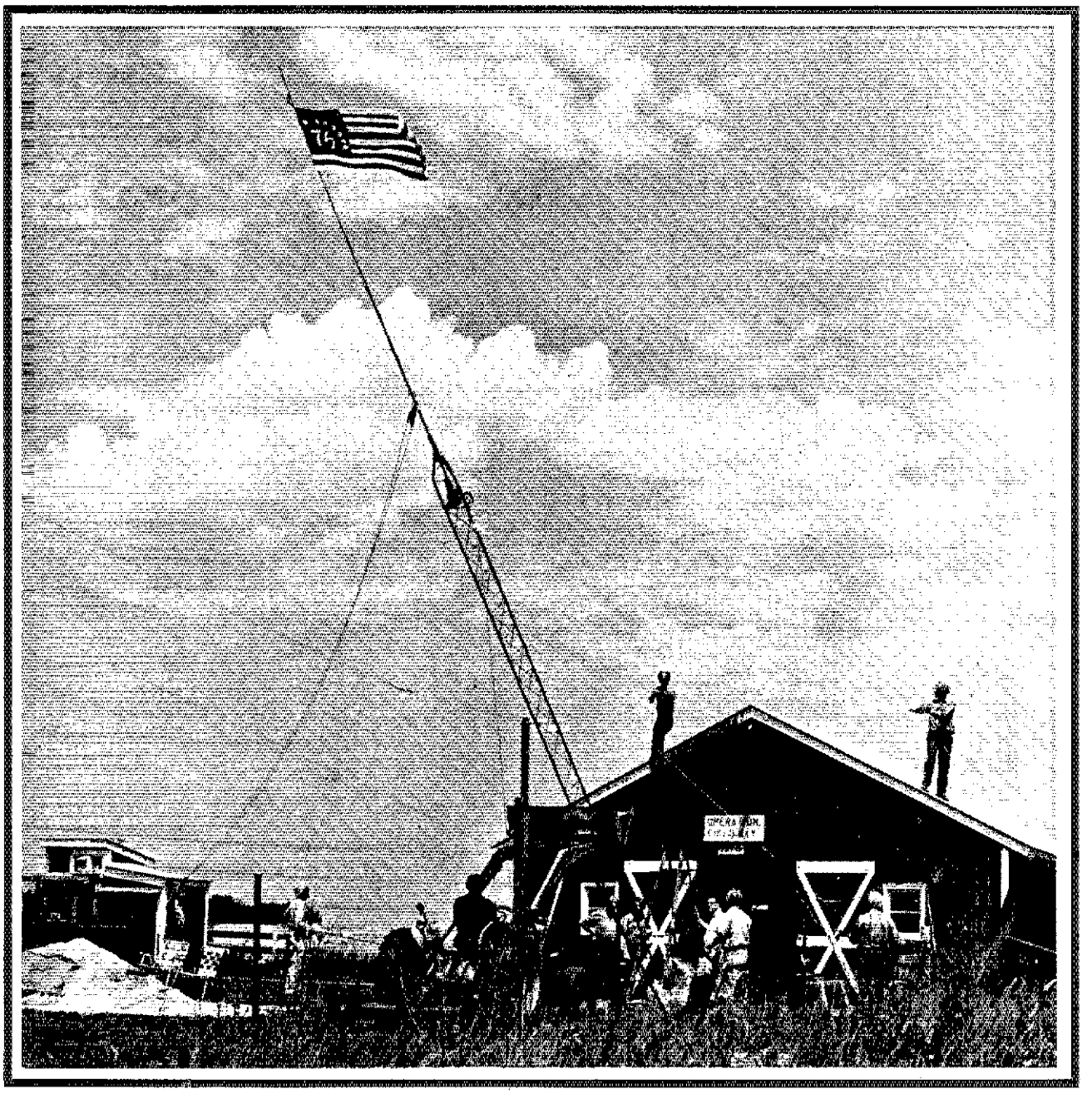
devoted entirely to Amateur Radio

November 1976 $1.50



1323 stations + 16,120 participants = FD '76.

INTRODUCING

The TEMPO 2020

A BRILLIANT NEW SSB TRANSCEIVER PROVIDING AN UNBEATABLE COMBINATION OF ADVANCED ENGINEERING AND UNIQUE OPERATING FEATURES.

YOU MAY NEVER HAVE OWNED A TRANSCEIVER THAT OFFERS SO MUCH.

Send for descriptive information on this fine new transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance.

*Phase lock-loop (PLL) oscillator circuit minimizes unwanted spurious responses.
*Hybrid Digital Frequency Presentation.
*Advanced Solid-state design...only 3 tubes.
*Built-in AC and 12 VDC power supplies.
*CW filter standard equipment...not an accessory.
*Rugged 6146-B final amplifier tubes.
*Cooling fan standard equipment...not an accessory.
*High performance noise-blanker is standard equipment ...not an accessory.
*Built-in VOX and semi-break in CW keying.
*Crystal Calibrator and WWV receiving capability.

*Microphone provided.
*Dual RIT control allows both broad and narrow tuning.
*All band 80 through 10 meter coverage.
*Multi-mode USB, LSB, CW and AM operation.
*Extraordinary receiver sensitivy (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up)
*Fixed channel crystal control on two available positions.
*RF Attenuator.
*Adjustable ALC action.
*Phone patch in and out jacks.
*Separate PTT jack for foot switch.
*Built-in speaker.
*The TEMPO 2020 ...$759.00.
Model 8120 external speaker...$29.95.
Model 8010 remote VFO...$139.00.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Now...more than ever---
the TEMPO line means solid value

Tempo VHF/ONE

the "ONE" you've been waiting for

No need to wait any longer — this is it! Whether you are already on 2-meter and want someting better or you're just thinking of getting into it, the VHF/ONE is the way to go.

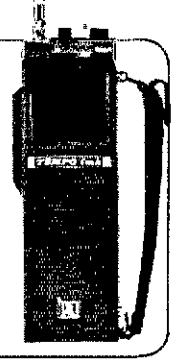
• Full 2-meter band coverage (144 to 148 MHz for transmit and receive. • Full phase lock synthesized (PLL) so no channel crystals are required. • Compact and lightweight — 9.5" long x 7" wide x 2.25" high. Weight — About 4.5 lbs. • Provisions for an accessory SSB adaptor. • 5-digit LED receive frequency display. • 5 KHz frequency selection for FM operation. • Automatic repeater split — selectable up or down for normal or reverse operation. • Microphone, power cord and mounting bracket included. • Two built-in programmable channels. • All solid state. • 10 watts output. • Super selectivity with a crystal filter at the first IF and E type ceramic filter at the second IF. • 800 Selectable receive frequencies. • Accessory 9-pin socket. • $495.00

TEMPO SSB/ONE

SSB adapter for the Tempo VHF/One

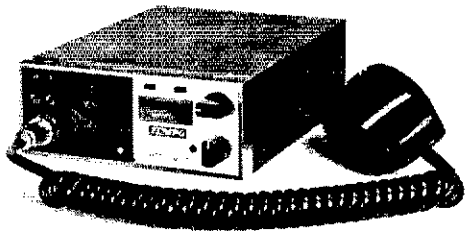
• Selectable upper or lower sideband. • Plugs directly into the VHF/One with no modification. • Noise blanker built-in. • RIT and VXO for full frequency coverage. • $225.00

TEMPO/fmh



So much for so little! 2 watt VHF/FM hand held 6 Channel capability, solid state, 12 VDC. 144-148 MHz (any two MHz), includes 2 pair of crystals, built-in charging terminals for ni-cad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone. $199.00

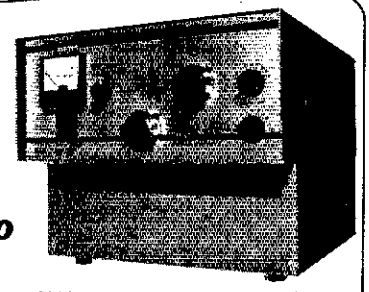
FMH-MC for Marine & Commercial service also available.



TEMPO/CL 146A

. . .a VHF/FM mobile transceiver for the 2 meter amateur band. It is compact, ruggedly built and completely solid state. One channel supplied plus two channels of your choice FREE

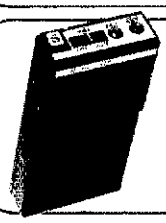
144 to 148 MHz coverage • Multifrequency spread of 2 MHz • 12 channel possible • Metering of output and receive • Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at $239.00.



TEMPO 6N2

The Tempo 6N2 meets the demand for a high power six meter and two meter power amplifier. Using a pair of Eimac 8874 tubes it provides 2000 watts PEP input on SSB and 1000 watts input on CW and FM. Completely self-contained in one small desk mount cabinet with internal solid state power supply, built-in blower and RF relative power indicator. $895.00

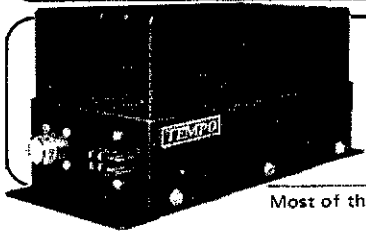
The Tempo 2002.. 2 meters only $745.00
The Tempo 2006.. 6 meters only $795.00



TEMPO POCKET RECEIVERS

MS-2, 4 channel scanning receiver for VHF high band, smallest unit on the market. **MR-2**, same size as MS-2 but has manual selection of 23 channels, VHF high band. **MR-3**, miniature 2-channel VHF high band monitor or paging receiver. **MR-3U**, single channel on the 400 to 512 UHF band. All are low priced, extremely compact and dependable.

TEMPO 100AL10	SOLID STATE VHF LINEAR AMPLIFIER. 144-148 MHz. Power output of 100 watts (nom) with only 10 watts (nom) in. Reliable and compact.



TEMPO

VHF/UHF AMPLIFIERS

Solid state power amplifiers for use in most base/mobile applications. Increase the range, clarity, reliability and speed of two- way communications.

Low Band VHF amplifiers available in 100W out with 2, 10 & 30W in. High Band VHF amps available in 30, 50, 80 & 130W out with 2, 10 & 30W in. UHF amps available in 10, 25, 40 & 70W out with 1, 2, 10 & 30W in. Call or write for spec sheet and prices.

Most of the above products are available at dealers throughout the U.S.

Henry Radio

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Prices subject to change without notice.

LEADING THE NEW WAVE... IC-211

THE NEW ICOM 4 MEG, MULTI-MODE, 2 METER RADIO

ICOM introduces the first of a great new wave of amateur radios, with new styling, new versatility, new integration of functions. You've never before laid eyes on a radio like the **IC-211,** but you'll recognize what you've got when you first turn the single-knob frequency control on this compact new model. The **IC-211** is fully synthesized in 100 Hz or 5 KHz steps, with dual tracking, optically coupled VFO's displayed by seven-segment LED readouts, providing any split. The **IC-211** rolls through 4 megahertz as easily as a breaker through the surf. With its unique ICOM developed LSI synthesizer, the **IC-211** is now the best "do everything" radio for 2 meters, with FM, USB, LSB and CW operation.

The **IC-211** is so new that your local dealer is still playing with his demo. Just hang in there and you can grab this new leader for yourself. ICOM's new wave is rolling in.

Frequency Coverage: 144 to 148 Mhz
Synthesizer: LSI based 100 Hz or 5 KHz PLL, using advanced techniques
Modes: SSB (A3J), FM (F3), CW (A1)

Selectivity: SSB ± 2.4 KHz or less at −60db
FM ± 16 KHz or less at −60db
Sensitivity: SSB 0.25 uv 10db SINAD
FM 0.4 uv for 20db Q.S.

Power Supply: Internal, 117V AC or 13.8V DC
Power Output: 10W PEP (SSB), 10W (CW, FM)
Size: 111mm H x 241mm W x 264mm D
Weight: 6.8 kg

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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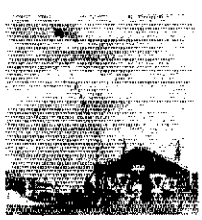
THE COVER

Record numbers participate in that contest for all seasons — FD. See page 79.



Contents

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Basic Radio

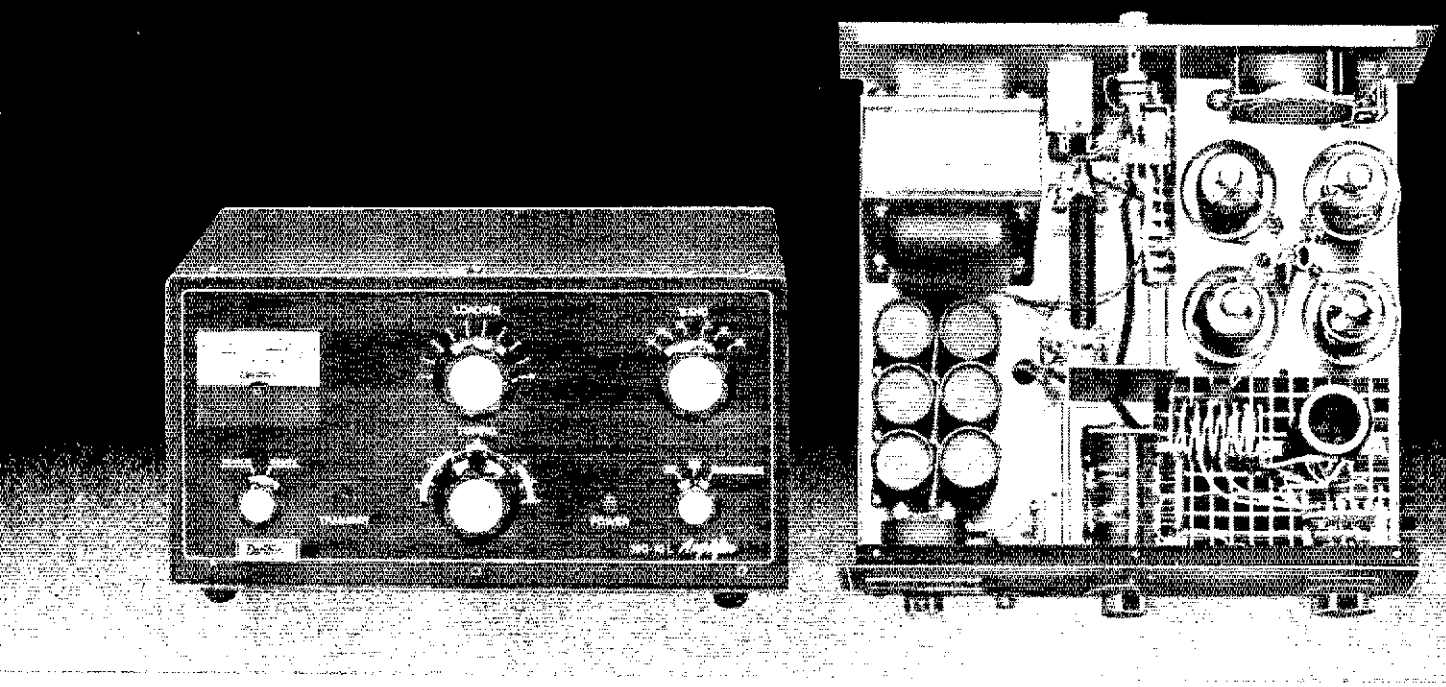
General

Organizational and Regulatory

Operating

Departments

Dentron Proudly Reveals the Secret of the New $499.50 Super Amp



If the amplifier you're thinking of buying doesn't deliver at least 1000 to 1200 watts **output**, to the antenna, you're buying the wrong amplifier.

Our New Super Amp is sweeping the country because hams have realized that the Dentron Amplifier will deliver to the antenna, (output power), what other manufacturers rate as input power.

The Super Amp runs a full 2000 watts P.E.P. input on SSB, and 1000 watts DC on CW, RTTY or SSTV 160 - 10 meters, the maximum legal power.

The Super Amp is compact, low profile, has a solid, one-piece cabinet assuring maximum TVI shielding.

The heart of our amplifier, the power supply, is a continuous duty, self-contained supply built for contest performance.

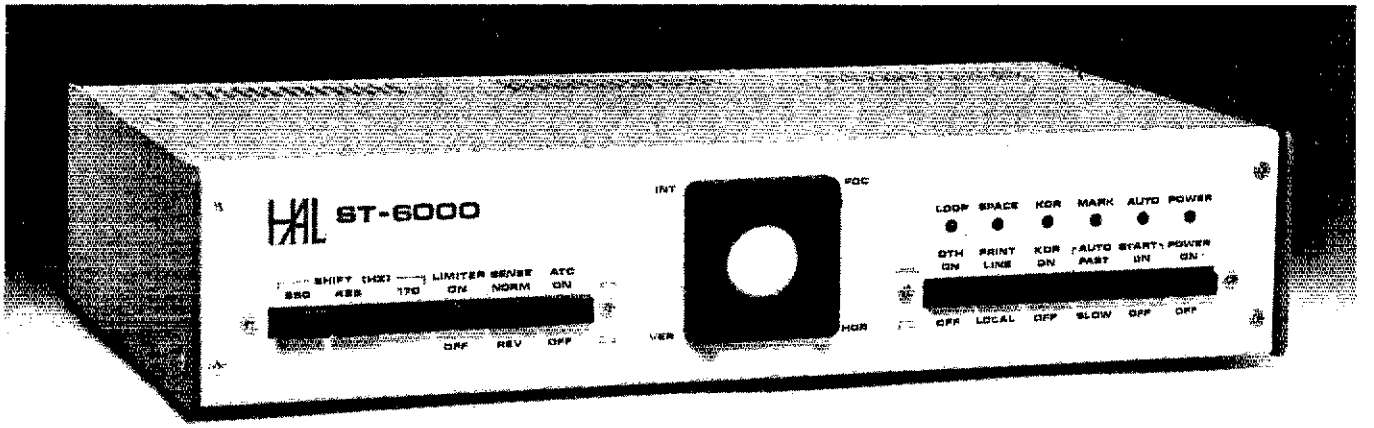
We mounted the 4 - 811 A's, industrial workhorse tubes, in a cooling chamber featuring the on demand variable cooling system.

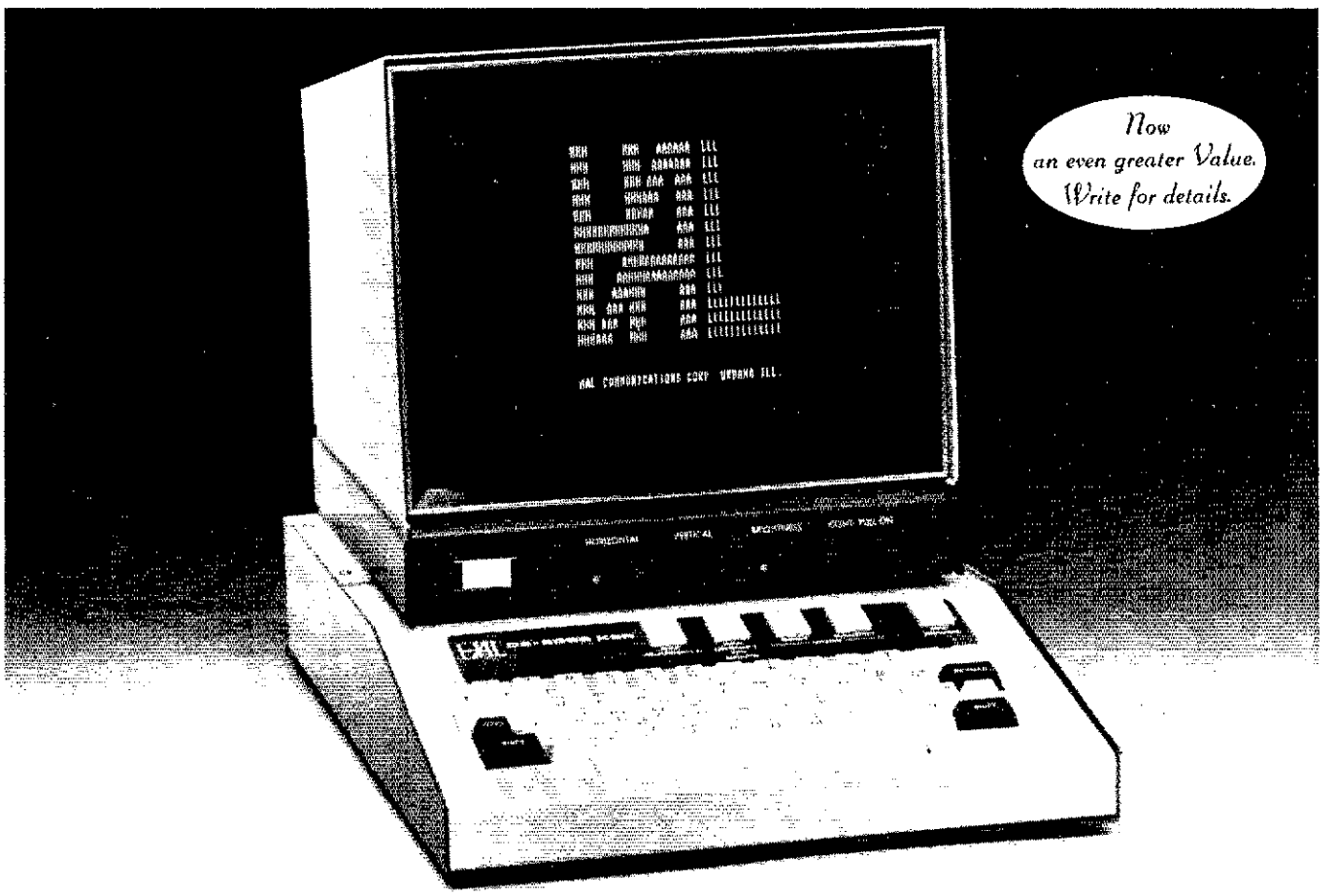
The hams at Dentron pride themselves on quality work and we fight to keep prices down. That's why the dynamic Dentron Linear Amplifier beats them all at **$499.50.**

The No-nonsense Amplifier at a No-Nonsense Price $499.50.

DenTron
Radio Co., Inc.
2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216)425-3173

Stay tuned for future programs.





Now an even greater Value. Write for details.

The HAL ST-6000 demodulator /keyer and the DS-3000 and DS-4000 KSR/RO series of communications terminals are designed to give you superlative TTY performance today —and in the future. DS series terminals, for example, are re-programmable, assuring you freedom from obsolescence. Sophisticated systems all, these HAL products are attractively priced—for industry, government and serious amateur radio operators.

The HAL ST-6000 operates at standard shifts of 850, 425, and 170 Hz. The tone keyer is crystal-controlled. Loop supply is internal. Active filters allow flexibility in establishing different tone pairs. You can select AM or hard-limiting FM modes of operation to accommodate different operating conditions. An internal monitor scope (shown on model above) allows fast, accurate tuning. The ST-6000 has an outstandingly high dynamic range of operation. Data I/O can be RS-232C, MIL-188C or current loop.

The DS-3000 and DS-4000 series of KSR and RO terminals provide silent, reliable, all-electronic TTY transmission and reception, or read-only (RO) operation of different combinations of codes, including Baudot, ASCII and Morse. The powerful, programmable 8080A microprocessor is included in the circuitry to assure maximum flexibility for your present needs —and for the future. The KSR models offer you full editing capability. The video display is a convenient 16-line format, of 72 characters per line.

These are some of the highlights. The full range of features and specifications for the ST-6000 and the DS series of KSR and RO terminals is covered in comprehensive data sheets available on request. Write for them now—and tune in to the most sophisticated TTY operation you can have today...or in the future.

HAL Communications Corp., Box 365, 807 E. Green Street
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ANNOUNCING AN EXCITING NEW 2-METER TRANSCEIVER FROM KENWOOD

the

TR-7400A

Featuring Kenwood's New and Unique CONTINUOUS TONE CODED SQUELCH SYSTEM

4 MHz BAND COVERAGE

25 WATT OUTPUT

FULLY SYNTHESIZED

UNIQUE SQUELCH SYSTEM
The TR-7400A may be used on your favorite repeater, no matter what type of squelch system is used. The continuous tone coded squelch (CTCS) may be used for both transmit and receive or for transmit only. Tone burst operation may also be used.

SYNTHESIZED, 800 CHANNELS
The phase-locked loop (PLL) frequency synthesizer in the TR-7400A divides the 4 MHz bandwidth into 400 channels at intervals of 10 KHz. The frequency may be offset 5 KHz higher with the push of a button, thus providing 800 discrete channels.

REPEATER OFFSET
A convenient front panel switch offsets the transmit frequency of the TR-7400A up OR down 600 KHz for standard repeater operation. This offset circuit uses digital technology to provide a highly stable offset frequency without spurious response. A dual color LED indicates the direction of offset from the displayed receive frequency.

OUTSTANDING RECEIVER PERFORMANCE
Large-sized helical resonators with high Q minimize undesirable interference from outside the 2-meter band. The large helical resonators, 2-pole 10.7 MHz monolithic crystal filter, and MOSFET front-end circuitry combine to give outstanding receiver performance.

TONE PAD CAPABILITY
A jack is provided to allow convenient connection of a tone pad to the TR-7400A.

FINAL PROTECTION CIRCUIT
The final transistor in the TR-7400A is protected from antenna impedance mismatch. Excessive reflected power reduces the amount of drive to the final transistor rather than turning off the final stage. This practical feature allows continued safe operation at a reduced power level, whether the antenna system becomes opened or shorted.

Specifications TR-7400A

- Range: 144.00 MHz to 147.995 MHz
- Mode: FM
- 800 Channels: 5 KHz spaced
- Sensitivity: Better than 0.4 uV for 20 dB quieting
  Better than 1 uV for 30 dB S/N
- Squelch Sensitivity: Better than 0.25 uV
- Selectivity: 12 KHz at −6 dB down
  40 KHz at −70 dB down
- Image Rejection: Better than −70 dB
- Spurious Interference: Better than −60 dB
- Intermodulation: Better than 66 dB
- Receive System: Double conversion
- First IF: 10.7 MHz
- Second IF: 455 KHz
- Audio Output: More than 1.5 Watts (8 ohm load)
- RF Output Power: 25 Watts (High)
  5-15 Watts (Low-adjustable)
- Antenna Impedance: 50 ohms
- Frequency Deviation: ± 5 KHz
- Spurious Response: Better than 60 dB
- Tone Pad Input Impedance: 600 ohms
- Tone Burst Duration: 0.5 to 1.0 sec.
- CTCS Range: 88.5 Hz to 156.7 Hz
- Microphone: Dynamic, with PTT switch, 500 ohms
- Voltage: 11.5 to 16.0V DC (13.8V DC nominal)
- Current Drain: Less than 1A in receive (no input signal)
- Current Drain: Less than 8A in transmit
- Polarity: Negative ground
- Temperature Range: −20 to +50 degrees C
- Dimensions: 182 mm (7-3/16") wide
  270 mm (10-5/8") deep
  74 mm (2-7/8") high
- Net Weight: Approximately 2.8 kg (6.2 lbs.)

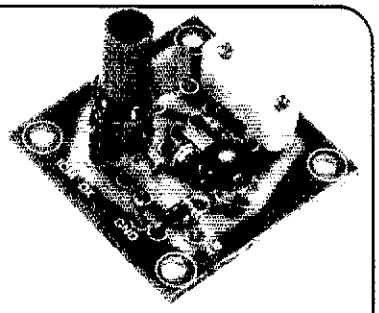
TRIO-KENWOOD COMMUNICATIONS INC.
116 EAST ALONDRA/GARDENA, CA 90248

KENWOOD
...pacesetter in amateur radio

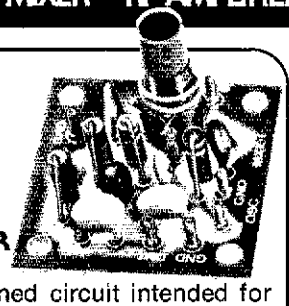
for the experimenter!

INTERNATIONAL CRYSTALS & KITS

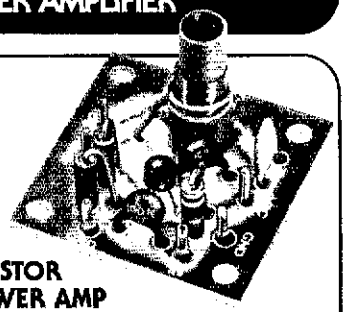
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



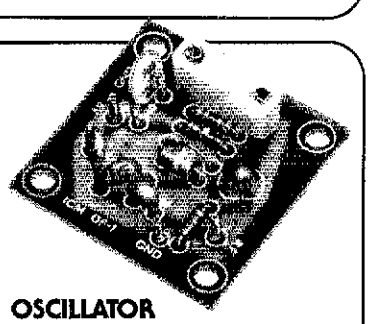
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$3.95 ea.



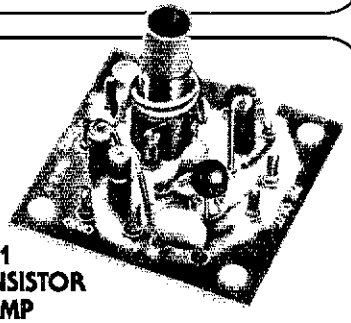
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
$4.50 ea.



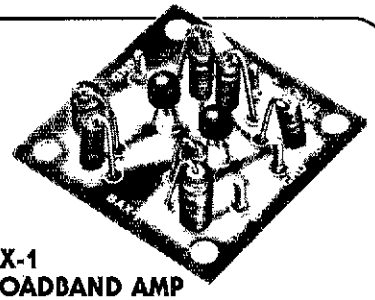
PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
$4.75 ea.



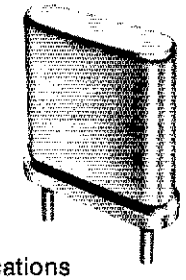
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.
$3.25 ea.



SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.
$4.50 ea.



BAX-1
BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering
$4.75 ea.



.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo *Specify when ordering*	$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.25 ea.

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Vice Director: Jack D. Gant, W5GM
521 Monroe, NW., Ardmore, OK 73401

*Members Executive Committee

Section Communications Managers of the ARRL

Reports Invited: All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. Novices are eligible for ORS - II. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

Canadian Division
Alberta — Sydney T. Jones, VE6MJ, 10706 – 57 Ave., Edmonton, AB T6H 0Y6
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver 8, BC
Manitoba — Steven Fink, VE4FQ, 14 Grandcrest St., Winnipeg, MB R2V 2X2
Maritime-Nfld — Aaron D. Solomon, VE1OC, 8 Crichton Park Road, Dartmouth, NS B3A 2N8
Ontario — L. P. Thivierge, VE3GT, RR 1, Renfrew, ON K7V 3Z4
Quebec — Lawrence P. Dobby, VE2YU, 157 Sedgefield Ave., Point Claire, PQ H9R 1N8
Saskatchewan — Percy A. Crosthwaite, VE5RP, RR 3, Saskatoon, SK S7K 3J6

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Tennessee — O. D. Keaton, WA4GLS, Rt. 1, Medearis Dr., Old Hickory 37138

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Ohio — Henry R. Greeb, W8CHT, 6580 Dry Ridge Road, Cincinnati 45247

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*Official appointed to act temporarily in the absence of a regular official.

THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

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

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

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

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"It Seems to Us..."

Will Amateur Radio Exist in 1980?

With the new growth in interest and enthusiasm that we're seeing in amateur radio, there's plenty of reason to be optimistic about the future. About 3,000 people are receiving *QST* for the first time as members starting with this issue. This month and next, more than 20,000 will be graduating from Novice license training programs all over the U.S. To them all, we extend a hearty welcome.

But in spite of this healthy growth, we can't afford to be complacent. Amateur radio's potential is measured in terms of *frequencies* as well as people. Frequencies are the lifeblood of amateur radio. And toward the end of this decade, we will face a major challenge on the international level to our continued use of frequencies in what we like to call the "ham bands." All amateurs and prospective hams should appreciate the significance of this challenge, should know what is being done in their behalf to meet it, and should understand that their activities and conduct can have a direct impact on the outcome. Yet, we know that there are many – and not just newcomers! – who don't have the slightest idea what is meant by "WARC-79." If you're in this category, or if you're a little hazy as to details, please read on. It's important.

WARC-79

On September 24, 1979, representatives of more than 100 countries will gather in Geneva, Switzerland, for a ten-week World Administrative Radio Conference (WARC). The objective of the conference is to revise the Radio Regulations of the International Telecommunication Union (ITU). More than 150 countries, including the United States and Canada, have agreed to be bound by these Radio Regulations. One of the most important sections of the Radio Regulations is the Table of Frequency Allocations, which specifies the types of radio stations and services which can be allocated frequencies in various parts of the radio spectrum. The frequencies to be used by radio and TV broadcast stations are reflected in this table, as are all of the ham bands, the latter being specifically assigned to the Amateur Service. (In case you're wondering, CB is not provided for in the Radio Regulations, but is treated domestically as a subcategory of the Mobile Service.)

Without those entries of the word "Amateur" in the Table of Frequency Allocations, the Federal Communications Commission (and in Canada, the Department of Communications) could not license *any* amateur stations, and amateur radio as we know it would not exist. Why? Because the nations of the world have agreed to abide by the table in making frequency assignments to any stations which could possibly interfere with stations in other countries. In these days of satellite communication, even the microwave bands have a potential for international communication – and international interference. So, how did that all-important word "Amateur" get into the table? Because a majority of countries represented at a similar conference in 1959 *voted* for it. If amateur radio is to survive beyond this decade, the same thing must happen in 1979. One country, one vote; it's as simple as that.

Between now and 1979, every country which will be represented at the WARC is going to examine closely its needs for radio frequencies for its services through the end of this century. A year before the conference opens, many of these countries will submit proposals for changes to the Radio Regulations and to the Table of Frequency Allocations. These proposals will be circulated to all of the member-countries of the ITU well in advance of the opening of the conference. Obviously, many of these proposals will be conflicting, and it will be the task of the conference to resolve the conflicts. Equally obvious is the fact that no country which has an interest in the outcome can wait until the day a conference opens to make its position known. Preparations must begin well in advance.

U.S. Preparations

U.S. preparations began in 1972. From the first, amateur radio has been deeply involved.

While the date of the 1979 conference had not been set, frequency management experts knew in 1972 that it would have to take place in the 1978-1980 time frame in order to

At the September meeting of the Advisory Committee for Amateur Radio, some twenty-one interested and concerned amateurs were in attendance. Pictured here, from left to right are Charles Dorian, W3JPT; John Serafin, W2QD; Bob Haviland, W4MB (hidden behind W2QD); Pete Hurd, K4NSS, secretary of the ACAR; John Johnston, K3BNS, ACAR chairman; Dave Mount, W4LVC; Fred Matos, W3ICM; and Fred Friel, Jr., W3FU.

accommodate the rapidly changing technology. So, the Spectrum Planning Subcommittee of the Interdepartmental Radio Advisory Committee of the Office of Telecommunications Policy (you can tell it's a government body, can't you?) established a number of special committees to study the requirements of the various radio services through the year 2000. The four-man committee for the Amateur Service consisted of three FCC staff people with extensive international conference experience and one member of the ARRL headquarters staff. This committee examined the history of amateur allocations, charted the growth of the Amateur Service, and envisioned the high-frequency (below 30 MHz) needs of a growing Amateur Service for the remainder of the century. The committee's report, made in 1973, formed the basis for most of the amateur preparatory work which has been done since then, not only in the U.S. but also in Canada and the three regional divisions of the International Amateur Radio Union (more on the IARU later).

In brief, the four-man amateur committee recommended the following.

BAND	*ALLOCATION*
1800-2000 kHz	exclusively amateur
3500-4000 kHz	exclusively amateur
7000-7500 kHz	expanded exclusively amateur
14.0-14.5 MHz	expanded exclusively amateur
21.0-21.5 MHz	expanded exclusively amateur
28.0-29.7 MHz	exclusively amateur

In addition, the committee recommended three *new* amateur bands of 500 kHz each, at 10, 18 and 24 MHz, to accommodate worldwide growth and to provide additional hours of propagation between distant points.

The committee did not deal with the vhf portion of the spectrum, as the assignment from IRAC related specifically to hf. However, the Advisory Committee for Amateur Radio (which will be described in the next paragraphs) extended consideration of future amateur spectrum needs up into the gigahertz range.

Advisory Committee for Amateur Radio

Once the Administrative Council of the ITU had fixed the date of the upcoming conference as 1979, FCC preparations began. In the U.S. there is divided responsibility for radio frequency management: The FCC handles only the nongovernment users of the spectrum, while the Interdepartmental Radio Advisory Committee (IRAC) does the same for the government users on delegated authority from the President. Thus, the two bodies develop their requirements independently, then coordinate the results into a single U.S. position. While the public does not take part in the deliberations of IRAC, the FCC has gone to considerable lengths to assure the public of a voice in WARC preparation. Early in 1975 a number of advisory committees were established under the Federal Advisory Committee Act, each representing a different radio service. These were fact-finding committees and were charged with providing the Commission with information as to the future spectrum requirements of the different services. All meetings were announced publicly and were open to the public. Committee members served without pay and had to meet all of their own expenses.

From the start, the Advisory Committee for Amateur Radio was the largest and one of the most active committees. The list of attendees at its organizational meeting in May, 1975, reads like a "Who's Who" of serious amateurs. This pool of talent ultimately generated a detailed table showing the requirements of the Amateur Radio Service for radio spectrum through the year 2000, including vhf and microwave, along with an impressive document justifying the requests.

While the volunteer representatives of the Amateur Radio Service were so engaged, the representatives of the other radio services in the United States were doing the same. Advisory committees for the aeronautical, maritime, broadcasting, land mobile, and other services all met several times. Because the work of these committees was bound to have an impact on amateur radio, the League's officers decided early in the game that ARRL representatives should attend as many meetings as possible. The result was that the Amateur Service was probably the best informed about the positions being developed by the various services. It took a lot of time and dedication on the part of several people to accomplish this, but we are convinced that it will pay off in the months ahead.

Coming – a Notice of Inquiry

Once all of the nongovernment services had submitted their requirements, in March 1976, the FCC published all of the requests as they had been received. Several conflicts and potential conflicts between the Amateur Radio Service and others were apparent. These conflicts were analyzed in detail, and arguments were prepared to show that amateur radio has the stronger public-interest claim in each case. These arguments will be presented during the next phase of preparation, which is nearly at hand: The Commission is about to release a Notice of Inquiry (in Docket 20271) showing the results of its own staff work on the analysis of the conflicts. This is an especially important notice, because it will be, in effect, a first-draft Table of Frequency Allocations amalgamating the requests of the various advisory committees. This draft table will be revised through a series of notices between now and 1978, and the public will have the opportunity to comment in response to each one.

The FCC staff work being done on the draft table has been conducted in

private, so no one outside the Commission staff knows exactly what is coming. However, it is obvious that there are going to be some things about the Notice of Inquiry that we amateurs will like, and some that we won't like. As soon as the notice is out, the League's staff will analyze it carefully and, with approval from the Executive Committee, will meld the arguments which have been prepared in advance into a comprehensive filing in support of the amateur position. Individual amateurs will have the same opportunity to comment. If you decide to file, though, bear in mind that the Commission is interested in facts and figures which demonstrate use of the spectrum in the public interest. Comments must be based on reason and logic, not on emotion, in order to make a favorable impression on the technical people who will analyze them. We hope to keep you fully informed through the pages of *QST* as domestic WARC preparation continues.

That, in a nutshell, is what has been happening in the U.S. A similar routine has been followed in Canada, Australia, the United Kingdom, and other developed countries. But each country, no matter how large or small, has one vote, and there are at this moment 56 more member-countries of the ITU than there were in 1959, at the time of the last general WARC. What about *them?*

This is where the International Amateur Radio Union (IARU) comes in.

The IARU

Since its establishment in 1925, the IARU has been amateur radio's window in ITU conferences. As an accredited international organization, the IARU enjoys observer status at these conferences. Important as this status is, though, the role of the IARU in WARC preparation is much greater than that. Its ninety member-societies, in countries representing all but about 3,000 of the world's 750,000 radio amateurs, regularly exchange information for mutual benefit in WARC preparation. For example, as soon as the report of the FCC Advisory Committee for Amateur Radio was released, copies were sent to each IARU society as background information. A monthly *WARC Newsletter*, prepared at IARU headquarters, keeps everyone informed of developments.

Probably the most important development within the IARU in recent years has been the establishment of Regional Divisions for the member-societies in the respective ITU Radio Regions. Each Division holds a triennial conference of its own, has its own officers, and raises its own operating funds from subscriptions of its members. During 1975 and 1976, Division Conferences adopted WARC strategies quite similar to the one which was then being developed for domestic use in the U.S. While there are some differences between the Regions, reflecting the differing realities facing the Amateur Service around the world, the basic approach is similar enough to permit worldwide coordination of the amateur position. This is being accomplished through periodic meetings of carefully chosen representatives of the three Divisions and of IARU headquarters. The second of these meetings was held in Geneva in September and resulted in the preparation of a position paper which can be used by the smaller member-societies in presenting their case to their governments.

Through the IARU, we also have frequent opportunities to establish contact with telecommunications administrators in countries where there are no organized amateur societies. In any country where there is no IARU society, WARC material is available for the asking to any amateur who thinks he can use it effectively in educating government officials as to the value and potential of the Amateur Service, especially as a means of technical self-training.

What Can *You* Do?

Back at the beginning we asked for your attention, because *your* activities and conduct can have a direct impact on the WARC outcome. That's because the Amateur Service is measured in terms of *growth, technical achievement,* and *on-the-air conduct.* Are you lending your assistance to prospective hams through the League's training program? Have you performed any innovative experiments with radio, and shared the results with others through the pages of this journal? Most important, do you always conduct yourself on the air in a manner which reflects credit upon the Amateur Radio Service? If you can answer "yes" to one or more of these questions (we hope *everyone* can answer the last one affirmatively!), and if you're reading these words in your own personal membership copy of *QST*, you're doing your part for WARC preparation.

Not every amateur can attend committee meetings, write position papers, or go to Geneva. But, through membership in the organization which does all of these things, and more besides, every amateur *can* lend his or her personal support to the all-important task at hand. And in the U.S. and Canada, that organization is the American Radio Relay League. We'll do our best to acknowledge your support, by keeping you informed of every development through the pages of *QST*. — *W1RU/K1ZND*

More participants in the September meeting of the ACAR. At the left, in addition to those identified in the previous photo, are Hersh Miller, W3SWD; Earle Cook, W4FZ; Jay Jackson, WA4AJF; Merle Glunt, W3OKN; and Chet Smith, K1CCL. At the right are Frank Theriot, K4BZ; Hugh Henline, W4JOP and Perry Klein, K3JTE. Much of the time at this meeting was spent in addressing the conflicts that were known to exist between allocations desired by the amateur service and the allocations desired by other services, and in considering the preparation of a paper which would provide a basic justification for the amateur service. *(W1RU photos)*

League Lines...

Because of public response, WWV resumed geoalert broadcasts from Ft. Collins, CO (but not from WWVH Hawaii) on October 1. The broadcasts are at 18 minutes past the hour and contain the solar radio 10 centimeter flux, the geomagnetic A-index and summaries of major solar flare events. The format is the same as was used last year.

How do you tell the Novices from the non-Novices during operating activities where it's important, as in the ARRL 10-Meter Contest and the Novice Roundup? Late word from FCC advises that it is permissible for Novices to sign "slash N" at the end of their callsigns, e.g. WA1VMC/N, for purpo of identifying themselves as Novices. Novices already operating "portable" would sign WA1VMC/1 for example.

Shhhh, quiet! On Mondays (GMT), Oscar 7 Mode B contacts should be made with ten watts or less effective radiated power (erp) -- experiments during June proved it would work so now one day has been set aside for "QRP." Try it other times, too -- it saves Oscar's battery. And 100 watts erp should be the very most you use; if you can't hear yourself then, maybe something's wrong with you receiver!

Personnel, personnel, personnel! The CD needs help, an assistant in the Public Service Branch and one for DXCC. And there could be an opening later for a W1AW operator. Qualified experience amateurs are invited to write for a personnel application form.

Got a simple request for ARRL Hq? You can phone it nights or weekends when the Telco rates are low. After business hours (Monday through Friday, 7:30 AM to 5:30 PM), a recorder is connected to the phone at area 203,666-1541. Tell us what it is you'd like, followed by your name, call, address and zip code slowly and distinctly, using phonetics for difficult words and for callsigns.

The September 8 West Coast Qualifying Run (courtesy of W6OWP) saw 8 participants qualify at 40 wpm! Congratulations to W6ETJ W6FNG W6RNL WA6TLV W6UTV W7FJZ W7IR W7LX.

Oops! A monkey wrench was thrown into the October League Lines. It's W7JXE/SU which is authorized to handle third party traffic from Egypt, not W7LXE/SU as previously reported.

The Bicentennial Celebration this past July was so well received that plans are underway for a Bicentennial Celebration "Plus One" for July 9-10, 1977, replacing the July CD Parties. Next year the October CD Parties will be "open" to all ARRL members.

Got spare time during the Phone SS Contest? Special event station NX1US will be in operation from 0100Z November 20 to 1900Z November 21 on 3.720, 3.950, 7.120, 7.250, 14.310, 21.120, 21.400, 28.120, 28.600 and 146.520 MHz by the Wellesley Amateur Radio Society. A commemorati certificate will be awarded to those stations giving RS(T) and ARRL section (RS(T) and country for DX either phone or cw. Phone SS contacts are also valid and welcome. Stations must submit complete QSL card and a long SASE to W.A.R.S., 324 Washington St., Wellesley Hills, MA 02181 before December 31, 1976.

