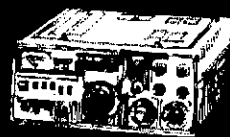
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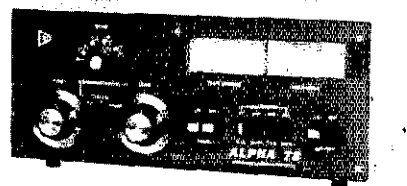
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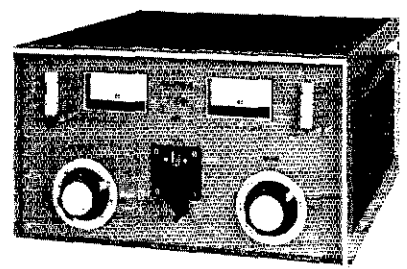
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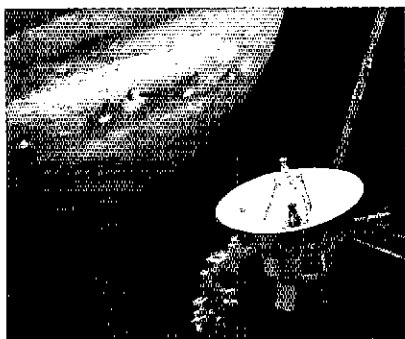
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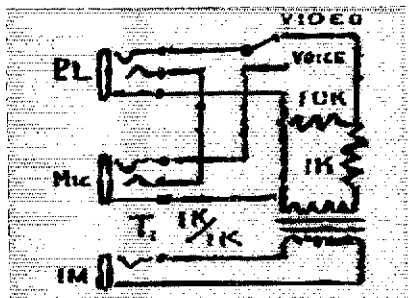


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Within seconds after these photographs were received on Earth from Voyager I and II, SSTV'ers all over the world were viewing and recording them on their own SSTV sets. Another pass-by Saturn is scheduled for mid 1981 by Voyager II. As space exploration continues to expand, this phase of SSTV activity will become increasingly exciting.

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Kids really enjoy SSTV. They like to help make up your "TV Programs," and they especially enjoy watching



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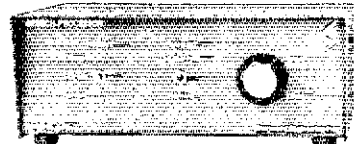
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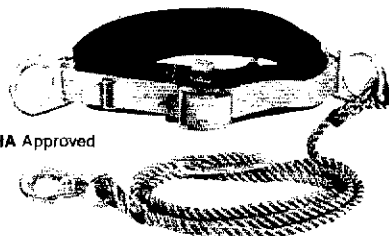
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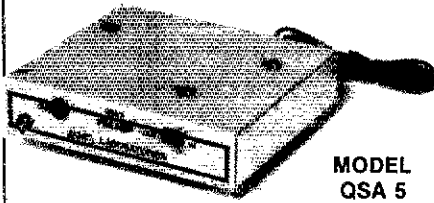
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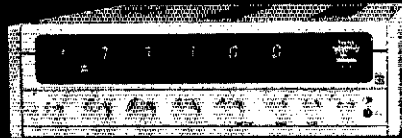
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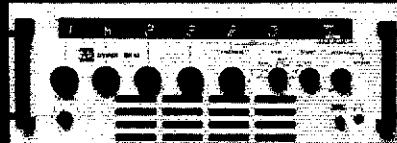


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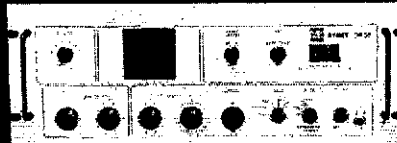
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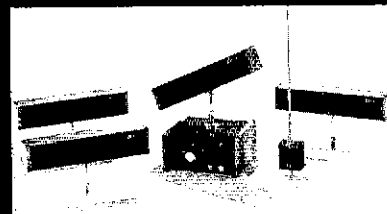
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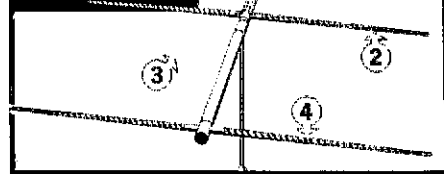
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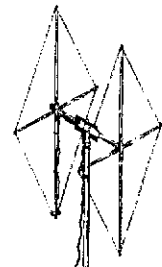
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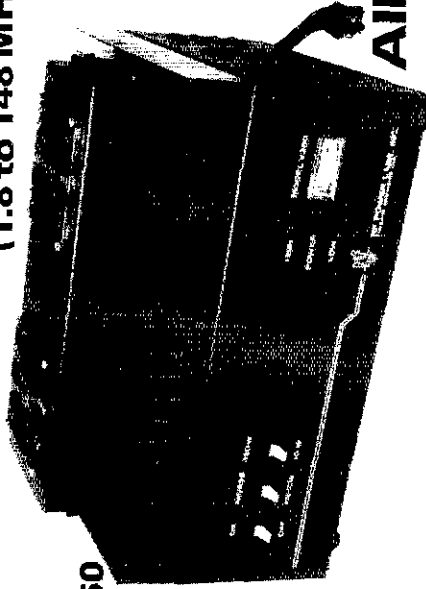
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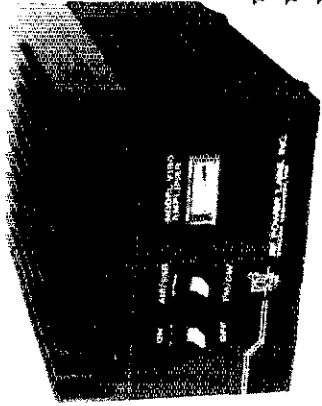
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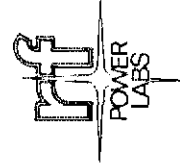
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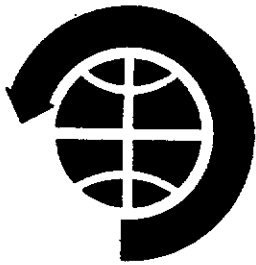
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73,