Looking for some inexpensive a-m gear that can be converted to operate on 160 and 75? As of January 1, 1977, boaters are required by FCC to shift from 2-MHz a-m gear to vhf-fm. Ssb can be used on 2 MHz, but all the present gear is obsoleted. A check with boating organizations, marinas, and marine electronics service stations ought to turn up some gear that you could use.

Heard an 8P7? It's Barbados, celebrating its Tenth Anniversary. There's a special award, too: write Amateur Radio Society of Barbados, Box 814E, Bridgetown, Barbados.

New prices on ARRL supplies are now in effect: Logs $1.50 U.S. and Possessions, $1.75 elsewhere; Minilog $0.75 U.S. and Possessions, $1.00 elsewhere; Stationery $3.00 per 100 sheets

"Be a Ham!" says a fine brochure prepared by the Atlanta Radio Club, W4DOC. It tells about the fun of ham radio, the things hams do and how to get started, then explains the club's buddy system, where each newcomer is teamed up with an experienced ham in his neighborhood. Nice work!

SSTV Image Processing

Image enhancement — a term we've grown accustomed to with today's computer processing of photographs from deep space. How about using some of those techniques to improve received SSTV pictures?

By Dr. George R. Steber,* WB9LVI

In visual communications, transmission and display fidelity play a key role. Commercial television, for example, functions adequately only because defects due to quantization and/or transmission are hardly visible. Slow-scan television (SSTV) on the other hand functions in spite of problems of atmospheric noise, interference, multipath distortion and in many cases inadequate signal strength. The fact that SSTV is successful and growing in this less-than-ideal environment is a tribute to the many dedicated individuals using this mode of operation. Image quality, however, is becoming more important, particularly to those who have used this mode for more than a short time.

Interestingly enough, the field of image processing has the potential for improving the quality of SSTV pictures. With the advent of the digital scan converter for SSTV,[1] many of the techniques of image processing may be directly applied to the design of display systems, signal processors, and encoders for slow scan. Computer picture-processing techniques are relatively new, having been employed routinely in the space program only since 1964 when Ranger 7's moon pictures were processed by a computer to correct for image distortion in the on-board television camera. Such techniques are by no means limited to space applications, however, and have been successfully applied to the bio-medical, astronomical and radiographic fields.

What exactly is image processing? Simply stated it is the process of *encoding*, *restoring*, and/or *enhancing* images. (For the reader wishing a more detailed treatment of this subject than is presented here, reference is made to two special issues of the *Institute of Electrical and Electronics Engineers Journals*[2,3] which cover the subject in depth.)

Encoding is used primarily when converting a conventionally scanned image into another form for purposes of efficient transmission. Normally pictures are sent over a channel occupying a bandwidth greatly in excess of that actually required. This occurs because most pictures contain great amounts of redundancy — much of which is irrelevant to the viewer. (Prime examples of this are SSTV keyboard-generated pictures which require eight seconds of transmission time to supply only a few

*Electrical and Computer Science Department, University of Wisconsin-Milwaukee, Milwaukee, WI 53201

[1] References appear on page 16.

A slow-scan picture must be broken up into several brightness levels for digital processing. The more brightness levels there are, the more digital circuitry is required for the processing. With fewer brightness levels, objectional "contouring" takes place because of more abrupt changes in the gray-scale presentation. Noise dithering is one means of smoothing out the effects of contouring, as shown here. At the left is a 128 by 128 picture-element slow-scan picture with 16 brightness levels. At the right is the same picture except for the addition of pseudo-random noise.

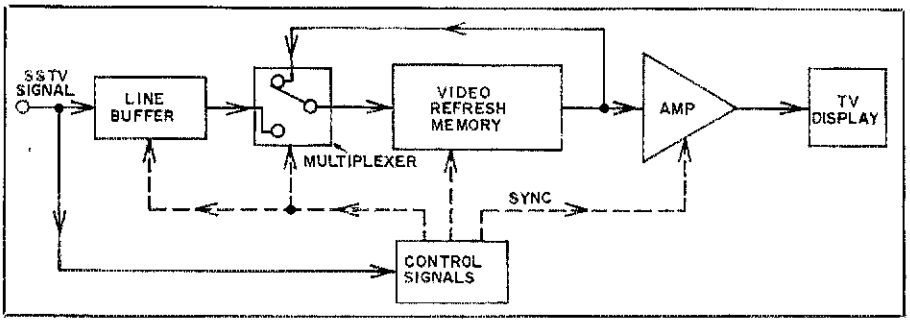


Fig. 1 — Generalized block diagram of a slow-scan to fast-scan converter. Control signals derived from the incoming slow-scan video are used for switching the multiplexer and entering the video into the main video refresh memory. A conventional television set is used for display purposes.

alpha-numeric characters of information.) However, because of the complex equipment needed there has been little encoding for purposes of efficient transmission, until recently. Integrated circuits have remedied the problem. Another application of encoding would be in reducing memory requirements in digital computer processors or in the refresh memory of a digital scan converter. Many different codes are used for images, and their efficiency (data-compression capability) varies from 6 bits per picture element to 0.5 bit per picture element. Typical of these are pulse-code modulation (PCM), run-length coding, differential PCM, delta modulation, and transform coding. Each has advantages and disadvantages under a given set of conditions.

Restoration of images is usually accomplished by reversing the effect of some degradation phenomenon known to have caused the distortion in the original process of forming the image. Examples of such distortion would be atmospheric effects, lens aberrations, and motion blur. The process of restoration is very complicated requiring detailed knowledge of the distortion and an accurate mathematical model. Most of these techniques are still in the very advanced development stage requiring large computers and memories.

Enhancement can generally be described as the manipulating of images to improve the apparent quality of the picture as seen by the viewer. These techniques include signal compression, pre-emphasis, noise averaging, and digital filtering. Commercial and scientific television systems use quite a few of these methods. In this connection, psychophysical aspects of vision perception must be carefully considered before a useful image display is designed since, after all, the ultimate receiver of the processed picture is the human.

It is the purpose of this article to discuss several of the above techniques as they have been applied to a prototype image processor developed especially for SSTV. The discussion will include a review of scan-converter operation, specialized image-processing techniques, and suggestions for future contributions in this area. Some circuit diagrams will be provided for advanced amateurs wishing to experiment with these concepts.

Scan Converters

The function of a slow- to fast-scan converter is to increase the scanning rate of a slow-scan signal so that it can be viewed on a conventional television display. As shown in Fig. 1, this is accomplished by employing a line buffer, video refresh memory, and a multiplexer, together with appropriate control signals. The scan conversion occurs in the line buffer which accepts an SSTV line at the normal rate and delivers it to the refresh memory. As each new line of slow scan is received it is inserted in the memory until eventually a complete image is stored. The video refresh memory has both slow- and fast-scan capability and can be read out at fast-scan rates directly to a regular television set. Although there are minor variations on this idea, depending on the device used for the video memory, this is roughly the concept of slow- to fast-scan conversion. Typical refresh memories utilize storage tubes, magnetic disks, CCD (charge-coupled display) registers, or a semiconductor memory. Of all of these, the semiconductor memory appears best-suited for use in a processor because of ease of access, excellent speed characteristics, and non-decaying information-retention capability. A digital scan converter such as described in a previous *QST* article[1] forms an ideal unit for an image processor. It is this device which will be used as the basis for much of the discussion to follow.

There are several image-processing techniques that can be used to improve the viewed image which is generated by the digital scan converter. We will restrict our discussion to three concepts that have been implemented on a digital scan converter and which are known to produce good results. They are pseudo-random dither circuits, video compression and expansion techniques, and picture-frame averaging. Many other techniques also exist for image processing and the field is wide open to experimentation by the advanced amateur. Later on in the article some suggestions will be made concerning possible future contributions by amateurs to this field.

Pseudo-Random Dither

In order to perform digital scan conversion it is necessary to digitally encode the intensity (brightness) of each point in the picture as a binary code. For good picture quality it has been established that at least 64 brightness levels (6 digital bits) per picture element (pixel) are necessary, since the eye is very sensitive to small brightness steps introduced by quantization. If less than 6 bits are used an objectionable phenomenon called contouring becomes apparent to the viewer.

Since a horizontal slow-scan line consists of 128 pixels and there are nominally 128 lines per picture, we find that a slow-scan picture consists of 16,384 pixels. And it is clear that at 6 bits per pixel, the total digital memory requires 98,304 bits. If less bits per pixel could be used and still retain good picture quality, a substantial savings could be made in the total number of bits.

In 1961 Roberts[4] discovered that adding noise to a video signal before it was quantized and subtracting the same noise after decoding produced a significant reduction in contouring. Subjective tests by Roberts indicated that good pictures could be obtained by using only 3 bits per pixel. It was also found that additional improvements could be obtained in the picture by compressing the brightness scale before adding the noise and performing the quantization. Video compression will be discussed later in the article.

Noise dithering appears to work because of the frequency-response characteristics of the eye. The eye can detect very small changes in intensity if there are large areas in the picture to compare. A large area of slowly changing intensity is fairly common and is transformed into contours by digital quantization. Contours are annoying and easily detected by visual inspection. However, if the quantization error is broken up and distributed as noise, a human will not notice it since there are no large areas to compare. Also the eye is less sensitive to high spatial frequencies generated by the pseudo-random noise.

One may take advantage of pseudo-random noise (dither) in digital scan

conversion to reduce the number of bits per pixel required. The pseudo-random noise itself can be generated in a wide variety of ways using analog noise generators, shift registers, or counters. The subjective effect of using different noise generators can be significant and much research has been devoted to this problem in recent years.

A simple dither circuit that works fairly well is shown in Fig. 2A, with connections shown for use with the scan converter of reference.[1] The output of the 7402 at pin 13 is a square wave of 64 cycles per SSTV line, with a 180-degree phase reversal occurring at the end of each line. This has the effect of superimposing a very low-level checkerboard pattern on the analog SSTV signal before quantization. After quantization, all of the contours are effectively replaced by individual randomized pixels of varying brightness which appear more pleasing to the eye.

Shown at B in Fig. 2 is a high-speed dither circuit for subtracting an equal and opposite amount of dither from the fast-scan output after decoding. This serves to reduce the rms noise in the picture and smooth the picture even more. The photographs on page 13 show an actual slow-scan picture that has been improved by the addition of dither as discussed here.

Video Companding

One of the psychovisual aspects of human vision that can be effectively utilized in scan conversion is the apparent increased sensitivity of the eye to low brightness areas. Tests on the eye have indicated a logarithmic brightness sensitivity, rather than a linear one. Consequently, if the quantization errors could be shifted to the bright areas of the picture rather than the dark areas, subjective picture improvement should result. This can be accomplished if the brightness scale is made nonlinear so that most of the quantization levels occur in the dark areas, thus reducing the errors in the dark areas and increasing the errors in the bright ones. This process is called video compression and may be performed in the analog domain with a suitable nonlinear amplifier.

In order for the displayed picture to have the same gray scale as the original picture an expansion of the brightness scale should be performed after decoding. This may be done in several ways using analog devices. However, a particularly attractive method uses the expansion characteristics of certain phosphors found in commercial CRTs. Fig. 3 indicates a typical compression curve that one might utilize. Notice that the expansion curve would be the inverse of the compression curve, to compensate for the original brightness compression.

Frame Averaging

If a signal is sent repetitively in the presence of random noise with zero mean, the original signal can be recovered by averaging the combined signal and noise over several periods. The noise will tend to cancel out since it is uncorrelated, but the signal should remain and increase in strength. A memory is generally required to perform averaging of this type.

If we think of an SSTV picture as a signal that repeats itself every eight seconds it should be possible to perform frame averaging in much the same way

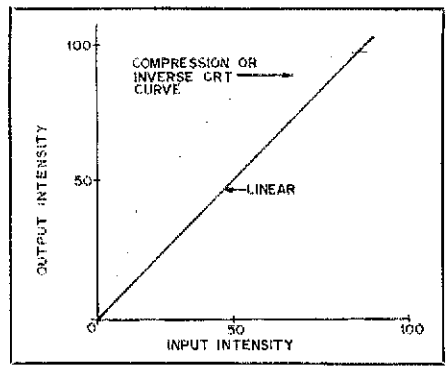


Fig. 3 — Compression curve for video companding. For best performance the inverse CRT characteristic should match the compression curve. This curve will depend to some extent on the settings of the brightness and contrast controls of the monitor.

as discussed above. A digital scan converter can be very simply modified to provide frame averaging capability over two frames. The circuitry required is shown in Fig. 4 and is for the most part self-explanatory. To give an indication of the performance of an SSTV frame-averaging circuit the following test was performed.

A standard SSTV signal was added to an analog noise generator to obtain a combined signal with a signal-to-noise ratio of about one to one. The resulting noisy signal was fed to the digital scan converter and averaged over two frames. The results are shown in Fig. 5. As may be seen, the frame-averaging capability can produce usable pictures under very poor conditions. Since it is normal procedure to transmit SSTV pictures two or three times, averaging should prove to be a practical technique. On-the-air experience indicates that oftentimes pictures can be "pulled through" by averaging when all else fails.

Suggestions for Further Work

As mentioned at the outset there are many areas of image processing that can be applied to SSTV processing. Several ideas, admittedly some of them "blue sky," are listed below.

Removal of electrical noise or multipath distortion from SSTV pictures by processing would be a great step forward. The low frequencies, 75 meters in particular, are extremely susceptible to this type of distortion. Perhaps it would be possible to model or measure the degradation phenomenon and remove it from the picture by reversing the process. Has anyone looked at this problem? Correlation techniques might also be considered.

Experimentation with different encoding schemes for slow scan might lead to greater reliability and/or narrower bandwidths. Digital encoding, possibly with the use of error-correcting codes, has the potential for extreme reliability

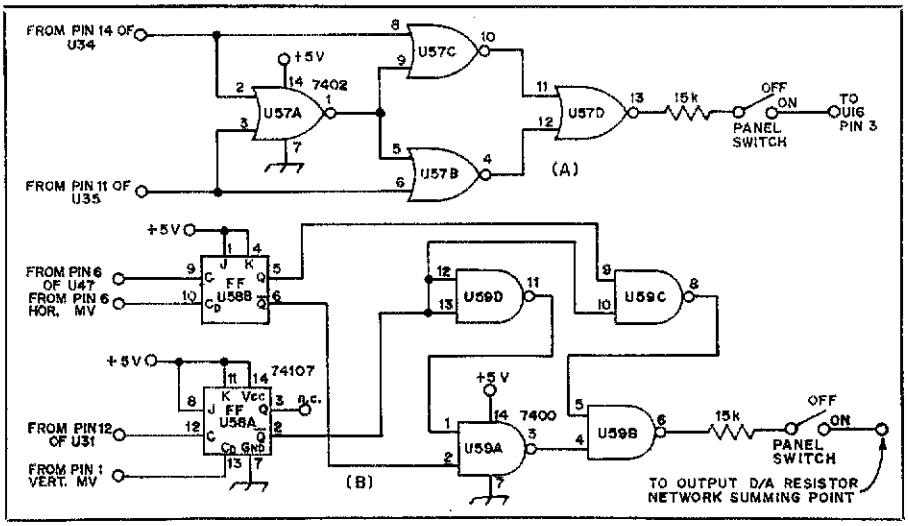


Fig. 2 — At A, schematic diagram of input dither circuit and at B, an output circuit for use with the WB9LVI scan converter. U57 supplies dither to the incoming slow scan and U59 subtracts a synchronized high-speed dither from the fast-scan video as discussed in the text. Vertical and horizontal multivibrator and summing resistor connections shown here are to be made to the circuit shown on page 36 of *QST* for May, 1976. Other connections are to related circuit diagrams in that issue.

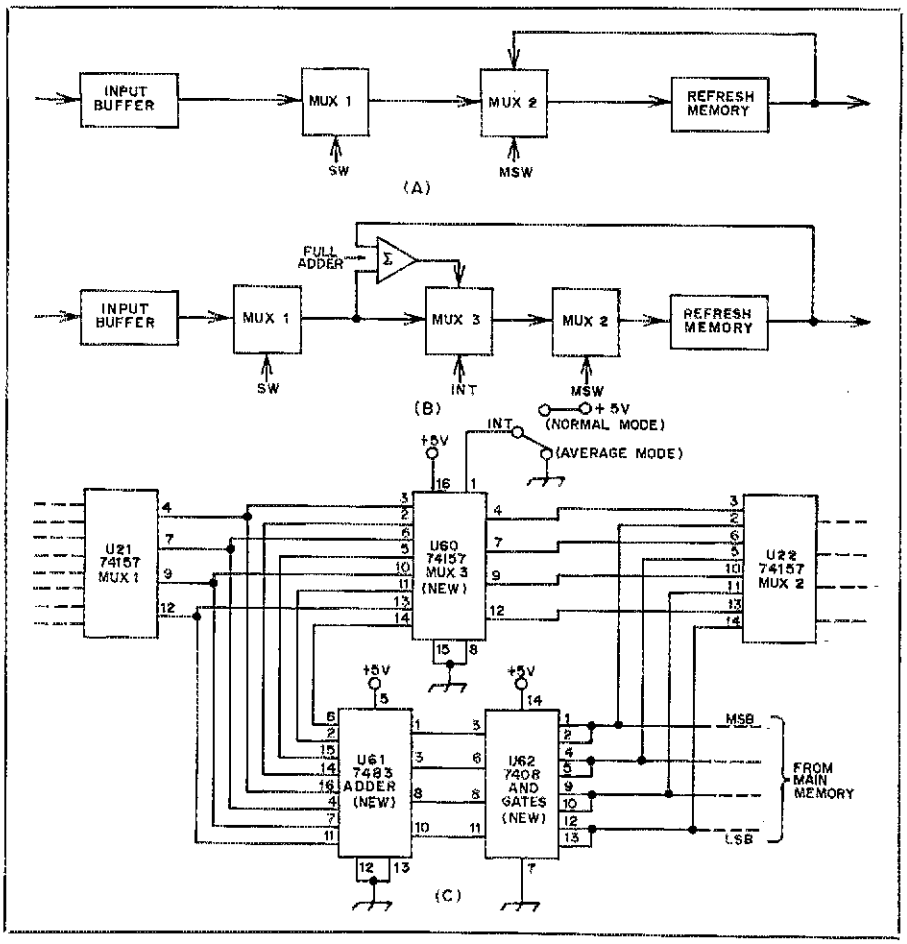


Fig. 4 — Block diagrams (A and B) and schematic diagram (C) of the frame-averaging addition to the WB9LVI scan converter. It requires three additional integrated circuits and provides true averaging of slow-scan pictures in real time. At A is shown the original circuit using two multiplexers, MUX 1 and MUX 2, to control the input video. At B is a modified diagram showing the addition of MUX 3 and a full adder. Shown at C are the actual circuit changes to the diagram originally published on pages 30 and 31, *QST* for May, 1975. U60, U61 and U62 are added.

and excellent performance in communications. Much work has already been done on encoders and perhaps some of it may be directly applicable.

Using conditional replenishment schemes or pseudo-random scanning, it may be possible to transmit pseudo-*motion* pictures over conventional SSTV channels. Strong considerations must be given to the effects of noise, QRM, and circuit complexity in proposing these systems. The experimenter should not be discouraged, however, as much work has already been done in transmitting true television over voice channels. As the cost of integrated circuits drops, many of these schemes may become more economical.

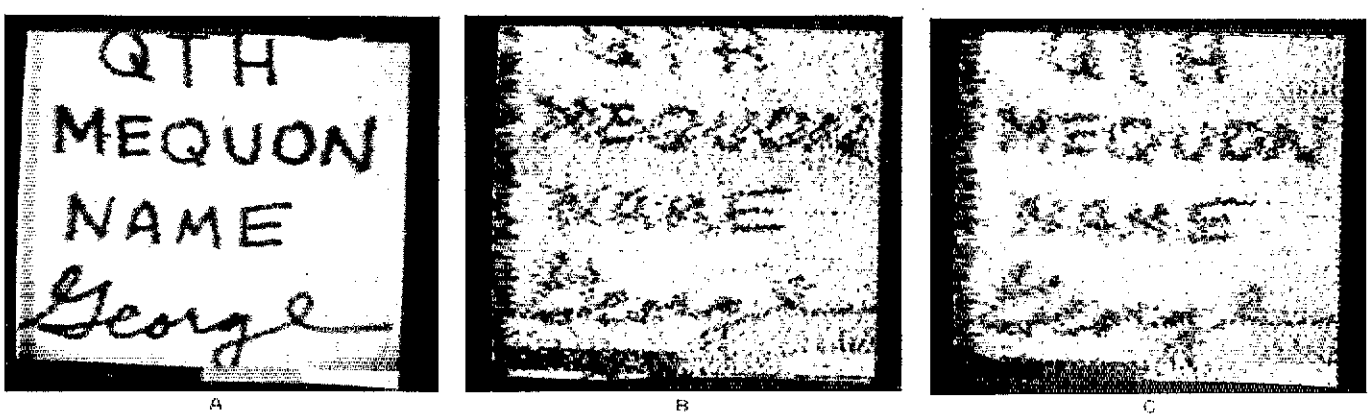
Color slow-scan television is already possible between two compatible amateurs. Many of the existing techniques have used photographic film to restore a full-color image from three separate SSTV frames, each photographed in a different primary color. It appears possible to develop a subcarrier color television signal, compatible with existing slow-scan standards, that could be used to drive a color slow- to fast-scan converter. The output could then be viewed immediately as it was received, directly on a color monitor. Also instead of transmitting the three primary colors one might consider sending only the short- and long-wavelength records, as in the Land experiments,[5] combining these records electronically to achieve nearly full color. This would reduce the bandwidth requirements considerably and still produce rich color pictures.

In conclusion, it may be said that there are numerous avenues of exploration in image processing awaiting the interested amateur — only a few of which were touched upon here. It is hoped that this article will act as a stimulus and perhaps cause some of you to take the gauntlet and get active in this field. If so, the author is satisfied and looks forward to hearing of your contribution.

The author wishes to thank the many amateurs who discussed the ideas contained in this article. As always, special thanks must go to my XYL, Gloria, for her constant inspiration in all of my work. QST

References

[1] Steber, "Slow-Scan to Fast-Scan TV Converter," *QST*, March and May, 1975.
[2] "Special Issue on Digital Picture Processing," *Proc. IEEE*, Vol. 60, No. 7, July, 1972.
[3] "Digital Image Processing," Special Issue, *IEEE Computer*, Vol. 7, No. 5, May, 1974.
[4] Roberts, "Picture Coding Using Pseudo-Random Noise," *I.R.E. Trans. Information Theory*, Feb., 1962.
[5] Land, "Experiments in Color Vision," *Scientific American*, May, 1959.



A B C

Fig. 5 — Example of frame averaging in the presence of severe noise. At A is the original with no noise. B is the first frame read into the scan converter memory and consists of the original SSTV signal plus random noise as described in the text. C is the result of averaging two successive, noisy frames.

A Side-Mount Rotator for a Large HF Array

How one Texan "rides herd" on his 40-meter beam!

By J. P. Ashcraft,* WB5BFZ/WB5DTX

The need for additional gain and the convenience of stacked antennas on the bands from 3.5 to 14 MHz have become evident during the current low in the sunspot cycle. The advantages of stacking beams have been described previously, and an apparent gain of 3 dB is often mentioned.[1,2] Use of two stacked and phased beams on 7 MHz at WB5DTX has pointed up other benefits. The ability to use one or the other beam, or both in phase, makes it possible to have two height selections for operating. Alternatively, two different directions may be chosen, saving rotation time. In order to turn the bottom beam of a large stacked array, it is necessary either to rotate the entire tower, or to use an outrigged rotator so the beam can "look" around the tower, as it turns. Although only 260-degrees rotation is possible with the unit described below, the area not covered was chosen to be the one least needed, in this case due south.

Assembly of Side Arm

The unit is assembled on the ground as shown in Fig. 1. After being hoisted into position, it is fastened to the tower by means of four hardened bolts. A mounting plate is fabricated from 1/4-inch steel plate, with an opening and bolt circle to receive the motor used. A Y-shaped saddle of steel channel, 3 X 1 or 3 X 1-1/2 inches, is formed and welded to the mounting plate as shown. A similar saddle and mounting plate hold a flange selected to clear the 2-inch OD steel vertical shaft by 1/16 inch. Dimensions for the horizontal members and antenna support mast are shown in Fig. 2 and have to be altered to suit the tower size used. The vertical support mast is nine inches from the tower leg, and the tower shown is 20 inches on a side. The turning of the vertical shaft permits the antenna support mast to clear the back of the tower while supporting a 3-inch boom. Connection from the prop-pitch motor to the drive shaft is by means of a welded adaptor to match the diameter of the motor shaft to the 2-inch OD tube. The shafts are drilled to 1/2 inch and reamed with a No. 9 tapered reamer. A No. 9 taper pin is driven into the shafts to lock them together. This arrangement overcomes backlash, and, in combination with the 2-inch OD, 5/16-inch thick-wall, heat-treated tube used for the antenna support frame, results in an extremely strong assembly.

Motor

The rotator employs the well-known prop-pitch motor. The unit most widely used is not easily described, as models and types bear no evident identity. They are often said to be "small prop-pitch motors," and their weight with mounting flange is about 35 pounds. Mounting is through six equally spaced holes around a 5-5/16-inch bolt circle. Power required is 28-volts dc at 6 to 8 amperes. The motors used at WB5DTX are of the small variety, with a gear-reduction ratio of roughly 10,000 to 1, and the output shaft turns at about 1 rpm. Saunders described a modification to get a higher rpm from a prop-pitch motor, but it has been found that higher speed is not important with stacked beams and only increases the danger of overtravel. The magnetic brake in the motor is not used.[3] Use a single-pole, double-throw momentary-contact switch with a center off position

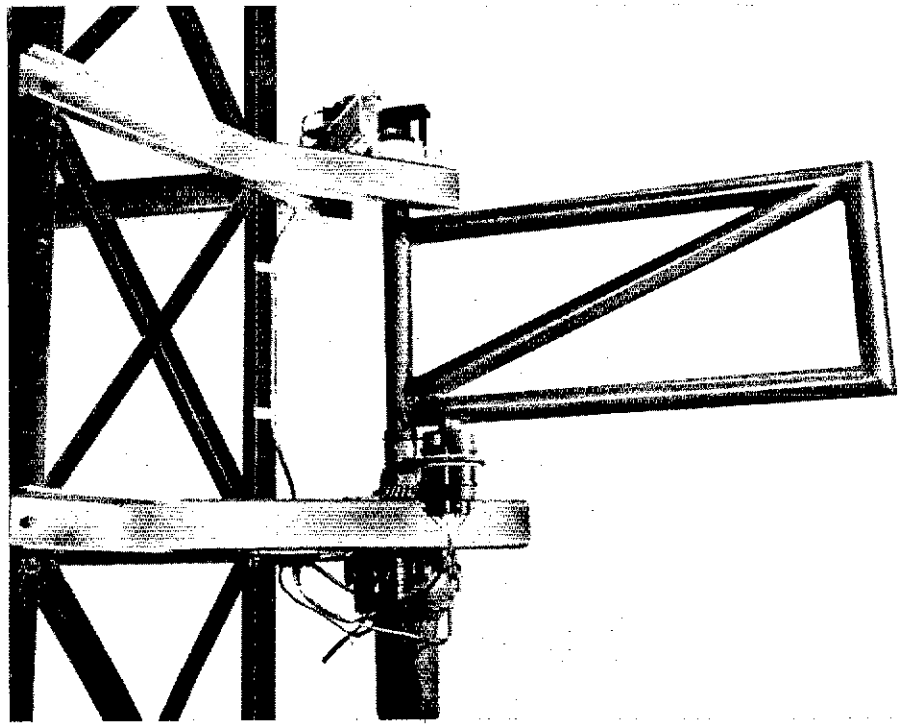


Fig. 1 — The rotator assembly mounted on a tower at WB5DTX.

[1] Footnotes appear on page 18.

*3008 Southwestern Blvd., Dallas, TX 75225

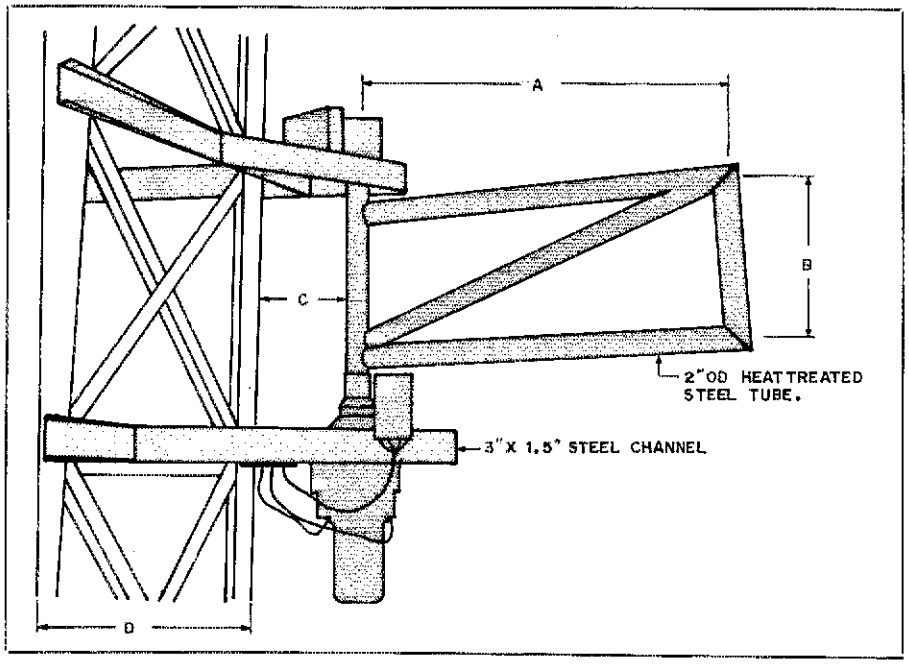


Fig. 2 — Dimensions for the side-mounted rotator: A — 33 inches; B — 13 inches; C — 9 inches; D — 20 inches.

capable of switching the current demand of the motor.

Limiting the travel of the motor is very important, since the power of the rotator and strength of the side arm can cause damage if overtravel occurs. Rubber pads are desirable to take the shock in case of slight accidental overtravel. At the top of the drive mast is a cam to open limit switches at either end of the rotation, breaking the current to the motor. The switches (Electro Snap Switch of Chicago No. 068-H18) are hermetically sealed. Additional safety may be obtained by using the normally open contact on each switch to turn on an indicator light at the operating position to indicate end of rotation.

Control Indicators

Surplus synchro motors and generators are used with a radio compass indicator often found at surplus aviation equipment dealers. The drive for the synchro is taken directly off the driven mast with a 5/16-inch Neoprene O-ring belt, made to order from a kit containing instant bonding cement and several sizes of O-ring material. The pulley for the antenna-mounted synchro is made from molded nylon with an aluminum sleeve inserted. The sleeve is tapped for the shaft of the synchro to be used. The pulley is threaded on and epoxied in place. The indicating device is mounted in a standard cabinet.

Conclusion

Building this unit requires access to an electric welder, a good metal saw (such as the "roll-in" type), a drill press, and a small lathe. The work may be jobbed out to a machine shop if a clear set of drawings is provided. The materials needed depend on the actual installation, and are available from surplus dealers and steel and electrical suppliers. None are scarce except the prop-pitch motors. One good place to look for these is in the *QST* Ham-Ads. One ad turned up 14 motors! This type of construction is more the blacksmith art than the solid-state art, but it sure brings in the signals! QST

Footnotes

[1] Kasper, "Optimum Stacking Spacings in Antenna Arrays," *QST* for April, 1958.
[2] Kasper, "Array Design with Optimum Antenna Spacing," *QST* for November, 1960.
[3] Saunders, "A Quick Change of Pace for the Prop-Pitch Motor," *CQ* for August, 1949.

Strays

Mounds of TV-dinner trays, aluminum cans and pull-tops in an ever-increasing flow over two years — that's what it took the Lockheed ERC Amateur Radio Club (W6LS) to reach their objective of 3,000 pounds of scrap aluminum. The 150-dollar profit realized from the drive went toward purchasing a guide dog "Misty" for Frank Ferrara, WA6YVJ, a blind amateur who lives in Glendale, CA. The project was run by a W6LS family trio: Marie (W6JEP), Bill (W6DDB) and Carl (WA6FNM) Welsh. Carl is the 15-year-old son of Marie and Bill.

The dog's trainer, Erich Renner, WA6MAM, recently completed a W6LS licensing class and obtained his General class license. The chief doctor for International Guiding Eyes, Joseph Giardina, WB6INB, also recently completed a W6LS licensing course and obtained his Advanced class license. Both men registered for the courses without knowing the club was involved in an aluminum drive to pay for one of their dogs.

W6LS members are not finished, however. They'll continue to collect scrap aluminum for one more year with the income slated to purchase refreshments served at local bloodmobiles.

Having successfully completed its drive to pay for a guide dog, Lockheed Amateur Radio Club (LERC) members meet "Misty" and his new owner Frank Ferrara, WA6YVJ. Looking on are (l-r) Bill Welsh, W6DDB; Joe Giardina, WB6INB and Erich Renner, WA6MAM.

International Guiding Eyes Director, Duke Lee, presents an award to Marie Welsh, W6JEP, who coordinated the W6LS aluminum drive that paid for the guide dog.

The Synthascanner

When you add a synthesizer to your 2-meter fm rig, it becomes an aggiornamento. This compact accessory will modernize your synthesizer too!

By Eugene R. Zobel,* K6AP

Frequency synthesizers are becoming commonplace. Several excellent models are available in finished and kit form. There is little question about the fascinating horizons opened up by operation with synthesizer frequency control, but there also seem to be some operating limitations. The inherent inflexibility of thumbwheel and rotary switches has been discussed previously in *QST* together with at least one alternative.[1] Here is another option that not only frees the synthesizer of its switch dependency but also provides a scanning capability.

The Synthascanner is designed to be an accessory to an existing synthesizer which has positive BCD encoding, such as the GLB unit.[2] The traditional switch bank is replaced by a keyboard, with the frequencies being displayed by seven-segment LEDs. As the transmit and receive frequencies are entered via the keyboard, they are stored in a random-access memory (RAM). Eight such transmit/receive pairs can be stored, and the receive (or transmit) channels can be scanned for activity with automatic hold and frequency display once an active channel is sensed. Frequencies can be changed at will.

The prototype unit has been mated with a GLB synthesizer and is used with a Canadian Marconi DT76 transceiver to provide coverage of the 144- to 148-MHz band in 10-kHz increments.

The Synthascanner is a joy to operate and increases the ease of use, versatility and effectiveness of the synthesizer. It is particularly useful when touring in unfamiliar or low-activity areas. Scanning a number of popular frequencies is apt to turn up new repeaters or groups of activity. Conversely, in those areas of heavy activity, scanning allows one to easily find unoccupied channels for simplex operation. Surely this is a significant improvement over our "rock-bound" past. It combines the advantages of standard channels with the versatility of full-band coverage.

Circuit Description

The block diagram (Fig. 1) indicates the relatively simple functions performed. A surplus hand-held calculator

[1] Footnotes appear on page 22.

*524 Washington Street, El Segundo, CA 90245

Here is the author's assembled unit. Functional and orderly in appearance, it resembles a four-function calculator!

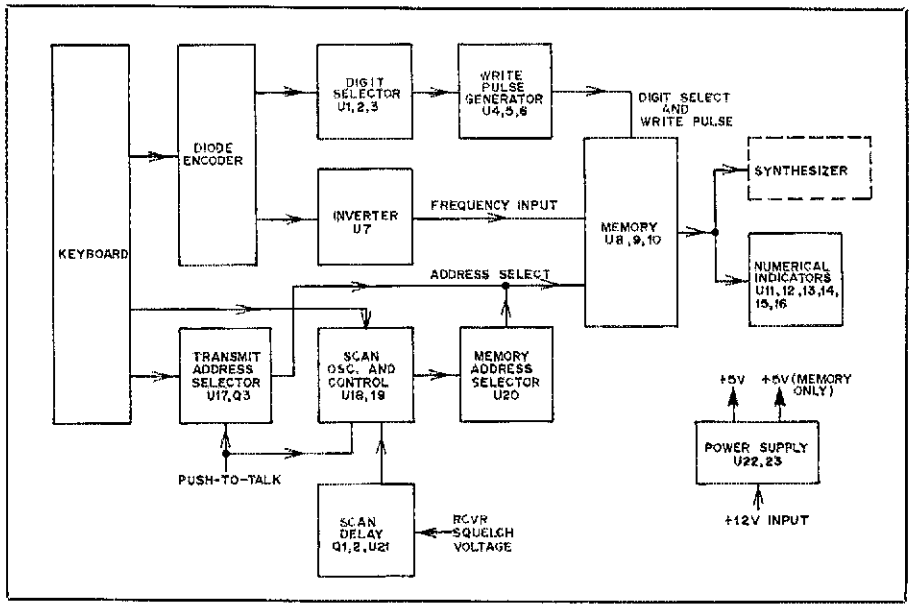


Fig. 1 — Block diagram of the Synthascanner.

Table 1

Synthesizer Connections

FROM	*TO SYNTHESIZER*		*GLB BOARD NO.*
U10 Pin 11	Megahertz	8	Z7 Pin 11*
U10 Pin 9	"	4	Z7 Pin 3*
U10 Pin 7	"	2	E22
U10 Pin 5	"	1	E21
U9 Pin 11	Hundreds kHz	8	E20
U9 Pin 9	"	4	E19
U9 Pin 7	"	2	E18
U9 Pin 5	"	1	E17
U8 Pin 11	Tens kHz	8	E16
U8 Pin 9	"	4	E15
U8 Pin 7	"	2	E14
U8 Pin 5	"	1	E13

*For coverage of the frequencies from 144-148 MHz, these two wires are not connected. To give coverage of the frequencies from 140-149.99 MHz, grounding foil to pins shown must be opened (see GLB instruction booklet).

keyboard provides the number inputs. Since the RAMs store input information in BCD format, it is necessary to convert the switch closures to BCD code. The diodes shown at the left of Fig. 2 perform this conversion. Sequencing of the megahertz digit (input to U10), the hundred-kilohertz digit (input to U9) and the ten-kilohertz digit (input to U8) is accomplished in a write sequencer circuit comprised of U1, U2 and U3. Proper operation of the memory circuit requires a write pulse. This pulse is provided by U4, U5 and U6.

Memory locations must also be in BCD format and these are provided by U20. The output of U20 is changed while scanning, by means of the scan oscillator U18, and turned on and off by signals from the keyboard through U19. The scanning is delayed upon signal receipt by U21 and put on hold by means of a push-to-talk signal via U17.

Memory outputs are provided to the readouts DS14, DS15 and DS16 via the decoders U11, U12 and U13. These outputs are also provided to the synthesizer as frequency controls.

Proper level and regulation of the input voltage for the Synthascanner are provided by U22 and U23 with memory circuits continually powered. This makes it unnecessary to load the memories after each shutdown. If this feature isn't required, one regulated supply should provide the proper voltage with this reduced current requirement.

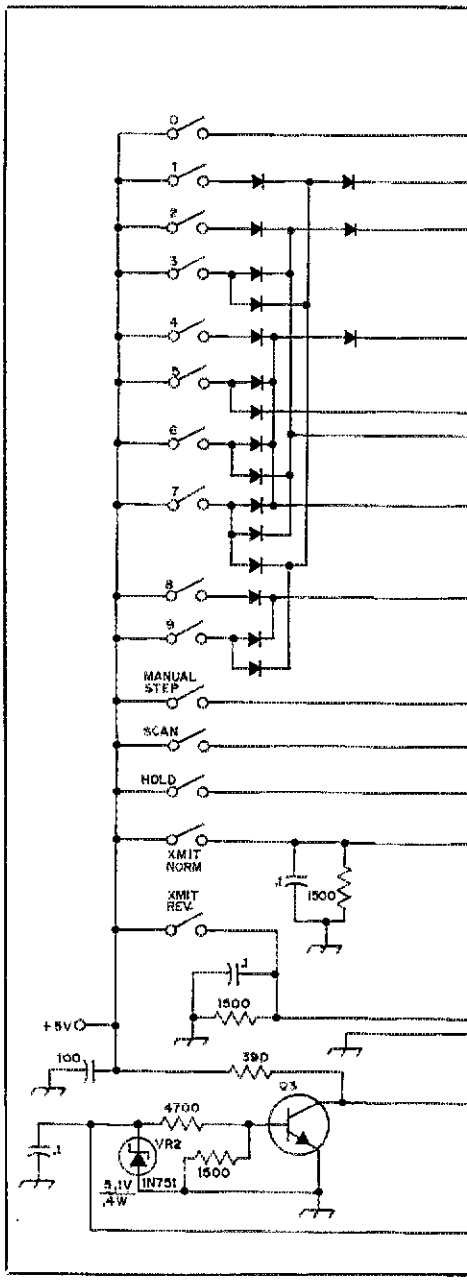
Construction

All of the ICs are TTL type and are available from numerous *QST* advertisers. Total parts cost should run under $50. The keyboard used in the prototype is a Wild Rover model C-1519. Almost any keyboard can be used that provides single-pole closures to a common or multiple bus. A Touch-Tone keyboard is not suitable, however, since it has a special contact-closure arrangement and would require a complex encoding circuit.

The prototype was constructed using point-to-point wiring on single-sided, copper-clad perforated board. This method is time-consuming and requires great patience, but offers flexibility during circuit design. A pc-board layout is being prepared and should be available by the time this article appears in print. An s.a.s.e. to the author will bring details. Whatever layout you use, be sure to sprinkle it liberally with .001 or .01 μF "glitch-elimination" capacitors. The prototype is housed in an LMB-138 box with overall dimensions of 6-1/4 × 3-1/2 × 2-1/8 inches.

It should be pointed out that the prototype also contains the first two digits of the five-digit frequency presentation. Details of how to hard wire these two digits are shown in Fig. 3. Table 1 is an example of how the Synthascanner can be connected to a GLB Model 400B channelizer. Note that the GLB synthesizer has an option to cover 140-150 MHz and that option is easily adapted to in this circuit. In the case of the GLB unit, the switches and associated diodes should be disconnected from the pc board and the Synthascanner connections made directly to the circuit board. The GLB used at K6AP has been repackaged into a much more compact box with all circuits (except rf) available at a single interconnection plug. Don't forget to use feedthrough capacitors on all lines as warned in the GLB instruction manual.

The push-to-talk circuit requirement is the same as the synthesizers and can be on the same line. The squelch circuit



was designed to be used with the DT76 receiver which swings from +12 to +6 volts when a signal is received. The 1N757 acts as a level-shifter and allows Q1 and Q2 to leave saturation upon reception of a signal. The voltage-regulator level of VR1 may require tailoring to your transceiver squelch circuit.

Scanning rates and squelch delay can be adjusted to your liking. The GLB locks onto signals very rapidly, so it is possible to scan at eight or ten channels per second without missing active channels. Some synthesizers have slower lock-up times and may require a slower scan rate. A three- to five-second squelch delay seems to work well for

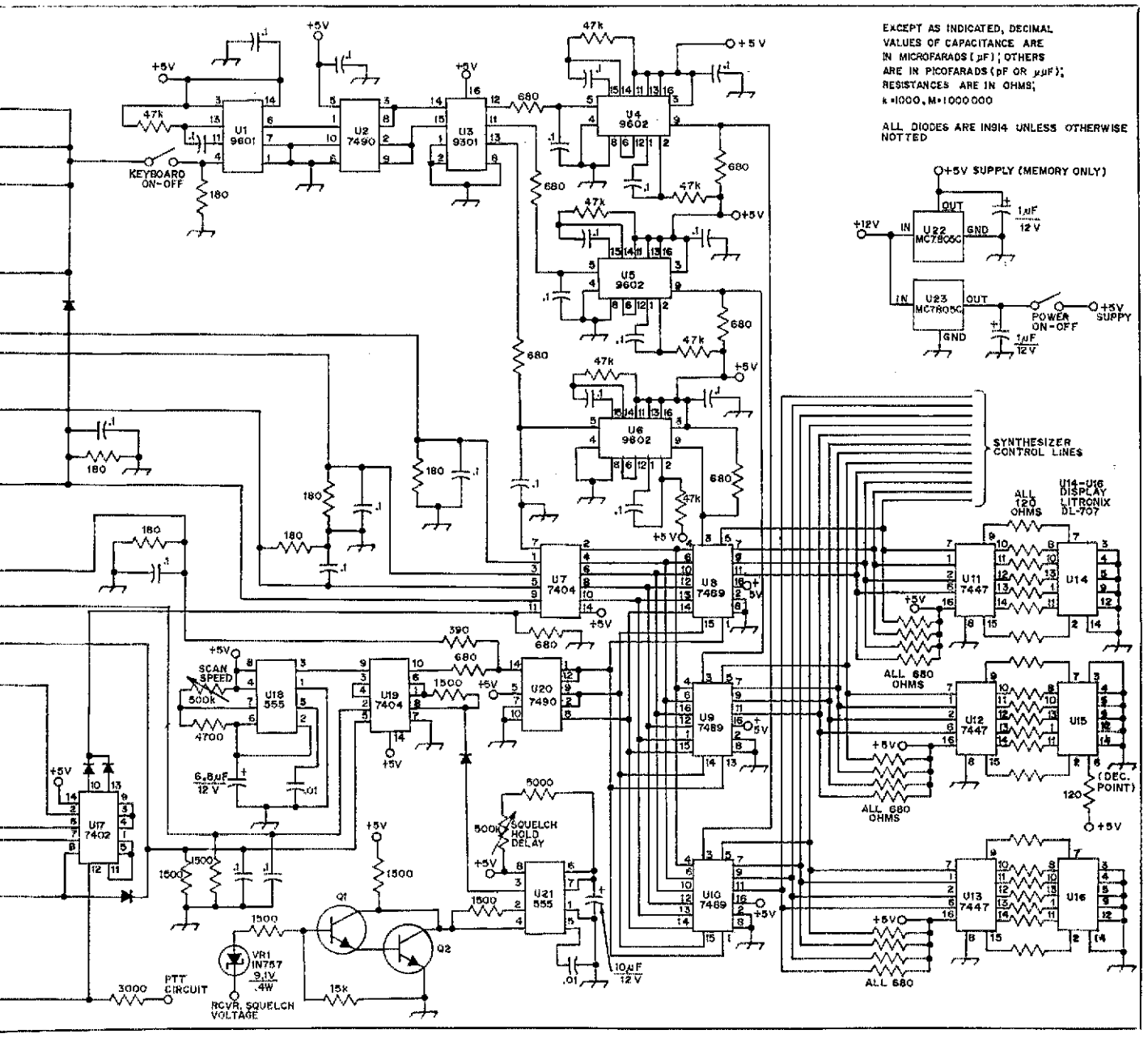


Fig. 2 — Schematic diagram of the Synthascanner. Switches at the left of the diagram are the keyboard keys. Only three of the five displays are decoder driven. The two remaining displays are permanently wired to indicate 1 and 4 (see Fig. 3).

most areas, but certain repeaters may require a longer delay to compensate for the operating habits of the repeater users.