The AMSAT Team

P.S. We still have two working communications satellites in orbit, AMSAT-OSCAR's 7 and 8, and are building a satellite for Science, UOSAT, due for launch in the Fall of 1981. It will contain scientific experiments as well as a slow-scan television (SSTV) camera. This satellite will be ideal for use in classrooms all over the world for live demonstrations of various aspects of space research.

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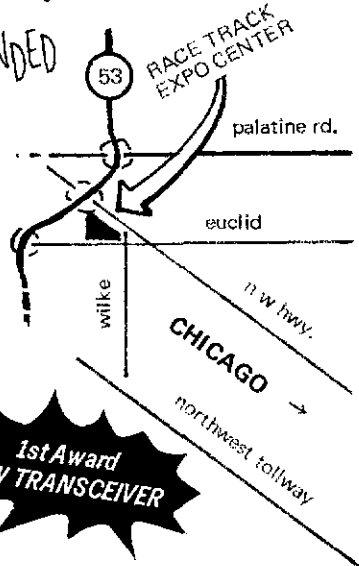
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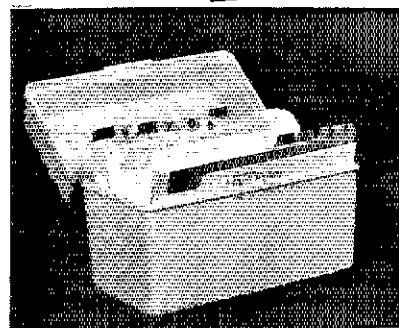
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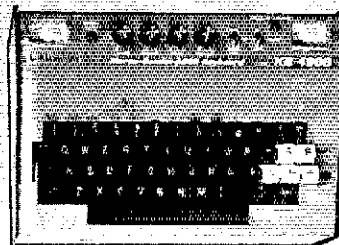
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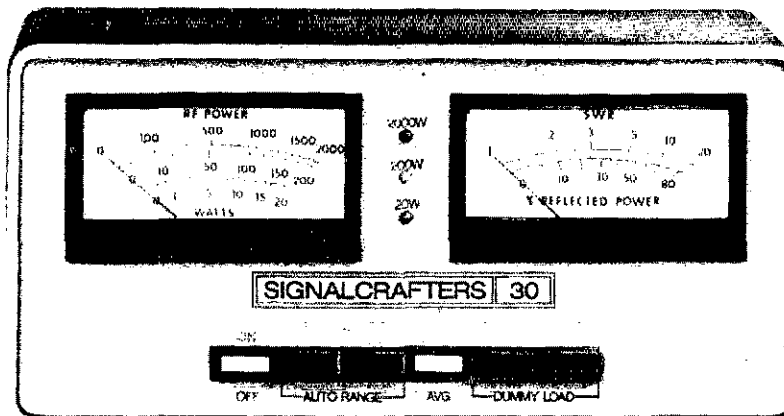


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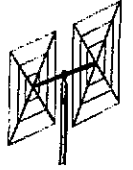
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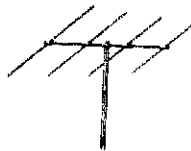
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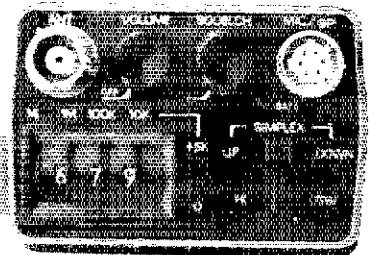