Operation

Operating the Synthascanner is relatively straightforward. "Punching" the hold button stops the scanning operation and allows manual sequencing. A receive frequency is then programmed into the memory by punching the last megahertz digit, the hundreds-kHz digit, then the tens-kHz digit. The control circuitry automatically stops from one digit to the next. The corresponding transmit frequency can then be programmed by first pushing the reverse-transmit button and repeating the above sequence. Another frequency pair can then be addressed by pushing the manual-step and normal-transmit buttons. The receive and transmit frequencies are once again entered.

After all eight receive and corresponding transmit locations have been entered, the scanning action can be initiated by touching the scan button. The scanning stops for about five seconds (adjustable) each time it encounters an active channel and each succeeding transmission on the channel resets the timer. An inactive channel (greater than five seconds) causes a return-to-scanning operation of the Synthascanner.

If one wishes to resume scanning before the five seconds have expired, simply press the manual-scan button. If a particular channel is causing undesired continued hold, the channel can be changed by entering a different (unused) frequency.

It is also possible to provide greater priority to a given frequency by programming it into several adjacent memory locations or by alternating the priority channel between others.

There are, of course, many variations of the circuitry that can be utilized. It is apparent that there are probably shortcuts that can be used and also that there are many additional niceties that could be added. Certainly, if only a few

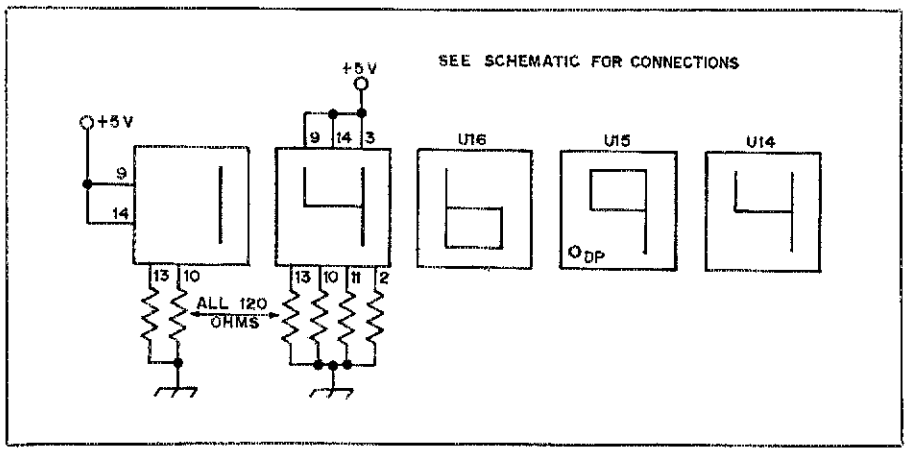


Fig. 3 — Hard-wiring diagram of the first two digits in the Synthascanner's display. Resistors are 120Ω, 1/4 watt.

channels are required, it would be very simple to use latch circuits instead of memories. The number of variations seems limitless.

Acknowledgements

The writer wishes to gratefully acknowledge the encouragement and assistance of the members of the El Segundo Radio Club, and in particular, the suggestions and proofing of Ron Gookin and John Swancara, WA6LOD. The photograph was taken by Ed Heimer.

Footnotes

[1] Rasmussen, "A Tuning Control for Digital Frequency Synthesizer," *QST*, May, 1972, page 29.

[2] McMullen, "GLB Electronics Model 400B Channelizer," *QST*, June, 1974, page 42.

Strays

QST Congratulates . . .

□ Members of the Amateur Radio Association of the Tonawandas (NY) voted one of their founders as the outstanding member for 1975. Ralph Janowsky, W2RPO, received the honor. He was a Signal Corps captain during World War II and now resides in Pendleton, NY. Presently, he is a research engineer.

□ Conspicuously disguised as an authoritative guide on camping, *The I Hate to Camp Book* was published in 1973 and describes "creeps" that disturb camplife — including ham radio operators. Nowadays, author Charmaine Severson, is eating her words instead of writing them. Her husband, Allan, is WN8BBQ and their son, Craig, is WN8ACM. — *K8YUW*

Frank Peletz, WN9VKM, said it loud and clear during the K9HWI/9 Field Day operation this summer.

A DOUBLE TAKE

□ In the latest *Callbook* update, fall, 1976, two consecutive entries have consecutive alphabet letters in the same place. Not unusual? Look again:

WBØTMU Dick Jugel
WBØTMV Pete Kugel

Their tale of path-crossing started when Dick worked in Omaha, Nebraska, from 1964 to 1968, while Pete was a Marine recruiter there from 1967 to 1969. They did not know each other then.

Still unaware of each other, both started working for Electronic Data Systems in Dallas, Texas, in fall, 1970. Pete was assigned to an account in Denver, Colorado, while Dick stayed in Dallas. Soon, their internal-company mail was being missent. When Pete returned to the home office he purposely looked up Dick.

In 1973, they were both assigned to Hartford, Connecticut, again on separate assignments. They arrived about one month apart, but rented houses on the same block in the town of Bristol. Dick caught the ham radio bug again after a 10-year lapse. Gary Nichols, WA1GWH, was his Elmer. They brought Pete on board and both got their Novices in fall, 1974.

A few months later Dick left EDS for a job in Omaha while Pete went home to Chicago. Of course, they were good friends by then, so after several visits with Dick, the Omaha company offered Pete a job.

Once settled in Omaha they went for upgrading last spring. Dick made Advanced while Pete got a Technician. Later, Pete also qualified for Advanced. A QSL card? They're still working on it.

Feedback

□ In September 1976 *QST* there are two errors in the pc-board information. (1) A 470-ohm resistor is shown in the layout of Fig. 2, page 22, in place of CR2. (2) The pc foil should be joined at Q1 to connect the B+ ends of the base resistor (15,000 ohms) and the collector resistor (1500 ohms).

□ Thanks to the discerning eye of WB8QYM we report an error in the pc-board pattern for "The Mini-Miser's Dream Receiver," *QST* for Sept., 1976. In Fig. 2, at the lower right, there is a short across the 150-μF electrolytic capacitor, as the pattern is shown. The foil should be opened so that the capacitor can serve its intended purpose.

□ Confusion continues to reign regarding Q1, the pass transistor for the power supply in "Learning to Work with Integrated Circuits," Part 1, January 1976 *QST*. Confusion, cease and desist! The pictorial drawing in Fig. 1 is indeed in error for the SK3083, as was mentioned subsequently in Feedback (August *QST*) and again in Part 8 of the series. If you use a 2N5193 or HEP substitute (S5007), view the transistor with the metal plate down and the pins pointing toward you. The pin connections now (from left to right) are emitter, collector, base.

In the input wave-shaper circuit, Fig. 28 in Part 8 of the series (October 1976 *QST*), the letter k was inadvertently omitted for the 47-kΩ input resistor, connected to the gate of Q3. The information in the circuit board overlay, Fig. 29, is correct. — *K1PLP*

□ The S-scale values given in Table 4 of "On Signal Strength Evaluation" (*QST*, October, 1976) are in microvolts (μV) rather than millivolts (mV).

A VFO Frequency Divider

Divide and conquer has been the philosophy of many a general. Novice, General or Extra, this divider may allow you to conquer the single-band dilemma!

By Sam Creason,* WA6LSL

Over the past few years, quite a number of designs have appeared for one- and two-band transistorized transmitters in the five- to ten-watt class. The design which is featured in the 1975 *Handbook* is typical of these. It provides about eight watts on both 40 and 20 meters. After building one such unit and using it for several months, this writer decided to see if it could be made to work on some of the other hf bands.

Adding 15 meters was no problem. A push-pull tripler was connected to the output of the VFO (7 MHz), producing drive at 21 MHz. Providing the appropriate tuned circuits in the succeeding stages completed that modification, yielding a three-band rig.

Adding 80 Meters

Adding a fourth band, 80 meters, was a bit more difficult. The VFO could have been moved to 3.5 MHz, with an additional stage of multiplication used for the higher bands. However, a good deal of care had been taken to ensure that the VFO was mechanically sound and stable, so that the rework would have been difficult. Accordingly, a different approach was taken — an outboard frequency divider was inserted after the VFO.

The VFO delivers a 7-MHz signal to the input of the divider circuit. The divider circuit then provides an output with approximately the same characteristics as the VFO, except at half the frequency (3.5 MHz). Divider circuitry can be disabled when coverage of the higher bands is desired. A schematic diagram of the divider is shown in Fig. 1.

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The heart of the device is half of a 7474 TTL type *D* flip-flop, U1, which is connected in a divide-by-two configuration. The 7474 is rated to toggle to at least 15 MHz, so it is more than adequate for this application. A well-regulated 5-volt source is required for the flip-flop and this is provided by U2, an LM-309H regulator fitted with a heat sink.

Rise and fall times on a 7-MHz sine wave are short enough to properly clock the flip-flop, but the negative-going portion must be removed to prevent damage to the 7474. This clipping of the negative-going portion of the sine wave is accomplished by Q1, a 2N2222A transistor which is used as a Class C amplifier. Q1 is powered by the LM-309H so that the pulse train to the flip-flop will be of the proper magnitude. The value of RFC1, the base return of Q1, and RFC2 in the source circuit of Q2 is 10 μH. Output from U1 is applied to Q2, an MPF102 which is connected as a source follower. Output from Q2 drives Q3, a 2N2222A Class A amplifier output stage.

Output from U1 is a square wave with a fundamental frequency of 3.5 MHz. A fair amount of filtering is required before that signal reaches the antenna, or the results will most certainly be a multi-band rig in a very

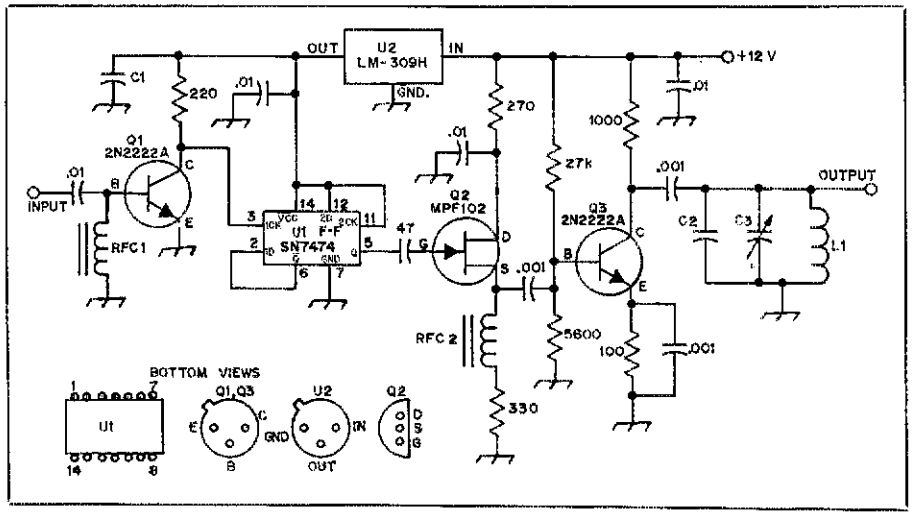

Fig. 1 — Schematic diagram of the frequency divider. Unless otherwise noted, fixed-value capacitors are disk ceramic. Resistors are 1/4- or 1/2-W composition. Assemble on single-sided pc board.

C1 — 6.8-μF, 10 V, tantalum type.
C2 — 100-pF, mica type.
L1 — 10 μH, 41 turns of No. 26 enameled copper wire on T-80-2 core, spaced to occupy entire diameter.
RFC1, RFC2 — See text.

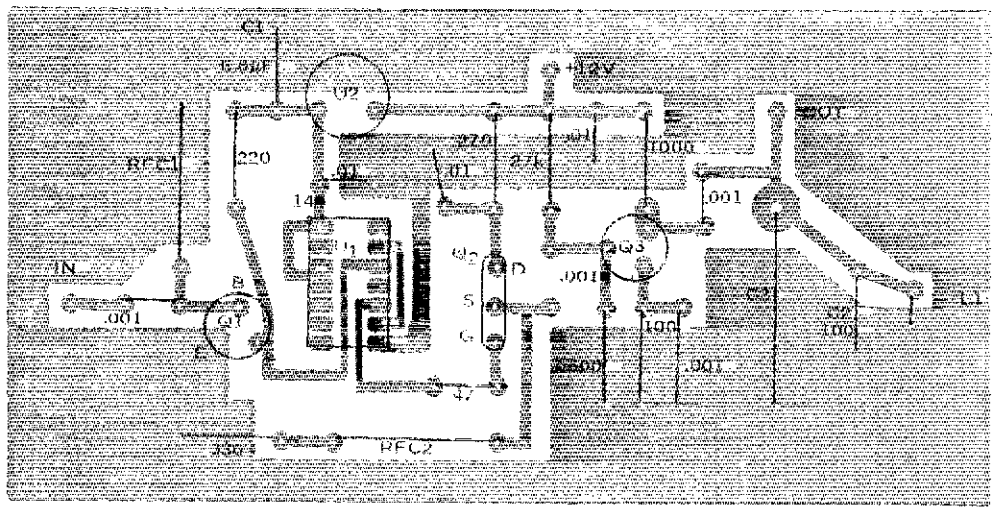

Fig. 2 — Foil-side scale pattern of pc board. Circuit board is single-sided glass-epoxy material. Grey areas represent copper.

undesirable way! The tuned circuit made up of C2, C3, and L1 provides at least some filtering. In the writer's rig, the driver and final tuned circuits, and half-wave filters provide enough additional suppression of harmonics that a sensitive wavemeter shows no significant energy above 3.5 MHz at the output to the antenna. The device should be assembled on a printed-circuit board in order to assure good stability. The circuit board pattern is shown in Fig. 2. Rf input and output leads should be brought to the board via miniature cable such as RG-175/U.

Conclusion

The divider has been in use for several months at WA6LSL with good results. It provided an excellent alternative to tearing apart and rebuilding the station VFO.

One final note — although it has not been tried, a *D* flip-flop CMOS CD4013 type might work well at U1. This would eliminate the need for the LM-309H, since CMOS integrated circuits do not require a well-regulated source of power, and they can be operated at voltages up to about 15. The '4013 could be powered directly from the 12-volt supply. Indeed, it probably would have to be powered in that fashion, since it is not guaranteed to toggle above 1 MHz when powered by a 5-volt supply. QST

Strays

Bob Dreste, K7VOR, was named 1976 Ham of the Year by the Amateur Radio Council of Arizona in recognition of his many years of service in the interest of amateur radio. The Council represents over 4,000 amateur operators in the state. K7VOR was co-founder of the ARCA and is an assistant director of ARRL.

□ Dave Vitkus is a 13-year-old with a talent — OSCAR. A SWLer since he was six, Dave designed and built a display of the satellites that copped first prize in each of the Science Fairs he entered.

The project (which he modestly describes as "not very elaborate") was good enough to take First Prize in Physics at his hometown fair in Knox, IN. He next traveled to the Regional Fair at Valparaiso, where he was again awarded first place, this time in engineering.

Dave received his Novice call sign, WN9RXV, at age 12, after his dad introduced him to a ham friend. "I was really thrilled listening to him talk over the airwaves, let alone to Washington," he remembers. Dave upgraded to General recently and is awaiting his new license.

A loyal amateur, the youngster undertook his OSCAR project as a means of giving some publicity to his favorite hobby. After the *Popular Mechanics* article on the satellites caught his interest, Dave set to work on his display. It consists of a diorama of the earth and sky, with models of both OSCARs, several posters detailing what they're doing up there and a visitor-controlled slide viewer. A continuous tape of an OSCAR QSO made by DJ6RD gave visitors a glimpse of the real thing.

Dave wants to set up an OSCAR ground station, but also has a few other things on his mind. Besides studying for his Advanced, he explains, "My other hobbies are basically electronics, SWLing, astronomy, micro-computers and model railroading."

If that weren't enough, he is working on an ATV vhf fast-scan station and edits the newsletter of the Starke County ARC.

Where can he go from here? For one thing, Dave hopes to go on to college and study "microcomputers in relation to astronomy-space." We wish him well.

For Accuracy, Go Wheatstone

What ham wouldn't like a shack filled with lab-type equipment? Commercial-grade test equipment can be built in the experimenter's workshop. Here's one piece!

By Sidney D. Gilstrap*

The Wheatstone bridge named for Sir Charles Wheatstone, a noted physicist of the mid-1800s, is a nearly indispensable instrument in most electrical and chemistry labs. In its most familiar form it is a simple bridge used for measuring resistance. Because of its accuracy and almost infinitesimal resolution, it can facilitate measurements far beyond the ability of most other resistance-measuring devices

Fig. 1 illustrates the basic bridge circuit. In operation, when R1/R2 = R3/R4, the bridge is said to be balanced and no current will flow through the galvanometer. R1 represents the unknown resistance, R2 the known resistance, and R3 and R4 are variable resistances of predetermined and known values. These resistors are changed to vary the range of the instrument. In the bridge circuit to be described, R4 remains constant at 10,000 ohms and R3 is varied in decade steps. R4 could be varied in decade steps if better resolution were desired at the high and low extremes, or if ranges above and below those given here were desired.

There are at least two disadvantages associated with most commercial bridges as far as the amateur is concerned. The low-resistance galvanometers normally employed require considerable loop current. Second is the expense. The commercial units are very costly considering the relatively low use they would get around the ham shack. In the inexpensive bridges that the author has used, R2 and R4 are replaced with a potentiometer, the wiper serving as the junction. This results in a wildly nonlinear scale. Dial calibration on a pseudo-log scale can compensate for this; however, with the tolerance normally available, the erratic linearity, and the poor reset accuracy of carbon potentiometers, the accuracy is no better than that of a good VOM. The application of ac to these instruments may render them useless for some measurements.

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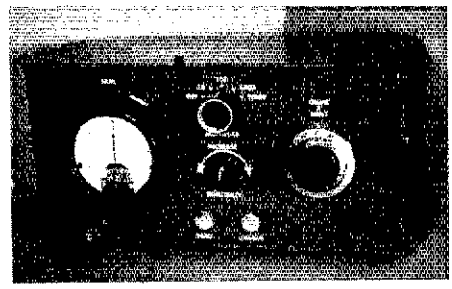
The Circuit

The bridge described here can be constructed for about $50 when employing new parts. Accuracy should be better than 0.5 percent. By taking advantage of the surplus market, a comparable unit could be built for less than $20. Accuracy of better than .01 percent should be obtainable if a calibrated laboratory bridge is available for tailoring resistors. Multiturn potentiometers could be substituted for resistors R2, R3, R4, R5 and R6. Rule of thumb suggests that the standard should have an accuracy four times that of the desired measurement. Thus, if the standard bridge has an accuracy of .001 percent, the measurement can be considered accurate to .004 percent. In this unit, the absolute accuracy of the ten-turn potentiometer (known element) is of less importance than the linearity. This potentiometer and the dial will probably be the most expensive components in the instrument.

In the author's bridge the known element (R7) is a Borg Model 205, which has a linearity accuracy of 0.1 percent. The battery is a nine-volt transistor-radio type. A 22-1/4-volt battery could be substituted to improve resolution at the high end of the R × 1000 scale. However, this bridge was designed primarily with a range of ten ohms up to about half a megohm in mind. As stated previously, better resolution may also be obtained by switching in other decade resistors at R6. Do *not* substitute a supply with high current capability (more than a few mA). Current *must* be limited, as the known element is easily destroyed. One of the best ways to limit the current is through the internal resistance of the supply.



Construction

It is vitally necessary to avoid erratic contacts or resistances. Special attention must be paid to all soldered connections. The rotary switch should have silver- or gold-plated contacts and the

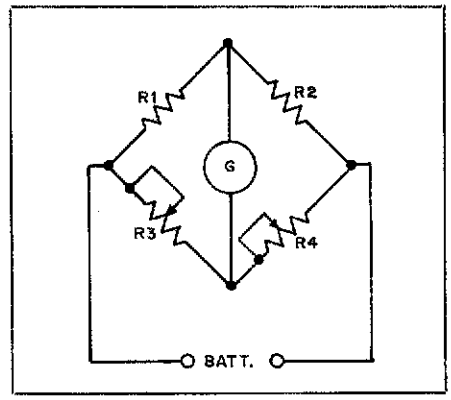
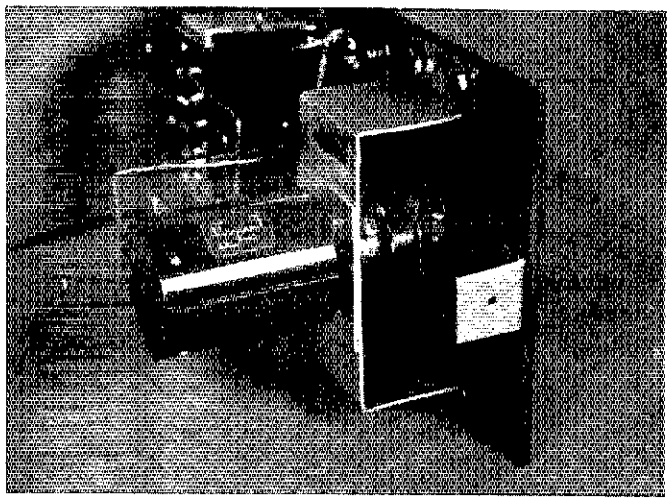
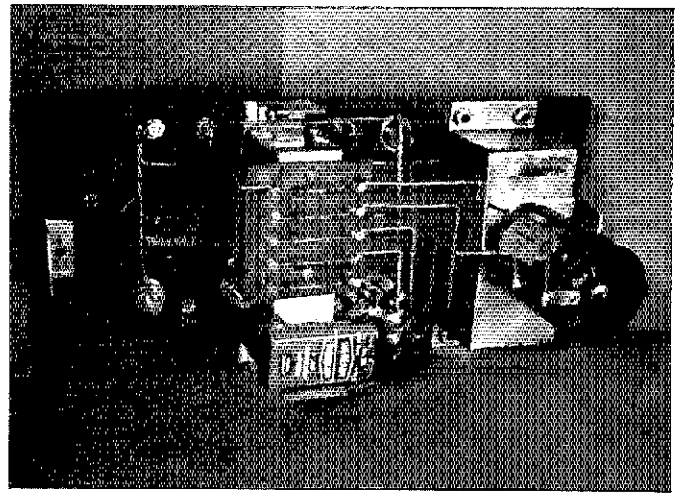


Fig. 1 — Basic Wheatstone bridge circuit.
R1/R2 = R3/R4
R1 — Unknown R.
R2 — Unknown R.
R3 — Variable R (known value).
R4 — Variable R (known value).





The Wheatstone bridge as assembled by the author. The large object mounted on the aluminum bracket is the precision potentiometer.

pushbutton switches should be the snap-action type to avoid possible changes in contact resistance. On S-2 the normally closed contacts are used to short out the galvanometer and damp the meter movement when transporting. It is not necessary to run the conductors exactly as shown in the pictures. This does not represent the only way, or possibly even the best way, to wire the unit. The dial is an Amphenol Type 1350 which boasts an indexing accuracy of 1000:1. As the ultimate accuracy is a function of the dial and potentiometer combination, don't skimp.

The meter is a surplus 0 to 100-μA unit which was modified for zero-center use. This is a fairly simple operation and results in an excellent and inexpensive galvanometer. In as nearly a dust-free environment as possible, remove the movement from the housing. Three screws around the case are usually all that hold it in. Sealed meters are not normally usable. Remove the meter face carefully, clean the back with solvent and spray paint it flat white. Apply suitable dial markings, spray with clear enamel, and replace the face on the movement. Displace the front and back spring levers an equal amount to bring the needle to center zero. Do this carefully as the meter adjustment screw is not normally usable after this operation. Linearity of the meter may not be exact, but this is not important as a center reading is all that is required. Commercially available meters may be used but are quite expensive especially for the better quality units. A flexible drive from the dial assembly to the potentiometer is a necessity. A dual flexible coupling was used in this meter. Calibration of the instrument is best performed with a laboratory bridge. However, quite accurate results may be obtained by using a number of 1 percent or better resistors and setting the dial to the mean readings on the various ranges. Keep in mind that even a 1 percent, 100-kΩ resistor may vary 1000 ohms either side of its 100-kΩ value. With off-the-shelf parts used in construction, and assuming a 0.5 percent accuracy, this could be as much as 1500 ohms each way. This looks good since most VOMs and VTVMs operate at approximately 5-percent accuracy.

The cabinet was constructed from 1/4-inch thick Masonite panels using epoxy resin and glue strips at the corners. This method worked well; however, a metal cabinet would be better.

Using the Instrument

A few uses for the bridge include measurement of meter-movement re-

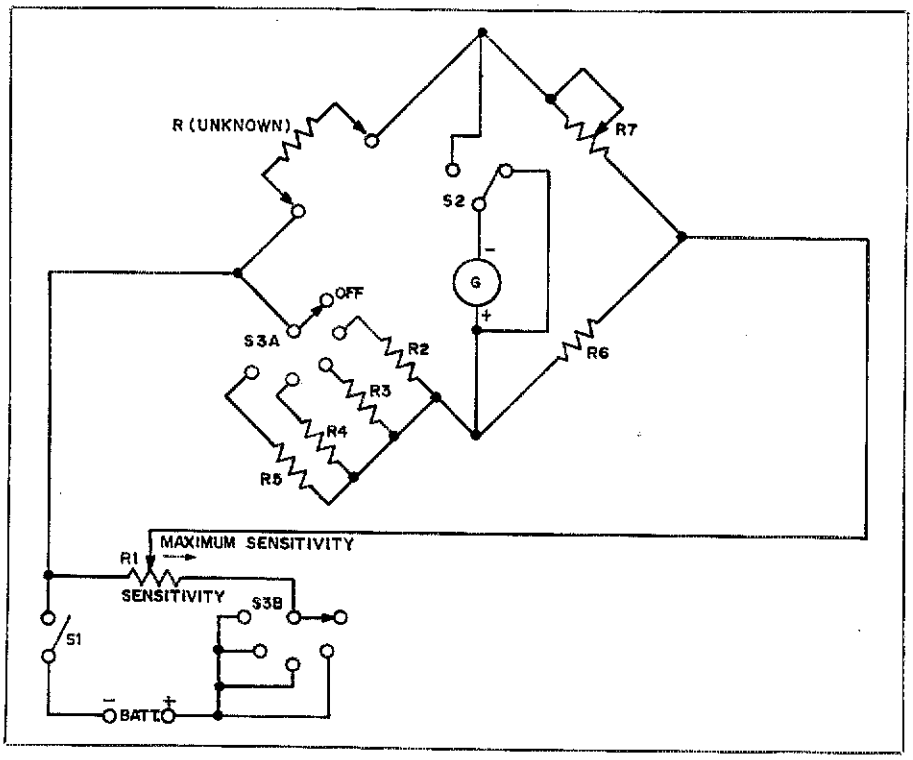


Fig. 2 — Shown here is the schematic diagram of the Wheatstone bridge. Battery information is given in the text.

M1 — See text.
R1 — Sensitivity potentiometer, 5000 ohms.
R2 — Precision resistor, 100 ohm, 1 percent or better.
R3 — Precision resistor, 1000 ohm, 1 percent or better.
R4 — Precision resistor, 10k ohm, 1 percent or better.
R5 — Precision resistor, 100k ohm, 1 percent or better.
R6 — Precision resistor, 10k ohm, 1 percent or better.
R7 — Precision ten-turn potentiometer, 100k ohm (see text).
S1 — Spst push-button switch, normally open.
S2 — Spdt push-button switch.
S3 — Rotary switch, 2 pole, 5 position, ceramic.

sistance (meters as sensitive as 25 μA have been measured with no damage to the movement), matching resistors, determining cable length, locating shorts, or tailoring resistors for meter repair or construction. In fact, it is useful anytime that it is necessary to measure resistance with a high degree of accuracy.

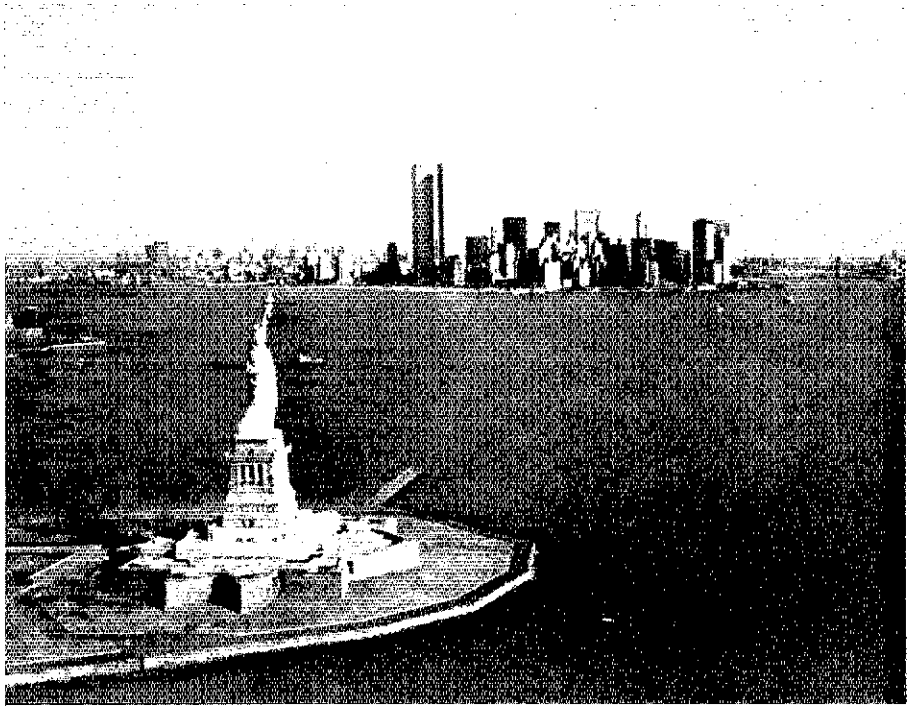
In use, always start with the sensitivity control at minimum. With both buttons depressed, advance the sensitivity control until a meter reading is obtained. If polarities have been observed in constructing the instrument, turning the dial to the right will result in galvanometer deflection to the right and vice-versa. Zero the needle and advance the sensitivity toward maximum and re-zero the galvanometer. The final reading should be found by alternately pressing PB-2 with PB-1 depressed and re-zeroing with the dial until no change is noted on the meter. Measure meter movements in the same manner, being careful not to "pin" either the meter under test or the galvanometer. This bridge, incidentally, is best used in a horizontal position to minimize any tendency of the meter to stick near zero. Carefully constructed, this instrument should be a valuable asset to any ham shack. QST

Strays

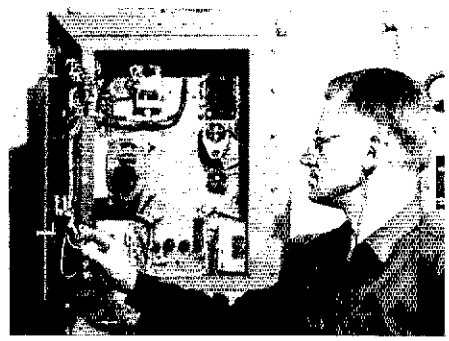
□ Communications provided: The Lung Association benefited from a bike-a-thon in Burbank, California, for which ten amateurs provided communications recently. Organized by Bob Goldberg, WB6OFO, the radio team from the San Fernando Valley ARC used simplex over a wide area at the various checkpoints. As most of the operators had worked together before on public-service missions, they considered the day's work as excellent refinement of their emergency tactics.

Participants were Paul Smith, K6CYP; Smith Russell, WB6IPY; Paul McDonald, WB6IYD; Jim Cass, WA6LYM; Shelly, WA6EYP; Archie Willis, W6LPJ; Jim O'Shea, WA6ZTS and two YLs, Cathy Schaffstein, WA6FAH and Lee Goldberg, WB6AVP. Inspiration was received from one of the enthusiastic riders on a tandem cycle. She was blind.

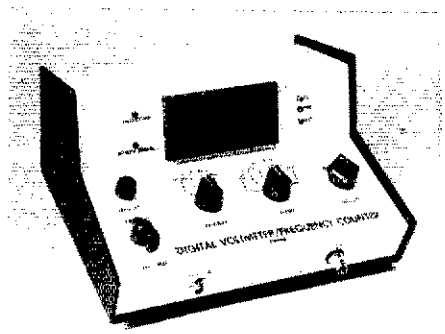
□ You're never too old: KØQOQ celebrated his 93rd birthday recently and is currently active on 75-meter ssb with an excellent signal according to the Minnesota Station Activity Report.



As this Bicentennial year draws to a close, yet another commemorative station will be activated. From Liberty Island in New York Harbor, home of the Statue of Liberty, WL2USA goes on the air during the Thanksgiving weekend, November 25-28. The Hudson Amateur Radio Council is handling the station's operation. On each day they expect to be on from 8 A.M. to 5 P.M., Eastern Standard Time, using the 2-, 20-, 40- and 75-meter bands. Full QSL information will be given on the air or cards may be sent via K2BM. *(New York Convention and Visitors Bureau photo)*



Inside look: Clayton Simmons of Eagle Point, Oregon, is proof that not all hams have legacies of electronic engineering behind them. W7IRZ hauls logs for a living. Here, in preparation for going on the air, he checks wiring inside his station. A member of the Radio Amateur Civil Engineering Services, W7IRZ enjoys ragchewing with stations in Japan and Russia. *(Knackstedt photo)*



Still trying to find ideas for packaging your DVM/counter, the one you just finished building the pc boards for based on the "Learning to Work with Integrated Circuits" eight-part series which appeared in *QST* for January – July and October, 1976? Here's one idea offered by WA1RIP. Fine job of craftsmanship, Jack!

The Code at Your Fingertips

Here's a key you can't buy — yet! So why not do as hams used to do — make it yourself — and have a key better in some respects than you can purchase!

By John S. Lewis,* W5TS

You play this key with two fingers on the levers. It won't slide around, even on a glass tabletop, because the operating force is toward the base, not parallel to it. It is light and may be held in one hand while sending code with two fingers of the other hand. That's real armchair sending! It is also human engineered, because it requires fewer muscles to operate.

The base (Fig. 1) is made from soft aluminum about .09-inch thick. The panel of those old war-surplus tuning units is just right. However, it could be made from wood, Plexiglas, Micarta or any suitable, nonmagnetic material.

Make the shaft from an 8- or 10-penny nail, cut to fit between the bent-up sides of the base. The paddles should be made from .035-inch steel, each about 7/16 × 4 inches in size. Bend one end of each strip around the nail so the two make a good electrical connection, but not so tightly that the paddles move stiffly.

Cut a 1/4 × 1/2-inch piece of Plexiglas to fit snugly in the space between the bent-up sides. Round off the lower edge at the ends so it will fit flat against the base. Place one side of it to line up with the edge of the bent-up parts as in Fig. 1 and use a No. 29 drill to make a hole through the Plexiglas and the base. The other two holes in the Plexiglas only are for No. 6 self-tapping hex-head screws, 1/4-inch long. Remove the hex-head screws from the Plexiglas and fill the heads with soft solder. Countersink the hole in the base for a No. 6 flat-head screw. Put a solder lug on each of the self-tapping screws and return them to their holes, with the lugs pointing toward the back. Mount the strip, being sure the screws don't short to the base.

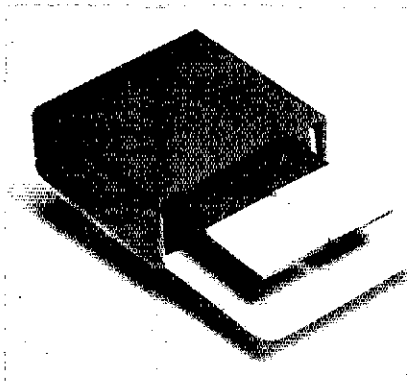
After the pivot-pin holes are drilled, put the pin through one hole; thread on a washer, both levers and another washer. Separate the levers and determine the length of the required spacer. Additional washers or a piece of 1/4-inch copper tubing will do. Drill for a screw in the rear center of the base and countersink on the bottom side. Solder a 1-1/2-inch piece of flexible wire or braid for coiled pigtails to each lever near the end wrapped around the pin. Solder the other ends and a wire (for common to the keyer) to a lug, and fasten the lug to the hole just drilled. The other two wires to the keyer are connected to the lugs on the hex-head screws.

The cover may be bent from thin (about .020-inch) aluminum or anything handy that is not magnetic. The magnet (Radio Shack 64-1875) is glued to the front edge of the cover in the center, long edge crosswise. The cover is adjusted up or down so the levers have about 1/16 inch of throw. Then drill and mount the cover. Two plastic tabs cemented to the levers and a piece of felt fastened to the bottom will finish the key. Hook it up so that the index finger of whichever hand will be used closes the dot contact, since that finger is usually more agile.

As for learning to send with the key, my advice is to make haste slowly. Start at about 7 wpm and practice *each* letter until you can send it perfectly 10 consecutive times. Then go on to the next letter. Only after you become accurate at this speed should you attempt higher speeds.

[Editor's Note: A copy of this paddle was built in the ARRL lab and was the hit of the day. One by one, nimble-fingered employees and visitors tried their hand at sending with the key. No one seemed to experience difficulty adapting to pushing, instead of wagging, the paddles. Bug senders who wish to use an electronic keyer without fouling up their bug fists should find this little paddle ideal.]

*3428 Winifred Dr., Ft. Worth, TX 76133



A model of the paddle constructed in the Hq. lab.

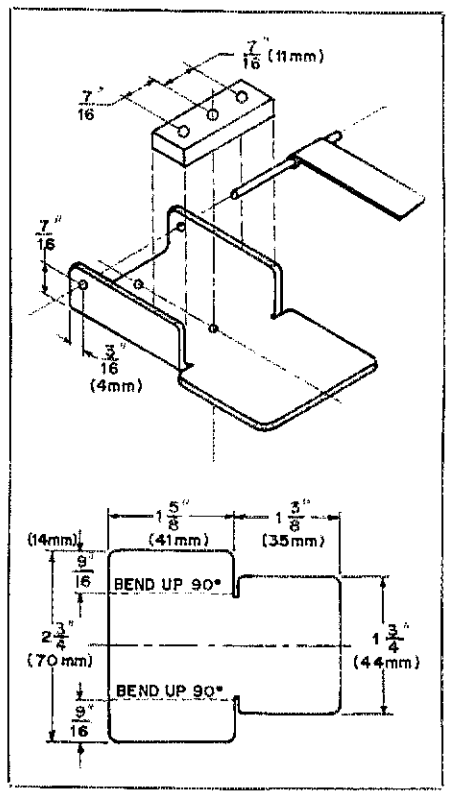


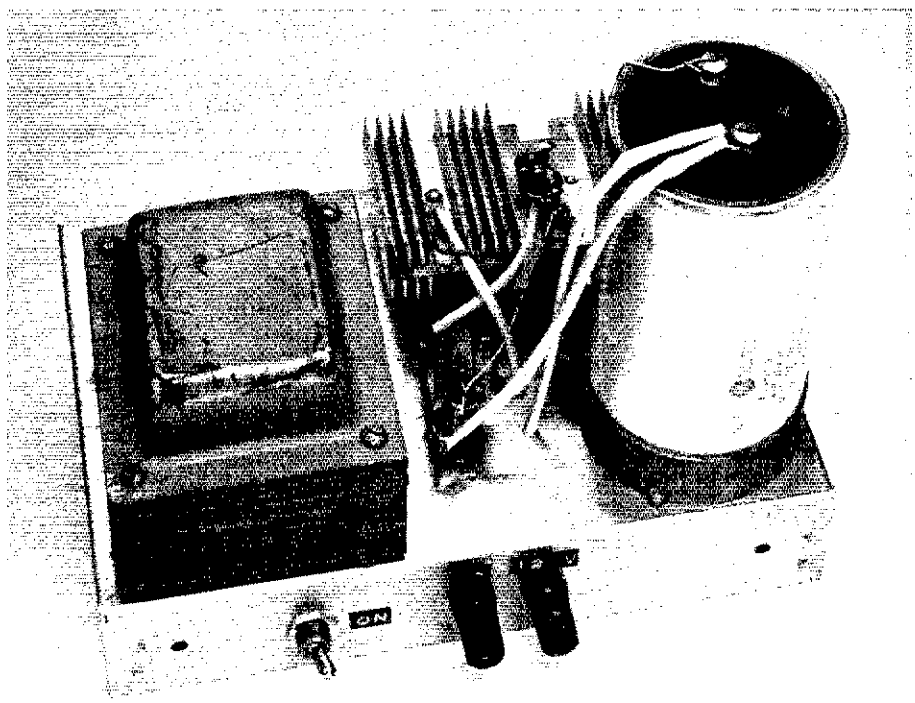
Fig. 1 — Dimensions of the paddle.

The Ugly Duckling

Isn't it time to defeat the high cost of amateur gear? Here's how to build a power supply for peanuts.

By Lew McCoy,* W1ICP

How do you power your 12-V transceiver? A large number of the solid-state transceivers are designed to operate from automobile power systems – 12 to 14 volts dc. When a ham wants to pull the unit from the car and use it in the house he is faced with taking the battery out of the car,. assuming he is energetic enough to do so. Of course, the sensible answer is to have an ac supply. However, the writer is a noted cheapskate: The very thought of putting out *many* dollars *just* for a power supply is unthinkable. Trouble is, trying to find the right power transformer to provide the necessary current at the appropriate voltage (and cost) is not easy! Some years ago – 12 to be exact – we did an article for *QST* on rewinding a power transformer from an old TV set. One way to cut costs of a supply for more modern requirements would be to follow the same avenue – wind your own. I figure that most hams are as cheap as I am, so they should be interested in learning how to wind a transformer and save a buck. However, before going into that part of the article, let's discuss the power supply.



The heat sink is visible at the rear of the chassis top, directly behind the electrolytic capacitor. The voltage regulator, U2 (not visible), is located on the chassis top just to the rear of the four resistors.

Power Supply Details

The circuit for the supply is shown in Fig. 1. The power transformer T1 provides approximately 18-volts ac which is rectified via U1 and then regulated at 12 volts. The regulator is a National Semiconductor LM340K-12. A pnp pass transistor is used to increase the current capabilities of the supply. With this supply we have used up to 10 amperes to power an fm transceiver. All of the components were obtained as surplus, with the exception of the power transformer. In fact, the chassis was a chopped-up one that was in the scrap aluminum bin at ARRL. Hence the name, Ugly Duckling.

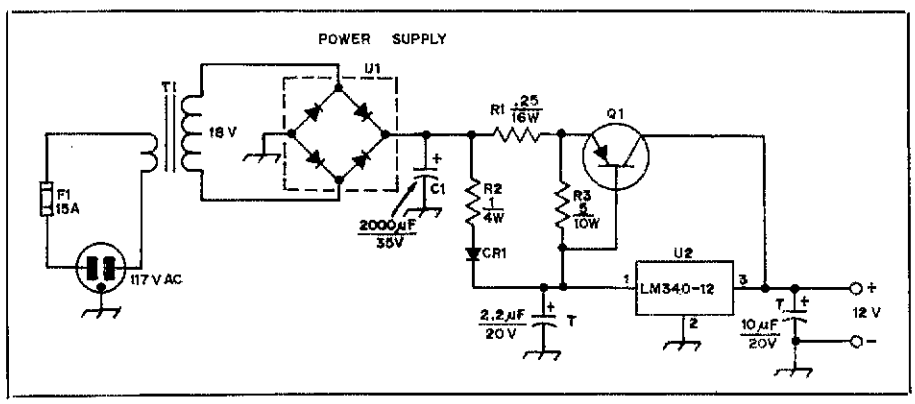


Fig. 1 – Circuit diagram of the Ugly Duckling power supply. Circuit designations not listed below are for text references.

C1 – 2000 µF (or more), 50-V electrolytic.
Q1 – Motorola HEP233, 237 or similar.
U1 – 100 V PRV, 25 A.
U2 – National Semiconductor, LM340K-12 regulator.

Rewinding Power Transformers

The newcomer to ham radio may feel that rewinding a power transformer

*Asst. Technical Editor, *QST*

is an impossible task. However, let us reassure you, it is a very simple process and the only major expenditure is time. We did considerable checking and found that the old tube-type TV sets that are now common at garage and tag sales are almost tailor-made junk boxes for the enterprising amateur. For the type of power supply we describe here, practically any TV transformer has the necessary power capabilities. Twelve volts at 10 amperes equals 120 watts, and even with a 100-percent excess rating (240 watts) such transformers are common in TV sets.

Before getting into the actual description of winding a transformer, let's take a look at a typical power transformer to see how it's made. A power transformer consists of a laminated iron core, windings of various sizes to provide the necessary voltages and currents, insulating paper, nuts and bolts to hold the unit together, and metal covers to protect the windings.

The iron laminations consist of E- and I- shaped sections as shown in Fig. 2. These are assembled in a stack to make up the total core. The method of stacking is also shown in Fig. 2. In the actual construction of a transformer the laminations may be put together in groups. In other words, there might be three E and I sections stacked the same way, then three more of each type section stacked in the alternate arrangement. An insulating and bonding agent, usually varnish or shellac, is applied between laminations. This reduces the power loss in the core and serves to make a tight form, minimizing hum or vibration.

How to Determine Power Capability

One of the first things a builder must know when scrounging an old TV power transformer is how much power it will handle. If we are going to build a power supply that requires 300 watts of power, we cannot get it from a transformer that has only 200 watts capability. The amount of power that a transformer will handle can be determined quite closely from the cross-sectional area of the core. This is the cross-sectional area *inside* the windings, and does not include the area of the part of the core that surrounds the winding. Fig. 3 shows this area.

It isn't actually necessary to take the transformer apart to measure the area. Lamination sizes are standardized, so if you know the outside width, length and height of the lamination stack it is easy to determine the power capabilities. Nearly all TV transformer cores have the same width and length, but the height of the stack will vary. The width and length are commonly 3-3/4 by 4-1/2 inches, and for a core of this size the tongue of the E lamination is always 1-1/2 inches wide. With such a core all you then need for finding the cross-sectional area is the height of the stack. For example, suppose the height is 2-1/4 inches. This multiplied by 1-1/2 equals 3-3/8 square inches. Looking at the graph in Fig. 4 we see that 3-3/8 square inches gives a power capability of 350 watts. This means that we can rewind a transformer having a core of these dimensions and expect to get about 350 watts from it.

There are two things to look for when getting an old TV transformer. First, take the one with the highest stack of laminations. This will be the one with the best power capabilities. Second, some transformer manufacturers soak the coils in tar. This type can be rewound but it can be a rather messy job and is best avoided. You may have to remove the housings on the transformer to make sure the windings aren't coated with tar. However, the tar-coated jobs are fairly rare, in our experience.

Taking the Transformer Apart

The first step in the rebuilding process is to remove the transformer from the TV chassis. At this point you can save yourself some further work if you first check out the windings and label them. The primary or input winding will be connected to the ac line, probably through a switch on the front of the chassis and a fuse or fuse holder on the rear. The 5-volt winding will be connected to the filament terminals (2 and 8) on the rectifier socket, which is usually a 5U4G. Two of the leads from the high-voltage winding will be connected to the plate terminals (4 and 6) on the rectifier-tube socket. The center-tap lead of the high-voltage winding probably will be grounded to the chassis. There will probably be two 6.3-volt windings. The leads from one of these will go into the shielded compartment on top of the TV chassis and be connected to a tube socket in the compartment. The other 6.3-volt winding supplies all the other tube heaters in the set. Tag all leads before removing the transformer.

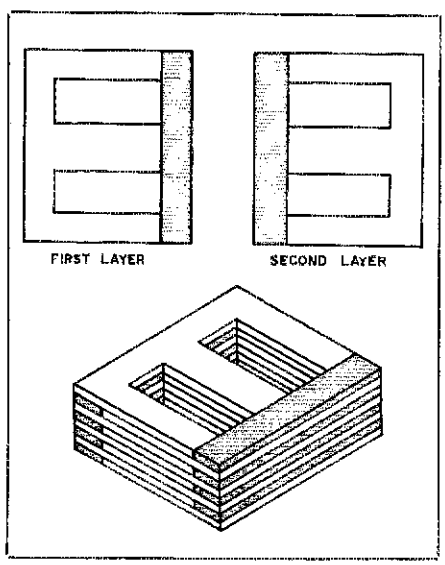
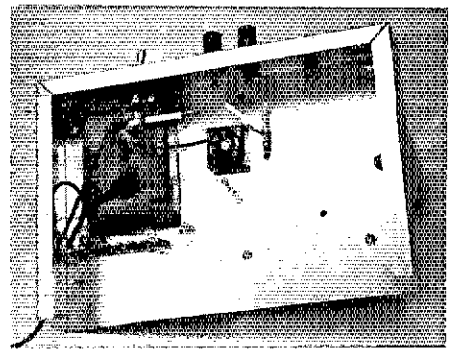


Fig. 2 – How the core is assembled. Alternate layers have the E laminations facing oppositely. Sometimes two or more laminations of the same kind are grouped together and handled as a single lamination, to save assembly time.



Bottom view of the power supply.

If you get a transformer that has *already* been removed from the set, get someone with an ac voltmeter to check out the various windings and mark them for you, assuming you don't have a meter yourself. There is a color code for the transformer leads and the information for identifying the leads is given in the construction practices chapter of the ARRL *Radio Amateur's Handbook*. However, the leads are not always marked according to the code. Also, the colors tend to fade with age, so it is best to actually check the transformer with a meter.

When checking out the transformer with a meter you'll find that voltages are slightly higher than what is actually called for because you'll be checking them without a load on the windings. For example, the 5-volt rectifier winding will show something over 5 volts. However, if the leads came off the rectifier socket, the winding *is* a 5-volt winding.

After identifying the windings, remove the four nuts and bolts that hold the transformer together and also take off the metal covers, assuming the unit has them. Don't worry about the transformer falling apart when you remove the bolts; it won't. Look the unit over carefully and try to determine which layers of windings are which. In most cases the winding nearest the core will be the primary. Usually the order will be something like this: first, the primary; next, the high voltage; then, the 5- and 6.3-volt low-current filament windings; and last, the heavier-current 6.3-volt winding.

Examine the lamination arrange-

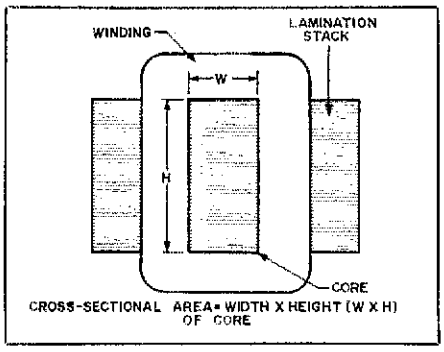


Fig. 3 — This is a cross-sectional drawing of a typical power transformer. The cross-sectional area referred to in Fig. 4 is determined by multiplying the tongue width by the height of the center core.

ment. Note that the laminations are probably inserted in groups. On one side of the stack there may be three I units and below that three E units, alternating through the entire stack. Note how the top and bottom of the stack are assembled so that you'll be able to put it back in this same order when you complete the winding job.

Getting the laminations apart is not a difficult job, but it should be done carefully. Insert a thin knife blade between the end piece and the rest of the core to break the varnish seal, so the end piece will be loose. Using a block of wood butted against the edge of the piece, drive it out of the core with light taps of a hammer. Alternate between the two ends so the piece will come out straight. Continue by breaking the next group of laminations free with the knife blade, then carefully driving them out. After a few groups have been removed the hammer won't be needed, as the broken-loose laminations can be pulled out by hand. Be careful not to bend the laminations when removing them. If the edges get nicked in hammering, file them smooth before reassembling the core after the new windings are finished.

Once the laminations are removed you are ready to go to work on the windings. The first thing to do is remove the high-voltage winding by pulling out the wire. If you are lucky you can start it just by pulling on one of the high-voltage leads. However, it is more than likely that the end of the winding will break off, because the wire size will be rather small. If it breaks you'll have to dig in with a knife or probe to get at the wire. Once you get it started the layers come out rather easily. When you get most of the high-voltage winding out you'll see that you can separate the primary winding section from the outer windings. Be careful not to disturb the insulation around the primary winding. Incidentally, in the unit we took apart, and this will probably hold true for most TV transformers, the wire size on the primary was No. 18 enameled.

After you've cleared away the high-voltage winding, remove the 5-volt rectifier-filament winding and *most* carefully count the number of turns. There will probably be approximately 10 turns, but count them to make sure. The number of turns on this winding will tell you how many turns you need for each volt you expect to get with the new windings you will put on. For example, if there are 10 turns on the 5-volt winding, the transformer is wound on the basis of two turns per volt. It doesn't make any difference whether the windings are near the center of the core or at the side; the turns per volt will be the same.

Putting on the New Winding

For this supply, the current rating is 10 amperes, so a wire size that will carry this current is required. No. 12 solid, enamel-covered wire handles our requirements. The transformer used in this supply required two turns per volt, and 18-volts ac was needed. This works out to a total of 36 turns of No. 12. To calculate how much wire you need, take a scrap length of wire or string, make a full turn around the core containing the primary winding, then measure how long the piece of wire or string is. Multiply this by 38, then add about three feet for lead lengths and slop.

Clamp one end of the wire in a vise and making sure there are no kinks, start winding the wire over the section that had the primary winding. Start as close to the edge as possible and keep the wire taut as you wind on the turns. The reason for starting close to the edge is that as you put layers on, each layer has to be progressively narrower, otherwise the end turns may slip off. After the first layer is wound, hold the ends in place with Scotch tape. Ordinary household waxed paper can be used between the layers. A single layer or sheet of paper is adequate insulation between layers. (We measured and cut up a supply of waxed-paper sheets beforehand.) Wrap a sheet tightly around the first layer of winding and fasten the end of the paper with small pieces of Scotch tape. Try to keep the starting point for the next layer as close to the outside turn of the previous layer as possible and always wind in the same direction.

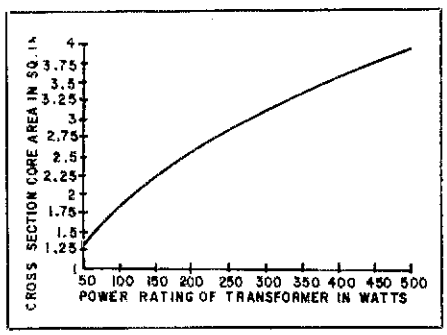


Fig. 4 — This graph provides a simple means for determining the power capabilities of an unknown transformer. First determine the cross-sectional area of the core. Find your cross-sectional area figure on the vertical axis and then go across the graph to the curve. Drop from intersection point vertically to the bottom of the chart to find the power in watts.

Take your time, keep the wire taut, and by all means keep track of your count by making notes. It is easy to lose your place in counting; needless to say, this can be highly provoking. Be sure to bring all leads and taps out on the same side of the core so the transformer covers will go back in place without interference. Note how it was done originally, before taking the transformer apart.

Once all of the turns are on, cover the windings with a couple of layers of electrician's tape (enough to secure the windings). The transformer can now be put back together. If there is too much open area between the top and bottom of the windings and the iron core, make up some smooth wooden wedges and gently drive them between the windings and the core. This will help prevent transformer hum or rattle. In our transformer we slipped some tubing insulation over the leads, where they came through the transformer housing, just to prevent chafing of the wire enamel covering.

Additional Details

To keep the cost as low as possible one needs to search the surplus sales sheets and flea markets. Q1 is the pass transistor. The one we used was strictly unbranded surplus. It came with a heat sink that was large enough to make a 10-ampere rating seem reasonable. Thus far it has worked well. Any pnp type that has 10 amperes or more of collector-current rating should be OK. Some suitable Motorola HEP numbers are 233 and 237. CR1 can be any rectifier that has a rating of at least 3 amperes at 35 volts. Surplus got into the act again in obtaining the required resistor values for R1, 2 and 3. R1 was managed by putting four 5-watt, 1-ohm resistors in parallel.

You will need a heat sink on Q1. Usually, the case of the power pnp transistor is also the collector connection, and the case must be in contact with the heat sink. If so, this means that the heat sink should be insulated from the main power supply chassis.

If you have the bucks, it is probably easier to go out and plunk down about $100 for such a supply. However, there must be enough ham ingenuity remaining to inspire one to wind his own transformer and scrounge for the rest of the parts. QST

A General-Purpose Audio Amplifier

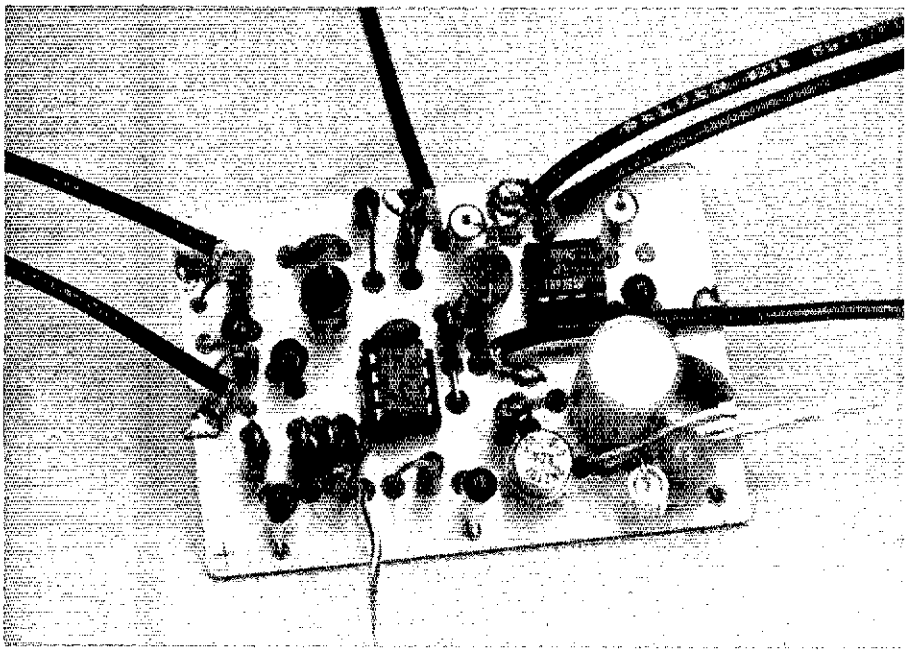
Hiss! Hum! Distortion! Do these conditions characterize your receiver audio system? Tried to improve it to no avail? Replace it with this system — a weekend project!

By Jay Rusgrove,* WA1LNQ

One weak point in many homemade and some commercial receivers is the audio amplifier. Through poor design or lack of understanding of device characteristics, many audio amplifiers suffer from excessive harmonic distortion, high ambient noise crossover distortion, insufficient output, waveform clipping and amplitude response that is not flat across the audio spectrum. All or even a few of these maladies can make listening something less than pleasant. Although a small amount of distortion can be tolerated, that is not readily detected by the human ear, distortion levels over several percent will usually be apparent. Through proper design and component selection the problems listed above can be minimized.

The audio system described here includes an audio preamplifier, *R-C* active filter, audio output stage and a voltage regulator. It was designed by W1CER. All of the circuitry with the exception of the filter in-out switch, audio gain control and the output jack are contained on a single printed-circuit board measuring 2 × 3 inches.

*Novice Editor, *QST*



Circuit Details

The circuit diagram of the amplifier shown in Fig. 1 is simple and straightforward. Af preamplifier Q1 is biased for Class A operation and provides a gain on the order of 20 dB. Output from the preamplifier is fed to the *R-C* active filter and to the filter in-out switch. The position of this switch determines whether the audio-output stage will have as its input the output from the preamplifier or the active filter.

An *R-C* active filter of this type is capable of providing approximately 12 dB of roll-off per octave as the frequency departs from the passband. The stage gain is set for unity (1) within the passband. The components that determine the frequency response of the filter are the two .0015-μF capacitors and the 1.5-MΩ, 750-kΩ and 15-kΩ resistors. These parts should be of relatively close tolerance so that the filter will peak at the design frequency. If 5-percent-tolerance resistors are not available, 10-percent types should yield adequate results if matched units are chosen with an ohmmeter. Tolerance levels worse than 10 percent should be avoided as the frequency response will be shifted more than an acceptable amount. Polystyrene capacitors should be used at the .0015-μF positions because of their high-Q characteristics.

Audio output is supplied by a

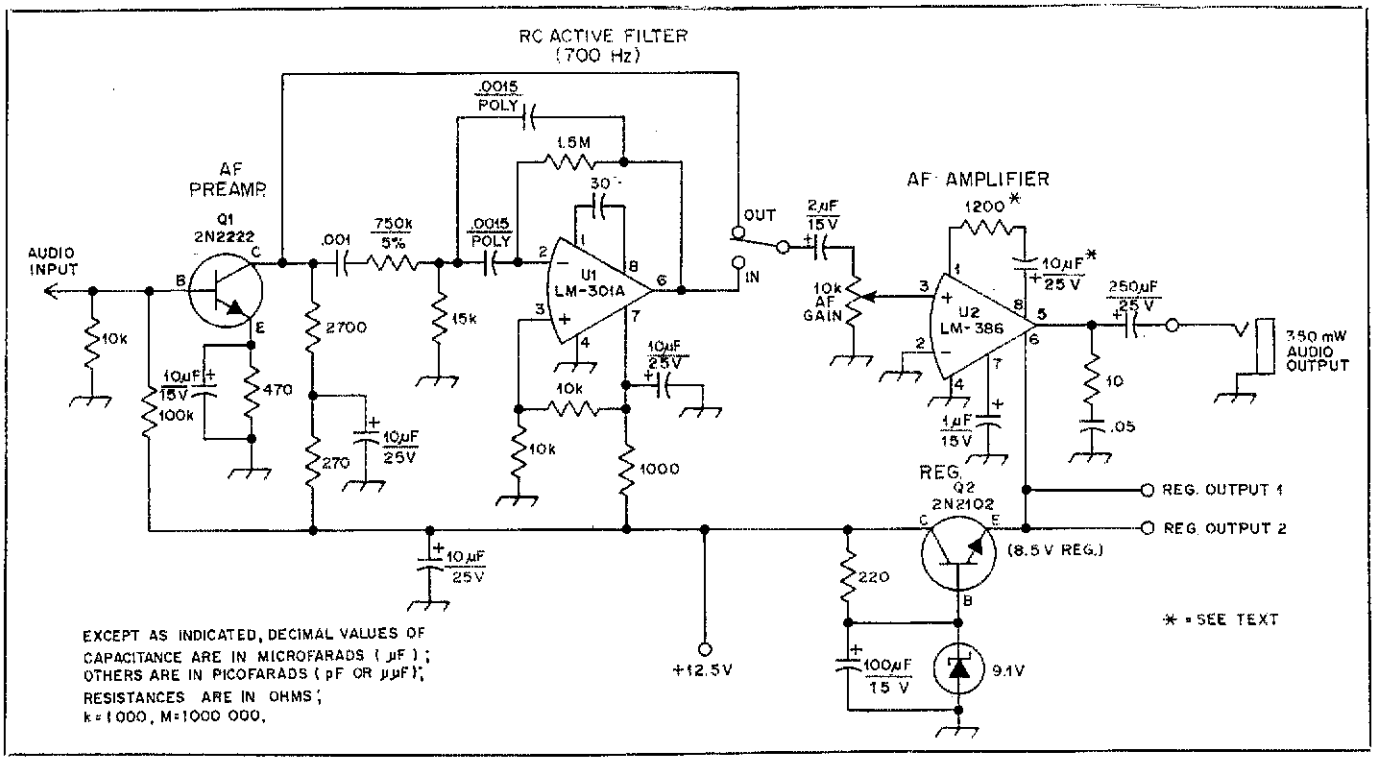


Fig. 1 — Schematic diagram of the audio system. The LM386 and LM301 are manufactured by National Semiconductor. Fixed-value resistors are half-watt types.

National Semiconductor LM386 low-voltage audio power amplifier. The device gain is set internally to 26 dB in the interest of keeping the external parts count low. Two pins (1 and 8) provide for external gain adjustment. If, for example, a capacitor is connected between pins 1 and 8, the gain of the device will be 46 dB. If a resistor is placed in series with the capacitor, the gain may be set to any value between 26 and 46 dB, depending on the value of the resistor. In the amplifier described here, no connection was made between pins 1 and 8, thereby setting the gain to 26 dB. Extra pads have been included on the circuit-board design for a resistor and capacitor combination, should the builder wish to experiment with higher gains. The output stage consumes approximately 27 mW of power supply energy during no-signal input conditions. Current drain with full audio output is on the order of 200 mA.

The voltage regulator consists of a transistor, Zener diode, a resistor and capacitor. Base voltage is established at 9.1 volts by means of the Zener diode. This voltage will remain constant for moderate variations in power supply voltage. The drop across the base-emitter junction is 0.6 volt and therefore the output from the regulator is 9.1 — 0.6 or 8.5 volts. Two taps for the regulated supply are provided. They can be used to power any circuit that requires a regulated 8.5 volts at 250 mA.

Construction

The circuit-board pattern (foil side) is shown in Fig. 2. Sockets were used for both of the ICs for ease of device replacement, should that become necessary. All components are standard "garden variety" with the exception of the 10-µF tantalum capacitors. These types were used chiefly because of their small physical size; however, ample room

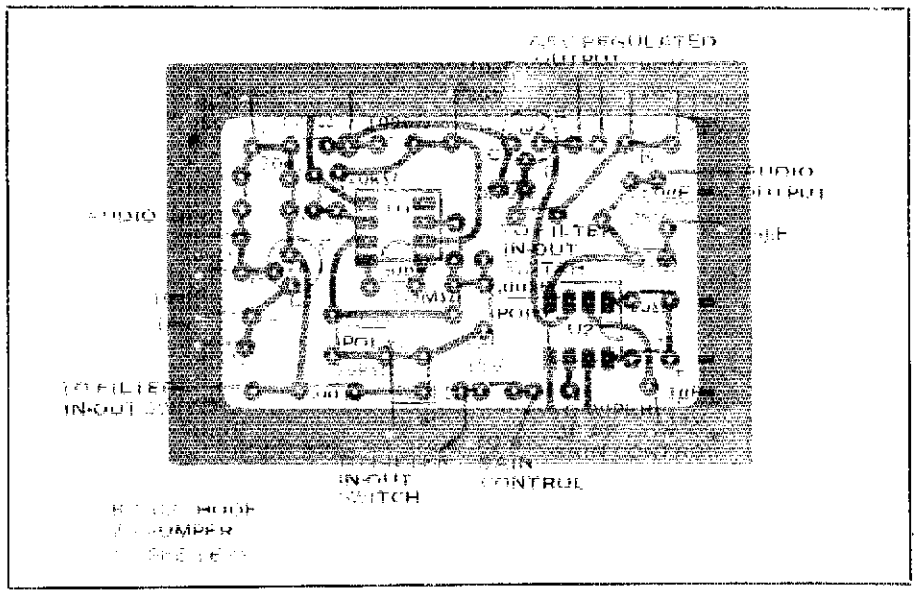


Fig. 2 — Circuit board template at actual size with parts overlay. The pattern shown is the foil side of the board with gray areas representing the copper pattern. J = wire jumper. Decimal values represent capacitance in µF; whole-number values with no units represent resistances; k = 1000. K = cathode of a diode.

has been provided on the layout to accommodate the somewhat larger electrolytic type.

All runs of cable carrying audio energy should be made with shielded cable, such as RG-174/U. Ordinary hookup wire can be used for leads carrying dc voltages. If the builder does not wish to incorporate the active filter into the amplifier system, U1 and associated components may be left off the board and the collector of Q1, directly connected to the 2-μF capacitor. Also, if the audio preamplifier is not required for the user's particular application, Q1 and its associated components may be left out, in which case the audio input may be connected to the pad where the collector of Q1 was attached.

Testing and Operation

When the amplifier is completed and the wiring has been checked against the template and circuit diagram, connect the 12.5-volt lead to a power supply capable of delivering at least 300 mA. Make a check of the dc voltages and compare them to those on the schematic. The readings should be similar. If some are not, chances are that there is a defective component or wiring error in that part of the circuit.

After it has been determined that all is operating satisfactorily, place the filter switch in the OUT position and apply an audio tone to the input of the amplifier. If all is in order a tone should be heard in the headphones or speaker. Changing the input frequency from 300 to 3000 Hz should have little effect on the amplitude at the output. Switching in the audio filter should decrease the amplitude of all frequencies not in the passband of the filter — approximately 700 Hz.

There are many applications for an amplifier of this sort around the ham shack. It could be used to replace an ailing audio amplifier in the station or accessory receiver. An ambitious experimenter could build a simple receiver around this circuit, especially since its gain is adjustable over a wide range. The amplifier provides sufficient output to drive a small loudspeaker. It will accept speaker load impedances from 4 to 16 ohms and headphones of 4 to 2000 ohms, with no circuit modifications.

Another use would be as a test-bench audio amplifier. Such a device is handy for tracking down problems in audio circuits by using it as a "sniffer." Starting at the input to an audio chain and using the amplifier to sniff the presence of audio at the input and output of each stage, the problem area can usually be located with relative ease.

A non-ham related application would be to use the amplifier as the heart of an intercom system. How about an amplifier for a code-practice oscillator with insufficient output to drive a loudspeaker? Or perhaps as an amplifier to boost the output of an audio speech processor for off-the-air adjustment. The applications are seemingly endless. Build one — it's bound to come in handy some day! QST

Strays

Clifford Penniston, W9BQQ, of Argyle, Wisconsin, built a complete radio station and broadcast spark signals in 1918 when he was 13. He has been a ham operator ever since. Recently he made a duplicate of the original set, including the telephone receiver he borrowed from the home phone for his 3-watt station. He recalls his mother saying, "I think the boy's losing his mind. He thinks he can pick signals out of the air." But his interest and skill got him the job as municipal powerplant operator. Since retiring from that, he is able to devote more time adding to his collection of some of the masterpiece sets of early radio. (*R. Barth photo*)

STOLEN EQUIPMENT

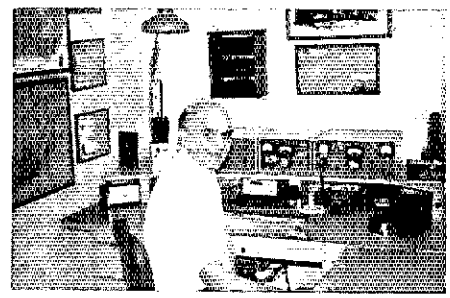
□ Motorola Metrum II D33APA1800AK, serial no. POC 100, stolen from locked car on Sept. 2. I-d-ed with soc. sec. no. 312-24-2065. Jack Flory, W4RXH, 1903 Woodmeade Street S.W., Decatur, AL 35601, tel. collect 205-353-5891 or 205-539-5808.

□ EBC-144 Jr., serial no. 7514359A, taken from auto in Basking Ridge, NJ, on Aug. 10. Unit inscribed on bottom with soc. sec. no. 089-32-6899; NJ driver's license no. M01814076312424 and owner's name, call and phone no. John Maikisch, WA2OFT, H-11 Farmhouse Lane, Morristown, NJ 07960, tel. 201-538-1667 or Bernards Township police.

□ Kyokuto FM-144, serial no. 6215. Abel J. Tapia, WA6FSZ, P.O. Box 414, Montclair, CA 91763.

□ Stolen from auto in Garden City, NY, on August 30. Heathkit HW-202 with soc. sec. no. 125-32-5960 etched internally on various parts including underside of trans. and rec. boards. David K. Gordon, WB2YUJ, 155 Nimbus Road, Holbrook, NY 11741, 516-222-3702.

□ Regency HR-2B, serial no. 49-01566, stolen from car in New York City. Alfred E. Hirsch, Jr., 33 Evergreen Road, Summit, NJ 07901.



He got it all: The fifty QSLs which document his Bicentennial WAS award are not the only "trophy" of Emile T. Timko's 1976 operating efforts. AC3OHX started for this award last January 15 and since his station is in the family room, his XYL and son got large doses of what amateur radio is all about. Now they too have latched on to the excitement of ham radio as WB3DAH (XYL) and WB3DAI (son).

Technical Correspondence

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

ANOTHER TVI MYSTERY SOLVED

I wish to describe my locating a very unusual source of TVI. The problem only occurred when transmitting on 20 meters and resulted in severe interference in both sound and color video only on Channel 4. Equipment used is an FT-101 and 4BTV vertical. Low-pass filtering is employed at the rig and high-pass filtering and coax line for the television receiver.

The interference appeared suddenly so it was assumed something had changed. The interference was identical on two different television receivers when either an FT-101 or Collins S-line was used. The television antenna was checked and cleaned. Terminating the rig into a dummy load eliminated the interference.

It was assumed that the cause of interference was somehow being generated by the vertical antenna. Inspection of the coax connectors and disassembly of the antenna to locate areas of corrosion were contemplated. However, also located on the roof is a Ringo Ranger 2-meter antenna. It was being used for receiver experiments and a new Kenwood TR2200A had recently been acquired. The Kenwood TR2200A uses diode switching!! *That* was the source of the interfering signal. Disconnecting the TR2200A completely eliminated the problem.

What was very baffling was the severe interference on Channel 4 and hardly noticeable crosshatch on Channel 2. The length of the Ringo Ranger is approximately 110 inches, which is 5/8 of a wavelength at 70 MHz (Channel 4). The 14-MHz energy coupled from the 4BTV was being rectified by the switching diodes in the TR2200A. Radiation of the 5th harmonic was favored by the Ringo Ranger and hence the interference on Channel 4.

Owners of the TR2200A and other equipment using diode switching are cautioned to be sure they do not inadvertently generate TVI in a similar manner. Disconnecting the rig when not in use or installation of a high-pass filter provides the necessary protection when an hf transmitter is in operation. – *Elliott D. Lawrence, WA6TLA, Life Member, 5435 Columbus Ave., Van Nuys, CA 91411*

THE DIODE ANTENNA

For a number of years I have been interested in antennas and antenna designs. You have published a number of excellent articles concerning these subjects both in *QST* and in the handbooks. There is one antenna type, however, that I have run into on numerous occasions and have never seen or heard it described or discussed from the technical aspect. I wonder if you have ever done a serious study of this antenna or if you have ever had correspondence from other members concerning the characteristics of this antenna.

The antenna I have in mind may take any form imaginable such as a dipole, inverted V, Windom, long wire, or even an array. For lack of a better term I refer to it as a Diode antenna. Its characteristics are really dual in mode and may be described as follows.

1) One may receive signals from just about anywhere with S-meter readings well above S9. CQ calls are numerous throughout the frequency scanned. The antenna loads beautifully and the SWR checks 1.1:1, but no one will respond to my call when I answer back.

2) The second characteristic is similar in nature but in this case the antenna loads, SWR stays low, etc., but when I call CQ no return calls may be heard and no one answers my call. Usually you may know it is not the result of band conditions since you hear numerous ragchewers and nets on the band.

If you have any additional information on this subject, I would sincerely like to hear it. – *Edward C. Denny, WB4UUG, 8113 Westmont Circle, Knoxville, TN 37919*

THE DIODE ANTENNA EXPLAINED

The characteristics of the Diode antenna are well known to every experimenter in the radio art; but, because of the Oath of Silence, previously unbroken, they have never been spoken of (except in hushed tones). And certainly never written down! One story has it that he who speaks of this device must recite an incantation while offering up 6146s to the Sacrificial Junque Boxxe. The incantation is "Sngier Yhprum." Failure to perform the rite, or improper administration of it, will result in the most dire circumstances, to wit: permanently high SWR, incompleted Sweepstakes QSOs and having the XYL accept dinner invitations for both weekends of the CW and Phone DX Contest.

In keeping with our role of protector of amateur radio, we are developing the Bidac antenna. It would have been completed years ago, except for the curse which keeps afflicting those who work on the antenna, causing them to forsake amateur radio and take up stamp collecting. – *James Kearman, WA1WVK*

MORE COMMENTS ON SSB SPEECH PROCESSING

I was delighted to see that someone else has conducted objective investigations[1] and shares some of my misgivings concerning af clipping, which I first voiced in 1971.[2] It may be interesting to note that I arrived at the same conclusion and results as Collins, but in a rather different manner. This method, as well as other fundamentals of ssb speech processing, was reviewed recently by Fisk, W1DTY.[3] There is no doubt, as old-timers will recall, that af clipping was advantageous with old a-m systems (dsb with or without carrier). Average power gains of 10 dB were obtained,[4] accompanied of course by appreciable distortion. To condense from Fisk's article, when a clipped af wave is used to drive an ssb generator, the coherence between the fundamental and harmonics is destroyed. At rf (or i-f) the components behave as unrelated frequencies and periodically they will all add together to form peaks more than 5 dB higher than the fundamental component. In order to accommodate these within the linear range of the ssb transmitter, the peak audio input to the exciter must be reduced by the same 5-plus dB! Subtracting this number from the expected gain of 10 dB gives the same results quoted by Collins.

Personally, I feel that Collins somewhat underestimates the performance of af and rf compression (or age, alc, etc.). In 1961, Paul Day, W1PYM, and I investigated ssb speech processing at National Co. in connection with a government contract. We found that a 3-dB improvement was typical of either system. This is only a little less than the 4.5 dB obtainable with af clipping, and of course is virtually distortionless. When we tested rf clipping, we obtained a 10-dB improvement for 15 dB of limiting, somewhat more than quoted by Collins. Incidentally, the results were verified by the audio-consulting firm of Bolt, Beranek and Newman, who used the word-scoring method with a selected audience and mixed the processed and unprocessed texts with noise. Other methods for obtaining the improvement factor or average power gain, such as a direct (thermal) power measurement may well give different results.

As another point on the subject of ssb speech processing, I would like to draw your attention to the split-band audio method described in Fisk's article.[3] This method was proposed some 20 years ago, but has only recently become realizable in a practical manner at a realistic cost. It provides the claimed increase in talk power (10 dB) at the low-distortion levels required for ssb and was announced for the first time in Fisk's paper. I have operated this system for over six months with good results. Direct comparisons between it and an rf clipper (15 dB) on marginal circuits favor the new method by 1 to 2 dB consistently. The split-band device uses 12 dB of limiting preceded by an af age circuit which makes misuse virtually impossible. At present it appears to be the No. 1 performer by a small margin, possibly because of its superior intermodulation performance. The cost appears comparable to a good rf clipping system. – *Walter Schreuer, K1YZW, Riverbank, Ipswich, MA 01938* QST

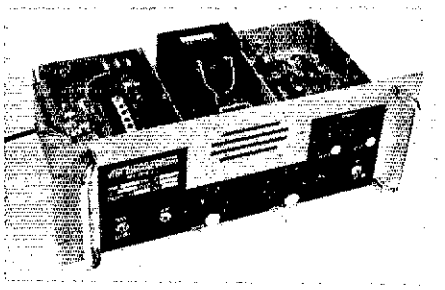
Footnotes

[1] Collins, "SSB Speech Processing Revisited," Technical Correspondence, *QST*, Aug., 1976.
[2] Schreuer, "Speech Clipping in SSB Equipment," *Ham Radio*, Feb., 1971.
[3] Fisk, "Novel Audio Speech Processing Technique," *Ham Radio*, June, 1976.
[4] Licklider and Pollack, "Effects of Differentiation, Integration and Infinite Peak Clipping on the Intelligibility of Speech," *J. Acoustical Society of America*, Jan., 1948.

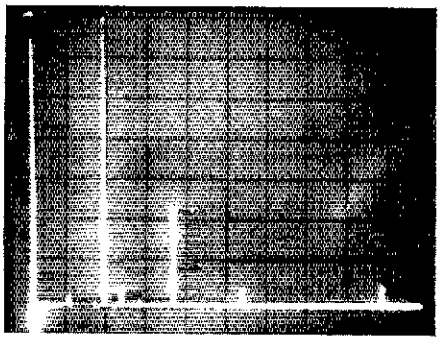
Product Review

VHF Engineering RPT 220

The move has started – repeaters are beginning to sprout in the 220-MHz band. It is possible to hear voices on other than the simplex frequency (223.5) in many parts of the country and some areas have enough activity to support more than one machine. In the greater Hartford (CT) and Springfield (MA) area there are 5 active repeaters on 220 MHz and two or three in construction stages. All of this without making a dent in the population on 2 meters!



Part of the repeater scene here has been a VHF Engineering Repeater used by this writer as WR1AAD, WR1AAD/1 and at times WR1AAD/2. The entire repeater has been transported to several meetings for demonstration purposes in New England and upper New York state. A particular success was in conjunction with the Rochester (NY) Hamfest this spring, when a hilltop site was found, the repeater hooked up and many mobile stations obtained excellent coverage during the weekend. Enough visiting W1, W2, W3 and VE stations had crystals for the frequency so that the machine got a thorough workout. But the purpose of this review is not to sell the 220-MHz band, but rather to describe the repeater.



A spectrum-analyzer presentation of the output of the TX220 shows that the second harmonic is 46 dB below the main carrier. Power output was 10 watts into a resistive load. Horizontal scan is 0 to 1200 MHz. Vertical scale is 10 dB/division.

Transmitter

The transmitter strip can be obtained either as a kit or factory wired and tested (as can all of the other parts of the repeater for that matter). A kit version was used for this review. The transmitter (TX220B) is identical to those sold for either mobile- or fixed-station use. Good-quality pc board is provided and enough room is allowed between components that assembly is not at all difficult. The completed exciter is supported by two strips of angle stock that are soldered to the edge of the board, then fastened to the chassis or enclosure with small screws. Design is straightforward, utilizing double-tuned circuits with capacitive top-coupling between stages in the oscillator, multiplier and low-power sections. This provides good rejection of unwanted products. In addition to the basic exciter strip, the transmitter enclosure contains an amplifier to bring the output up to the 10-watt level. Early enclosures were of the cast-metal variety, but later production versions have made use of standard folded aluminum chassis and covers. Feedthrough capacitors are provided for entry of audio and dc voltages to the strips.

One notable improvement that has been made since the first TX220 kit was assembled is improved decoupling of dc, and other changes have resulted in a reduction of noise modulation of the transmitted signal. This is important since wide-band noise from the transmitter cannot be rejected by a duplexer, which results in a desensitization of the receiver. When this problem appeared in the first tests of the repeater, a call was made to the engineers at Binghamton. They were aware of the cause and were working on the cure at that very moment. Within a few days an improved exciter arrived and all has been well since. Another improvement was the addition of a harmonic trap to the output circuit of the amplifier strip.

Receiver

Receiver assembly is made easy by the sectional and modular technique. A separate pc board is furnished for the audio/squelch, low i-f and detector, high i-f/filter and rf amplifier/mixer circuits. The four boards use angle strips along the edge to hold them together and to provide mounting brackets. Interconnections are made via short jumpers. The enclosure is an aluminum chassis and cover of the same type used for the transmitter.

Improvements in design have been forthcoming in the receiver department too – a new front-end called the RF220D is now available, which features improved sensitivity and more readily available transistors for the rf and mixer stages. Sensitivity was not a problem with the unit assembled by this reviewer, but there were some reports of early units that required .4 to .5 microvolt signal for 20-dB quieting. The RX220D has a better record here, .25 μV, which makes a pretty good set of "ears" for the machine.

Other Components

A transmitter and a receiver do not a repeater make. Several peripheral devices are required to enable the machine to do its thing – carrier-operated relay (COR), timer, power supply, (M) cw-identification generator, to name a few. Fortunately they are part of the package that is furnished with the VHF Engineering unit. A COR and timer board is provided and space for it is allotted under the main chassis. Two timing adjustments are available – one to determine the length of the "squelch tail," the other to turn the repeater transmitter off after a given period. The i-d board was reviewed in July, 1976 *QST*.

There is also room under the chassis for a regulated power supply, except for the transformer which is mounted on top. This supply is rated for heavy-duty use and will provide power to the receiver and transmitter for hours without showing signs of overheating.

Ample controls are available on the front panel to allow adjustment of operating levels. The receiver section has an audio-level control and a squelch control, both brought out through the front panel. A separate volume control is provided for adjustment of local speaker level – a feature that prevents grumbling when the repeater is located in a residence. Transmitter deviation level can be adjusted by means of a front-panel control in addition to a miniature potentiometer that is located on the exciter board proper. A switch to select either repeat or simplex modes and a jack to allow a microphone (which is furnished) to be connected complete the features of the panel. One slight modification was deemed necessary and has been installed by the writer: Because of the weight of the power transformer, the chassis tended to droop a bit. This did not affect the operation, but it just didn't look right. A small strip of metal was installed as a support bracket from the rear of the chassis to the top of the panel to bring everything back to an even keel again. Much better!

Performance

Operation of the repeater has been satisfactory in every respect. It has been in use without a failure for more than a year as of this writing. (It has been off the air only during antenna-modification periods or when

taken to a demonstration meeting.) An output of 10 watts, reduced to 8 by the loss in the duplexer, does not make a big splash on the band. This can be solved by the addition of power amplifiers, and indeed has been. But that is another story and will have to be told later. – *WISL*

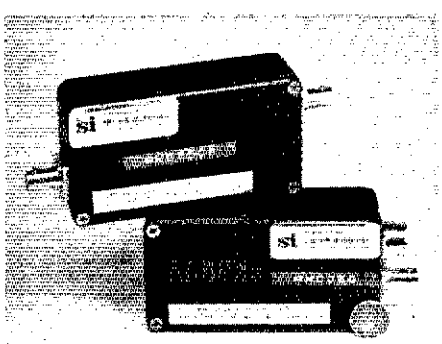
VHF Engineering RPT 220

Dimensions (HWD): 8 × 17(19) × 11 inches.
Power requirements: 120-V ac, 60 Hz, 12.6-V dc, up to 10 A (with additional power amplifiers) transmit.
Deviation: Adjustable to ±10 kHz.
Receiver sensitivity: 0.35 μV for 20-dB quieting, 0.2 μV to open squelch.*
Manufacturer: VHF Engineering, Division of Brownian Electronics, 320 Water St., P.O. Box 1921, Binghamton, NY 13902.
*Measurements made in ARRL lab.

MICROWAVE MODULES FREQUENCY COUNTER MODEL MMD050 AND PRESCALER MODEL MMD500P

Digital frequency meters have come a long way within a relatively short time span. The first such meter – or counter – that this writer worked with arrived on the scene in a large wooden crate that took two people to carry. When unpacked, it was still heavy enough to make you think twice about moving it more than a few inches. Tubes were used in large numbers, creating a maintenance problem and the heat generated and the power consumed were marks of gross inefficiency – so much energy being used just to ignite a row of neon lamps!

Newer techniques and better packaging have led to a marvelous array of counters for one to work with. They come in a wide variety of sizes and shapes and work at frequencies well into the uhf range. Further, power consumption for an entire counter can be about the equivalent of the filament drain of just two tubes in the earlier version.



Microwave Modules and their U.S. representative, Spectrum International, have applied the shrinking technique to a unit that will almost fit in a shirt pocket – the unit by itself will indeed fit most pockets but the power supply required would have to be located elsewhere. Their MMD050 50-MHz frequency meter is in a cast-aluminum box that measures 4-3/8 × 2-3/8 × 1-1/16 inches (111 × 60 × 27 mm). A companion unit, MMD500P, is a 500-MHz prescaler in a box of the same size.

Top frequency of the MMD050 is given as 50 MHz, but this is conservative; the unit checked in the ARRL laboratory performed well up to the 64-MHz area where it became sensitive to wave shape and amplitude. At approximately 65 MHz it appeared to reach the end of reliability. Input signal level required for stable counting was 30 to 50 mV, up to just over 50 MHz. This sensitivity allows the user to pick up enough signal, in most instances, by means of a short piece of wire inserted in the center pin of the BNC fitting on the box. A short length of coaxial cable with two or three inches of braid removed at the end will serve as a good "probe" for checking the frequency of various stages in a receiver or transmitter.

The MMD500P prescaler requires a bit more input signal – approximately 200 mV – to work over the range of 50 to 500 MHz. This is still within the capability of a short bare wire probe to pick up when in the proximity of an rf source – it will indicate the frequency of operation of most grid-dip oscillators if the coaxial-cable probe is placed less than an inch from the coil. The 500-MHz rating is again conservative.

Power requirements for the modules can be met by a small battery pack or inexpensive ac-operated source. The counter, MMD050, needs 11- to 15-V dc at 200 mA for operation; the same voltage range at 100 mA is needed for the prescaler, MMD500P. Thus you can see that the type of battery pack that is used in many modern hand-held transceivers can be used to make the counter, or combination counter/prescaler, a truly portable unit – not quite in your shirt pocket, but close. Power connection to the counter module is by means of a 5-pin DIN connector, which incidentally has provisions for wiring a switch to place the decimal point for proper interpretation of the frequency.