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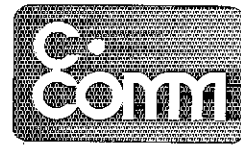
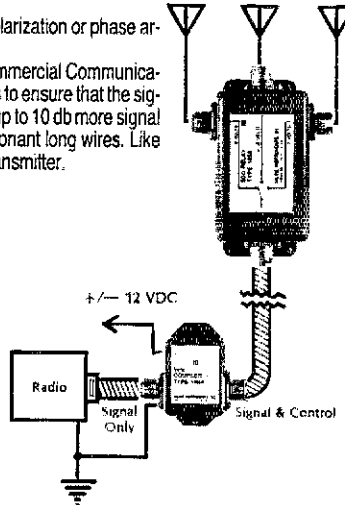
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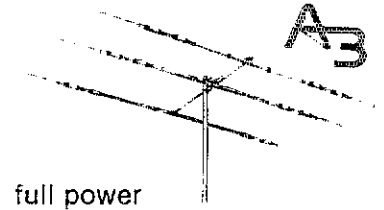
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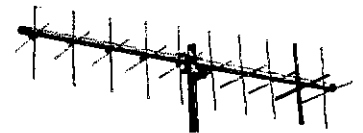
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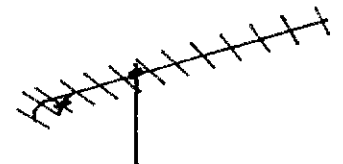
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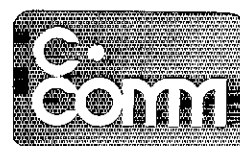
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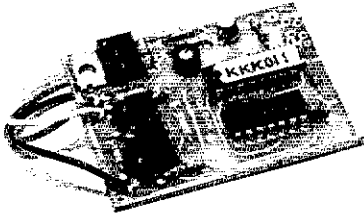
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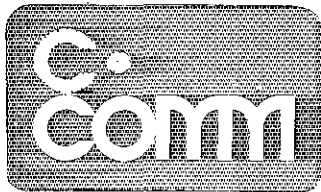
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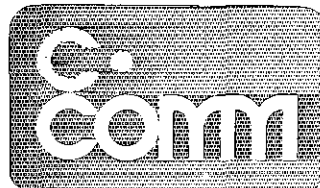
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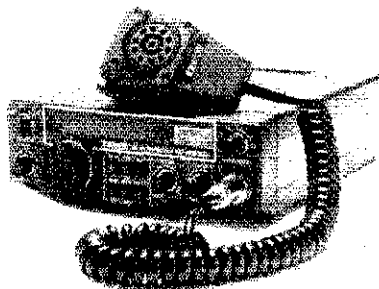
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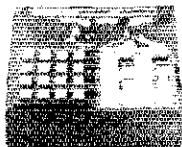


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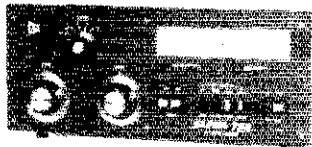
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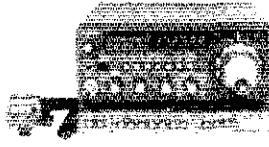
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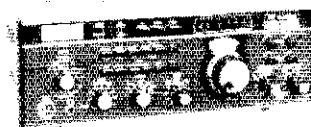


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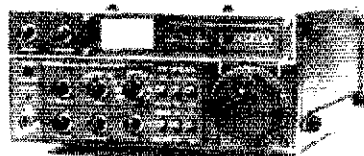
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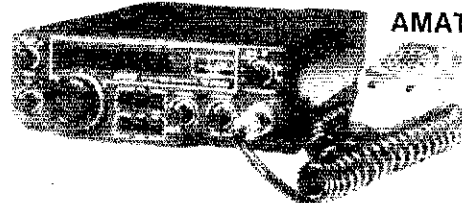


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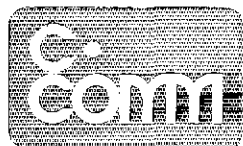
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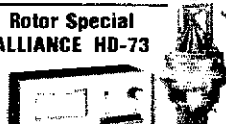
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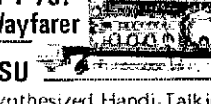
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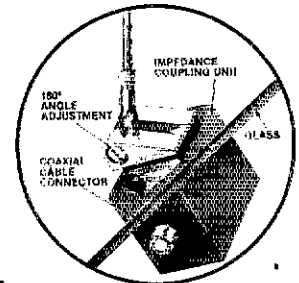