A six-digit LED readout is used to indicate frequency, which means that the last (right-hand) number indicates hundreds of hertz at 50 MHz, or kHz at 500 MHz. The internal time base is crystal controlled and a hole is provided in the case for access to the frequency-adjusting trimmer. Another hole allows access to a bias-adjustment potentiometer in the internal prescaler in the counter module (the prescaler module requires no adjustments). Input and output connectors for the prescaler and for the input to the counter are BNC. A mating DIN connector is supplied for power to the counter, and power connection to the prescaler module is made via a pair of solder terminals.

So there you have it – a wide-range, sensitive, frequency-counter system that consumes little power and occupies little space. Now even a battery-operated, remote, uhf station can be checked with an accuracy of a few hundred hertz.

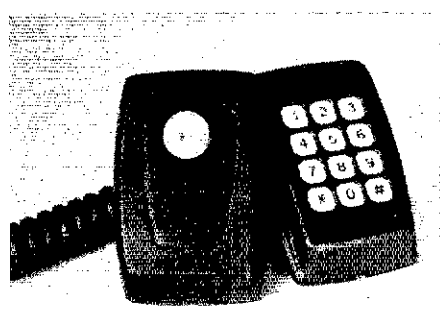
Price class: MMD050, $180; MMD500P, $80. Order from Spectrum International, P.O. Box 1084, Concord, MA 01742. – *WISL*

HEATH MICODER MODEL HD-1982

Those who have ever had to contend with a tone encoder dangling from the mobile fm transceiver, or with an irate YL (or OM in some cases!) complaining about "that thing" taped to the transmission hump, should appreciate what Heath has to offer in the HD-1982 Micoder. The Micoder combines a high-impedance condenser microphone and a tone encoder, complete with keyboard, in a hand-held case the same size as most other mobile microphones. What more could the avid vhf-fmer ask for?

With the exception of a slide switch, terminal strip and the microphone element, all of the components are mounted on a 1-5/8 × 2-7/8-inch double-sided pc board. Heathkit's step-by-step instruction manual is very detailed and easy to follow. However, care should be taken when installing the small pins into which the keyboard will mount because they can be easily bent or otherwise deformed. The manual for the unit assembled by the reviewer contained an addenda sheet which made the installation of these pins the first step in the construction process. Compliance with the instructions on the addenda is a must, since installation of the pins further into the assembly process will be *much* more difficult.

Circuits of the Micoder are built around two 555 timer ICs, with selectable *R-C* networks providing the various tones (one 555 is used to generate the low-tone group, the other the high-tone group). Once properly adjusted, the Micoder tones will key any decoder meeting Bell System specifications. Since the encoder tones depend on *R-C* combinations, they must be adjusted to the proper frequencies. The preferred method requires a frequency counter which will provide resolution to one hertz. Power for the encoder and the microphone is provided by a 9-volt transistor-radio battery, which is housed inside the Micoder case.



The Micoder was designed to be used with an fm transceiver which has a microphone input impedance of 22 kΩ. Users of the Micoder may encounter some difficulty in matching the Heath unit to transceivers (transmitters) with other microphone input impedances. Heath specifies a minimum input impedance of 10 kΩ, but lists no maximum. Installation of the Micoder in the reviewer's 220-MHz mobile system, which has a very high input impedance (on the order of 75 kΩ), resulted in the attenuation of the high-frequency component of the microphone output. Heath engineers recommend in such cases that C114, a .047-μF capacitor, be replaced with a 4700-ohm resistor. If the audio from the microphone still has too much bass characteristic, the input circuit of the transmitter or transceiver may have to be

modified to present an input impedance which is closer to 22 kΩ.

Some Options

The user has the choice of mounting a microphone clip-hanger button or a decorative label on the upper portion of the microphone side of the case. Although mounting the hanger button on the microphone side of the case may seem a bit unusual, it is necessary since the encoder key pad occupies the entire "back" of the case. The Micoder is a handy addition to the mobile communications installation, and combining the functions of a tone encoder and a microphone in a single hand-held case at a reasonable price makes the Micoder a convenient and worthwhile accessory. – *W2SDU*

Heath Micoder Model HD-1982

Output level: Adjustable, 30 mV rms maximum.
Output load: 10 kΩ minimum.
Frequency tolerance: 1.5 percent.
Operating temperature range: –20 to +100°F (–29 to +43°C).
Power requirements: 9-V dc, 12 mA (9-V battery not included).
Price class: $50.
Manufacturer: Heath Company, Benton Harbor, MI 49022.

DENTRON 160-V (SKYCLAW) ANTENNA

"No, no," I said, "I *want* to buy a DenTron SkyClaw and you're not going to talk me out of it!" The above quote is from a portion of a conversation this writer had with another amateur at the Tropical Hamboree in Miami, Florida, in January, 1976. Who was this person trying to dissuade me from making an antenna purchase? Was it fellow 160-meter enthusiast Gene, W4BRB, who was in attendance at the hamfest? Nope, it was an amateur I had worked previously on 160 using my base-loaded Hy-Tower but had never met before in person. In fact, it was none other than Dennis Had, K8KXK, who *is* DenTron Radio. *Whoa!* What gives here? How good can a product be if the manufacturer is discouraging a sale? Well, let me set that record straight at the outset – Dennis knew that my primary operating interest is DX and that for 20 meters I had a 90-foot tower topped by a 4-element Yagi. He reasoned that I wouldn't be satisfied with a 27-foot vertical antenna on 160 meters and besides, I could always load my tower for use on 160. Well, that's certainly a refreshing attitude, a manufacturer that wants to see you purchase what you *need*, not just what he has to sell! Nevertheless, I persisted. The deal was made and in a few short days up drove a UPS truck containing a short brown carton.

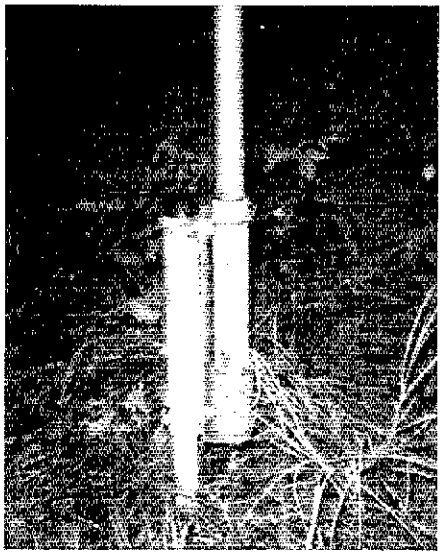


Fig. 1 — The base of the DenTron SkyClaw antenna.

But I'm getting a little ahead of the story; why *did* I want a 27-foot vertical for 160? It's quite simple really: (1) My Hy-Tower had been taken down earlier to make way for some additional construction at my home, (2) I was itching to get back on 160 meters before the season was over, and (3) since I was still recovering from the effects of recent surgery I didn't want to do any extensive antenna work.

In short, what was desired for my particular situation was a simple antenna that took up practically no space, could be easily erected by one person and would work reasonably well. The writer is pleased to report that the DenTron SkyClaw filled the bill on all of those counts. But again, that's getting ahead of the story.

At this point I am forced to admit a personal foible; I usually read the instructions for a piece of ham gear as a last resort and just jump right in and turn the knob or screw that looks right. Oh yes, of course, that's the wrong thing to do; and I have (or should have) learned my lesson long ago. But it's a habit, something like tailending a pileup – not the best thing to do but hard to stop doing!

In the case of the DenTron antenna the writer decided to make an exception and study the instructions thoroughly before proceeding. This approach turned out to be a little confusing because several of the steps concerning assembly as outlined in the instructions were found to be unnecessary. Major parts of the antenna were preassembled as they came tumbling from the carton which makes assembly instructions for *these* parts superfluous. The best approach, then, seems to be to lay out all the parts on a dry, flat surface, perhaps the driveway at your QTH. Then, compare carefully the exploded diagram of the antenna on the last page of the instruction sheet with what you actually have. It should quickly become obvious what remains to be done to complete assembly.

As you can see from Fig. 1, the author ground-mounted the antenna. A three-foot length of water pipe was hammered into the ground until only about 12 inches above ground level remained. In addition, a copper ground rod (8-feet long) was driven into the earth to provide a ground connection, the water pipe being only for mechanical support. In order to permit getting on the air quickly with minimum effort, no system of radials was used, only the grounding as described above.

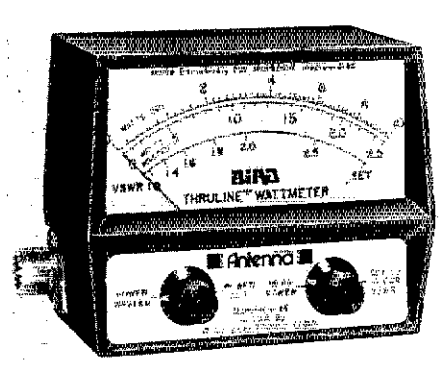
The antenna uses a B&W 3031 coil for loading. The coil is contained within a clear plastic cover that can be slid up for making tap adjustments. A clip lead (not provided) is handy when searching for the correct spot to tap the coil. In this case, the first spot tried by the writer (selected at random) was eight turns down from the top of the coil. Amazingly, when the wattmeter was installed in the coax feed at the base of the antenna, excitation applied, and the SWR calculated, the antenna turned out to be matched for 1807 kHz. Never being one to argue with success, whether accidental or not, I quickly removed the clip lead and soldered the tap into place at that point. Forward and reflected power measurements were made with a wattmeter over the portion of the band of my immediate interest. The calculated SWR ranged from approximately 1.5 at 1800 kHz to 2.6 at 1860 kHz.

In the time remaining before darkness fell and the first opportunity to try the antenna out on the air arose, the coil cover and coax fitting were waterproofed with a silicone rubber compound. Although this step is recommended in the instructions, you must furnish your own sealant. Total elapsed time for assembly was only 1-1/2 hours; not bad if the darn thing worked! Well, to make a long story short, during a ninety-day period after the antenna was installed and pressed into service, 25 states and 15 countries were worked on 160. Best DX worked was GW4, not bad at all for a 27-foot-tall antenna, no radials and a 50-watt power level. Not bad at all!

Of course everyone realizes that the antenna will not outperform the larger antenna used for operation on 160. And, depending on local environment, such as ground conductivity, it may work differently at your own location. But, considering its cost, small physical size and ease of assembly and installation, it can give a good account of itself and should help to expand the rising popularity that 160 meters is now enjoying. – *Larry E. Price, W4RA*

ANTENNA, INC. MODEL 10043 POWER METER/VSWR INDICATOR

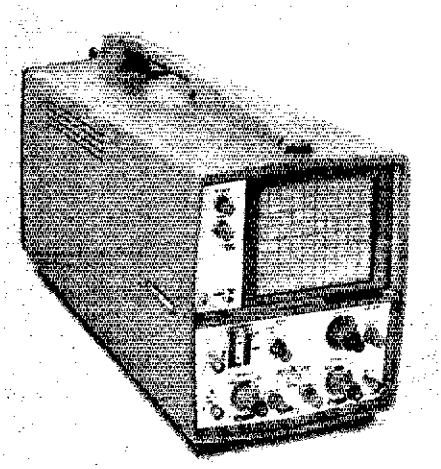
Antenna, Incorporated has introduced a new rf power meter and SWR indicator which may be just what many amateurs are seeking. Although it is described in advertisements as a citizens band instrument, its 10-watt full-scale



indication for reflected power is in just the right range for the amateur who runs "peanut-whistle" power. The model 10043 has an accuracy of ±5 percent.

The meter is manufactured exclusively for Antenna, Incorporated by Bird Electronics. It features the Bird Thruline design, but differs from Bird instruments which amateurs may already be familiar with in that it uses a strip-line rf section. Frequency-range information was unavailable from the distributor, but it should certainly work on 10 meters and be usable on 15 and probably 20 meters. The instrument is housed in an attractive, high-impact black plastic case. It will indicate either forward power or reflected power directly, and in addition it may be used to read the standing-wave ratio in a 50-ohm line directly. No more need to refer to tables, charts, or to make calculations in order to convert forward and reflected watts to SWR. The model 10043 is available from Antenna, Incorporated, 23850 Commerce Park Rd., Cleveland, OH 44122, tel. 206-464-7075. Its price class is $90.

Amateurs using the 10043 power meter should not be misled by the "wasted power" labeling of the meter face and on the forward/reverse power selector switch. If you've been following Walter Maxwell's series of *QST* articles, "Another Look at Reflections" (Part 7 appeared in the August, 1976 issue), you've been reminded that reflected power is not necessarily "wasted" power. If the transmitter is properly matched to the line (conjugate match), the reflected power will be added to the transmitter output power to provide a net increase in the forward power reading; the *difference* in the forward and the reflected power readings will be the power delivered to the antenna system. Just keep in mind that a CB operator has no means of matching his transmitter to the line from the front panel – his rig is fix-tuned by the manufacturer to work into a 50-ohm nonreactive load. – *K1PLP*



TEKTRONIX T922 DUAL-TRACE OSCILLOSCOPE

Tektronix has for some become a synonym for good test gear and the introduction of the new T922 15-MHz oscilloscope does not compromise that reputation! As most folks know from working on circuit design and testing, a prime essential in meaningful measurements (for most projects anyway) is reliable test equipment. And an oscilloscope such as the T922 should fill that requirement.

The T922 dual-trace oscilloscope is equipped with features such as calibrated vertical amplifier deflection factors from 2 mV to 10 V/division, calibrated sweep rates from 0.5 s/division to 0.2 μs/division and a times-1 to times-10 magnifier which extends the maximum sweep rate to 20 ns/division. The rise time is 23 ns or less. Input impedance of the T922 is 1 megohm shunted by 30 pF.

Provided with the unit is an instruction manual which is very complete, and it contains such useful information as operation and calibration instructions and some analysis of waveforms. Presentations given in this section assume the reader already has some knowledge of waveforms and their meaning. Circuit diagrams and circuit information are also extensive and should make troubleshooting and maintenance possible for those with in-house test-equipment labs. The T922 is versatile, allowing measurement of frequencies up to at least 15 MHz and phase comparisons. And for special applications a *Z*-axis modulation input is included. The versatility of the scope is additionally enhanced by its extreme portability. The unit has a cabinet made of durable plastic and lends itself to be carried to the job, rather than the other way around! During the time the T922 was at the ARRL lab, it was used almost daily in the test of both digital and rf circuits and proved to be a valuable piece of test equipment. – *James F. McGivern III, WA1QZH*

Tektronix T922 Portable Oscilloscope

Dimensions (HWD) and weight: 10 × 7 × 19 inches, 15 lbs.
Power requirements: 117-V ac, 60 Hz, 35 watts.
Manufacturer: Tektronix Inc., P.O. Box 500, Beaverton, OR 97077.

TRIO-KENWOOD TR2200A 2-METER FM TRANSCEIVER

There is a style of fm box that is "worn" by a great number of amateurs, and also fills in admirably for a mobile unit. This is the shoulder-mount transceiver, seen in great numbers at hamfests and conventions. Many of them are plunked down on the seat of an automobile and connected to an external antenna or to an amplifier. These units do a tremendous job of acting as a filler in the gap between the strictly hand-held equipment and the dash-mounted mobile rig.

The newest version of this type of transceiver to come to the fore is the Kenwood TR2200A. While it still follows the basic lines of the many predecessors, there are some features that make it an interesting and versatile package.

Receiver

A dual-conversion, 12-channel receiver offers good performance in the listening portion of the TR2200A. Circuitry is somewhat straightforward, inasmuch as it employs a dual-gate MOSFET front end, a JFET mixer, and filters at both the high (10.7 MHz) and low (455 kHz) i-f. Doubly tuned circuitry, with low-value capacitive coupling, provides a degree of protection against off-channel signals that might otherwise bother the rf stage. I-f, audio and crystal oscillator stages employ bipolar devices. The squelch amplifier and audio output stage each make use of an IC for their functions.

Sensitivity is excellent and recovered audio quality and volume leave nothing to be desired. While a test for adjacent-channel overloading and for on-channel blocking could not be made under laboratory conditions, it was found that a 15-watt rig in a vehicle 4 to 5 car-lengths away, did not hamper operation of the unit. Car-to-car communications were maintained without flaw and when the other station switched to another channel to work through a repeater, there was no indication of blocking or splatter in the TR2200A.

Transmitter

Signs of good engineering practice are evident in both the transmitter schematic diagram and in the spectral output from the unit. Double-tuned circuits are employed between multiplier stages (except for the 24- to 72-MHz tripler, which has three tuned circuits) to suppress unwanted products. With the exception of an IC that amplifies the microphone output, all devices are bipolar.

Phase modulation of the carrier is performed by a variable-capacitance diode and associated circuitry that is located between buffer stages. Crystals used are in the 12-MHz range, which allows reasonable and adequate modulation to be developed by the pm circuit.

A front-panel-mounted push-button switch allows the user to select either high- or low-power output, as needed. Transmit-receive switching of the antenna is taken care of by diode circuitry, thus eliminating the need for relays.

Convenience Features

A pilot lamp behind the channel-selector knob is a very handy thing for use in

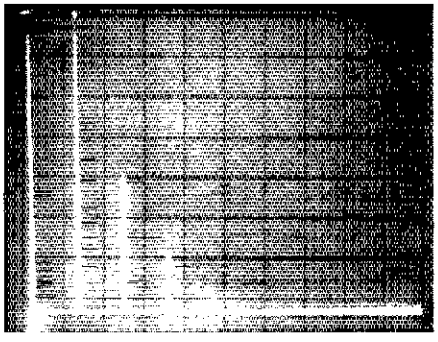
darkened areas. However, the power consumed by the lamp would place an extra burden on the batteries. A push-button switch allows this feature to be turned on only when needed. A meter on the front panel indicates relative signal strength when receiving and relative power output when transmitting. This meter will also indicate battery charge condition when activated by a switch that is located on the squelch control.

A capability of twelve channels makes the unit the equal of many mobile rigs for versatility and – this is the best part – six of them are "crystalled up" when you buy the TR2200A. A jack on the side of the enclosure permits the connection of an external speaker. Connection to an external antenna or amplifier may be made through a standard uhf fitting on the rear panel. An auxiliary socket allows one to do such things as connect a zero-center meter for alignment, turn on an external amplifier or circuit, or obtain 13 V (up to 10 mA) for an accessory device.

NiCad batteries, if used, can be charged through either the ac charger that is supplied or through a cord and plug assembly that also comes with the transceiver. A switch built into the charger/external-power socket disconnects the transceiver when the batteries are being charged by the ac converter, but the cord assembly can be wired to charge and/or operate the unit.

A collapsible whip antenna, a microphone, a carrying case and a shoulder strap complete the accessories that accompany the TR2200A.

There were two sources of annoyance to this writer: The microphone hanger does not grab the mic very securely, and the snaps for attaching the carrying strap to the case are so tempered that it requires pliers to compress them for removal. It soon became apparent that the microphone is tough – when it slips out of the hanger it smacks the pavement with a horribly sickening sound and rebounds on the coil-cord, only to hit the cement again. It is even possible that in the confusion it has been stepped on. So far, there is not a hint of a crack or malfunction. As to the strong snaps, perhaps it is better this way – a transceiver that dropped to the pavement from waist height might make an even more sickening (and expensive) sound. – *WISL*



A spectrum-analyzer presentation of the output of the TR2200A shows that the second harmonic is 40 dB below the main carrier. Power output was 2.2 watts into a resistive load. Horizontal scan is 0 to 1200 MHz. Vertical scale is 10 dB/division.

Kenwood TR2200A Portable 2-Meter FM Transceiver

Dimensions (HWD) and Weight: 2-1/4 × 5-1/2 × 8-1/2 inches, 4-1/4 pounds.*
Frequency of operation: 146 to 148 MHz, 12 channels, crystal controlled.
Power requirements: Internal battery pack or external 13-V dc supply; current drain 35 mA with receiver squelched, 360-mA transmit at low power, 620-mA transmit at high power.*
Transmitter output: 2.2 W, high power; 0.4 W, low power.*
Transmitter deviation: Adjustable to ±6 kHz.*
Crystal frequency: Operating frequency divided by 12.
Receiver sensitivity: 0.2 μV for 20-dB quieting.*
Image rejection: 54 dB.
Crystal frequency: Operating frequency minus 10.7, divided by 3.
Price class: $230.
Distributor: Trio-Kenwood Communications, Inc., 116 E. Alondra, Gardena, CA 90248. Available through authorized Kenwood dealers nationwide.
*Measured in ARRL lab.

VOLTAGE REGULATOR HANDBOOK

A *Voltage Regulator Handbook*, which places special emphasis on design techniques is available from National Semiconductor Corp. The handbook starts with the basics of power-supply design and covers transformer specification, rectifier circuits and how to specify them, filtering and load effects. The book goes on to heat flow and thermal-resistance theory and covers custom heat-sink design and commercial sink selection. It shows the detailed inner workings of the regulators and how to expand their capabilities. It describes the design of voltage outputs, booster high-current regulation, high-voltage outputs, foldback current-limiting and electronic shutdown. Also included are full descriptions and specifications of most of National's line of three-terminal and dual-tracking regulators, applications and a cross reference comparing major specifications of other manufacturers.

The *Voltage Regulator Handbook* may be obtained by sending a check for $3 (California residents add 6 percent sales tax) to the Marketing Services Department, National Semiconductor Corp., 2900 Semiconductor Drive, Santa Clara, CA 95051.

VHF/UHF MANUAL

VHF/UHF Manual (Third Edition), by D. S. Evans, G3RPE and G. R. Jessop, G6JP. Published by the Radio Society of Great Britain, London. Hardcover edition 7-1/2 × 10 inches. Page count 412, including index. Available from *Ham Radio* magazine, Greenville, NH 03048. Price at time of review, $12.95.

Readers who are not familiar with *Radio Communication*, the journal of the RSGB, may think that radio amateurs on this side of the Atlantic have a corner on activity in the spectrum above 30 MHz. Even a casual perusal of this welcome revision to an already excellent book will reveal the advanced work being done at vhf and above in Great Britain. With the exceptions of 6 meters and 1-1/4 meters, every American and Canadian vhf and up band is represented. The lowest vhf band in Great Britain covers 70.025 to 70.7 MHz. More than just a how-to-do-it collection of construction projects, the book includes a wealth of explanatory theory, for those builders interested in knowing what's going on behind the panel. Construction projects include a phasing-type 144-MHz ssb exciter, several high-power bandpass filters, balanced mixers for the 23-, 13- and 8.5-cm bands, and a transmitting converter to translate from 144 to 1296 MHz.

For the reviewer though, the high point of the book is an entire chapter devoted to microwave generation, transmission and reception, including much valuable information for those inclined toward operation above 10,000 MHz. While interest in these frequencies seems to be waning in the States, it is obviously alive and well in Britain. The authors have studiously avoided the esoteric devices available only to persons commercially involved with microwaves, and have gone so far as to describe parabolic reflectors made from dustbin lids. The chapter titled Space Communications begins with a discussion of orbital geometry and Doppler shift and concludes with specifications of requirements for a successful EME (moonbounce) system. Reference is made to all popular modes of vhf operation, including ATV.

Quite a bit of forethought went into the preparation of this book, and the authors were obviously in close contact with vhf adherents in their country. No serious vhfer should be without this book. The reviewer's copy is always kept close at hand.

MODERN ELECTRONICS MATH

Modern Electronics Math, by Jerrold R. Clifford and Martin Clifford. Published by Tab Books, Blue Ridge Summit, PA. Paperback version 5 × 8-1/4 inches. Page count 684, including index. Price at time of review: paperback, $9.95; hardbound, $12.95.

The study of mathematics is essential for a full understanding of the ins and outs of electronics. The radio amateur may find it frustrating to attempt to learn mathematics "cold," that is, without a firm idea of how the numbers interface with the special techniques of amateur radio. With this thought in mind, the authors, one a mathematician and the other an electrical engineer, have written a fairly complete math course using electronic circuits and formulas to illustrate each concept as it is presented. Not a quick study, this lengthy volume carries the reader from a simple explanation of number systems through algebra and trigonometry, winding up with two chapters on calculus. The emphasis is on practical applications of each subject and good use is made of diagrams and graphs where needed.

Modern electronics requires its practicioners to have a better grasp of theory than ever before and there is no reason to believe the future will not demand an even greater awareness. This book goes beyond the needs of most, but, by acquiring knowledge now, the reader will have at his disposal the tools with which to analyze and understand future developments in the field of electronics. – *WA1WVK*

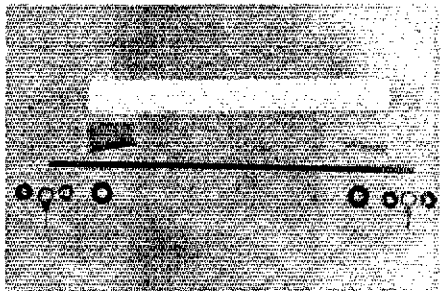
Hints and Kinks

WIRE-WRAPPING TOOL

A dried-out ball-point pen refill may be converted into a wire-wrap tool by cutting off the tip just above the ball, and filing or sawing a small notch in the metal. Be sure the refill is dry before cutting the tip! – *Chas. C. Whysall, K4WZ*

ANTENNA FEEDTHROUGH METHOD

I had a problem when running the end of a wire antenna into the basement shack without replacing a window pane with plastic sheet. I needed a weatherproof feedthrough, and the photo shows what I came up with. Materials used were a piece of 1/2-inch PVC pipe long enough to go through the wall, and a brass rod which was 1/8-inch diameter and 2 inches longer than the PVC pipe. It was threaded to accept 6-32 hardware. I used two No. 00 rubber stoppers, and two each No. 6 brass nuts and washers. Corks may be substituted for the rubber stoppers. Additional waterproofing is possible if silicone sealant is applied where the stoppers press into the pipe. – *Art Mueller, WA3BKD*

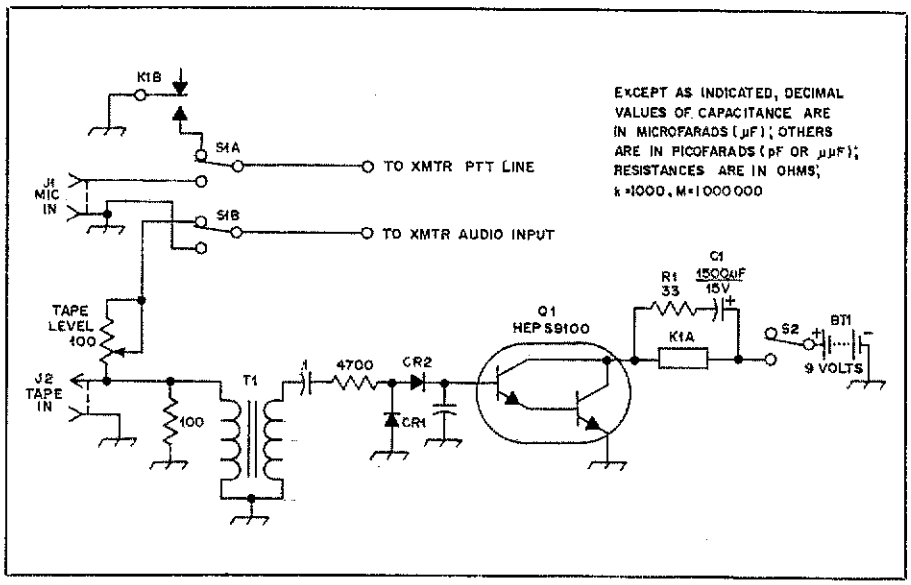


USING PLASTIC DISPLAY CASES

The plastic display cases supplied with some watches make attractive housings for small projects. If you aren't planning to buy a new watch, ask local jewelers to save them for you, as some customers may not want the cases. – *Warren Smith, WØKHT*

ANTENNA ADAPTER FOR THE WILSON HT

The standard connector on the Wilson T-1402 handie-talkie does not mate easily with coax connectors commonly used by amateurs. Adapters made from coax are cumbersome and don't allow for rapid cable swapping. Rather than modify the rig, I used an F male to BNC female adapter, available from AVA Electronics and Machine Corp., 242 Pembroke Ave., Lansdowne, PA 19050. The part number is 1013-24, and the adapter cost $1.95, plus 80¢ for postage in 1975. When used with a "rubber duckie" antenna having a BNC connector, the adapter allows quick changing from hand-held to mobile operation. – *Jim LaSalle, WA3OOV*



Schematic of the contest accessory.

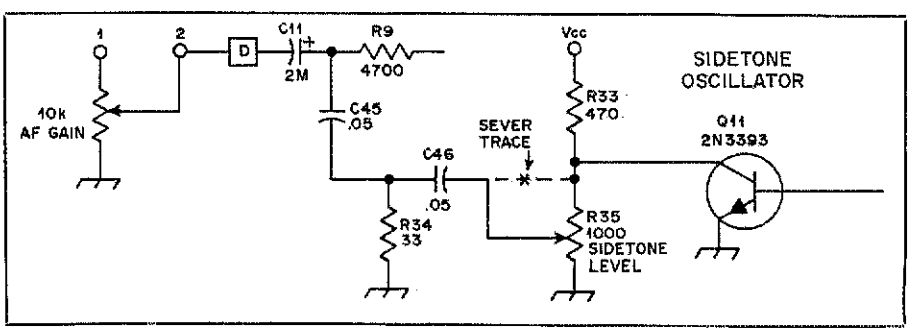
BT1 – 9-volt transistor-radio battery (RCA VS323 or equivalent).
C1 – See text.
CR1, CR2 – Silicon diode (1N914 or equivalent).
J1 – Connector to mate with station microphone.
J2 – RCA-type phono jack.
K1 – Sensitive dc relay with 6-volt coil and spst contacts.
Q1 – Darlington pair (Motorola HEP semiconductor).
R1 – See text.
S1 – Dpdt toggle or slide switch.
S2 – Spst toggle or slide switch.
T1 – Audio transformer, 8-ohm to 10-kΩ ratio.

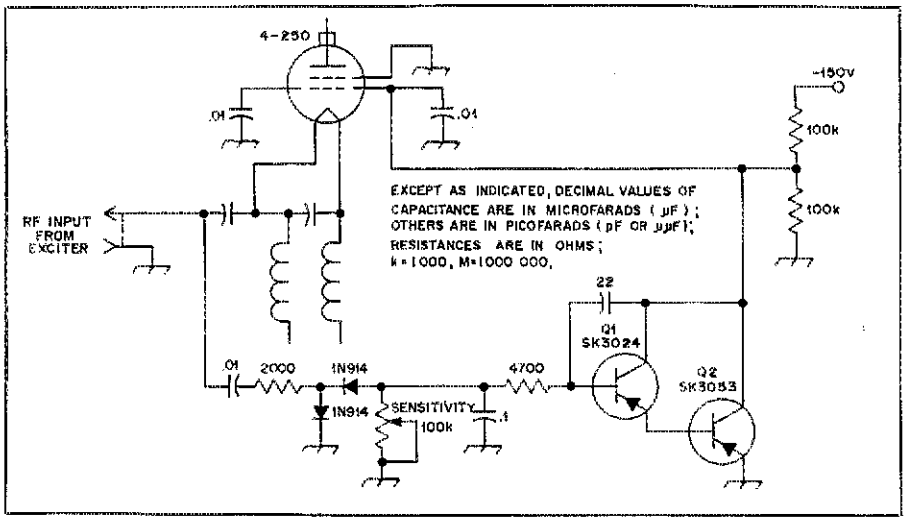
HEATH HW-7 SIDETONE LEVEL CONTROL

The HW-7 sidetone lacks a method of reducing the tone level, and it can be excessive to some people. I modified the circuit by replacing R35 with a ten-turn Trimpot. Two holes were drilled in the board to accommodate the two leads from the potentiometer. The trace between Q11 and C46 was severed and connected as shown. The desired sidetone level is easily achieved now, and operator fatigue is reduced considerably. – *David Palmer, W6PHF*

CQ CONTEST

Using a prerecorded tape to call CQ during a contest is nothing new, but many vhf rigs don't have VOX, and manually switching the PTT line is tedious. This circuit will automatically activate the PTT function of the transmitter while the tape is playing. C1 and R1 determine the delay time before the relay drops out, and exact values will depend on the relay used. T1 is connected to step up the voltage before application to the voltage doubler. S1 is used to select the microphone or tape input. The TAPE IN connection is made to the speaker of the tape recorder. Layout isn't critical, but the unit should be built in a metal enclosure to provide rf shielding. – *Bill Radice, K2OWR*





ELECTRONIC BIAS SWITCHING REVISITED

I wanted to incorporate electronic bias switching in my home built 4-250 linear amplifier.[1] It occurred to me that the protective measures and high-power transistors used in the original *QST* article were not needed if the bias were applied to the grid instead of the cathode. I lifted the control grid from ground and applied 80 volts of bias from a voltage divider across a small power supply. The two .01-μF mica capacitors keep the grid at rf ground potential. I opted to use a slower-acting system like that described by W6VFR.[2] If the bias circuit fails, either the high bias remains on the tube and the amplifier won't operate, or the grid will be at dc ground potential, resulting in very high plate current with no drive. In either case, there is no danger of high voltage appearing anywhere in the bias circuit as is the situation when the bias is applied to the cathode. The SENSITIVITY control is set just above the point where ambient noise and hum in the exciter activate the bias switch. – *Barry Roothe, W9UCW*

[1] Bryant, "Electronic Bias Switching for RF Power Amplifiers," *QST* for May, 1974, p. 36.

[2] Gonsior, "Electronic Bias Switching for Linear Amplifiers," *Ham Radio* for March, 1975.

MORE ON SILICONE SEALANTS

In Hints and Kinks for May, 1976, WB6GNM described several uses for one-part silicone rubber sealants. If sealants are to be used near electronic components or connections in an enclosed area, the sealant used should be one that gives off alcohol, rather than a corrosive substance, as it cures. One alcohol-cure sealant I have used successfully is Dow-Corning 738, available from their distributors. – *Roger Halstead, K8ZKF*

UPDATING THE SWAN 350

The original SWAN-350 transceivers use a pair of 6HF5 beam-power pentodes, designed for use as TV horizontal-deflection amplifiers, in the rf output stage. It is a reasonably easy task to convert this final stage to use the General Electric type 8950 beam pentode which is actually designed for linear amplifier and rf power-output applications. We have converted two SWAN model 350 transceivers and found considerable improvement with both units. The 8950s not only run cooler, the plates show no color, than the 6HF5s, but also provide more output. It is possible to load the final amplifier to approximately 450 watts of input.

The same 12-pin compactron socket is used for both types of tubes so socket changes are not necessary. The only connections that are common to both tube types, however, are the control grid leads; therefore *do not* remove anything that is connected to the socket pins No. 5 and No. 9 of either tube.

The "hot" heater lead on the rear socket should be moved from pin No. 1 and connected to pin No. 12; then ground pin No. 1. This change is all that is necessary to apply 12 volts to each tube. The 8950 tubes require 12 volts for heater operation, whereas the 6HF5 tubes required only six volts.

Carefully remove the ends of all resistors and capacitors that are connected to the remaining pins on both sockets, as these components can all be used in the conversion. In some cases the one-ohm one-watt cathode resistors will have to be replaced with a 2-watt resistor. In some Model 350 transceivers, we have found 2-watt resistors already installed in the cathode circuit, in which case they can be reused.

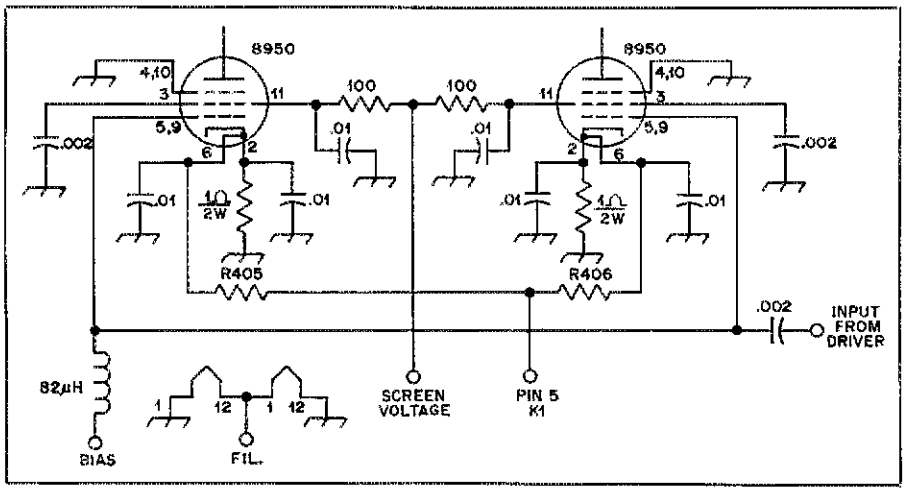
Leave the two copper straps connected between both sockets in place: One is in the control-grid circuit; the other is left in place and both pins No. 4 and No. 10 on each socket grounded with the shortest possible leads. These are the beam-forming plate leads. Reposition the two 100-ohm screen-grid dropping resistors under the copper straps so that one connects to pin No. 11 of the rear socket and the other to pin No. 3 of the front socket. Wire pins No. 3 and No. 11 together on each socket. Wire pin No. 2 to pin No. 6 on each socket; then connect the cathodes of both tubes together by running a bare wire from pin No. 6 of one tube socket to pin No. 6 of the other socket.

Making all leads as short as possible, bypass pins No. 2, 6, 11 and 12 on the rear socket, and pins No. 2, 3, and 6 on the front socket to ground with the .01 NF disk-ceramic capacitors previously removed. Pin No. 3 of the rear socket and pin No. 11 on the front socket should be bypassed to ground using the two .002 NF disk-ceramic capacitors previously removed.

Resistors R405 and R406 in the cathode circuit should be connected to the center of the bare wiring running from pin No. 6 of one socket to pin No. 6 of the other socket. The 2-watt, 1-ohm cathode resistors should be connected from pin No. 2 of each socket to ground. It is imperative that all leads be kept as short as possible, particularly the ground leads. This completes rewiring of the tube sockets necessary for the conversion.

It will be necessary to touch up the driver tuning due to the change reflected from the amplifier tuning and loading. Neutralization will also have to be readjusted. See your SWAN 350 manual for the details of tuning and neutralization procedures. I strongly suggest a thorough study of the manual, remembering the timely warning about the tune-up time limit of thirty seconds. Do not forget to make notes in the instruction manual regarding the changes you have made, correcting the PA stage of the diagram and the heater wiring circuit. The tube lineup on page two should be corrected, the voltage chart on page 14 and the trouble-shooting guide on the same page.

The type 8950 tubes, although not available everywhere, can be obtained in matched pairs from Slep Electronics Company at P.O. Box 100, Otto, NC 28763, on the East Coast, and from SWAN Electronics, 305 Airport Road, Oceanside, CA 92054, on the West Coast. – *Carl Coleman, K4WJ*



Radio Foxhunting in Europe

Part 2: Want to bushwhack in backwoods? Here's a simple, but effective, receiver for 80 meters that'll help you track those wily, wireless creatures.

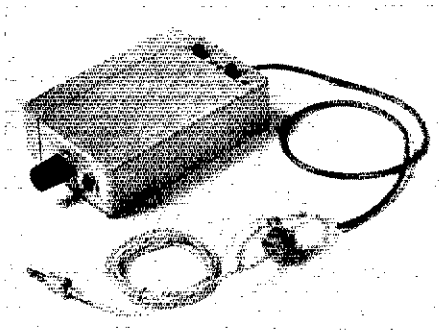
By Nicolai K. Holter,* LA5CH

Scouts race through the woods and brush, stop, carefully listen, take a bearing and are off again. At last! There's the sly fellow that has been howling in their ears.

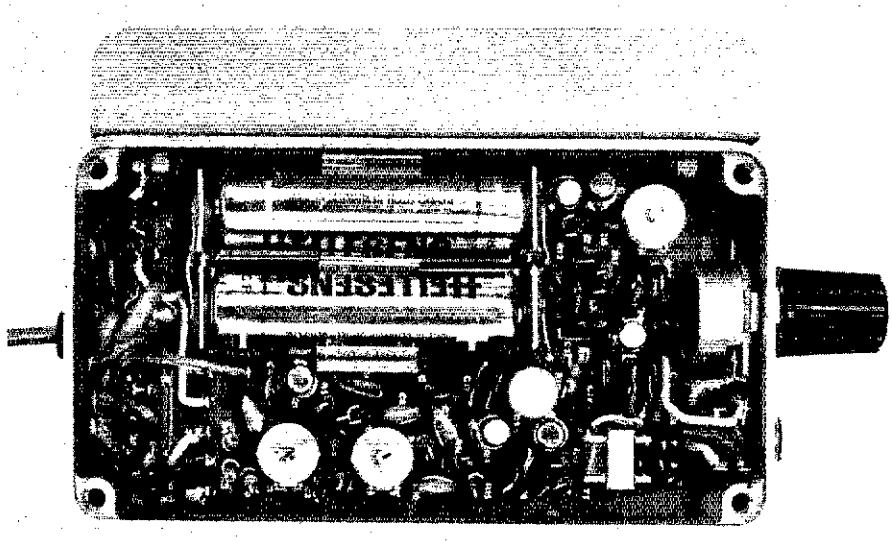
Among the most popular sports in Europe is radio foxhunting. The interest has become so intense that competitions are held all the way to the international level. Using the same principles as hidden transmitter hunts in the United States, this continental activity combines cross-country running, map reading and compass orientation with hidden low-power transmitters and portable receivers. Typically, they operate on the 80-meter or 2-meter band.

Part 1 (QST, *August, 1976*) *detailed foxhunting principles and course setups. Those can have as many as five transmitters simultaneously activated across a three- or four-kilometer course. Now, we take a closer look at the 80-meter portable receiver that was used by Scouts at NORDJAMB-75* (QST, *September, 1976*).

*Box 58 Oppsal, Oslo 6, Norway



FOX-75 receiver with earphone and sense antenna. The latter is allowed to hang down vertically as the receiver is held in one hand.



Interior view of the complete FOX-75 receiver.

As plans progressed for the 14th Boy Scout World Jamboree, in Norway for 1975, it appeared that we would need some 150 foxhunting receivers along with another 150 kits for sale at the event. With this in mind the Norwegian Radio Scouting Committee early in 1974 started a design and evaluation program for an updated receiver based on an earlier design, but modified for ruggedness, simplicity and lowest possible cost for 300 units.

The FOX-75 Receiver

For almost 10 years a popular receiver for 80-meter foxhunts in the Scandinavian countries was a simple, direct-conversion job that almost anyone could put together. Designed by SM5AKF and SM5BZR, it included the necessary features: a directional ferrod and a vertical sense antenna, plus an attenuator for insertion at close range. To help interested Scouts get started, kit projects on this receiver were organized in 1972 for Norwegian Boy Scouts.

Soon, it was found that little improvement could be made in the basic design, but for the Jamboree and later use among Boy Scouts, it appeared that the sense antenna and attenuator might be eliminated. The battery switch was made part of the headphone jack and a few other changes assured a "Scout-proof" receiver of very low cost and ultimate simplicity. A varactor-tuned oscillator eliminated mechanical problems in capacitively tuned circuits and reduced the oscillator cost. The result,

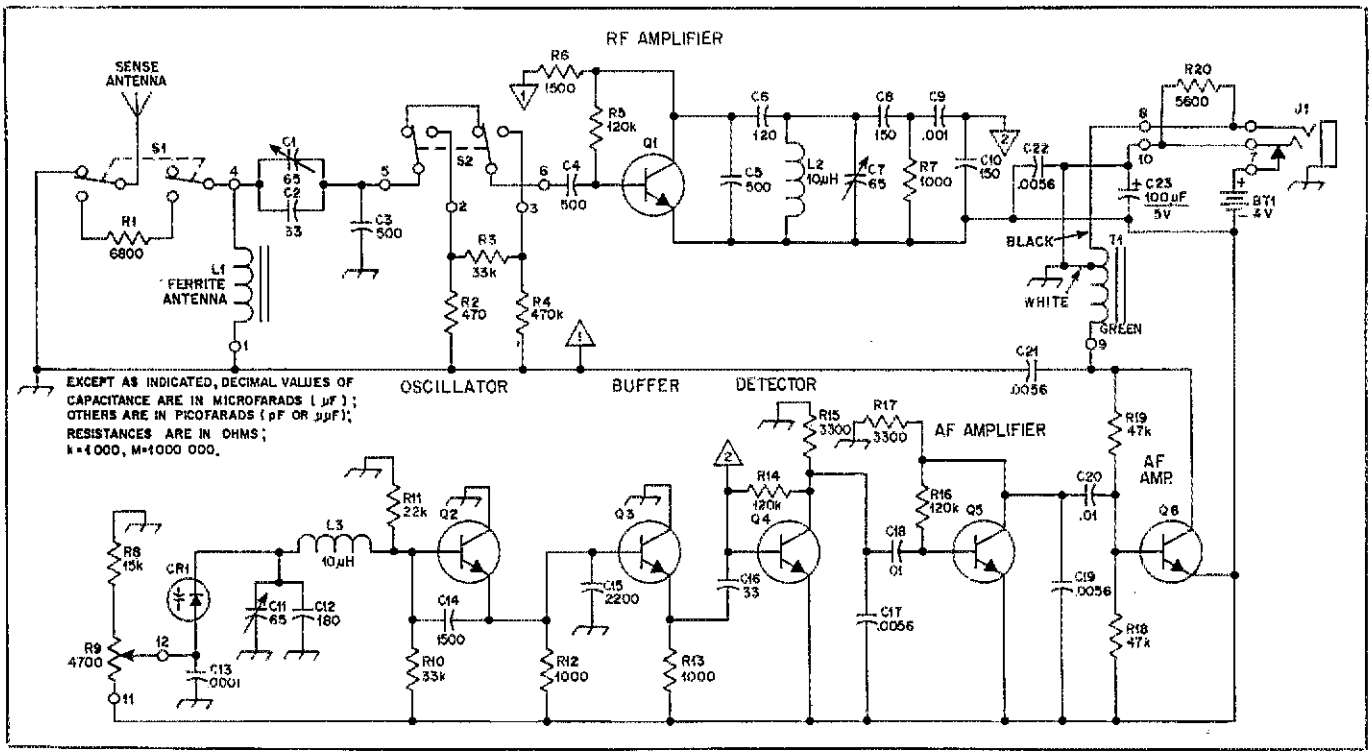


Fig. 3 — Circuit diagram and parts information for the FOX-75 receiver. Numbers on parts not described below are for layout identification and text references.