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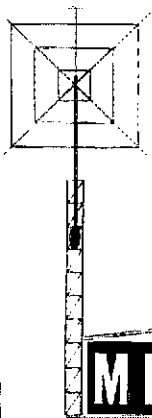
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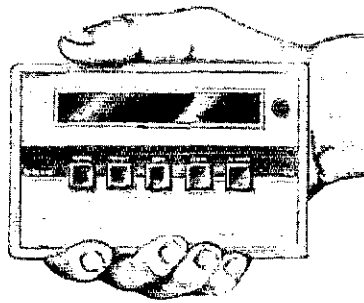
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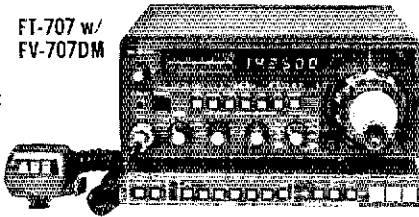
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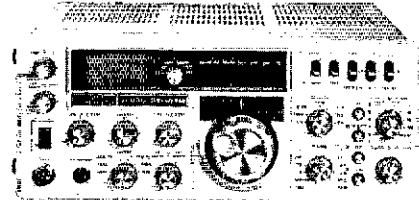
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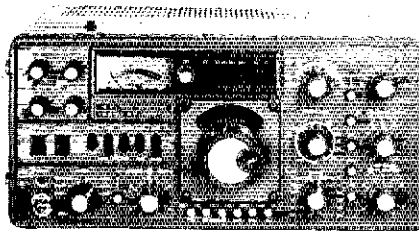
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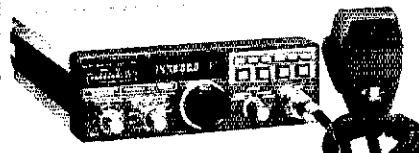
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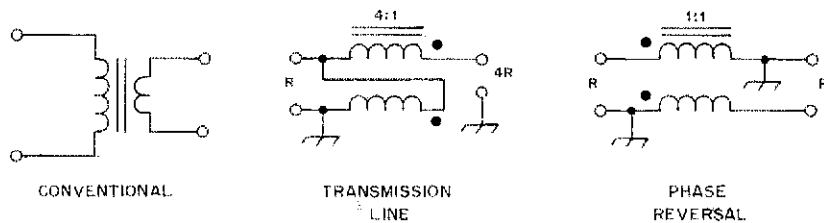
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# QST DATA FILE NO.4

## CONCERNING BROADBAND TRANSFORMERS



$$B_{OP} = \frac{E_{RMS} \times 10^8}{4.44 f N A_c} \text{ GAUSS}$$

(SEE HANDBOOK CHAP 2)

$$N = 1000 \sqrt{L_{\mu H} \div A_L} \text{ TURNS}$$

$A_L = \text{MFGR'S INDUCTANCE FACTOR}$

We hear a lot these days about broadband transformers being used in solid-state transmitters and antenna systems. Most of these transformers are wound on cores made from ferrite, but some are designed around powdered-iron cores: The core material can take the form of a toroid, rod, sleeve, bar or pot-core shape, and each core style has its own advantage, practically or electrically. In amateur work we use the toroid format most frequently because a toroidal inductor or transformer is self-shielding. Furthermore, the toroid lends itself nicely to miniaturized equipment. A toroid is defined as a donut-shaped object, just in case the word is unfamiliar to you. A toroidal inductor need not have a magnetic core. It still qualifies as a toroid if it is air wound, circularly.

What are the specific advantages in using magnetic-core transformers and inductors? Notably, a lot of inductance can be obtained with relatively few turns of wire as opposed to an air-wound inductor of equivalent  $\mu\text{H}$  or  $\text{mH}$  value. What does this do for us? It reduces volume and permits the use of large-diameter wire. The latter reduces the series-R (resistance) component and enhances the  $Q$  (see *QST* Data File 3). Another advantage in utilizing a magnetic core in rf transformers is the enhancement of the bandwidth (broadbanding) characteristic. Suppose we wanted to wind a transformer that would have a good broadband response from, say, 1.8 to 29 MHz. We would choose a ferrite core that provided ample inductance ( $X_L = 4R$ , where  $R$  is the characteristic impedance of the circuit point to which the transformer connects) at the low end of the desired frequency range, but would have a core characteristic that permitted the core to "disappear" electrically with increasing frequency. That is exactly what happens in a properly designed broadband transformer, and is our basic objective.

There are two kinds of broadband transformer — *conventional* and *transmission line*. The conventional transformer is configured like a power or audio transformer: It has separate windings that have been laid on a common core to provide any ratio of impedance transformation. Transmission-line transformers, on the other hand, consist of bifilar, trifilar or quadrifilar windings of specific impedances (usually 25 ohms), and yield only certain integers of transformation (1:1, 4:1, 9:1 and 16:1). It is accepted generally that the transmission-line transformer is slightly more efficient than the conventional equivalent, and will enhance the high-frequency response in the process. But, for Amateur Radio work the conventional transformer is usually acceptable, and it is much easier to fabricate.

We might do some head scratching about how to pick a core of the right size and  $\mu_i$  (permeability). Size relates to the physical *and* electrical properties of the core. First, will it fit into the space allocated on the pc board? Second, will it handle the maximum circuit power without saturating or becoming damaged? Saturation is a function of the  $B_{op}$  (operating flux density), and specific equations are used to determine  $B_{op}$ . Once this factor is known, we can check the manufacturer's data sheets to learn the  $B_{sat}$  (saturated flux density in gauss) for a given core. Our objective is to use a core that has a much higher  $B_{sat}$  than our calculated  $B_{op}$ . This will ensure that the core operates well into its linear region.

With respect to  $\mu_i$ , for most broadband transformers and inductors we will use a permeability of 900 or 950, although some designers use 1500- or 2000- $\mu_i$  cores in the 2-30 MHz range. For 10 MHz through the vhf region we would generally use a  $\mu_i$  of 40 or 125 for most broadband transformers.

Information on broadband and narrow-band rf transformers is contained in our 1981 *Handbook*. Advice is given on choosing the right core for the application, how to calculate the  $B_{op}$  and how to hand-wind toroids. Also, numerous practical circuits are contained in the transmitting and receiving chapters, illustrating the everyday use of magnetic cores. You'll want the new edition of the *Handbook* in your workshop to ensure that you're up to date on the latest technical concepts and methods in Amateur Radio. The revised edition is available at your local dealer, or you can order a copy direct from League Hq. — *Doug DeMaw, W1FB*

For more information about *The 1981 Radio Amateur's Handbook*, see page 133 of November 1980 *QST*. To order, see page 185 of this issue.

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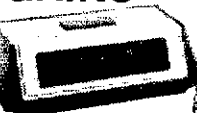
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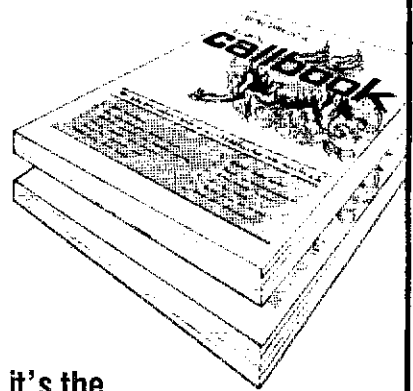
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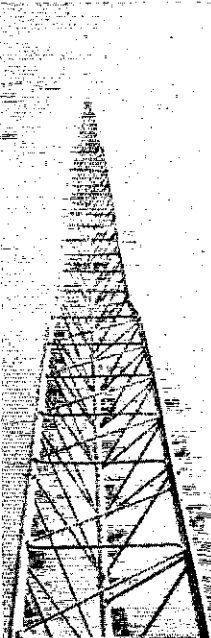
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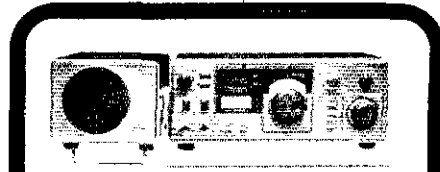
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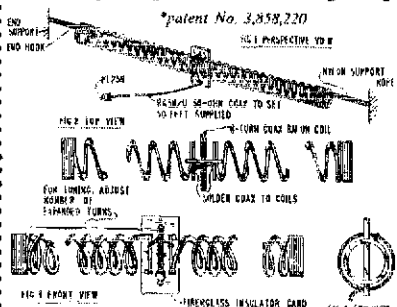
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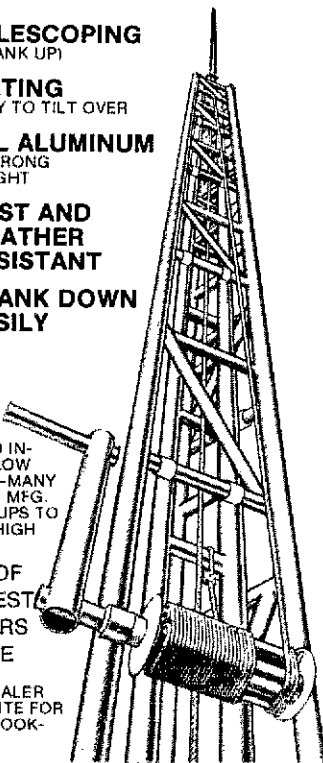
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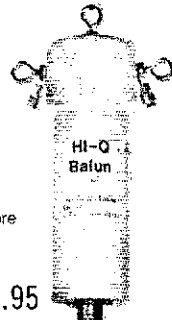
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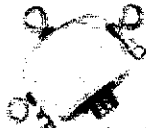
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D-15	50-15	2.5	29.95	29.95
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D-15	15	2.3	23.95	19.95
D-10	10	1.6	17.95	18.95
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SD-15	50-15	1.8	24.95	24.95
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P-15	50-15	2.5	39.95	39.95
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P-15	15	2.3	34.95	29.95
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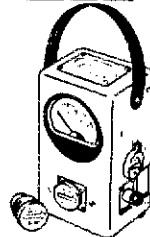
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P-5	C-5	5	P-354	C-354	35, 40
P-68	C-68	6, 7, 8			
P-91	C-91	9, 10, 11			
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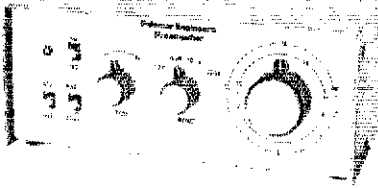
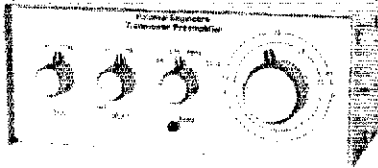
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YM-22	Keyboard scan	69.00
YM-23	Keyboard encod.	69.00
YM-24	Speaker mike	32.00
YM-34	Desk mike 107/707	31.00
YM-35	Scan 107/707	20.00