BT1 — 3-volt battery (penlite AA cells).
C1, C7, C11 — 65-pF ceramic variable.
CR1 — Variable-capacitance diode. Various types can be used by adjustment of C11, and possibly a different value for C12.
J1 — Miniature phone jack, to match earphone plug, with double-make contacts.
L1 — Ferrite-rod antenna; 22 turns No. 28 enamel wound on two ferrite rods 10 X 95 mm, as shown in Fig. 6.
L2, L3 — 10-μH subminiature coil.
Q1-Q6, incl. — Hf small-signal amplifier transistor, npn.
S1, S2 — Miniature dpdt slide switch.
T1 — Subminiature autotransformer, 2000 and 8 ohms.

now known as FOX-75, performs quite well in hunts and does a surprisingly good job in other QRP work as well.

The Circuit

The ferrite antenna, L1 in Fig. 3, is part of the input tuning circuit. L1-C1, C2-C3. On the FOX-75 version with sense antenna and attenuator, a network of resistors, R2-R3-R4, is used to reduce the signal to a level suitable for direction finding when the hunter is close to the fox. To avoid too much loading of the tuned circuit, the attenuator is inserted across C3, which is in series with the C1-C2 parallel connection. It attenuates about 23 dB, a value found suitable for a fixed attenuator.

The receiver oscillator, Q2, is tuned coarsely by trimmer C11 with a fixed padding capacitor, C12, in parallel. In normal use, fine tuning is done with the varactor diode, CR1, varying its reverse-bias voltage by means of R9. The Philips BA102 diode used has a capacitance range of about 35 to 52 pF with the 3-volt source used in the FOX-75 receiver. Other diodes can be selected from manufacturers' characteristics, altering the values of R8 and R9 as may be required for the desired tuning range.

Normally, a 25-kHz tuning range is enough as the foxes are usually crystal-controlled, and close together in frequency (if not sharing the same channel).

More tuning range will be desirable if the receiver is to be used for general QRP work. It should be noted, however, that tuning only the oscillator limits the practical coverage with a receiver in this form.

The receiver can be set up for high-impedance earphones or headsets without the miniature autotransformer, T1. The 5600-ohm resistor, R20, is needed only in such an application. Use of T1 permits either high- or low-impedance phones. Connect the phone jack, J1, to lug 8 of T1 for 8-ohm output, or lug 9 for 2000-ohm output. Note that no conventional on-off switch is used. The receiver is on as long as the phone plug is in the jack.

Construction Hints

The FOX-75 receiver was prepared as a complete kit. All parts and detailed instructions were packed with it, but it can be built readily from the information given here. Only common parts, available almost anywhere, are used. The principal precaution should be to check that parts dimensions are similar to those used in the original version before duplicating the circuit-

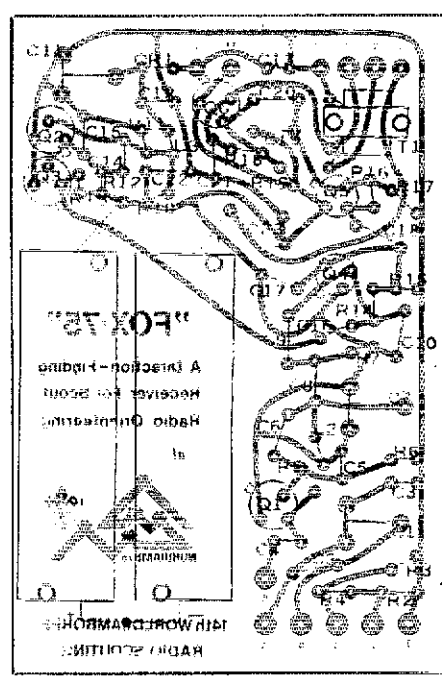


Fig. 4 — Parts layout and circuit-board details for the FOX-75 receiver. A final check should be made of all parts dimensions before using the layout exactly as shown. Some European components may require slightly different layout from those available in this country.

board layout of Fig. 4. The case is an Eddystone diecast alloy box, 138 X 76 X 37 mm, outside dimensions. It is available in the United States from BRE Ltd., 927 Gist Ave., Silver Spring, MD 20910 or from Bud distributors. An exploded view of the receiver, showing all parts not mounted on the circuit board, is given in Fig. 5.

The ferrite-rod antenna, L1, is wound with 22 turns of No. 28 enameled wire, as shown in Fig. 6. It is molded into a U-shaped aluminum retainer mounted on the side of the case, using any of the potting resins that will cure easily in the retainer. When the casting material is solid, it can be filed or sanded smooth and painted along with the metal box to which it is attached.

The fully assembled circuit board can be supported in the box by the wires that connect to components mounted on the case. A sheet of insulating material should be underneath the board. Full support can be provided with foam rubber, cut to a thickness that gives some compression in the battery area when the cover is fastened.

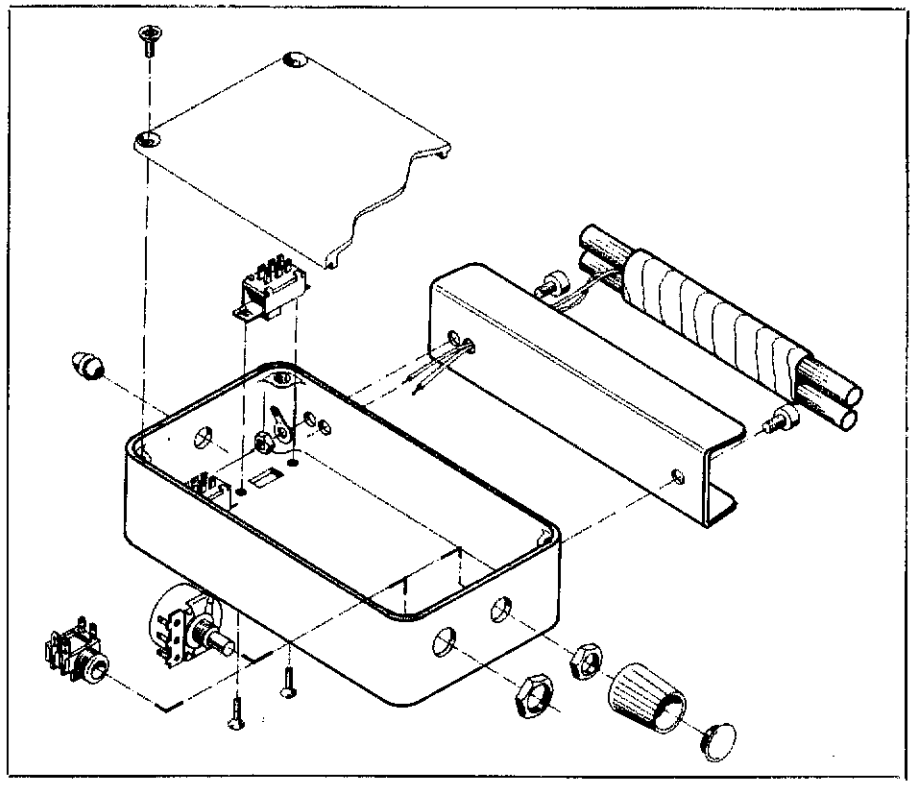


Fig. 5 — Exploded view of the receiver, showing methods used to mount parts not included on the circuit-board assembly.

Adjustment and Use

Setting up the receiver for foxhunting is quite simple. With penlite cells in place and earphone plugged in, check the tuning range with a variable-frequency test signal. A dip-meter oscillator is handy for this. Tune the rf filter trimmer, C1, and the amplifier trimmer, C7, for maximum response, moving the signal source away if necessary to give a low-level signal for peaking purposes. The setting of C11 should be such that the desired frequency range is covered by variation of the varactor bias with R9. If the desired coverage is not attained, change the value of the fixed padder, C12, as needed. This capacitor is critical for stability. Only a good-quality type intended for rf service should be used. Some experimentation with temperature coefficient may be necessary to balance the characteristics of L3 for optimum stability. To be sure that the receiver sensitivity is adequate, a final check should then be made with a typical transmitter setup as used in foxhunts.

To obtain accurate bearings and maximum sensing, hold the receiver as far away from your body as possible. Avoid spots where wires, fencing or other metal materials are in close proximity. Now check the sensing antenna length and, if necessary, the value of R1 for best sensing effect. The attenuator network, R2-R3-R4, may also be subject to some experimentation. Usually the value of R3 is all that need be changed.

The sense antenna is flexible, insulated wire hanging down about 400 mm from the receiver. It can be trimmed for maximum effect, starting with a little more than the above length and cutting off 5 mm at a time.

In the Jamboree receivers the attenuating switch was eliminated and the fixed network was left permanently connected. It was set up so that nulls could be obtained within a few yards of the transmitter while retaining an effective operating range of about 200 yards. This is adequate range for training purposes or for handling a large number of hunters in a short time.

Transmitters

Practically any QRP transmitter can be used as fox in transmitter hunts. In view of the large number of hunters

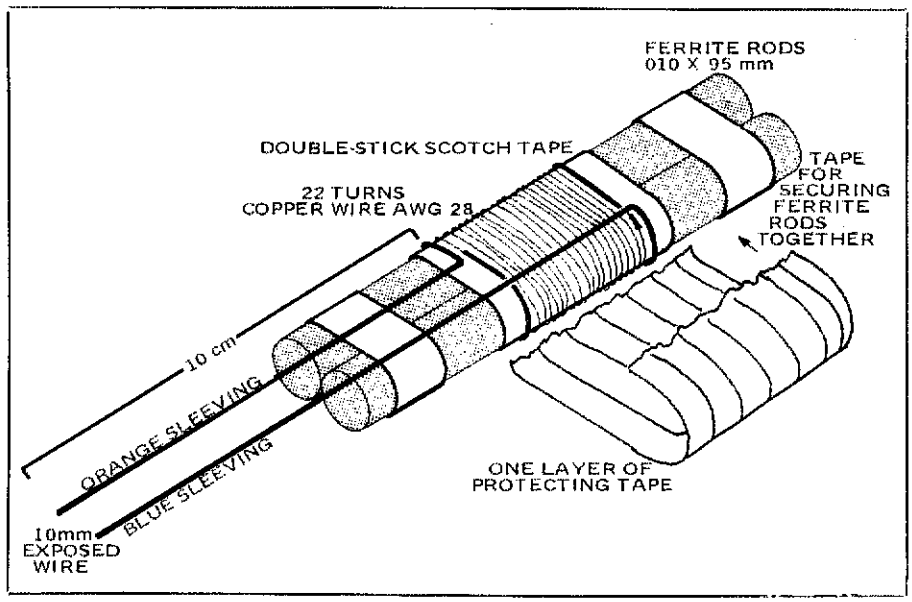


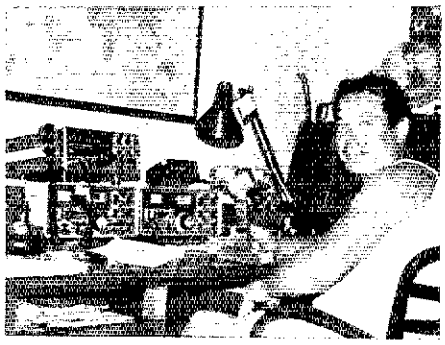
Fig. 6 — Details of the ferrite-rod antenna used in the hunter's receiver.

operating in a small area simultaneously, the 1975 Jamboree imposed some special conditions. Some 25 hunters each 15 minutes was typical!

We had four transmitters, crystal-controlled on 3.566, 3.585, 3.635 and 3.680 MHz – each with individual identifying codes. Frequencies and codes on all transmitters were changed every half hour. The many crystals that were needed to make this versatility possible were generously supplied by JAN Crystals, Ft. Myers, Florida. There was no way to tell where any receiver might take you, except to head for the woods and find out for yourself.

To accomplish all this required a degree of sophistication in crystal selection, keyers and timers that is beyond the scope of this story. But, anyone who has been caught up in the excitement of even an ordinary foxhunt will have some appreciation of conditions at NORDJAMB-75! QST

Strays

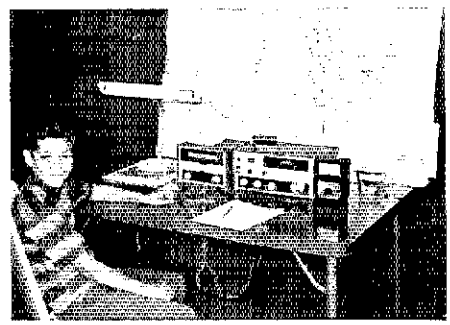


VISITING WITH THE OTHER SIDE

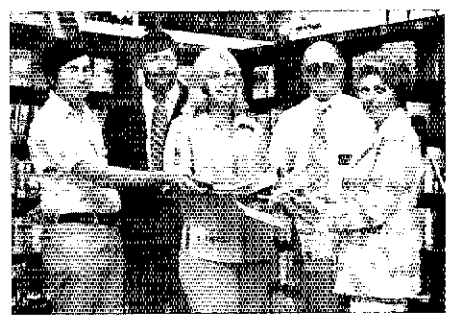
□ International friendship – no other hobby can match amateur radio for its unique ability to instantly create goodwill between different parts of the world and across all boundaries. Best of all it's always on a one-to-one basis. On an overseas visit an eyeball QSO adds that little extra to make the trip special. (top photo) Returning home for a visit in Junction City, KS, was Ann Willert (left), DJØIX, an avid cw operator. Clarence Schultz (center), WØCHJ, also hosted the OM Ernest (right), DK3FF, a vhf buff on OSCAR and ssb. (second photo) Going the other way, Gino Gard, W9NMZ, met another active cw op, Silvano Susanj, YU2REP, in Opatija, Yugoslavia. (third photo) A south-to-north excursion took Jose de Souza, OA4ASF, to Alaska. Here, he is keeping in touch with his family back in Lima, Peru, while at the shack of Roger Hansen, KL7HFQ. (bottom photo) Yet another visitor to Alaska was Dr. Ernest Lemberger, OE1ELW, greeted by members of the Fielson Air Force Base Radio Club. From left to right: (front) Mike Brooks, KL7IFW, Jerry Campbell, KL7IRN; (rear) Herschel Siebert, Jr., Dr. Lemberger, Pam Hottenstein, James Crofutt, KL7IIO and Gerold Kaplan, KL7IFR. *(KL7IPU photo)*

AN EYEBALL WAC

□ When Irving Zambakian, W2PUK, read of the half-million-mile round trip QSO between Al Katz, K2UYH and Pete Carey, ZE5JJ, he informed us that he had an eyeball contact with the Rhodesian moonbouncer a few years ago. As a matter of fact, Irving has also made eyeball contact with amateurs in all six continental areas. The others were Venkate Sulu, VU2GV, India; Spiro Tsaltas, SZØAT, Greece; Ed Boyle, Sr., WA2ZFZ, NJ; Silverio Aison, DU1SA, Philippines; and Oscar Zuloaga, YV5DZ, Venezuela.



Within a month after receiving his Novice ticket, 10-year-old Rex Bowers, WN8ANR, worked 18 states and qualified for a 10 words-per-minute Code Proficiency certificate. Now he's up to 19/25 confirmed/worked states. He hopes to qualify for Bicentennial Worked All States. When he went into Boy Scouts a little early he made the radio merit badge his first one. Among his wallpaper collection, he is most proud of his ARRL membership certificate, noting that "it's a big men's organization." *(WA8UAN photo)*



Members of the Broward Amateur Radio Club recently presented the Ft. Lauderdale (FL) Public Library with a complete set of ARRL publications. From left to right: Tony Urbizu, WB4TED, communications officer; Bob Hill, WB4RZX, president; Janet Urbizu, WA4FUA, secretary; Elmer Anderson, K4GOI, vice president; and Jean Trebbi, head librarian.

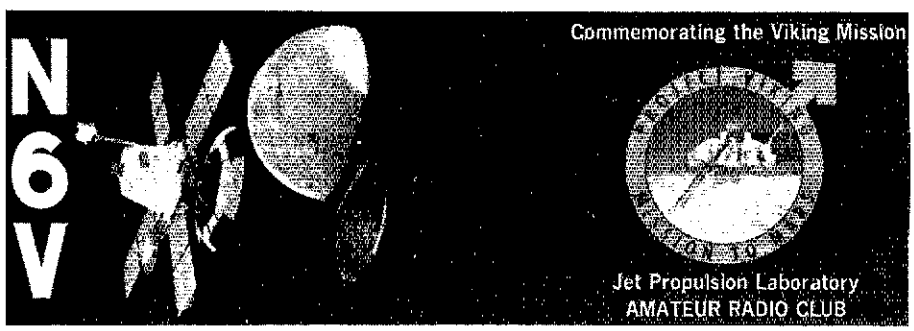
Does your club want to spread the word about ham radio? Then donate a complete set of League publications to your local library – and have we got a deal for you. Your club can get a complete set of ARRL publications for this purpose at half-price. Three conditions: (a) Yours must be an ARRL affiliated club, (b) The order must include a letter from the local library agreeing to display and circulate the manuals, and (c) $25 with the order.

A Tip of the Hat

Viking exploration of Mars touches amateurs worldwide through special-event stations marking the mission.

By James Lumsden,* WA6MYJ

The Viking Project comprises dual missions designed to orbit and soft-land spacecraft on the surface of Mars. Making observations of the planet during approach and from orbit, each spacecraft also takes direct measurements in the atmosphere and on the surface of Mars. Particular emphasis is being placed on obtaining biological, chemical and environmental data that may indicate existence of some form of life on the planet.



Viking spacecraft were launched by Titan/Centaur vehicles on August 20 and September 9, 1975. Each spacecraft consists of an orbiter carrying a sterilized capsule landed by parachute and braking rockets. Viking 1 arrived at Mars on June 19, 1976, and landed in mid-July. Viking 2 was scheduled to arrive on August 7, 1976, with touchdown set for mid-September.

"What are those pictures you are sending? They look like the surface of Mars. N6V from CZ20."

"CZ2O from N6V. That's what they are."

Amazement, disbelief, bewilderment such ran the gamut of reactions. Novices, not quite trusting what they had heard, often came back with responses which logically incorporated the three-character call into some more familiar pattern. But 1 × 1 calls they were and they came from two special-event stations commemorating Project Viking, the soft landings on Mars.

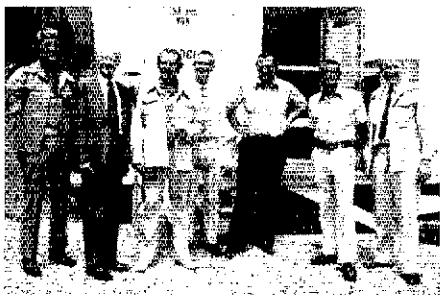
On the East Coast N4V was activated from Hampton, VA, at the NASA Langley Research Center. From the West Coast N6V is still operating from the Jet Propulsion Laboratory in Pasadena, CA. Langley has overall management responsibility for the Viking project while the JPL assignment was development of the orbiter system, the tracking and data acquisition system and the mission control and computing center system.

Touching the Lives of Many

At first amateurs everywhere were confused a bit by the call sign. But, what a show! Members of the JPL Amateur Radio Club have set a goal of 10,000 contacts for N6V before closing down on November 15. As of this mid-September report, they have already accumulated more than 6000 stations. This far exceeded the anticipated two to three thousand contacts typical of their previous special-event stations. And the interest explosion necessitated some alterations and additions to the club's existing station.

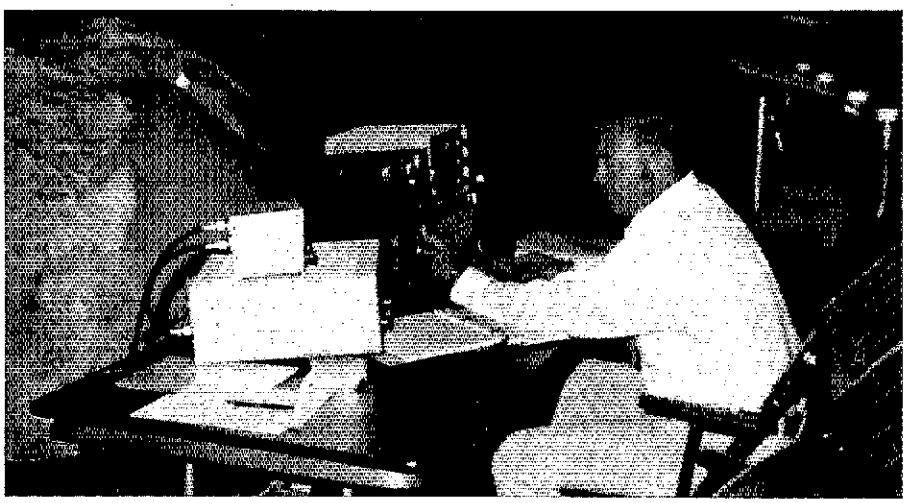
One fortuitous inclusion was slow-scan TV. N6V treated amateur tele-

*Jet Propulsion Laboratory, M/S 233-103, Pasadena, CA 91103



A delighted N6V group stands before the Jet Propulsion Laboratory Amateur Radio Club's main station. With much perspiration and sore muscles, antennas were hoisted approximately 600 feet up the hill behind the trailer. Construction of the new setup was a part of the preparation for the special-event station.

Bill Pickering, retired JPL director (seated); NBC Science Commentator Roy Neal, K6DUE (standing right) and Stan Brokl, K6YYQ, 1976 W6VIO president watch a just-received photo from the Viking 1 orbiter being sent SSTV to N6V followers.



On the East Coast Jim Wise, W4PRO, operates from the N4V QTH at Langley Research Center in Hampton, Virginia. *(WA4DUS photo)*

vision viewers around the world to some "live" pictures of the Martian surface after translation by a computer. For many areas, it was the first news about the event. Several amateurs forwarded photos of pictures they had received to their local newspapers. Live news coverage featured one amateur on network TV as he was receiving SSTV. An icebreaker off the coast of South America took more than usual interest in the Viking mission progress during one SSTV operating period. It turned out that the ship was returning from Antarctica with several Viking project biologists aboard. They were heard to vow that next trip out they would have SSTV aboard.

This SSTV picture was received by K4TWJ from N6V at JPL in California. N6V retransmitted this picture from Viking after its initial landing on Mars. The black object in the picture's lower right corner is a shadow from the spacecraft's leg. Windswept soil with soft shadows is evidenced in the top of the picture.

Pulling Together

Only through joint membership effort were such successes possible. To meet the voluminous demand, the club's visionary goal of a trailer facility at a higher location received a real deadline. Construction to make that deadline meant among other difficulties hauling coax cable up some 600 feet through rattlesnake-infested hills under a relentless sun. Although not in the original plans, OSCAR communications were eventually made part of the station setup. In the something-for-everyone approach, even QRP was occasionally exercised. So when N6V went on the air, on time, at 1300Z on June 18 for the first operating period of five days, a double goal was achieved: The initial time slot netted a whopping 2250 contacts and the JPL Amateur Radio Club had its new facility.

Well-Deserved Kudos

Anne Morrow Lindbergh has defined communication as "the translation of one's individual talents into a negotiable form. What you . . . have to give is transferred to other people in a form they can understand, accept and use constructively." When that exchange involves the united talents of an entire club, the impact is likewise multiplied. The intention of a special-event station is to recognize milestones in the progress of mankind. But more than that N4V and N6V added a fresh step to the sum of human accomplishment, knowledge and insight. Testimony to this deed is best given by those who have participated. In Caracas, Venezuela, YU5FBL didn't quite make it to a ham club meeting on time. Jose couldn't tear himself away from the Mars pictures he was receiving said his XYL. Besides, he adds, "The rest of the club would not believe me unless I had tapes to prove it." QST

Another SSTV picture received by K4TWJ shows rocks with erosion and effects similar to sandblasting. The rocks are embedded in soil. The large rock at the top of the photo has a black shadow due to erosion in its center.

Strays

I would like to get in touch with . . .

□ others interested in playing Avalon Hill games over the air. Clarence Erickson, WBØNCP, 8614 Beverly Street, Duluth, MN 58808.

□ hams in the military service in the Pacific, particularly shipboard Navy personnel. Mike Anderson, WBØLEY, MMR3 Div-E, *USS Ogden* LPD-5, FPO San Francisco, CA 96601.

□ anyone wishing to exchange BASIC computer programs. Bob Steuer, WA2ZIQ, 466 Grandview Terrace, Leonia, NJ 07605.

□ New addition to NTS: A slow-speed cw traffic net to serve the Arizona/New Mexico area has recently been added to NTS. Dubbed NAN for New Mexico/Arizona Traffic Net, it was intentionally located in the Novice portion of the band to allow Novices and Technicians to check in. It was planned that this net will train operators in traffic handling and give slow-speed operators an opportunity to QSO with experienced operators as an aid to advancement. Net speed will average 10 wpm and operators at any speed are welcome.

The net is patterned after the Colorado/Wyoming Net which has evidenced tremendous ability in training and keeping operators. Reports from the Colorado/Wyoming Net indicate that about 75 percent of the Novices checking into that net regularly acquired their General class license within four months.

Particulars of the new net are as follows: frequency, 3735 kHz; time (summer) 0230 nightly, (winter) 0330 nightly.

Worked All States on 144 MHz

Dick Hart, KØMQS, realizes an operating first after 12 years of pursuing the fascination of vhf.

By James M. Morris,* KH6HQG

His address, 5 Rhombic Road, tells part of the equipment story. For Dick Hart, KØMQS, his recent 144-MHz Worked All States represents a personal achievement as well as a technical one.

Before World War II, he had studied Morse code. "I had an Elmer in high school," so becoming a Navy radio operator was easy. For the duration he served in the Aleutians. Shortly after the bands were restored to the Amateur Radio Service, he obtained his license while in Saginaw, Michigan.

During the following years he moved around the Saginaw area and eventually into Iowa. Also, he married and started raising two sons, now 12 and 17. While his career developed into insurance, he continued an amateur radio interest, especially propagation. In Cedar Falls, Iowa, he decided to pursue WAS on 2.

Wants to "Compete and Win"

"I looked at what others were doing and were not doing. I also looked at my location in geographical relationship to the rest of the continental United States and concluded that I had a reasonably good chance of completing the first 2-meter WAS." A check of mileage figures shows that he was equidistant, about 1400 miles, from the eastern and western fringe states.

On July 5, 1964, Dick went on 2 meters using a 4-element beam antenna made from coat hangers and a broom handle. Within 10 weeks he had worked eight states.

As he became more sophisticated in working over the horizon on 144 MHz, he turned much of his attention to meteor scatter. Again, the maximum mileage happened to be about 1400 miles for that propagation means. From the Cedar Falls location, Dick ran 335 meteor-scatter schedules.

"At first, nobody took me seriously." But, by mid-1969 he had worked 45 states. As he progressed others did begin taking him seriously and making schedules. Then he moved.

A Second Start

Dick and his family went about 80 miles south, 55 miles over the limit set by WAS rules. The town name of Delta accurately described his new location. Although river bottomland would hardly seem the place to settle either for amateur activity or family living, the place was really suited for both. In that particular Skunk River valley his 70-acre site occupies the only sizeable hill in the area. "It's not much for raising crops, but the family loves it."

Once more, he began the climb upward for WAS. "I had to keep prodding." Among the difficulties encountered was trying to pry some of the rarer states on the air for schedules since many had already worked Iowa. Within three years, however, he was back to 45 states.

Although meteor scatter was the primary means, other ways were used. In fact, his logs easily identify how. Red entries are for meteor scatter, green indicates auroral contacts, blue shows tropospheric QSOs, and purple is used for moonbounce work.

To Moonbounce for the Hard Ones

During his first effort from Cedar Falls, the question of how to work Alaska and Hawaii had been left largely unresolved. By the time he neared his goal in the second try, enough advances had been made in low-noise receivers, high-power amplifiers, and gain antennas to make moonbounce reliable. An 1100-foot rhombic went up.

Among the few stations doing serious vhf work in Hawaii was KH6NS, Ed Bryan. When Ed became aware of the situation, however, he faced a moving deadline of two weeks. For personal considerations he was going from the cane-field countryside of Ewa into the city of Honolulu. Nevertheless, a complete EME (earth-moon-earth) station was assembled by Ed. Their signals were weak, but enough for a complete two-way on September 20, 1973.

With a nonsteerable antenna, the opportunities for moonbounce were quite limited. Thus, WØOHU, WØDET, WB6NMT and WAØCHK combined to give Dick computerized predictions of his moon window time.

The last two states came only days apart. Keith Armstrong, W7UBI, in Boise, Idaho, ran 56 schedules with Dick before making a complete EME contact on August 2, 1976. At about the same time Wayne Overbeck, K6YNB, was preparing to embark on an expedition to Alaska sponsored by the Northern California DX Foundation. Via moonbounce again, Dick Hart worked his 50th state on August 17.

Congratulations, but Not the End

Of course, it was one of the biggest topics at the Central States VHF Conference held in Houston, Texas, the following weekend. An ARRL VHF Achievement Award was presented to Dick and a congratulatory telegram from ARRL President Harry Dannals, W2TUK, was read.

Dick wants to see more activity and is still quite willing to schedule anyone. For example, he has consistently worked K7NII, in Queens Creek, Arizona, during known meteor showers over the past two years.

"If someone in the Midwest were to start from scratch now, they could be second."

*Editorial Assistant, *QST*

Novices Extend Age Horizons

Individuals are unique. But young or old, amateur radio operators greet each other with friendship and opportunity.

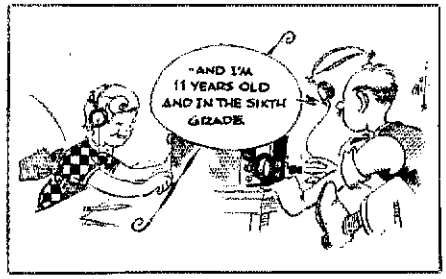
By James M. Morris,* KH6HQG

Age is no barrier to becoming a radio amateur. With an Elmer, be it an individual or club, new worlds can open for people becoming radio amateurs; no matter what their age. A "stray" in last month's *QST* by Harry Blomquist, K6JSS, defined Hzs, an average ham. The age parameter was given as a range from 11 to 73 years old. Extrapolate those figures a bit and we can focus on even more contrasting ages in amateur radio, reflecting this hobby's diversity.

From the ninth call district come Evelyn Fox, WN9QZA, of Merrimac, Wisconsin, and Neil Rapp, WN9VPG, of Vincennes, Indiana. She is 80 years old and he is 5.

"Ever since I was a little girl, I've been fascinated by radios," Mrs. Fox said. What really sparked her interest was literally that in those days – spark gap. She recalled how a boy across the street from her strung up wires all around his yard to communicate with others by wireless. "Of course, amateur radio then was very pioneering in equipment and operating practices, hardly a feminine pastime."

The Great War came, putting amateur radio off the air. When it passed she tended to running a household and raising two sons, although one was lost in the next war. Her radio interest, however, never subsided. After her husband passed away she had a lot of time and wanted something to do, to be active, to communicate.



In 1974 she joined the Yellow Thunder Amateur Radio Club, of Baraboo, Wisconsin, to start their Novice course. Within a year she had her ticket. Since then, Mrs. Fox has found amateur radio to be "a great hobby . . . which can be useful in times of emergency." She particularly likes to collect the various QSL cards from her different contacts.

At the other end of the age spectrum, Neil Rapp also had an early interest in radio. Now, however, personal communications has become more readily available, so he fulfilled his curiosity almost immediately with the current popularity, citizens band. He was four years old then. In a month's time last summer, he changed from a shy boy to a regular radio operator, memorizing more than a dozen call signs of stations that frequented the channel his parents monitored.

At Christmas, his father happened to pull a code oscillator out of a closet. He dusted it off in preparation for relearning the Morse code, which he had once pursued as a teenager. "What's that, dad?" Neil asked. From then on, they practiced every day. Neil would key the reset button on his father's Pocket Pager when he came home for lunch.

They noticed an announcement in January for classes at the Old Post Amateur Radio Society in Vincennes. It stated a lower age limit of 13, but Mr. Rapp noticed a 10-year-old on the first night as well as others of different ages. They all had a common goal – an amateur radio license.

Less than two months after starting, both Neil and his Dad passed their code tests. Neil's written test, however, became ensnarled in the FCC backlog last spring, so it was June before it arrived. Their patience was worthwhile. He received his license and for his first contact tried calling his 10-year-old classmate, Carol Smith, WN9UKC. No answer. A CQ brought back Jim Cobb, K3DIF, Silver Spring, Maryland.

Already Neil Rapp is eagerly pushing his dad to study for the General. Evelyn Fox is in a General class course herself with an incentive of a new transceiver given by her son. "I'm a little slower now, but I keep plugging along." Amateur radio starts with getting a license. From that point, the limits of friendship and challenge are boundless. QST

*Editorial Assistant, *QST*

Ever since her childhood Evelyn Fox, WN9QZA, has been interested in radiocommunications. She will be 80 this month.

Thanks to encouragement and instruction from his dad, and diligent study, Neil Rapp, WN9VPG, obtained his license at the age of five.

The Oscarlocator

The OSCARs are up there someplace. Find them quickly with this handy device, available now from ARRL hq.

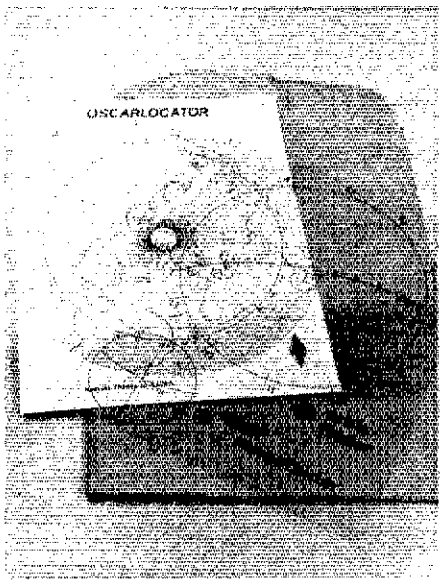
By Charles J. Harris,* WB2CHO and Joel P. Kleinman**

You're waiting, intently listening to the receiver hissing with the silence of the 10-meter band. Suddenly, signals explode from the band – frantic CQs, cw signals drifting like a passing train, creaky sidebands and the steady dit-dahs of the telemetry beacon. OSCAR – Orbiting Satellite Carrying Amateur Radio – is headed your way.

With two satellites active and another one getting ready for launch perhaps as early as late next year, interest in the OSCARs – the only satellites accessible with portable, inexpensive equipment – has never been greater.

How do you go about pinpointing a tiny metal box speeding 910 miles above the earth at 16,000 mph? Enter the OSCARLOCATOR.

*Club and Training Manager, ARRL
**OSCAR Educational Program Asst., ARRL



As it comes from the envelope, your very own OSCARLOCATOR.

Available Now

Based on the original design of Kaz Deskur, K2ZRO, the OSCARLOCATOR lets you predict when both active satellites will be within range of any location on earth. *It is now available from ARRL hq. for $1 postpaid.*

It consists of three parts – a polar projection of the earth and two circles on an acetate sheet. The larger circle, with numbers around its circumference, is the Orbit Finder, and the smaller is the QTH/Rangefinder. Centered on your location, the Rangefinder shows, appropriately enough, the satellite's range. The larger Orbit Finder is positioned over the map and turned so that the number 1 is on the longitude of the equator crossing for the day you are listening. Equator-crossing data (time in UTC and place in longitude west) are provided with the OSCARLOCATOR, or they may be copied from W1AW bulletins. Check this issue's "Operating News" for the schedule.

The Orbital Track across the Orbit Finder shows the exact path of the satellite; where the track intersects the QTH/Rangefinder circle, OSCAR will be within range. A scale along the track indicates the amount of time in minutes after equator crossing that the satellite will be accessible.

That's all there is to it. Complete directions are included with the device, and are also given below. Table 1 gives both satellites' uplink, downlink and telemetry frequencies, as well as their present operating schedules.

Anyone with a 10-meter receiver and simple antenna can copy frenzied QSOs via satellite up to 5,000 miles away; North Americans commonly work Europe, Hawaii and South America through OSCAR, vying for the Satellite DX Achievement Award. Telemetry report forms available from the ARRL, help AMSAT (the Radio Amateur Satellite Corporation) monitor their vital signs.

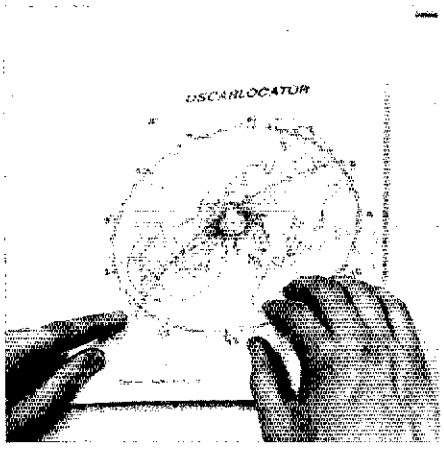
To assemble, cut out the two circles and tape the smaller QTH/Rangefinder (B) over your location on the map (A). Fasten the Orbit Finder (C) to the North Pole with a pin or expansion clip and you're ready to track the satellite.

Table 1

Spacecraft Frequencies

SPACECRAFT	*UPLINK*	*DOWNLINK*	*BEACON*
A-O-6	145.900 – 146.000 MHz	29.450 – 29.550 MHz	29.450 MHz
A-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

Notes
1) All date and time references are UTC (formerly GMT).
2) OSCAR 6 operates Monday, Thursday and Saturday evenings (ascending passes only). Effective Oct. 3, 1976, Sunday morning (descending) passes are also operational.
3) OSCAR 7 operates in Mode A on odd days of the year, Mode B on even days. Wednesdays are reserved for educational uses.
4) The Mode B transponder turns "upside down." A signal to the low end of the 70-cm input returns on the high end of the 2-meter output, and vice versa. Thus, an upper sideband signal returns as lower sideband.
5) Beginning Oct. 1, Mode B orbits on Mondays (UTC) have been designated QRP orbits – use maximum of 10-watts erp when transmitting.



Let's illustrate an example. Say you want to determine what time OSCAR 7 will be in range of Chicago on the evening of December 16. The Reference Orbit Table enclosed with the OSCARLOCATOR gives the EQX time of 0139 UTC and 74.6 degrees for December 17. (For evening passes, use the next day's Reference Orbit information.) Turn the Orbit Finder until the "1" is lined up with that longitude and you can see the track passes almost directly overhead. Use the Time Conversion Chart to figure local time – 7:39 P.M. Add to this time the number on the Orbital Track scale where it first intersects the QTH circle (2 minutes), and you will have the time to start listening (AOS) – 7:41 P.M. The scale indicates that OSCAR 7 will pass out of range (LOS) on that orbit 23 minutes later, at 8:04 P.M.

With the launch of the eighth OSCAR (presently dubbed AMSAT-OSCAR-D) getting nearer, communication via amateur satellite will be that much more irresistible. If you've been wary of getting your feet wet in satellite communication, get yourself an OSCARLOCATOR and experience firsthand what everyone's been talking about.

Using the OSCARLOCATOR

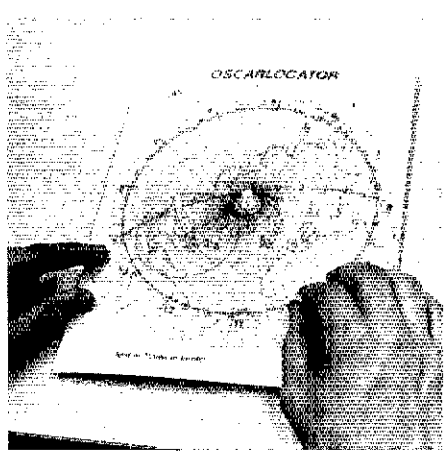
1) Follow assembly directions.

2) From the Reference Orbit Schedule enclosed with the device or from W1AW bulletins, determine the time and longitude for the reference orbit of the day you want to listen or transmit. For an evening pass (local time in North America), the time in UTC is the following day.

3) Position the "1" on the Orbit Finder at the EQX longitude and you'll have that orbit's track.

4) For the following orbits, move the Orbital Track to the successive numbers on the Orbit Finder. Since each orbit takes about 115 minutes, the next EQX time will be that long after the previous one. An easy way to figure it is to add two hours and subtract five minutes.

5) To determine the exact time you can first hear the satellite (known as "AOS," acquisition of signal), add the number on the Orbital Track where it first intersects the Rangefinder circle to the EQX time. Of course, you can work the satellite until it leaves your circle ("LOS," or loss of signal). The small margin of error produced will become significant after a few days. Simply reset the OSCARLOCATOR with a new reference orbit. QST



The next pass should also be in range of Chicago. Note the longitude of the "2" (the second-orbit EQX) and turn the "1" to that position (103 degrees). The EQX time will be 115 minutes after that of the previous orbit, or 9:34 P.M. According to the scale, AOS will be 9:39 and LOS, 9:55. That's all there is to it!

Strays

W6EI, OF VACUUM-VARIABLE FAME, SK

□ We regret to report the death in July of Jo Emmett Jennings, W6EI, founder of the Jennings Radio Manufacturing Company of East San Jose, California, and pioneer inventor in the fields of vacuum-variable capacitors, vacuum relays and high-voltage vacuum switches (the first two well-known among amateurs; the latter, largely for power-company use).

A 1936 graduate of San Jose State College, Jo went to work for Eimac, then as now a big name in vacuum tubes for transmitters. Shortly after the outbreak of World War II, Jo established his own firm, making radio tubes and vacuum capacitors for the Armed Forces. He developed a vacuum capacitor using nickel instead of tantalum at a great savings, and soon was selling all he could produce, a million and a half of the devices during the war alone.

Among some 50 patents on these high-voltage, small-space gadgets were those for "variable condensers" with a sort of bellows inside the vacuum enclosure allowing for changes in capacitance. Though the company was sold to ITT in the early '60s, its products (under the name ITT Jennings) are still very much around; indeed, a rig is in the works in the ARRL lab which will use both its vacuum capacitors and its vacuum relays.

W6EI didn't neglect amateur radio either: At least eight articles of his appeared in *QST* during the fifties and sixties, including a "blockbuster" in January, 1964, on a broadband amplifier using 12 12GJ5s in parallel, which would work from 3.5 through 30 MHz without band switching!

When he died at about age 65, he was officially retired to a mobile home in Portola Heights, Watsonville, California – but even in retirement had still tinkered, developing a burglar alarm and a long-life light bulb. He was First Reader, the elected leader of the congregation, in the Watsonville Christian Science Church. He leaves his widow, Ila. – *W1UED*

STOLEN EQUIPMENT

□ Taken during burglary at home. Collins 75A4, serial no. 2717 and Collins 32V3, serial no. 1396. Louis W. Berni, W1FJW, 16 Montmorenci Avenue, East Boston, MA 02128.

□ Spec. Comm. 512, serial no. 1170 with 25-watt amplifier, serial no. 0114. Marlene Maslin, WA3UOC, 2736 Taunton St., Philadelphia, PA 19152.

A Call to Arms

Though the bicentennial year is drawing to a close, the bicentennial spirit remains as strong as ever. In Idaho, hams united and battled a tragedy with the devotion of America's first patriots.

By Dean W. Laughlin,* K7JWZ

Saturday morning, June 5, 1976, started like any other Saturday in the upper Snake River Valley of southeast Idaho, one of the richest farming communities in the state. But by nightfall, it was estimated that the worst flood disaster in terms of property damage had occurred. On Sunday, the counties of Fremont, Madison, Jefferson, Bonneville and Bingham were declared a disaster area by President Ford. Madison was the hardest hit.