### ICOM

#### BASE STATION EQUIPMENT

Model	List Price	
251A	2M FM, SSB, CW	\$ 689.00
561	6M SSB, CW	549.00
651D	6M 80W, 12V, w/wh	669.00
651D / PS	6M 80W with AC Supply	849.00
770	9-hand HF Xcvr, 12V DC/Mic	1149.00
770/PS	9-hand HF Xcvr, AC & 12V Sup/Mic PS15	1298.00

#### MOBILE TRANSCEIVERS

Z-25	2M FM 10W 22CH Programmable	389.00
Z56A	2M FM 25W Synthesized	389.00
Z80A	2M MBL, SSB, FM, CW	489.00
Z80	2M FM 10W, Remotable	359.00

#### PORTABLE TRANSCEIVERS

ZA-NICD	2M 800 CH. HT w/Nicad. Chr.	229.50
ZAT-NICD	2M 900 CH. HT w/Nicad. TT pad, Chr.	219.50
Z02S	2M SSB Portable	249.00
402	403 MHz SSB Portable	349.00
502A	6M SSB Portable	229.00

#### POWER SUPPLIES

APC	AC to 12V Supply 3A/Spk 3A/Spk	85.00
PS16	12V Power Supply	149.00
PS20	12V Power Supply	170.00

#### ACCESSORIES

HMB	8-pin mike w/TTN	39.50
SM2	Desk mike	32.50

### DRAKE

#### COMMUNICATIONS RECEIVERS AND ACCESSORIES

R-7/DR-7	General Cov. Rec.	\$1449.00
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#### 2KW AMPLIFIERS

L-7	160-15 M Amplifier	1090.00
3-500Z	Lube for L-7 (2 req.) ea.	120.00

#### HF TRANSCEIVERS AND ACCESSORIES

TR-7/DR-7	Dia HF transceiver 160-10M	1549.00
NB-7	Noise blocker for TR-7	80.00
SL-300	300Hz CW filter for 7-line	55.00
SL-500	500Hz CW filter for 7-line	55.00
SL-1800	1800Hz R-FTY filter for 7-line	55.00
SL-6000	6000Hz AM filter for 7-line	55.00

#### AUX /

AUX-7	Auxiliary range program board for TR-7	15.00
FA-7	Fan for TR-7/PS-7 DL-1000	29.00
Rv-7	Remote VFO for TR-7	195.00
MS-7	Speaker for 7-line	39.00

#### LOW PASS AND HIGH PASS TVI FILTERS

LTV-330DLP	1000 watt low pass filter	26.80
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### CUSHCRAFT

#### BOOMER ANTENNAS

Model	List Price	
32-19	144-148MHz 19 ele.	\$ 99.95

#### BOOMER STACKING KITS

32SK	Stacking Harness & P.D. 7 Boomers	44.95
PD-7	Power Divider, 2 Boomers	22.95

### CUSHCRAFT (cont'd)

#### MULTI BAND HF ANTENNAS

Model	Description	List Price
A-3	3 element	\$ 219.95
ATB-34	1m-band vertical	319.95
ATV-3	7.14, 21.23MHz Vert.	14.95
ATV-4	3.5, 7.14, 21.18MHz Vert.	112.95
ATV-5	3.5, 7.14, 21.18MHz Vert.	119.95
R-3	1m-Band Hoop	399.95
A-3SK	Stainless Hardware for A-3	39.95

#### FM ANTENNAS

A147-4	146-148 MHz 4 el.	39.95
A147-11	146-148 MHz 11 el.	44.95
A147-20T	144 & 147 MHz 20 el.	74.95
A147-22	146-148 MHz 22 el.	129.95
AZ20-7	220-225 MHz 7 el.	37.95
AZ20-11	220-225 MHz 11 el.	42.95
A449-6	148 MHz 6 element	39.95
A449-11	148 MHz 11 element	42.95
AFM-4D	144-148 MHz four pole	79.95
AFM-24D	220-225 MHz four pole	72.95
AFM-44D	440-450 MHz four pole	67.95
AR-2	135-170 MHz Ringo	37.95
AR-270	220-225 MHz Ringo	44.95
AR-450	440-450 MHz Ringo	34.95
ARX-2K	135-170 MHz Ringo kit	21.95
ARX-220	220-225 MHz Ringo kit	44.95
ARX-450	440-450 MHz Ringo kit	39.95

#### BLITZ BUGS

LAC-1	Coax lightning arrester, double female	5.95
LAC-2	Coax lightning arrester, double female	5.95

#### VHF / UHF BEAMS

450-3	50 MHz 3 element	54.95
450-5	50 MHz 5 element	74.95
450-6	50 MHz 6 element	99.95
A144-7	144 MHz 7 element	32.95
A144-11	144 MHz 11 element	44.95
A430-11	432 MHz 11 element	42.95

### HUSTLER

Model	Description	List Price
5-B1V	5-hand vertical	\$139.95
CE-144	2-metre mobile with without mount	28.95
CGT-144	2-metre mobile w/mount	45.95
GS-144B	6 db stacked station, 2 m	89.95
G-144	7 db fixed station, 2 m	139.95
MD-1	54" mast for tender	37.95
MU-2	54" mast for bumper	37.95
DR-1	Quick disconnect	16.95
RM-10	10 metre std. resonator	10.95
RM-10S	10 metre std. resonator	17.95
RM-11	11 metre std. resonator	10.95
RM-11S	11 metre std. resonator	17.95
RM-15	15 metre std. resonator	10.95
RM-15S	15 metre std. resonator	17.95
RM-20	20 metre std. resonator	14.95
RM-20S	20 metre std. resonator	21.95
RM-40	40 metre std. resonator	16.95
RM-40S	40 metre std. resonator	23.95
RM-75	75 metre std. resonator	18.95
RM-75S	75 metre std. resonator	39.95
RM-80	80 metre std. resonator	19.95
RM-80S	80 metre std. resonator	39.95
RS-2	Res. spring stainless steel	6.95
SSM-2	Commercial stainless full mount	18.95

### HY-GAIN

Model	List Price
TH6DX	\$ 329.95
THDX	294.95
18AVT	105.95

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AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "Ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

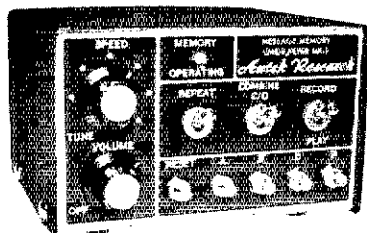
Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible 20 HZ

**BANDWIDTH**, but also variable all the way to "flat" — imagine what the **NARROWEST CW FILTER MADE** will do to QRM! Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with SSB hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 QST.) The new "A" model is more selective, adds a **HIGHPASS** mode for SSB, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS, or NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR**. Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend \$3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries reqd. (+12 VDC hookup possible.) 6 1/2 x 5 x 2 1/4". Handsome light/dark grey styling. Get yours today!