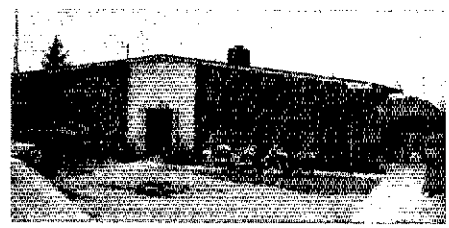
The Teton Dam was designed primarily for flood control, as a water supply for surrounding farmland, and as a huge recreation area. At midmorning, the 307-foot-high, man-made dam collapsed; dumping billions of gallons of water into the deep, narrow canyon; spewing out over the fertile valley below; demolishing everything in its path. Milford was the first small community to feel the full force of the flood. By midafternoon, the water had devastated Sugar City, Rexburg and Hubbard. The water spread out across the valley to a width of 12 miles.

By Sunday afternoon, many acres of farmland and the small town of Roberts were underwater. That evening, the flood crested at Idaho Falls, but it continued its destructive course Monday and Tuesday, hitting the towns of Shelley, Firth and Blackfoot. Eventually, it was contained at the American Falls Reservoir, some 90 miles below the Teton Dam.

Property damage in the five counties has been estimated at well in excess of one billion dollars. In Madison County alone, over 1000 homes were destroyed. Losses in livestock exceeded 12,000 head. Miraculously, only 11 human lives were lost during the flood. Local people hesitate to estimate the loss of life had the dam failed late at night.

*392 Starlite Avenue, Idaho Falls, ID 83401

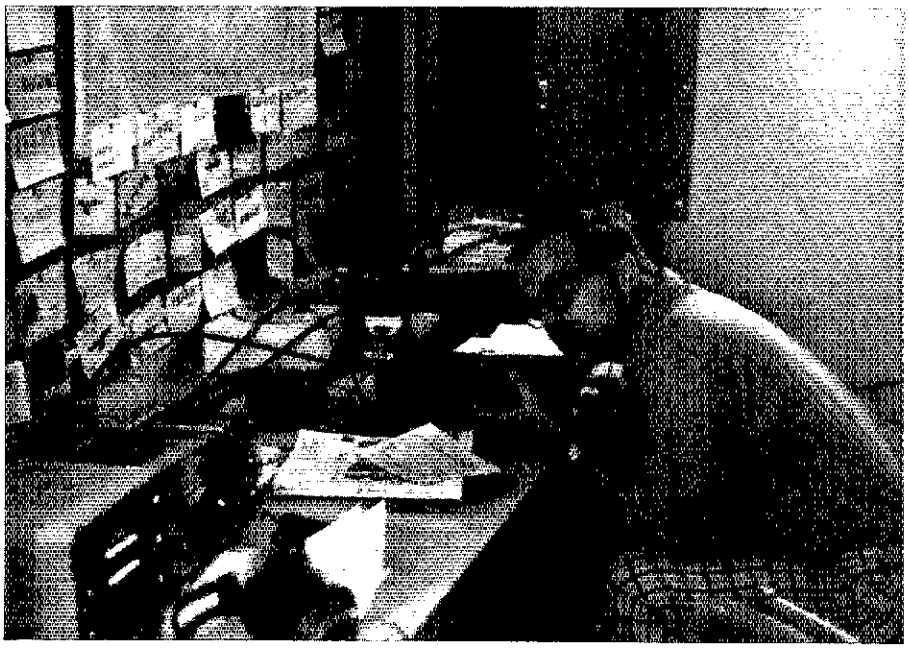
In Madison County Ron Moss, K7ENE, civil defense director, was on a typical weekend shopping chore in Rexburg, Saturday morning. Suddenly, a man came running down the street shouting that the Teton Dam had collapsed. Ron immediately contacted WA7ZYM, requesting that he set up a two-meter station at the county courthouse. By coincidence, three other hams from the Idaho Falls area (W7MXM, WA7OIM and W7WEX) were in an airplane at the time. They were requested to fly directly to Rexburg (approximately 25 miles) and pick up Ron and the chairman of the county commissioners. Once in the plane, they flew toward the dam. Approaching the Wilford area, they saw a wall of water, estimated at about 30 feet deep, inundating houses, barns, livestock and everything else in its path. K7ENE called WA7ZYM through WR7ACQ and advised immediate evacuation of all of Madison County.



The Madison County Army Reserve Center was designated as the official civil defense Command Post during the emergency. Primary control was on 34/94, WR7ACQ. Several simplex frequencies were also used. This control station was manned continuously for over a week following the disaster. *(WA0LPA photo)*

Since the county courthouse was located on the valley floor, the civil defense Command Post was moved to the Army Reserve Center on higher ground. The c.d. people and county

K7ZVT was one of the thirty operators running K7CCG, Ricks College Radio Club. They handled over 2000 messages with activity centered on 75 and 40 meters. *(W7WBK photo)*



Ricks College is located on high ground to the south of Rexburg. Many buildings on the campus were used to provide disaster relief services to flood victims. The student union building served as a control location for information and disaster messages. Here WA7UUJ operates on 146.52 MHz, linking K7CCG and the student union. *(W7WBK photo)*

commissioners were able to maintain constant contact with K7ENE (still airborne) via WA7ZYM, by way of the WR7ACQ repeater. The repeater covers much of southeast Idaho and it didn't take long before hams began to realize what had happened. Equipment and antennas were hurriedly put together as hams headed for the county.

Once the flood reached Rexburg, all normal means of communication were destroyed. Other than the Idaho State Police and National Guard, ham radio provided the only source of information to the outside world for several days. Roughly 97 square miles of the county were affected by the flood.

The Many Fingers of Amateur Radio Aid

Amateur radio was put to many other uses during this first week: (1) A station went on the air at Madison Memorial Hospital and was used to keep the medical director at the Command Post and the Idaho Falls Hospital advised of emergency medical needs. (2) A station operated from the Idaho National Guard Armory to keep the Madison and Fremont e.d. coordinators in contact with each other. (3) WR7ACQ linked the Command Post and commercial station KIGO. KIGO, in accordance with FCC, communicated with the public regarding disaster information received from the Command Post. (4) Since the exact course of the flood was unpredictable, a ham was posted on Menan Butte, west of Rexburg, to observe and report conditions to the Command Post. (5) A mobile unit was dispatched to report on flooding below Rexburg, in farming areas along the river. (6) At various times, hams were used in National Guard helicopters to provide communications back to the reserve center. (7) A paramedic unit had been placed in Sugar City, with a ham assigned to provide communications with Madison Memorial Hospital. (8) Several mobiles were assigned to the USDA, Army Corps of Engineers and the Rexburg city engineer. (9) From time to time, hams were required to repair malfunctioning electrical gear, install antennas and carry out various technical functions.

Throughout the week, several groups of amateurs came from Utah, one group from Montana and, of course, many from southern Idaho. As new operators came into Madison County, they relieved other operators. Other participants hailed from Arizona, California, Iowa and Wisconsin.

Bonneville County

The Bonneville e.d. headquarters activated soon after the dam's collapse. For the next three days, hams were handling traffic from many local points within the county and assisting Madison County as needed. A two-meter base station was located at e.d. hq., along with a 75-meter mobile unit. This unit established communications with the Red Cross in Salt Lake City and Boise. They operated on emergency power for a short time when the Idaho Falls upper power plant failed.

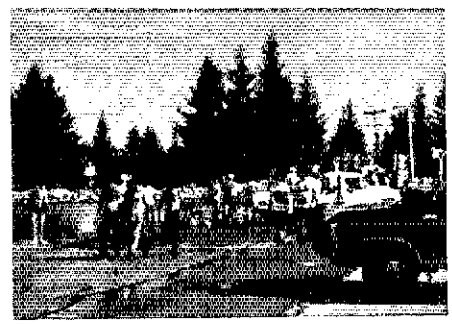
Local radio dealers offered free use of any equipment they had in stock to help in the emergency. On Saturday afternoon, a two-meter station got going at Idaho Falls Hospital, manned by three operators around-the-clock. This station had a direct link (WR7ACQ) to both the Madison and Bonneville e.d. command, as well as the Madison Memorial Hospital. A multitude of medical traffic was passed for several days. By this time, Madison County had lost all telephone service.

National Guard helicopters were used to transport patients out of Madison County to the Idaho Falls Hospital. Amateur radio served to inform the hospital of the nature of the problem and the ETA of each chopper. A hospital-bed survey with Idaho hospitals to the south of the devastated area was conducted via radio on WR7AFH. This repeater was also used to "talk-in" hams enroute to the area, who were volunteering their services.

On Sunday morning, mobile units on .76 simplex were sent to check the status of the Snake River and a large canal that flows through a residential area of Idaho Falls. At one of the bridges crossing the river, an operator was assigned to continuously take water-level measurements and report to e.d. hq.

By Sunday evening, it was feared

The Bonneville County civil defense headquarters had four different operating positions on two meters, as well as a 75-meter station. Two of the many hams that manned the headquarters 24 hours a day from June 5 to June 16 were WB7AMB and WA7BGK. *(WN7BXP photo)*



A massive sand-bagging effort was undertaken at the west bank of the Snake River in Idaho Falls in an attempt to head off the onrushing water. Hams were at the scene, handling communications and directing the operation itself. *(WA0LPA photo)*

that the Broadway Bridge in downtown Idaho Falls would collapse. A diversion canal was cut through the street to relieve some of the pressure on the bridge. In doing so, the main telephone trunk line to the west side of town was destroyed. A mobile unit was positioned at the west bank of the river to provide communications back to c.d. hq., located on the east side.

During this time many amateurs also operated from their home stations, handling health and welfare traffic.

Fringe Counties

As the shattering effects of the dam's collapse diminished, so did the intensity of ham involvement. In Fremont, Jefferson and Bingham Counties flood damage was not as severe. The flood affected only the south side of Fremont County where local hams responded as needed. Since normal communications weren't interrupted in Bingham County, the role of hams there was not the dramatic life/death effort of Madison County operators. However, engineers at the KID TV site were mostly hams and they passed a huge amount of traffic, mainly concerning needed medical supplies, via WR7AFH. Traffic was handled with the Idaho State c.d. headquarters in Boise, Hill AFB in Utah, and Mountain Home AFB in Idaho.

W7COL was one of the operators at the Jefferson County Courthouse, maintaining contact with Rexburg, Idaho Falls and other points. Communications were provided as needed. *(W7LQU photo)*

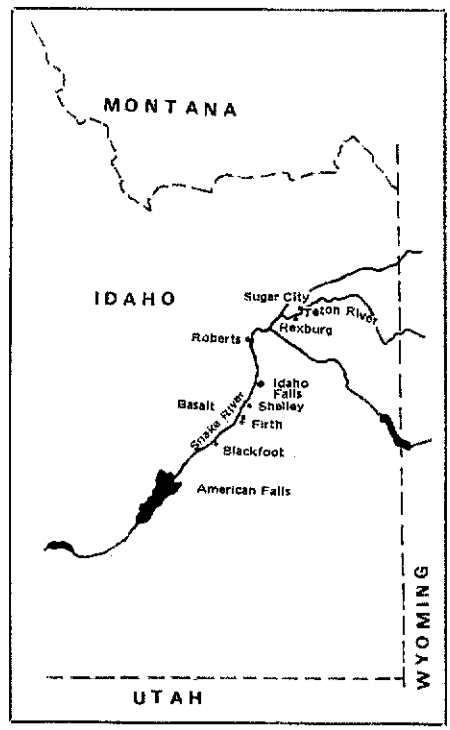
A Sweep of the Hat to Amateur Operators

In a letter of tribute to all amateur volunteers, the Madison County commissioners and civil defense staff characterized their humanitarian efforts.

"When a disaster of great magnitude occurs, such as the Teton Dam disaster, there are those individuals whose rapid and effective response can be credited with minimizing loss of life and property. During those early dark hours following the dam's collapse, Madison County's communications with the outside world rested with a dedicated group of amateurs; from the airplane which signaled the county Emergency Operations Center the order to evacuate our citizens from the path of the Teton Tidal Wave, to the Madison County Hospital, where preparations of this evacuation were completed. In our EOC, the operators throughout the U.S. carried the burden of getting the word to the proper people, at the earliest possible time. Serving without compensation, these unselfish men and women were instrumental in the county's successful administration . . .

"Please be assured you have merited our highest commendation and praise. Your accomplishments for the community are far beyond the call of duty."

Due to the large number of hams that came and helped at the flood area, no attempt has been made to identify individuals by call sign. Each operator who participated is aware of the service he/she provided. Rather than forget someone and cause ill feeling, no calls (with a few logistical exceptions) have been listed. QST



Corridor of destruction: The 307-foot-high Teton Dam toppled, spewing a mountain of water that buried fertile valley farming towns one by one.

Strays

ARRL HAM RADIO EDUCATION BOOMS

□ Amateur radio license classes are the in thing this fall as the overwhelmingly favorable response to the new ARRL Training Program shows. More than 1300 individual courses are going on right now, with nearly 25,000 students working for their Novice and Technician tickets. Almost all of these courses are using the new training program produced by the Club and Training Dept. at Hq.

Favorable comments on the program indicate that the free training materials have paved the way for the explosion in amateur radio instruction. The aids allow any amateur to easily conduct a well-planned course. First-time teachers and those with years of teaching experience have praised the ARRL materials as invaluable in their courses.

But, the real heroes of the training program are the literally thousands of volunteer instructors throughout the country. They donate their time and effort to helping future hams while the League provides the instructional materials. These include a comprehensive instructor's guide, student handouts, code tapes, slide sets, quizzes and even handsome certificates for their efforts.

The real reward, though, is more subtle. Only one who has helped others through the maze of regulations, over the code hurdles, and around the often-confusing theory can appreciate the inner satisfaction — the joy of teaching. The bright eyes, the faces lighting up, and the look of "Oh, I understand now," await any amateur instructor.

And more instructors, more courses are needed. Do you want to do your part to help amateur radio grow? To help your fellows earn their amateur licenses? For complete details write the Club and Training Department at Hq. — *WB2CHO*

□ Keeping the "soup" in the family: The XYL of W5QNA was in the Pillsbury Cook-Off for the third time. This time, she won the $25,000 grand prize. W5QNA is the son of Soupy Groves, W5NW, a long-time League official.

I would like to get in touch with . . .

□ those who share my interest in the Black rhythm and blues sounds of the 1940s to mid-'50s. Will Wiehe, WB2FEL, 113 Farragut Pkwy., Hastings-on-Hudson, NY 10706.

Great Britain Interference Survey

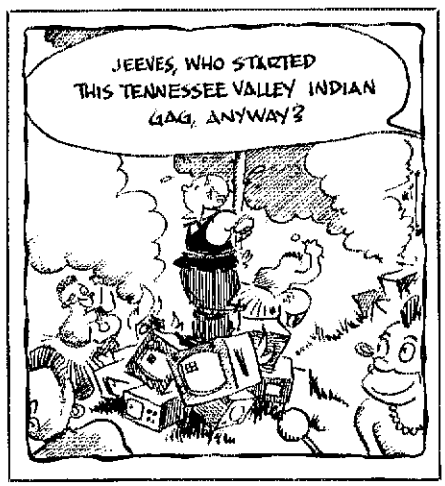
Government statistics on reported interference cases abound, but no one's asked the amateurs what they think . . . until now.

By Theodore J. Cohen,* W4UMF

Interference to television sets, stereos, broadcast receivers and other home-entertainment devices has been a bugaboo of amateur radio since commercial TVs first achieved popularity in the early 50s. In the United States, with the recent increase in the popularity of CB radio and a commensurate increase in the number of privately owned transmitters, the FCC is now receiving interference complaints at a rate of over 100,000 a year. Of the complaints of interference to home-entertainment devices, only seven percent involve amateur radio operators. Further analysis shows that of these complaints, almost 90 percent would not have occurred at all if the manufacturers of the home-entertainment devices had provided adequate filtering or shielding in their products.

. . . the British government underestimates the number of interference cases which are related to amateur activities because amateurs often resolve these cases themselves.

These statistics suffer a severe limitation in that they record only *reported* cases of interference. Many cases of interference go unreported; furthermore, it is entirely possible that some amateurs restrict their operation for *fear* of causing interference, or because they have had some incidents of interference brought to their attention and prefer not to "rock the boat." It's clear that even though amateurs are involved in only a small percentage of all reported interference cases, the overall effect on amateur radio operation is unknown. To get the amateur's point of view, the Radio Society of Great Britain surveyed its members in May, 1975, to determine the extent to which British amateur stations are responsible for interference to home-entertainment equipment. Further, the survey sought to determine the amateur's attitude toward interference problems and the effect these problems had on operating habits.



A total of 1221 survey forms was returned, about a 10-percent return rate. Since about 60 percent of the amateurs in Great Britain are RSGB members, the returns represent about six percent of all licensees in Britain. The results of the survey, released in July, 1976, provide some interesting statistics on the various types of interference encountered by UK amateurs. With respect to television interference (TVI), for example, the RSGB found that each amateur had 2.65 cases on the average.

Only 17 percent of those surveyed had no TVI complaints. When TVI did occur, only nine percent of the cases could be cured by modifications made to the amateur stations involved. Thus, just as in the United States, almost 90 percent of all TVI cases encountered in the UK must be cured at the television receiver. Of the cases sampled, 52 percent were cured by installing a high-pass filter at the television receiver's antenna terminals, and so, we conclude that one has about a 50-50 chance of curing a case of alleged TVI by external modifications alone.

. . . design deficiencies in home-entertainment devices are to blame for the majority of interference cases encountered.

Turning to broadcast interference, each UK amateur, on the average, had about one case. Almost 56 percent of those surveyed, however, had no BCI at all. When BCI was encountered, those whose radios were affected expressed little concern, and as such, a significantly lower percentage of BCI cases

*8603 Conover Pl., Alexandria, VA 22308

were resolved than were TVI cases.

With respect to audio frequency interference (AFI), amateurs in the UK have, on the average, about one case per amateur installation, though 33 percent of those responding to the survey had no AFI. Where it was encountered, only four percent of the cases were cured by modifications to the amateur station; more specifically, such modifications involved repositioning of the amateur's antenna so as to reduce the local field strength at the audio device. After all, there is nothing an amateur can do to his or her transmitter which will prevent an audio device from intercepting and rectifying an rf signal.

In expressing their concern for interference problems, roughly 10 percent of the amateurs responding to the survey said that they were "severely worried," while 26 percent said that they were "moderately worried." An additional 35 percent were "slightly worried." From these figures we estimate that over one-third of the licensed amateurs in Great Britain are sufficiently worried about interference problems such that these problems could influence their operating habits. There is no question, for example, that concern about interference problems could act to lessen band occupancy, especially during the evening hours and on weekends, when neighbors are most apt to be using television receivers and other home-entertainment devices.

Table 1

Restriction of Operation by Bands: Percentage of All Licensees

BAND (MHz)	*INTERFERENCE KNOWN TO OCCUR (%)*	*INTERFERENCE FEARED — NOT PROVED (%)*
1.8	5.05	2.27
3.5	19.67	7.52
7	13.29	5.15
14	21.22	9.17
21	23.59	13.08
28	19.98	10.81
70	7.21	5.46
144	15.15	3.19
432	3.36	1.97

RSGB *Radio Communication*, July, 1976

The RSGB study concluded that the incidence of interference, especially TVI, is considerable. Further, the British government underestimates the number of interference cases which are related to amateur activities because amateurs often resolve these cases themselves. Finally, it was clearly evident that design deficiencies in home-entertainment devices are to blame for the majority of interference cases encountered. Thus, only the manufacturers of such equipment can reduce the number of interference cases which occur each year and they can do this by designing their products to operate in the presence of rf fields from nearby transmitters.

We gratefully acknowledge the help of Roy F. Stevens, G2BVN, who provided copies of the RSGB interference survey to the ARRL RFI Task Force.

Strays

SOLAR ACTIVITY RISING

□ Though the overall level of solar activity continued low in the late months of 1976, there are encouraging signs that at last the new cycle is well on its way. Prior to early summer, all visible activity associated with Cycle 21 (the "new" cycle) was short-lived and of minimal practical effect on radio propagation. Most of the scattered periods of good long-distance propagation came from resurgent activity of Cycle 20.

The first long-lived activity of Cycle 21 seen by this observer came in June, with a sizeable spot that remained in view during its entire crossing of the solar disk. When this was gone, however, we settled into a period of solar calm that made July the quietest month, overall, on this writer's records. It appears, in retrospect, to have been the real turning point, for since that time the new-cycle activity has been making the solar news.

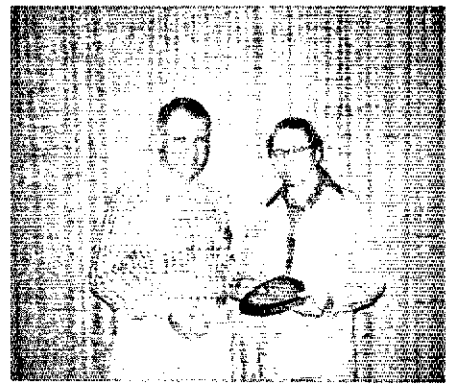
Beginning September 25, we had our first view of two major spot areas, one from each cycle, moving across the solar disk almost in tandem. It may be of long-term significance that, of the two, the Cycle 21 area was the more active. The coming-alive of the 15- and 10-meter bands in late September and early October seemed to result mainly from this new-area activity.

We are not about to experience daily high-latitude openings on 21 and 28 MHz, but things are looking up again. The F-layer skip on 21 MHz is getting shorter. Southern Europe is being heard in the Northeast on the better days, and F-layer backscatter from the south is improving on 28 MHz, almost daily.

What both these bands need most these days is consistent activity. Don't sell either short, as we move into 1977! — *W1HDQ*

Charles N. Wright, W4PED (center right), received the Roanoke Division ARRL Service Award for 1976. This was presented to him at the Division's banquet by Ed Redington, W4ZM (center left), the 1975 award winner, as ARRL President Harry Dannals, W2TUK and 1st Vice President Vic Clark, W4KFC, add their congratulations. The service award is made annually to the amateur who, in the opinion of the judges, has compiled the most impressive record of long-term service to the amateur radio fraternity. Each recipient of the award becomes a member of the committee which carries responsibility for selecting subsequent recipients.

Deep in thought, these future hams were part of a Novice licensing class offered by the Mankato Area Radio Club of Minnesota. Such classes are part of the club's annual fare which also includes classes for those who wish to upgrade. Mike Daly, WB0JYT, is shown here instructing the group in code. Those bags on the table contain parts — capacitors, transistors, resistors — brought by the students to use in an electronic-part identification exercise.



Jim Garrett, WB4VVF (right), receives plaque denoting Division Technical Merit Award from Southeastern Division Director, Larry E. Price, W4DQD. Jim is the author of the popular "Accu-Keyer" article in *QST*.

Sweepstakes... for the First-Timer

Step right into the annual November madness. It'll sharpen your operating skills and you'll catch "SS-itis." Here's expert advice on how to approach it with sanity.

By Chip Margelli,* K7VPF

Last November, new national records were set during both weekends of the SS contest. South Texas cw man WA5LES did the job on code, and K7VPF, operating W7RM, set a new all-time phone record of 1742 contacts. Chip was also fourth nationally on cw. Having K7VPF teach you how to operate the SS is like having Joe Namath demonstrate how to throw a forward pass!

"Now I've really done it," you're thinking. You've just gotten home from the radio club meeting and the contest chairman has self-righteously assigned you a quota of 250 QSOs per mode in the upcoming Sweepstakes contest. Or, worse yet, it's now 15 minutes into the SS and you've discovered that the exchange is other than "59 New York." Indeed, the Sweepstakes is sufficiently different from any other contest to make one's first venture into it traumatic at best and short-lived at worst; yet, this difference makes SS one of the most fun contests going, and a first-class arena for sharpening *anyone's* operating skills. If you've never entered a Sweepstakes before and want to (or have to!), or if you hate contests but want to confront the annual madness in a more organized manner, read on! This article is designed to help the newcomer survive that first harried encounter with the November Sweepstakes.

The Contest

SS consists of two separate contests, one cw and one phone, each occupying one weekend in November; the exact dates and times can be found in *QST*. The contest each weekend runs a total of 30 hours, out of which you are allowed to operate no more than 24 hours, and your breaks must be at least 15 minutes long. These and other rules are spelled out in *QST*, but because of the frequent confusion over times, etc., they are emphasized here.

The SS contest exchange is perhaps the greatest source of confusion for the first-timer. Basically it is a shortened and modified preamble from the standard message format used by traffic handlers; in an earlier day the exchange was a complete message including text, but time and the headaches of thousands have caused a shortening of the exchange to its present form which we shall discuss presently. It consists of a number, precedence, your call, a "check," and your section.

The number: Abbreviated "NR" on cw, this indicates how many preambles you have exchanged (in other words, how many SS QSOs you have) including the one in process. Your first QSO will be NR 1, the second NR 2 etc., and your competitors and the ARRL contest checkers will not at all be amused if you begin with NR 500.

The precedence: If you are running less than 200 dc watts, your precedence is A; if more, it is B. If you change powers during the contest from one grouping to another, use the precedence that applies to the QSO for which each power is used.

Your call: Send your own call. Tough, eh?

The check: For this item send the last two digits of the year in which you received your first ham license. If you became a Novice in 1975, your "CK" is "75."

Your section: For organizational purposes ARRL has divided up the nation into "sections"; for many of us this will simply be our state. However, some of the more populous states (e.g. NY, NJ, PA, CA, TX, and FL) have been divided into two or more sections. A listing of all ARRL sections can be found in the front of any *QST*. If you are still not sure, ask around (before SS starts) or write ARRL headquarters. They will be happy to send you the necessary information plus a membership application (Note: SS is open to *all* amateurs, not just ARRL members).

If you've never entered a Sweepstakes before and want to (or have to!), or if you hate contests but want to confront the annual madness in a more organized manner, read on!

Now we can put together all the pieces. A typical exchange for one's first SS contact would be "NR 1 A WBØXYZ 75 IA." The only change for the next QSO will be in the NR, unless for some reason you change transmitter power. Keep the items of the preamble in the order described, for your own sanity and that of others.

Working the Contest

What you'll need: If you are going to make more than one or two SS QSOs you'll need a couple of special forms to ease working the contest: SS log sheets and a cross-check sheet (dupe sheet). Both can be had for the asking from ARRL headquarters (be sure to include return postage); you might check with the contest chairman for your club, who

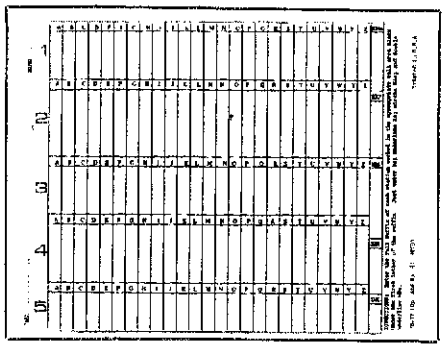
*2806 N. Union Ave., Tacoma, WA 98407

may already have a bushel of these forms. The log sheets are already numbered and have space for 100 QSOs per page.

The dupe sheet is a device used to avoid duplicate contacts. Regardless of the band, within each SS weekend you may only work each station once, and it should be clear that making duplicate contacts wastes time. Operating Aid 6, available from ARRL, is an excellent system to use once the operator is familiar with its use. Each side of a standard 8-1/2 × 11 sheet is divided into alphabetical columns, then separated by call area, 1 through 0. Each prefix has a coding assigned to it, and this is outlined on the sheet. To use an example, if you work W1ABC flip to the "1" section, "A" column, and enter "BC," the last two letters (only) of the call. For K7VPF, flip to the "7" section, "V" column, enter "PF," and underline these letters (this is the coding for the "K" prefix; WAs are circled, and WBs are underlined twice. With a little practice this will all become automatic and a terrific time-saver. [Editor's Note: We suggest entering the *entire* suffix, until you become proficient in using Operating Aid 6.]

The dupe sheet is a device used to avoid duplicate contacts.

At this point you may rightly ask, "If everyone else is keeping a dupe sheet why should I have to bother with one?" First off, not everyone else *is* using one. Many stations are in the contest only to



give out a few contacts or are "not in the contest" at all. Moreover, many "big guns," especially on phone, find it easier and more efficient not to use a dupe sheet in the contest and remove the duplicates afterwards. I think you will agree that in a string of 120 QSOs per hour it makes more sense to spend 20 seconds working a duplicate than to spend 2 minutes arguing over whether or not a duplicate has been made. If a duplicate calls *you* on cw, your response should be a quick "W1XYZ B4," the later being a shortened "before." The dupe sheet is a must for *anyone* who is going to dart from pile to pile in search of contacts.

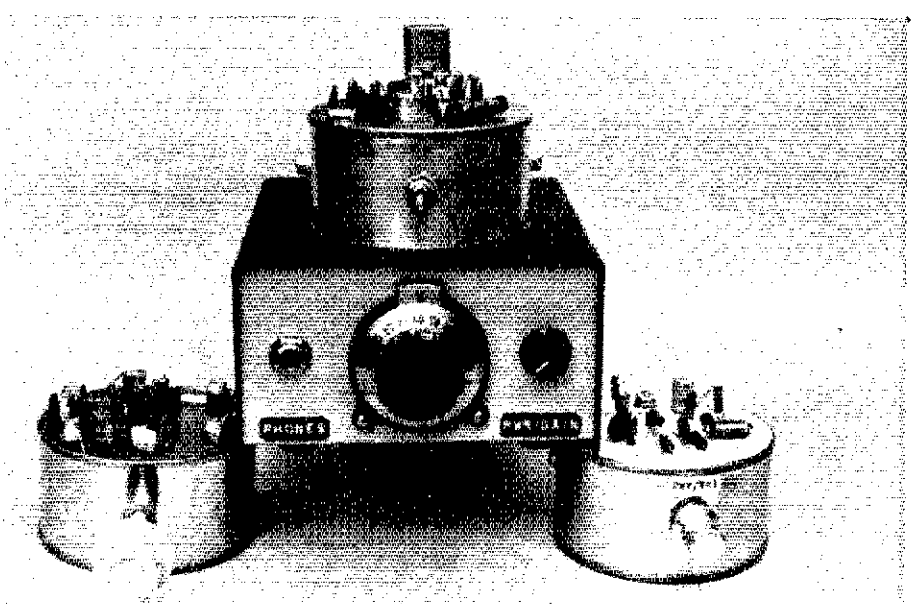
Operating tips: It is not the intent of this article to develop an operating strategy for the reader. However, a few basic concepts should help the SS newcomer. Your score is based on two points per QSO times the number of different sections worked (maximum of 75), so the idea is to find some balance between QSOs and sections which maximizes score. The operator must determine where the volume of easy contacts can be found from his or her part of the country, and likewise where the tough sections are to be found; a few hours' planning strategy will put you miles ahead of the chaps who spend countless evenings on 75 bragging about how badly they're going to beat you! From the West Coast easy QSOs are found largely on 20, 15, and 10, while many tough multipliers (Wyoming, Nevada, etc.) can be had on 40 and 80. The reverse is often the case from the East. While it makes no sense to work 100 QSOs with only the Los Angeles section, there is no reason to pass over a loud station just because you already have his section.

A few hours' planning strategy will put you miles ahead of the chaps who spend countless evenings on 75 bragging about how badly they're going to beat you!

With all this under your belt, you are more than ready to attack SS! Just a few things to remember: Only send your preamble and its parts *once*, and the other guy will ask for repeats if needed. If *you* need a fill, a quick "NR?" will get an equally quick reply. Don't be afraid to ask a fast station to QRS, if you can't keep up with him. Finally, don't forget this is a *fun* activity, and if you get frustrated change bands and seek new action. The SS bug is quite infectious, though, and one can expect that the affliction of "SS-itis," once acquired, is incurable. So be it! GL SS!!! QST

Strays

HOMEBREWING HAM GEAR (AND PYRAMIDS) IS FUN



□ Building *QST* "goodies" can be fun, and here is an example of the handiwork of Dick McIntyre, K4BNI, who calls this collection of solid-state apparatus his "pryamid of *QST* projects." Seen at the left is the front end for WA1LNQ's "Herring Aid Receiver." He uses the unit at the right as the audio channel. The latter was taken from the W1CER/W1ICP beginner's series in 1974 issues of *QST*. The larger of the four units is the "Mini-Miser's Dream Receiver" from *QST* for September, 1976. Atop it resides the popular "Tuna-Tin Two" transmitter from May 1976 *QST*. Dick offers proof that some amateurs still "do their own thing" when it comes to ham gear! – *W1CER*

From Whence Came Ham

Hams could well be Plugs, now. Both were popular terms applied by seasoned railroad telegraphers to green operators.

By Bill Johnston,* WB5CBC

Gather a few hams together and you're sure to hear some reminiscing about the past – what great fun the old days were with primitive, homebrewed equipment and friends made around the world. But one issue there's never been much agreement on is the origin of the word *ham* itself. You would think, though, that with so many old-timers around, *someone* would remember. On the other hand, perhaps that's the trouble. Countless tales have been woven over the years – romantic yarns having only in common that they have nothing in common. Perhaps it's because we *all* remember how it was, that none of us really are certain any longer. Most amateurs now are resigned to the belief that we will never know.

Now that we are in our bicentennial year, and amateur radio has been with us for three-quarters of a century, it seems fitting that we should put this puzzle into historical perspective. While I cannot trace the origin of the word, I can tell you the origin of its use in amateur radio.

On the American railroads during the 1800s, ham was a slang word for a new or inexperienced telegraph operator and was used interchangeably in this context with the word plug. Such jargon was used not only along the railroads, but in the commercial telegraph and cable companies as well. These terms continued among wireless telegraph operators as this new field began to open up about 1900, and amateur radio operators adopted the nickname for obvious reasons. Actually, the word plug was the more commonly used term of the two. Why radio amateurs chose to be hams instead of plugs, or for that matter, why one name didn't survive is not clear. I have been unable to determine how the words came to be used on the railroads, but plug has several connotations which have the general meaning of "green" or "second best," as in a reference to a horse. So it is easy to see why experienced operators might refer to a beginner as a plug. To this day, many dictionaries include a definition for a plug as "an inexperienced telegrapher" (though I have seen some fairly recent ones which define it incorrectly as "an incompetent telegrapher").

"73," One of Many

Our nickname wasn't the only thing copied from nineteenth century railway telegraphy. The salutation 73 was just one of a long list of "Numerical Wire Signals" in use at the time, and meant then, as it does now, best regards.

The abbreviation "es" for the word "and" comes from the American Morse character for &. (American Morse was used on domestic telegraph lines. International Morse, also called continental Morse, has always been used for radio communication.) Some American Morse characters have spaces within the character itself. The ampersand (&) is one of these, but when viewing the separate elements as distinct characters themselves, it is equivalent to the letters "es."

Nineteenth century telegraphers spoke of duplex, quadruplex, bugs-in-the-wire, and knocking off – all of which had the same meaning as they do today. Traffic handlers and brass pounders will be interested to know of another expression, getting old, which referred to telegrams that were being delayed. A telegram was considered to be old if it was delayed for longer than fifteen minutes. Incidentally, standard time signals were received from various observatories and transmitted daily to all points on the line.

Almost all the special telegraphic signals commonly used today (AR, AS, SK, K, CQ, DE) were in use since the very earliest days of commerical wireless. I have seen no evidence that they were used by the railroads, but the possibility cannot be ruled out.

Libraries, a Good Source

Much interesting history stands behind our hobby, and its *real* beginning starts even before Marconi; a slow evolution which began on the singing wires of the American railroads. For historically oriented radio buffs, I recommend a visit to the local library in search of old books on telegraphy, railroad operations and wireless. The most informative ones, it seems, were published between 1880 and 1920.

One book you might enjoy is *The Telegraph Instructor* by G. M. Dodge. This charming volume delves into considerable detail on telegraph and railroad operations. First published in 1898, several editions followed later. From it, you can learn meanings of slang words then in vogue, how to set up and care for a gravity battery, and a host of other things. Incidentally, for many years Dodge ran a school in Valparaiso, Indiana, called Dodge's Telegraph and Railway Accounting Institute, starting about 1891. In later years a wireless department, complete with a 2-kW Marconi Marien set, was added, and the name of the school was modified to reflect this. Apparently, he was also president of the Northwestern Indiana Telegraph Company.

There may still exist in some obscure location, historical records of these and similar institutions. Perhaps somewhere out there lies the answer as to why, by some stroke of luck, we are called hams, rather than plug radio operators. QST

*1808 Pomona Drive, Las Cruces, New Mexico

Tulip Time for Amateurs, and the President

Once a year this small town's population expands tenfold for a festival and parade, particularly for a special guest. Can a small amateur radio club handle it? No problem!

By James Huisman,* WA8PWZ

For three years running, the Holland (Michigan) Amateur Radio Club has provided communications for the Tulip Time Parade of Bands. Thanks to efficient planning, their operation has always been smooth and routine – even this year when 150,000 spectators came after the United States' first family decided to drop in.

Every spring thousands upon thousands of tulips blossom into a brilliant display along the lanes and farms of one of this country's oldest Dutch settlements, Holland, Michigan. Stemming from this seasonal occurrence, and patterned after Tulip Time in the Netherlands, an annual celebration began nearly 50 years ago. Always, it starts on the Wednesday closest to May 15 and ends with a parade the following Saturday. Over the years it mushroomed such that now the festival attracts 300,000 visitors during the half-week-long event. To handle the increasing crowds and expanding parade, coordination was needed.

Communications Plan Developed

Contact was made between the Tulip Time committee and the Holland Amateur Radio Club, a small group but one which has always been active in community affairs. Together, they developed a three-phase approach for communications using 2-meter fm:

1) Amateurs assist the parade marshalls in lining up more than 60 bands, 50 floats and 650 dancers in authentic Dutch costume. Once their units are underway, the amateurs walk the two-hour route with their assigned division, keeping the head parade marshall advised of any changes while he is at the net control command post. This part uses 146.94 simplex.

2) Via the Holland 28/88 repeater, various Red Cross first-aid stations along the parade route are linked to the Holland Hospital. At the last station on the route, a local doctor stands by for any medical emergency. The base station is in the hospital emergency room.

3) In this portion, the first two facets tie into the civil defense, police and fire networks. The club's primary station, K8DAA, operates from the civil defense, emergency-operations mobile van located at the parade route start. At civil defense headquarters is their secondary station, WB8ISY. Police officers on duty for the event carry a list of participating amateurs and their call signs.

As before, the year-long planning had been finalized and set by the week prior to the festival. About 20 volunteers, including supplemental aid from the Grand Rapids (MI) Amateur Radio Club, had their assignments and were studying last-minute instructions.

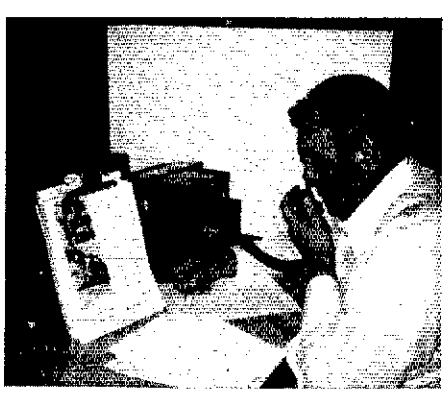
All Systems "Go," Then . . .

Unknown to all, changes were imminent. On Tuesday, May 11, word was received that Susan Ford would ride as Grand Marshall at the head of the Saturday parade. Then on Friday, May 14, the Holland Police Department was notified that President and Mrs. Ford would ride the last parade division.

First, one of the command post operators, Glen Timmer, W8QOL, an Ottawa County civil defense director, was reassigned to the HPD city emergency-operations center for coordination with the Secret Service. Next, the Secret Service had to be advised of the HARC's setup for possible tie-in. Try walking among the agents while carrying Handie-Talkies if they're not informed of your mission! Also, the parade route was extended to handle the additional crowds expected, and two more first-aid stations were set up.

Despite a hectic meeting and increased crowds, all went smoothly. Only one minor incident occurred that required amateur aid to the law enforcement officials. Everything checked OK on it. In addition, the police department asked amateurs' aid for position reports of the President during the parade.

It was a big day for Holland and the tulip festival. Already, plans are being made for next year's Tulip Time and everything will follow a pre-arranged schedule. That is, unless something unexpected comes up! QST



Inside the civil defense mobile communications van, the author handled parade traffic while operating the club's net control station, K8DAA.

*653 W. 27th St., Holland, MI 49423

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 360
September 18, 1976

Pursuant to due notice, The Executive Committee of the American Radio Relay League, Inc., met at the Headquarters offices of the League in Newington, Connecticut, at 8:55 A.M., September 18, 1976. Present: Harry Dannals, W2TUK, in the Chair; Directors Roy L. Albright, W5EYB, Max Arnold, W4WHN, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were General Counsel Robert M. Booth, Jr., W3PS, and Directors John C. Sullivan, W1HHR, and Stan Zak, K2SJO.

On motion of Mr. Griggs, Life Membership was unanimously GRANTED the following applicants: Ralph L. Abbott, WA3ELQ; Alice Ramsay Akins; David A. Anderson, K9AUZ; Alvin C. Bach, Jr., WA2GNX; Douglass P. Bacon, WA7UJK; Edward S. Baker, W7RC; Robert W. Balcom, W3PZK; H. Lea T. Ball, WØOPN/KL7; David A. Bauchiero, WA1TQO; J. Baumgarten, KØIJL; Thomas J. Benson, WA6TKF; David Benton, WB4JGG; Leon T. Berandt, WØAEP; Julius Bernstein, W2EV; Neal Blochinger, W4LKL; Francis M. Broussard, WN5LWP; Paul R. Browne, WB4PZW; John F. Bunting, W4NET; Mark N. Busch, W2GRD; Robin P. Bushore, WA7ETN; William J. Byron, W7DHD; G. Glenn Carlson, W6KVD; Joseph P. Carrigan, WA3QJR; Lester J. Chadwick, WB9DBL; John W. Chapman, Jr., WB8INY; Emile W. Clede, Jr., WA1RZA; W. C. Clements, Jr., K4GMR; Ray Cobb, K4PGM; Thomas L. Comport, K6EUW; Barry L. Cook, WA2OMN; Carl R. Cook, WB9IJH; Edmund F. Cook, W1GIN; A. T. Corbin, Jr., K5EE; Gerald H. Crabtree, WA4GAX; Charles W. Cramer, WØZLW; David J. Crawford, K2DC; Robin Critchell, WA6CDR; Frederick B. Cull, WA5BUC; Francis T. Cullen, K1RCD; Francis T. Cullen, WB8JWE; A. Davis, VK1DA; John L. Dickinson, W2FMT; Richard T. Dunn, WA1TTW; J. O. Eaton, K6IDP; W. L. Eddy, K4AR; C. Fadden, WA2LNU; Robert E. Fain, WA8TMI; Gary J. Ferdinand, WA2PJL; William A. Ferguson, WB6CGS; Gordon C. Fogg, WA5JMK; Philip L. Ford, WB4TIH; Margaret A. Gauthier, WA6OUD; Richard A. Gilson, W3NQA; Milton W. Gleason, WB6OTX; Walter Grosser, W2TE; Gerald Guerin, K8AFO; Dennis J. Had, K8KXK; Diane E. Haigh, WA1UAC; William M. Haigh, WA1UAD; Harvey Hamel, W2HKT; Gordon Walter Harris, W7UIZ; John Hawk, W2IBS; John C. Hendricks, WB9FCB; Milton G. Herbert, WB4TKN; Milton D. Hodges; Joe Hoffman; J. M. Hollander, WB6NRK; Robert J. Hudson, W4MCM; Rodney L. Huke, K3HJD; Peter M. Hurd, K4NSS; Thomas B. Ingles, WB4LZK; Carroll E. Isham, WB6ORT; John Thayer Jensen, KH6GPC; Gregory W. Jones, WA3FSC; Ron Jones, WB7DOL; Andrew C. Kalayta; Carl L. Karlson, W9ECF; L. S. Kayser, VE3QB/VE3RMR; Edgar F. Kessler III, WB4KIU; Paul R. Krugh, WB2PBO; Siegfried Keugler, DK7AA; Stan L. Kuhl, K6MA; Michael A. Lasater, WA4IRH; Harvey Le Cato, WA2VXK; Joseph LeKostaj, WB9GOJ; John C. Lenahan, Jr., WBØKXZ; Randal B. Lilly, WA3MNT; William H. Lindsay III; Gerald F. Lofstead, W3CDE; R. E. Lovejoy, K6UW; Robert Lewis Mapou, WA3QDH; Joseph H. March, WA9FVD; Bruce T. Marshall, WA1EOT; Charles Marshall, WA1GSB; Robert J. Massey, WA9NBU; Lester L. McClure, W3GXT/WB2JNE; Russ McKay, WN2CBU; Gregory R. Miller, WB8HHN; Ronald M. Miller, WA2GUR; Thomas K. Mills, W4PIB; William T. Mitchell, Jr., WB4KYC; Richard L. Murphy, WB9QHD; Stephen X. Nahm, AA3QCN; John D. Nicholson, WA7IHO; Roy Ken Ota, WA6LWH; Janet M. Patjens, WA7WMB; Anthony J. Penta, WA1MWN; Ed Persinski, W1VYW; John Renning Phillips, WB6WFQ; Elmer Polivka; David S. Porter, K2BPP; David W. Potter, W2GZD; Neil Prather, WBØCQU; George R. Presley, K4RSV; John L. Pugh, W8GKI; Edwin R. Ranson III, WA5PWX; John M. Ray III, WB4BFS; Keith A. Regli, WB6BIG/WA1WOE; David W. Rego, W5YRX; Louis B. Richardson II; Michael P. Rioux, WA1TPE; Ernest P. Robbins, WB9LKQ; A. L. Robertson; Steven A. Romondo, WBØISW; David Rothman, WAØDNH; Chris A. Sarros, WØSAP; Robert W. Schaer, WN5JLC; Stanley Schwam, WA5YYG; Ignaz Schwinn II, W9ROS; William B. Shepherd; William A. Shillington, W9ZCL; Victor Smith, K4CAX; James R. Sohl, WB5MPX; David L. Sprague, WB9DNI; Baker Springfield, W4HYY; Ronald J. Tauber, W9QUW; Leslie Taylor, WAØQIT; Ferdin F. Terry, W7MYM; Gene F. Tomlinson, WA7ILO; Mark A. Turnbull, WN3WSF; Ronald Ulrich, WBØLPH; H. S. Valentine, K4LRO; Daniel B. Van Syckel, WB2PDA; Ronald N. Vance, W6GKS; James E. Walters, WB9DZL; Robert D. Watson, WØYOC; Richard E. Webber, WN7VMN; Thomas M. Whittaker, WA9RSB; John M. Wondergem, W5RKR; David Dexter Young, W6MLA; James W. Youngberg, K1NKR; Theodore A. Zwicker, WA8ZSW.