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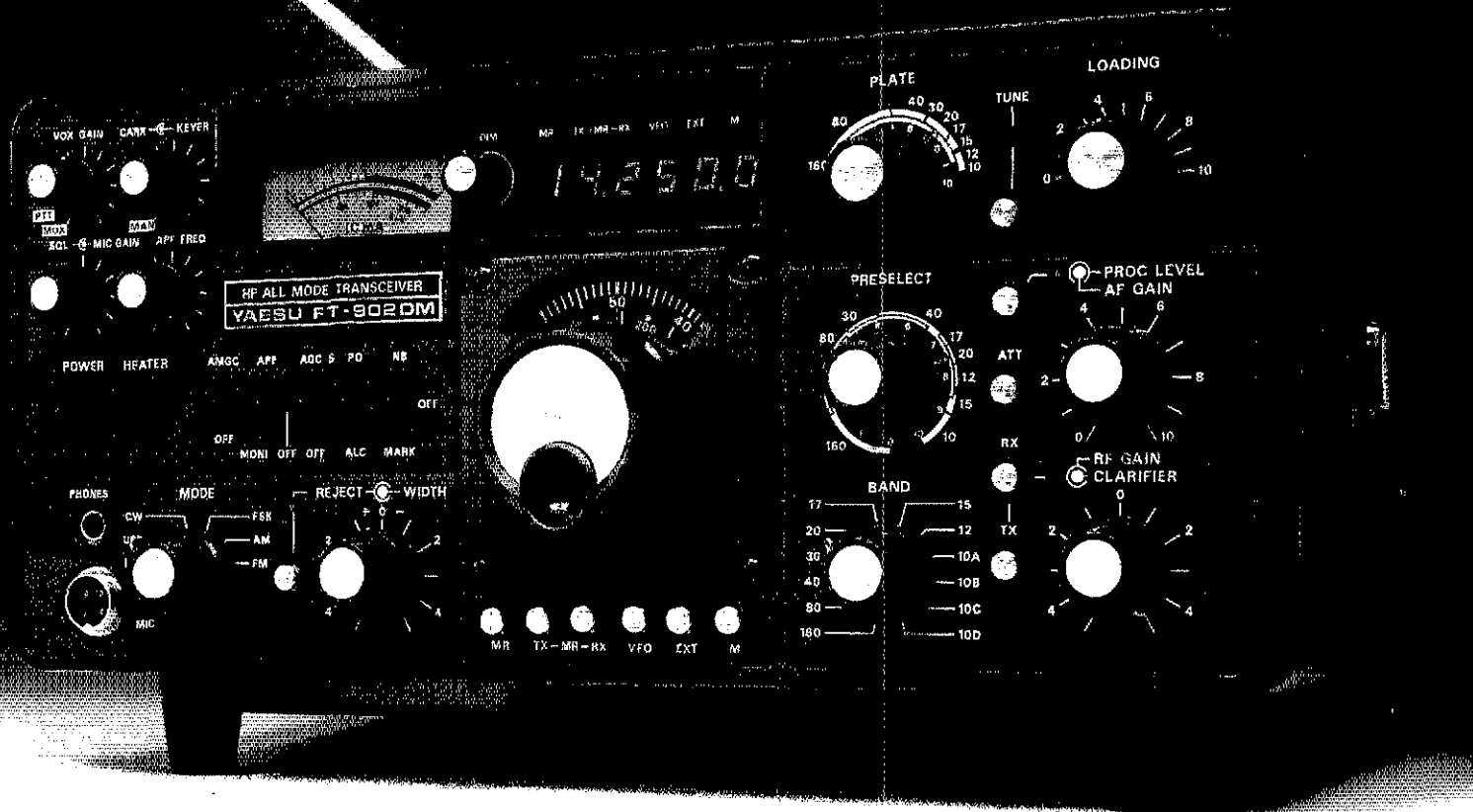
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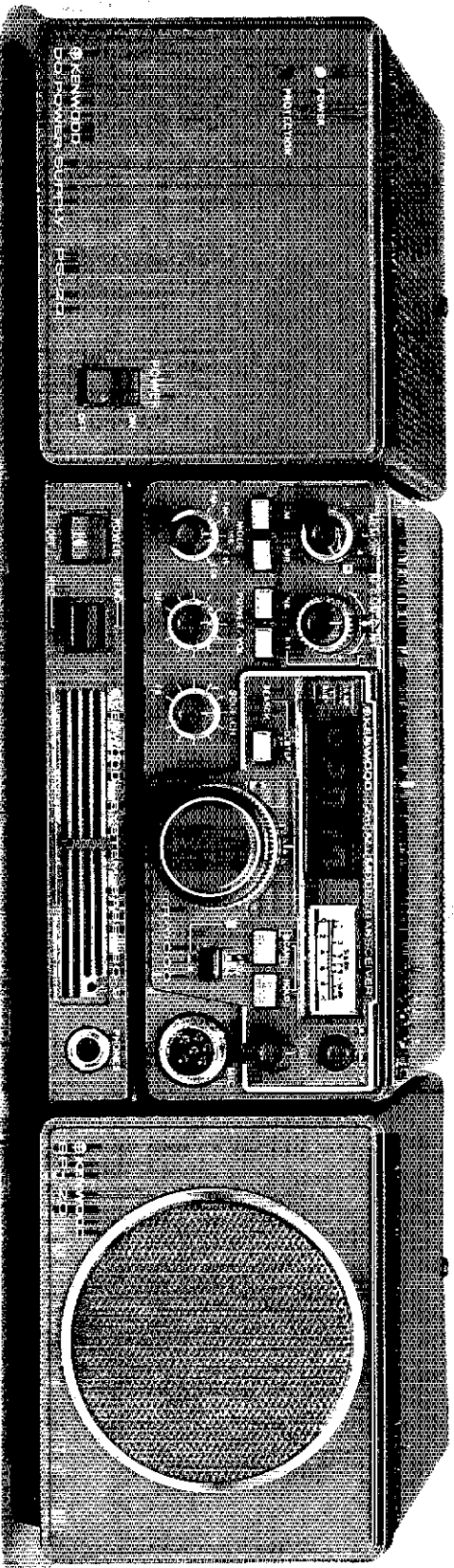
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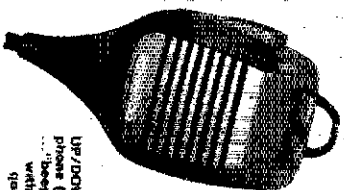
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