On motion of Mr. Arnold, unanimously VOTED to grant approval for the holding of a Louisiana State Convention in Metairie, La., on October 30-31; a Delta Division Convention in Baton Rouge, La., on May 5-7, 1978; and a West Gulf Division Convention in El Paso, Texas, on September 1-3, 1978.

On motion of Mr. Thurston, affiliation was unanimously GRANTED to the following societies: Arizona DX Club, Scottsdale, AZ; Border Amateur Radio Club, Fort Smith, AR; Comsat-Andover Amateur Radio Club, Andover, ME; Cranford Amateur Radio Society (CARS), Cranford, NJ; Cowley County Amateur Radio Club, Arkansas City, KS; Downey High School Amateur Radio Club, Downey, CA; Duluth Guns Radio Club, Duluth, MN; East Ridge Junior High School Amateur Radio Club, Ridgefield, CT; Erie Amateur Radio Society, Sandusky, OH; Gould Radio Club, Euclid, OH; Northeast Contest Club, Worcester, MA; Northern Amateur Relay Council (of California), Rio Linda, CA; Scientific-Atlanta Amateur Radio Club, Chamblee, GA; Stonewall Jackson Amateur Radio Club, Bridgeport, WV; Southern California Contest Club, Arcadia, CA; The Tahoe Amateur Radio Association, Stateline, NV; Texas Association of Contest Operators (TACO), Euless, TX; Union County Amateur Radio Club, New Dover, OH; University of Chicago Amateur Radio Society, Chicago, IL.

The Committee next proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial radio connections. The Committee made findings and ordered actions as detailed below, all by unanimous action.

Central Division

For Director: *Philip E. Haller, W9HPG*, and *Don C. Miller, W9NTP*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: *Dwight B. Raddatz, WA9EUN*, was found lawfully nominated but ineligible because of the lack of the required membership continuity. *Kenneth A. Ebneter, K9GSC*, and *Edmond A. Metzger, W9PRN*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Hudson Division

For Director: *Stan Zak, K2SJO*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Hudson Division for the 1977-1978 term without membership balloting.

For Vice Director: *George A. Diehl, W2IHA*, and *George Hawrysko, K2AWA*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

New England Division

For Director: *James D. Pickard, WA1PSI*, was found lawfully nominated and eligible but the Committee was in receipt of a mailgram from Mr. Pickard withdrawing his name as a candidate. *John C. Sullivan, W1HHR*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the New England Division for the 1977-1978 term without membership balloting.

For Vice Director: *James D. Pickard, WA1PSI*, was found lawfully nominated and eligible, but the Committee was in receipt of a mailgram from Mr. Pickard withdrawing his name as a candidate. *Fred E. Evans, W1JFF*, and *John F. Lindholm, W1DGL*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Northwestern Division

For Director: *Mary E. Lewis, W7QGP*, and *Robert B. Thurston, W7PGY*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: *Dwight J. Albright, W7HLF*, and *Dale T. Justice, K7WWR/WA7KTV*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Roanoke Division

For Director: *L. Phil Wicker, W4ACY*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Roanoke Division for the 1977-1978 term without membership balloting.

For Vice Director: *Gay E. Milius, Jr., W4UG*, and *Donald B. Morris, W8JM*, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Rocky Mountain Division

For Director: *Charles M. Cotterell, WØSIN*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Rocky Mountain Division for the 1977-1978 term without membership balloting.

For Vice Director: *Maurice O. Carpenter, KØHRZ*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Rocky Mountain Division for the 1977-1978 term without membership balloting.

Southwestern Division

For Director: *John R. Griggs, W6KW*, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Southwestern Division for the 1977-1978 term without membership balloting.

For Vice Director: *Jay A. Holladay, W6EJJ*, was found lawfully nominated and eligible. Being the only eligible nominee, he

was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Southwestern Division for the 1977-1978 term without membership balloting.

West Gulf Division

For Director: *Roy L. Albright, W5EYB,* was found lawfully nominated and eligible, but the Committee was in receipt of a letter from Mr. Albright withdrawing his name as a candidate. A petition was found for *Carlos F. Montemayor, W5YZ,* but it lacked the required number of signatures and was declared invalid. *Jack D. Gant, W5GM,* and *John A. Sloop, WA5QCW,* were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: *Douglas N. Brooke, K5YHX, Thomas W. Chance, WA5VJX,* and *Thomas H. Morrison, WB5IZN,* were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

On motion of Mr. Arnold, unanimously VOTED that the League proceed with the signing of a statement of understanding between the American Radio Relay League and the Salvation Army with respect to disaster services.

On motion of Mr. Griggs, after discussion, unanimously VOTED that implementation of the W1AW shift to 1820 kHz be postponed until further study by the staff and recommendation to the Board at its January meeting.

On motion of Mr. Albright, unanimously VOTED to approve IARU Proposal 142, concerning admission into membership of the Gibralter Amateur Radio Society.

On motion of Mr. Thurston, unanimously VOTED that in light of the numerous suggestions for overhauling the DXCC criteria and award which have been received from the membership over the past several years, and the possible changes in our frequency allocations and/or operating privileges that may result from the forthcoming World Administrative Radio Conference, the Executive Committee requests that the DX Advisory Committee, in cooperation with the Headquarters Awards Committee, explore the desirability of establishing a new beginning for DXCC, with updated country criteria, as of January 1, 1980. A coordinated recommendation would be needed by July 1, 1977, in order to permit action by the Board of Directors at its July 1977 meeting.

On motion of Mr. Arnold, after discussion, unanimously VOTED that the Communications Manager is directed to advise the Nevada SCM by certified mail, return receipt requested, that the office of Nevada SCM is to be declared vacant in thirty days, in accordance with Rule 6 of the Rules and Regulations of the Communications Department, unless the Nevada SCM requests suspension of this action.

On motion of Mr. Thurston, unanimously VOTED to express the League's appreciation to Dayton L. Phifer, WØVEA, for his offer to donate land to ARRL, and instructed the secretary to notify Mr. Phifer that no action would be taken on the offer at this time, pending further study by the Board.

On motion of Mr. Arnold, unanimously VOTED to appoint Max Arnold, Noel B. Eaton and David H. Houghton as a Committee of Tellers, with F. E. Handy and John Huntoon as alternates, to count the ballots in the current elections.

On motion of Mr. Griggs, after discussion, unanimously VOTED, that the General Manager is instructed to continue supplying membership lists for use by convention and hamfest committees only in printed form, such as self-adhesive and other forms of strip labels.

(The Committee was in recess for luncheon from 11:58 until 1:08.)

On motion of Mr. Albright, after discussion, unanimously VOTED to authorize the General Manager to establish a bank of emergency communications equipment, to be used in instances of major disaster, at a cost not to exceed $10,000.

On motion of Mr. Griggs, VOTED to authorize a supplementary 1976 appropriation of $500 for the Canadian Division.

On motion of Mr. Albright, after discussion, VOTED that the Headquarters Awards Committee is to study the matter of issuing an award recognizing the achievement of working ten or more countries on six meters.

The Committee considered at length the problems associated with the sale of amateur transceivers to unlicensed persons, and recommended that the Hq. staff study the problem and make a report to the January meeting of the Board.

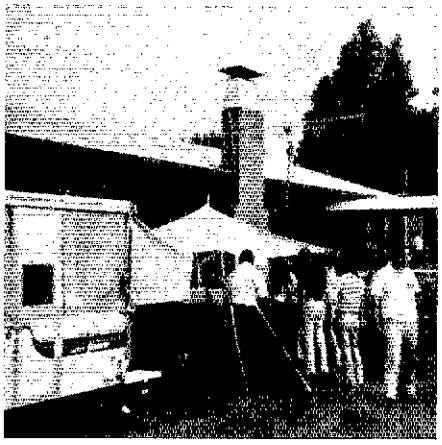
The Committee discussed extensively a number of matters relating to ARRL conventions, including director approval, the possible development of an updated set of convention guidelines, the possible appointment of a Headquarters assistant for convention planning, publicity for both the conventions and ARRL, the central importance to an ARRL convention of an ARRL forum, the relevance of the ARRL Training Program, and a number of other similar and related topics in connection with the better planning and control of ARRL conventions.

During the course of the above deliberations, the Executive Committee also discussed, without formal action, the requirements and guidelines for eligibility of director candidates, the former policy of mailing OBS bulletins to clubs, the schedule of the planned building addition, the availability of Board committee reports, the providing of travel expense funds for various traffic nets, the current and future status of ARRL membership, TVI and RFI, and various legal problems facing individual amateurs.

There being no further business, the Committee adjourned at 4:40 P.M.

Respectfully submitted,
RICHARD L. BALDWIN, W1RU
Secretary

Strays



Many visitors to the annual Shelby (NC) Hamfest received their first in-person exposure to space communications at an OSCAR setup. A dozen orbits of OSCARs 6 and 7 were worked during that Labor Day weekend by hamfest station, W4GCB/4. On several passes hundreds of spectators would gather and listen to a loudspeaker as greetings were sent from several states and countries. The event also marked the 20th anniversary of the Shelby Radio Club. Here, the OSCAR operators prepare the station for a Sunday morning pass. *(WA4MVI photo)*

□ When the Mt. Airy (PA) VHF Radio Club takes on a project, they go all out. Aside from successfully completing the first moonbounce from South America, their recent expedition to Colombia (October *QST*) produced a few firsts with AMSAT-OSCAR 7 as well.

Despite an abrupt end to their first QSO (blown transistor) and other minor setbacks that go hand-in-hand with experimentation, their satellite activity was a rousing success. As Tony Souza, W3HMU, one of five Pack Rats to make the trip, describes it, "The operation worked out really well."

Their accomplishments underscore the accuracy of his statement: First OSCAR 7 Mode B operation from Colombia; more than 70 QSOs to more than 50 stations in five countries (Argentina, Mexico, Venezuela, Canada and the U.S.); spreading word of the excitement and practical applications of satellite work to groups of interested Colombians; and loads of mutual goodwill.

Using portable, battery-operated equipment loaned by AMSAT, the Pack Rats' station, HK1TL, shot 80 watts at every available OSCAR 7-B orbit between July 27 and August 5. Tony Souza's log of their first series of contacts is revealing:

The first orbit worked was 7771 on the evening of July 27, 1976, (EST). The equipment was set up at the KH1TL beach-front location in Santa Veronica, a small resort village near Juan de Acosta about 18 miles west of Barranquilla, Colombia. A dozen or so local hams were on hand. The satellite was acquired immediately after it crossed the horizon. A CQ was called by W3HMU and answered by a signal with the peculiar warble of fm modulation in our receiver's ssb detector. Switching to a-m and slope detecting we heard LU8MBL answering us in Spanish. "Quick, a Spanish operator is needed," I said. Beating the rush to the microphone was Bolmar, HK1AMW/WB3AOP. The first O-7-B contact from Colombia was in progress; cheers from the gallery; ssb to fm. After signing with LU8MBL we called CQ on cw for a couple of minutes before an answer came from YV5ZZ. Ed has an excellent cw and ssb signal on O-7-B. W1JAA's ssb CQ was answered by us indicating the satellite was now in range of North America and the tempo would increase. And indeed it did! As Joe signed, the satellite was a crescendo of stations calling us and then sudden silence. Our converter had been the victim of Murphy.

To our HK friends, it was a sudden disappointment in an evening which had just provided the first Colombian O-7-B contacts. To the contest-hardened Pack Rat crew it meant a typical pressure repair was required. Indeed an hour's time with a one-transistor signal source and the VOM showed that one of the LO transistors had blown due to too much voltage. We had been operating a 9-V converter on 12 volts. Somehow in the feverish expedition preparations this important consideration had been overlooked. A spare transistor was installed and the power supply voltage reduced through a voltage dropping resistor. Also via the 20-meter liaison frequency with W3KKN the delivery of a spare converter was arranged. Bolmar's wife, Margarita, was due to leave Philadelphia to join us in a couple of days' time. No sweat!

Their OSCAR gear was similar to the state-of-the-art equipment used to transmit President Ford's remarks via satellite from the National Air and Space Museum dedication two months earlier — a KLM Echo 70 ssb and cw solid-state transceiver, coupled to the moonbounce driver amplifier, a 4X250 in a coaxial cavity. A 2-meter converter playing into an Allied Radio R-190 receiver completed the station.

Although persistent efforts to reach Europe on northeast passes were fruitless, their successes far outweighed the disappointments. There is no doubt that the Mt. Airy Moonbounce/OSCAR expedition will do a great deal to stimulate satellite activity in Colombia and the rest of South America, where amateurs have seemed reluctant to latch onto OSCAR.

Happenings

Conducted By Perry F. Williams,* W1UED

Elections—Halfway Through

The process by which League members choose their leadership is strung out nearly as long as the national elections — but with considerably less media coverage!

Back in the July issue, we announced the opening of nominations for director and vice director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions. This announcement, repeated in the August issue, invited groups of ten or more Full Members to name candidates for these offices. Nominations closed at noon on September 10. September 18 saw the Executive Committee of ARRL meeting in Hartford to examine nominating petitions and make decisions on the eligibility of the candidates. (See the full minutes in "Moved and Seconded," elsewhere in this issue.)

Where only one candidate was lawfully nominated and eligible, the Executive Committee declared that amateur elected. The "short path" this year included Stan Zak, K2SJO, reelected as director from the Hudson Division; John C. Sullivan, W1HHR, director of the division "next door," the New England; Roanoke Division Director L. Phil Wicker, W4ACY; the Rocky Mountain team, Director Charles M. Cotterell, WØSIN and Vice Director Maurice O. Carpenter, KØHRZ; and, in the Southwest, John R. Griggs, W6KW and Jay A. Holladay, W6EJJ, were reelected director and vice director, respectively. Thus as we write in late September, the election process is half completed.

Your part is in progress now: Ballots were sent by October 1 to Full Members in the Central, Hudson, New England, Northwestern, Roanoke and West Gulf Divisions who were in good standing on September 10. If you're in one of these divisions and haven't yet received a ballot, please get in touch with the writer at once. Ballots are due back at Hq. at noon, November 20.

Nominees in the Central Division are the same as two years ago: the incumbent Philip E. Haller, W9HPG and Don C. Miller, W9NTP, for director; Kenneth A. Ebneter, K9GSC and Vice Director Edmond A. Metzger, W9PRN, for the latter's post.

The present Vice Director George A. Diehl, W2IHA and George Hawrysko, K2AWA, share the ballot in the Hudson Division.

In the New England Division, Fred E. Evans, W1JFF, is challenging incumbent John F. Lindholm, W1DGL, for the vice-director spot.

A double race awaits the voters in the Northwestern Division, with Mary E. Lewis, W7QGP and Director Robert B. Thurston vying for the top spot and Dwight J. Albright, W7HLF and Dale T. Justice, K7WWR, the incumbent, seeking the vice-directorship.

Roanoke voters will choose between Gay E. Milius, Jr., W4UG and the current vice director, Donald B. Morris, W8JM, for the number-two spot.

West Gulf Director Roy Albright, W5EYB, withdrew as a candidate. Vice Director Jack Gant, W5GM and John A. Sloop, WA5QCW, seek to replace him. The vice-director race is a three-way, with Douglas N. Brooke, K5YHX, Thomas W. Chance, WA5VJX and Thomas H. Morrison, WB5IZN, as candidates.

Winners will be announced by W1AW bulletin on regular schedules following the count on November 20 and in these pages of the January, 1977, *QST*.

MARYLAND SCRATCHES HAMFEST

Hams in every state need "legislature watchers" to raise the alarm when appropriate. In Maryland, legislators trying to control flea markets, tag sales and the like put in a bill requiring licensing of all merchants at such affairs with a sliding scale of fees depending on sales volume and made the sponsors legally responsible for its enforcement.

The Foundation for Amateur Radio, which was to have held its 20th annual hamfest at Gaithersburg, Maryland, on October 17, felt it had no assurance of complying with the new law. Accordingly, the FAR Executive Committee voted unanimously to cancel this year's fest.

There's a message here for all: We must keep an eye on legislation and sound the alarm if there is some bill getting started which could hurt amateur activity. City ordinances, similarly, need to be watched: In Oklahoma and California, ordinances have been enacted which attempt to regulate radio frequency interference, even though that field has been preempted in most of its aspects by the federal government. Please inform the Membership Services Department of ARRL and the League's General Counsel of any new bills which look ominous.

*Manager, Membership Services, ARRL

The *QST* article about the Accu-Memory earned for its authors, Duke Contini, W4YUU (left) and Jim Garrett, WB4VVF (right), the *QST* Cover Plaque Award. Southeastern Division Director Larry Price, W4RA, makes the presentation.

RULEMAKING REQUESTS

Alan Cassel, WAØUYU, has filed a request for rulemaking with FCC, designated as RM-2730, asking that Novice class licensees be given privileges in the 220- to 225-MHz band, with not more than 75-watts dc input.

Steven Putman, WB4ZRR/8, asks in RM-2728 that amateur operators of General class and above be allowed automatic shared use of the citizen's band at 27 MHz, with amateur-level powers and privileges. The idea is to help entice CBers into amateur radio and to train them in operating procedures.

Among the hardest-working of all ARRL volunteers are the QSL Bureau personnel — and their spouses! Not only do they sort and mail cards year round, but they also go off to hamfests and conventions, meeting hams, explaining the Bureau system, and attempting to cut the backlog of unclaimed cards. Here is Rosemary Willis, "Mrs. W6LTJ," appearing for the W6 Bureau at Burbank.

We don't often get a chance to run pictures of Yellowstone Park in *QST*; after all, it's a hobby/technical magazine. But Yellowstone is also the scene of the annual WIMU hamfest (for hams in Wyoming, Idaho, Montana and Utah) and that gives us our chance. Attending this year's affair were, from left, Rocky Mountain Director Chic Cotterell, WØSIN, First Vice President Vic Clark, W4KFC, and Northwest Director Bob Thurston, W7PGY. *(W7WYG photo)*

Though the deadline for filing comments in support or opposition to these requests is technically past, the Commission will welcome comments with respect to these two suggestions, at its offices in Washington, DC 20554.

CANADIANS STUDY UHF

Because of the growing demand for radio services and the increasing congestion of certain portions of the radio spectrum, the Canadian Department of Communications is currently examining radio spectrum use in the 406- to 960-megahertz band with a view to developing a national policy for the use of this band.

As part of its examination, the Department is inviting submissions from all interested parties or organizations concerning spectrum allocations in Canada in this frequency range. These submissions will be used to arrive at the final policy for the use of this band including, if necessary, consideration of any changes to the present Canadian allocations. This policy will form an important input to the Canadian preparations for an International Telecommunication Union (ITU) conference to be held in 1979, which may result in significant international changes to the allocations of the entire radio spectrum.

At the present time, the following types of services are allocated spectrum in the band: broadcasting, mobile, fixed, amateur, radiolocation, radio astronomy, industrial, scientific and medical.

A background paper containing information on the allocations in this band in Canada may be obtained from the Department of Communications, Director-General, National Telecommunications Branch, 300 Slater Street, Ottawa, Ontario K1A 0C8 or from Departmental Regional Offices in Vancouver, Winnipeg, Toronto, Montreal and Moncton.

Submissions should be addressed to the Director-General, National Telecommunications Branch at the above address and must be postmarked by December 20. Copies of these submissions will be made available at the DOC library at the Ottawa hq. and at the regional offices. Those wishing to respond to these submissions may do so in writing to the Director-General, National Telecommunications Branch within a further 60-day period. *(From an official release)*

The Canadian Radio Relay League has made comment in the study supporting the position already established for WARC preparations in this part of the spectrum.

BEHIND THE DIAMOND

The backbone of the ARRL is its Board of Directors, for it is through its elected representatives that the League's membership makes known its wants and desires. *Stan Zak, K2SJO*, represents members of the Hudson Division, which includes Eastern New York, New York City – Long Island and Northern New Jersey sections. His constituents must be well satisfied with his performance in office for he has no opposition this year and hence will be serving amateur radio on the Board for another two years.

Stan didn't get his first amateur ticket till he was 28, when he became KN2SJO. He always had an interest in electronics, though, and when he joined the Navy (1945-'46) after high school, and again in 1951-'52, he served as an electronic technician working on vhf radio gear. Between his tours of military duty he worked as an auto mechanic and he still enjoys working on his own cars as a hobby; he does his own tune-ups, overhauls, oil changes and grease jobs.

Stan is an example of how hard work and perseverance can pay off in the long run. He presently works for the New York Telephone Company, where he has been employed since 1950. His first job there was as a splicer's helper, but for five years he attended RCA Institutes in New York City to study radio and television broadcasting, graduated in 1957 and now serves as a senior-staff engineer – a second-line management position.

Dave Bell, W6BVN (left), is amateur radio's answer to Metro-Goldwyn-Mayer. He has produced the movies, *Ham's Wide World, This Is Ham Radio,* and now, *Moving up to Ham Radio;* a twelve-minute film intended as part of a half-hour mostly live presentation by amateurs at meetings of CBers and other members of the general public. The new package is now in the hands of ARRL directors, vice directors and public relations assistants; ask for it so you can promote amateur radio in your area. In the photo, W6BVN was being introduced to hams attending the 11th Burbank Hamfest by Roy Harrison, WB6CRL, shortly before the premier showing of "Moving Up." *(W6LS photo)*

Stan has been ARRL Hudson Division director since 1972 and prior to that was vice director since 1965 (the director at that time was someone named Harry Dannals). He is past director and past secretary of the Westchester Amateur Radio Association and past editor of its journal, *Bandspread*. He's currently communications chief for Port Chester/Town of Rye c.d., is advisor of the local Radio Explorer Post, BSA and has served on the NY Call Letter License Plate Committee. On the civic side and to maintain good relations with his neighbors so they won't say anything about the 55-foot tower in his backyard, he was president for four years of his neighborhood civic association and now serves on a CATV committee exploring the feasibility of introducing cable TV in the town of Rye. He has also received the NY Telephone Good Neighbor Award.

Stan lives in Port Chester, NY, with his wife, Joan, who works as an executive secretary for Dictaphone. They have two daughters – Laura, a freelance illustrator and Donna, who is a third-year medical student at Albany State University. Stan's hobbies, in addition to ham radio, include photography, gardening and woodworking.

One of Stan's chief interests is public relations for amateur radio and he is constantly pushing for more PR activity at each Board meeting. We have to agree that PR is important to amateur radio and we're glad to have Stan on board for two more years. – *K1FHN*

Washington Mailbox

□ Q. Isn't it true that communications involving material compensation to a third party are prohibited by the FCC rules?

A. Yes, paragraph 97.114(b) prohibits amateur radiocommunication that involves material compensation, either tangible or intangible, direct or indirect, to a third party, a station licensee, a control operator, or any other person.

□ Q. What other types of third-party communication are prohibited?

A. Third-party traffic consisting of business communications on behalf of any party is prohibited. (97.114c)

□ Q. Why are there so many restrictions on what type of third-party traffic can be handled via amateur radio?

A. These "restrictions," as you call them, are actually intended to protect the Amateur Radio Service. The amateur service was never intended to take the place of the business-radio service, the broadcast services or the common-carrier services. Stop for a moment and think what would happen if there were no limitations on what type of messages were allowed via amateur radio. It's almost a certainty that many people and commercial firms would use the amateur bands for business-type traffic. This would in a short time completely defeat the basis and purpose of the amateur service, and no one wants that to happen.

□ Q. OK, I agree that it's a good idea to prevent the amateur service from turning into a business-radio service. But there are more subtle questions that arise. For example, I'm a salesman and I have a two-meter rig in my car. The repeater has autopatch facilities. Can I use the autopatch to call my office to see if any of my customers have left messages?

A. No, because this would facilitate the regular business affairs of your enterprise. However, you *could* use the autopatch to check with your office to see, for example, if your wife called to ask you to stop on the way home to pick up something for the dinner table. But the person you talk to at the office could not pass along any messages from customers.

□ Q. Suppose my car breaks down on the highway. Can I use autopatch to call a tow truck? Wouldn't this be considered facilitating the regular business affairs of the service station dispatching the tow truck?

A. Strictly speaking, this would be a business communication. But it's also an emergency, so the normal third-party restrictions don't apply. Do not hesitate to call a tow truck via autopatch.

□ Q. What does the FCC consider to be an emergency?

A. FCC's definition of an emergency communication is any amateur radio communication directly relating to the immediate safety of life of individuals or the immediate protection of property.

□ Q. But who is to judge whether or not the danger to life and/or property is "immediate"? Is this up to me or the FCC?

A. When faced with what may be an emergency situation, you should not hesitate to act. You are at the scene; you are in the best position to determine if an emergency exists.

□ Q. Let's take a less drastic example. Suppose I'm driving my car past a doughnut shop. Is it legal to ask my friends on the air if they'd like me to pick up some doughnuts for them? Is it legal to use autopatch to call home and ask if anyone would like doughnuts?

A. You raise one of the stickiest questions of them all, and there is no cut-and-dry answer to it. The FCC realizes that *such* quasi-business type communications are likely to take place in the normal course of events. The question is "Do such communications facilitate the routine business activities of a commercial enterprise, in this case a doughnut shop?" In a very strict sense, they do, and are thus prohibited by the rules. But in a practical sense such communications happen very innocently with no intent to violate the FCC rules. It just seems natural to ask your friends, out of courtesy, if they'd like doughnuts.

What we're getting at is, if such activities take place over your repeater on an occasional and haphazard basis, do not worry about it. The thing to worry about is if such activities happen regularly, because somewhere you have to draw the line between "innocent and polite" chitchat and "routine business" communications. Also, the regular use of amateur radio for quasi-business purposes raises questions about the very nature of the amateur service, and whether or not it serves in the public interest.

Amateurs have always shown maturity and good judgment in their on-the-air activities. Abuses of amateur radio and/or autopatch for quasi-business communications have been minimal. Our advice is, if there is any question of the legality of a transmission, don't do it.

[Note: Send *your* FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.] QST

50 Years Ago

November, 1926

□ For maximum efficiency in handling traffic, the Editor suggests a "five-point" system — daily schedules with four stations, one in each major direction of the compass. Universal use of c.w. has made the Trunk Line system obsolete.

□ For some 18 months, General Electric has been firing r.f. into the ether on selected frequencies from 2.7 to 20 Megacycles, and about 500 hams have sent in monitoring reports to assist in a study of short-wave propagation. Separately, 2AER comments that vertical transmission surpasses horizontal for best signal strength from local stations.

□ 1CGQ, staggered by the thought of 3,000 solder connections to construct a 1,500-volt Edison battery, rigged up a welder by winding heavy wire on an old transformer core.

□ Hoffman and Schnell of Burgess labs have designed a sensitive vacuum tube relay; you can use it as a sort of "auto-call" by attaching it to a receiver tuned to your favorite frequency.

□ 6GD is pushing for more use of loop antennas, and has demonstrated them to a local Army Air unit by installation and flights in an open-cockpit DeHaviland, with considerable QSO success.

□ 8LO spent $6 for some used packing cases and built a 65-foot mast which has supported 300 pounds and withstood 60-mile winds.

□ R.f. amplification is a complex subject which E. B. Lyford attempts to interpret for us in a complete rehash of the principles, with particular attention to regeneration problems.

□ A neat installation is, as you would expect, obvious in the description of 1XV-1XAN at the Massachusetts Institute of Technology.

25 Years Ago

November, 1951

□ The League strongly opposes FCC's plan to eliminate special call signs for clubs, public event stations, those previously held, etc.

□ The cover drawing by "Gil" is only slightly Utopian in showing an amateur deeply involved in the SS contest while wife and son watch a TVI-free picture in the next room.

□ Continuing Hq.'s special attention to the new Novice class, the staff shows how an ARC-5 surplus rig can be modified for the required crystal control, and the design of a simple receiver for those who wish to start on 144 Mc.

□ W6SRY claims one db. *per cycle* with his 2-tube i.f. amplifier. He uses 12 high-*Q* circuits with inductances wound on toroids.

□ W3KQU runs a 500-foot feedline to the hill in back of his QTH to get more antenna height, and with non-resonant lines achieves a 2:1 S.W.R. or better over most of the 10- and 20-meter band.

□ Amateurs excelled in supplying emergency communications during one of the greatest floods in the Midwest's history, with major damage in Kansas City.

□ Using a solenoid stepping relay, W1JEQ shows us how to put a mobile rig in the trunk and still have a choice of a number of crystal frequencies from the control unit under our dashboard.

□ If you stack coaxial dipoles, you get a lowered radiation angle and this is highly desirable for effective local civil defense communication on 2 meters, W1DBM points out.

□ And if you're using steel panels, W2RYT says, don't trust your meter readings, since the instrument was likely calibrated on non-magnetic mountings. — *W1RW*

Strays

□ Judith W. Rundle, coordinator of student services at the Institute of Electrical and Electronics Engineers, Inc., sends word of a relatively new group, the IEEE Ham Network. The concept behind the net is to put students in touch with others in the electrical and electronics fields. To accomplish this goal, an "IEEE Student Hams Directory" has been published.

Who says there's no life in old rigs? A surplus TCS transmitter and receiver pair works well for Al Ferreira, WN2EQP. The gear was reconditioned as part of a continuing project by the Maple Hills High School Radio Club, in Castleton, NY, to help members establish home stations.

Coming Conventions

November 6-7
South Florida Section, Clearwater, FL
November 13-14
Hudson Division, McAfee, NJ
January 22-23, 1977
Florida State, Miami, FL

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.

Hamfest Calendar

Michigan: The 11th annual Swap n' Shop is December 5 from 9 A.M. to 3 P.M., Hazel Park High School, Hazel Park. Admission $1 with plenty of free parking. 52 simplex talk-in. Limited free space for those who bring their own table. Food. Reserved table space for 50¢ a foot. S.a.s.e. for details. WB8JYO, K. M. Spahr, 41431 Saal Rd., Sterling Heights, MI 48078.

Pennsylvania: The Foothills Radio Club is sponsoring a Swap n' Shop on Sunday, November 14, from noon to 5 P.M. at the Circleville Fire Hall in North Huntington off Rte. 30. Check-in on .52, 22/82 and 07/67. Indoor flea market. For information call Harv Irby, W3IBW, 412-836-3444.

Ohio: Massillon ARC flea market/auction is November 19 at Amhurst Park Civic Center, Massillon. Contact: MARC, 1331 Concord NE, Massillon, OH 44646.

Silent Keys

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

K1ELA, Arthur K. Tinkham, Belmont, MA
W1EXR, William H. Osborne, Everett, MA
W1HZR, Col. Henry M. Tourville, Milton, MA
W1JHJ, Victor A. Rossi, Malden, MA
W1LUE, George A. Pappas, Saugus, MA
K1MUU, Edward B. Perry, Westbrook, ME
W1VOK, Tony Bickley, New Canaan, CT
Ex-2DW, Meyer Knoll, Miami Beach, FL
K2FF, Harold C. Vance, Sr., Orlando, FL
WA2LWK, Hermann J. Kortbus, Centereach, NY
W2QX, David R. George, Port Washington, NY
W2RMH, Arthur L. Keefe, Hornell, NY
Ex-W2RPB, Guy O. Crandall, Franklinville, NY
W2YQR, Joseph F. Carno, Syracuse, NY
K3CHB, John S. Langletz, Sr., New Cumberland, PA
W3GYO, Roy J. Bennett Beistle, Panama City, FL
K3MPG, Thomas Christo, Philadelphia, PA
W3NVI, John W. Waterloo, Chester, PA
W3QAL, Floyd Dasey, Glen Burnie, MD
W3VXO, Charles E. D'Amico, Ridley Park, PA
W4AA, Wayne M. Nelson, Concord, NC
WB4CIX, William H. Hunn, Louisville, KY
W4COJ, James R. Stanton, Sr., High Point, NC
K4DP, George W. Fahrubel, Huntsville, AL
W4EXI, Victor Samardza, Norfolk, VA
K4GCP, Pelham C. Wilmerding, Wabasso, FL
W4IMH, Friel T. Vance, Plumtree, NC
W4ITW, Wayne R. Deavers, Richmond, VA
W4JVA, Paul R. Colby, Ormond Beach, FL
W4KBR, Charles J. Elder, Sr., Louisville, KY
W4SG, John F. Stuart, Pensacola, FL
WA4YPP, Wilbur J. Enniss, Chattanooga, TN
W5DDZ, John H. Simms, Long Beach, MS
W5EYC, Dr. Edmund M. Fountain, Houston, TX
W5EYM, Dr. Ross D. Margraves, Houston, TX
W5HRW, Mark Thomas, Jr., Gulfport, MS
W5HUT, Alfred F. Korson, New Orleans, LA
W5KTE, James M. Coleman, New Orleans, LA
WB5MOX, Boyce E. Miller, Duncan, OK
W5NGW, Billy R. Archer, El Paso, TX
WN5PFM, Bobby Wayne Myers, Little Rock, AR
W5RAK, John H. Dittemore, Dallas, TX
WA5STA, William G. Beard, Bossier City, LA
WA5WHS, Leonard M. Collins, Metairie, LA
W6AE, John H. Doig, San Diego, CA
WA6BJO, James H. Richards, Santa Ana, CA
W6CKK, Arthur W. Kaufman, San Francisco, CA
WA6DKW, William W. Webber, Concord, CA
W6DTR, James C. Davis, Fullerton, CA
W6EI, Jo Emmett Jennings, Watsonville, CA
W6EWO, Joseph G. DiCarlo, Sun Valley, CA
W6FNK, Edward R. Hyskell, Santa Maria, CA
W6LC, Leon A. Bartholomew, Santa Barbara, CA
W6OAJ, Kenneth W. Hedlund, San Diego, CA
WB6PGW, Albert W. Potts, Woodland, CA
WB6QDV, Howard C. Hess, Los Angeles, CA
WA6WPX, Vernon H. McIntyre, San Gabriel, CA
K7AL, Albert L. McIntosh, Tucson, AZ
W7BVO, Rolland H. Mietzke, Longview, WA
W7HVX, Wendel R. Williams, Portland, OR
W7ILO, Gilbert F. Burnett, Sedona, AZ
W7KRV, Reuben H. Ford, Sun City, AZ
WA7MAH, LeRoy A. Grant, Glendale, AZ
WA7PTP, Raymond G. Healy, Tacoma, WA
W7RS, C. V. "Bud" Fontaine, Portland, OR
WA8AXB, Edwin M. Howison, Columbus, OH
WB8BFK, Victor G. Howk, Sturgis, MI
W8HAK, Andrew Curilovic, Cleveland, OH
W8HWF, George M. Sheldrick, Perrysburg, OH
K8HZA, Edward A. Lipinski, Dayton, OH
W8MNQ, Clifford V. Richmond, Port Huron, MI
W8NJE, Floyd A. Rettig, Ravenna, OH
W8ZJS, Forrest R. Armstrong, S. Charleston, WV
W9ACK, Milton B. Tauscher, Plymouth, WI
W9BQM, Henry I. Palmer, Fond Du Lac, WI
WB9CQM, William E. Combs, E. Moline, IL
K9EWL, Steve Soltes, Jr., Racine, WI
K9QHS, Glenn A. Mattes, Milwaukee, WI
W9SQA, Clifford A. Hill, Prophetstown, IL
WØAPV, James M. McIntosh, Omaha, NE
WØASW, John W. Oigard, St. Paul, MN
WØEFV, Richard D. Barney, Shickley, NE
KØFSI, Harry H. Bennett, Joplin, MO
WØHQW, Sam J. Main, Ely, MN
KØLMR, Leroy McCann, Kansas City, KS
WBØLNE, Charles W. Duree, El Paso, TX
WØMGV, Bruce Hagemeister, Hemingford, NE
WØNMD, Charley E. Watson, St. Joseph, MO
WØNVR, Capt. John A. Postle, St. Ann, MO
WØPVI, Ernest W. Crego, St. Louis Park, MN
KØULQ, Richard J. Santin, Grand Island, NE
VE1XQ, Walter H. Morgan, Woodstock, NB
VE3BQ, Harold H. Hodgson, Toronto, ON
VE3GTJ, A. J. James, St. Catharines, ON
VE3HGX, R. R. Wainwright, Kingston, ON

Strays

Hollywood TV host Johnny Grant, WB6MJV, featured ham radio on his show by interviewing Lee Goldberg, WB6AVP and Mary Stocksdale, WA6LUC, and showing the new ARRL film by Dave Bell, W6BVN, *Moving Up to Amateur Radio. (WB6OFO photo)*

Amateur radio, a modern communication mode, teamed up with an early form of American communications, the wagon train, as part of the bicentennial celebration. Woody Brem, K3YVV, of State College, PA, acted on behalf of the Nittany Amateur Radio Club by starting with the coast-to-coast event in early June. He stayed with them until they reached Valley Forge, PA, on July 4. Woody operated special-event station AC3YA during the last two days, demonstrating ham radio to hundreds of people along the route. The grand finale used a Touch-Tone-equipped hand-held transceiver, permitting the wagonmaster to contact the State College mayor for a greeting via autopatch. *(WB3AIQ photo)*

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

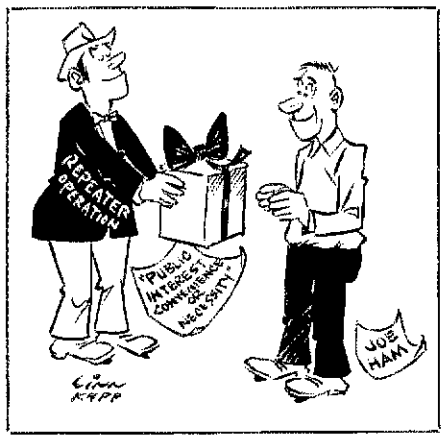
PICON—Repeaters—and Autopatch

Not too many years ago if there was a local emergency problem, such as a lost child, the hams would be hard pressed to put together a network to handle the situation. The problem was that Joe was on 80-meter cw, Pete operated 40-meter phone exclusively, Doug was a 160-meter nut, and Charlie was a 20-meter DX hound. Oh sure, if the lost kid got bit by a snake, Charlie could get on the air and quickly get the serum information from some doctor in far-off Africa. But put together a local network to help find the child – no way!

Not any more. With practically every ham community supporting a repeater club, good local communications are something we have come to expect. The main reason for amateur radio's existence can be expressed in PICON, Public Interest Convenience or Necessity. Fulfilling our obligations via PICON becomes an easy and enjoyable task using repeaters. *And* when we tie a repeater to an autopatch system it becomes an even better emergency tool.

Some months back we mentioned that hams should aim at connecting their autopatch to 911 emergency phone systems wherever possible, as is done in the Chicago area. Have you considered how your repeater would function in emergencies on a day-to-day basis, even without autopatch?

The Chicago FM Club uses both methods and asks their members and users to report back to the club (on reporting forms) about any emergencies they take part in. The



following material was excerpted from their club bulletin and speaks for itself.

DE Squelch Tale – Chicago FM Club

May 30 – WB9OXW, Gary, notified police to help four women in a stalled car, reported by K9GBT, Gard.

May 30 – Lee, W9MOL, spent the day reporting an accident for WB9NJB, Randy; broken traffic lights in Oak Park and topped it off by reporting a *robbery in progress* reported by Jeff, WB9KAZ. Jeff was out walking his dog, heard shots being fired and looked around to see a robber and a gas station attendent, who had just shot each other. The robber, wounded, escaped; but was quickly caught by police who were notified via CFMC.

June 5 – John, WB9FCB, reported a stalled car for WA9DGY, Don, and Art, K9TRG, using the 450 repeater; and on June 29 he called in an accident in Arlington Hts. for WB9LAP, Howard.

June 12 – WB9LGR, Craig, called CPD about a 2-car accident for WA9FRC, Maury.

June 15 – WA9WDE, Wes, reported a 3-car accident on Lake Shore Drive for K9BTG, John.

June 22 – Tim, WB9QLM, relayed a report of two stalled vehicles on the Eisenhower for Ray, W9VRK. Tim used the Maps repeater No. 911 autopatch.

June 24 – Ellen, WA9ACO, reported an attempted robbery of a pedestrian for WB9IZP.

June 30 – WB9FCB reported another accident in Chicago for WB9PLI, Pete. Then he reported a car on fire on the Eisenhower expressway, reported by W9GHD via the CFMC 220 repeater on July 15. John notified Chicago Fire via the WR9AGL autopatch. A little later, John notified Chicago PD about an overturned car with a man pinned inside, reported by Larry, WB9MMW.

July 4 – WB9OHR, Greg, called in debris blocking Rte. 53 in Palatine for Howard, WB9LAP; and Larry, WB9LOZ, told state police about a stalled car on I-57 reported by WA9FRC, Maury. QST

REPEATER DIRECTORY INFORMATION

The ARRL Repeater Directory continues to be a very hot item. And it's getting thicker and thicker as new machines bloom throughout the U.S. and Canada. We're hard at work compiling the next edition, which should list over 3,000 repeaters, so *now* is the time to re-register your machine – or make sure that your new one is listed in the upcoming edition.

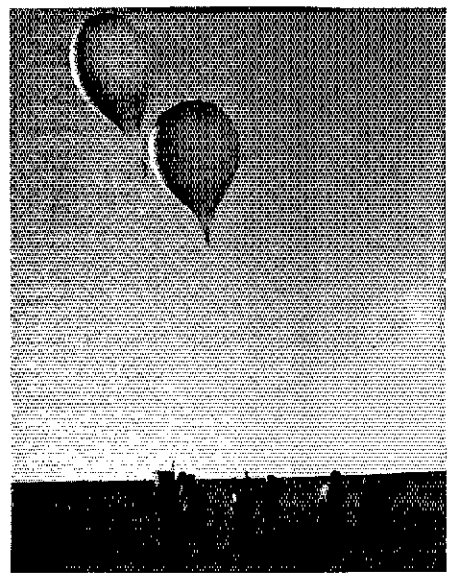
To make it easier for you, we have a smaller, simpler registration card available. Write for Form CD85A(9-76) – it's free, s.a.s.e. please. You no longer need to list your repeater's elevation, power output, modulation, etc. And, like current 1976-77 Directory, the handy guide will continue to be available without cost, except for postage. Let's hear from you!

A NASTY SUBJECT – HOW CVRA HANDLES IT

The Carolinas-Virginia Repeater Assn. President, WA4PEN, had some words of wisdom for members of their society. The information is worth passing on.

"Of course, periodically, we all have a problem situation arise! One may occasionally be in an area where some unfortunate misunderstanding has occurred – where the air is a bit blue – where someone is 'Kerchunking' a repeater – where a net is being interfered with – where music (?) comes in on the access frequency – or where someone just forgot the kind of manners amateurs are supposed to exhibit. If or when this occurs, let me urge you to be cool. A quick flick to another channel can keep you from getting in the middle. In addition, most malcontents soon run out of ugly things to say or do if the audience disappears or at least does not respond. It is sad when someone is on such an ego trip that they must disrupt nets, upset normal repeater operations or otherwise make our hobby less pleasurable than it should be. But, in my opinion, it makes more sense to change channels than to respond and seemingly encourage the offender. It has seemed that in areas of greatest problems that if users can totally disregard the interference by not even keying up the machine, the problem will ultimately disappear. Users are gradually learning that offenders thrive on arguments, angry words, hot tempers and even threats. Generally the purpose of such interference is to stimulate antagonism and without this kind of response, the antagonizer receives no food for his sick ego and finally turns off the rig and wonders why, totally oblivious that he is being laughed at by cool operators.

"So keep cool and do whatever has to be done to meet the needs. If an alternate frequency and even Net Control is needed – QSY; if in a local ragchew – switch to simplex or go QRT; whatever the case, cool it! It is a lot better for the ulcers and your reputation among peers." QST



This is the launching of NC0ARL, the 16/76 repeater that was used during the 1976 ARRL National Convention at Denver. The balloon launch took place from Boulder, Colorado and many amateurs made contact through the machine. *(W4ONA photo)*

*VRAC Liaison, ARRL Hq.

Correspondence

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

SERVING THE PUBLIC

□ I really enjoyed reading Jerry Barber's article on Amateur Radio and SAR in the July issue of *QST*. The Mountain Rescue Association performs a most valuable service to the public through its rescue work. Many lives have been saved through the efforts of its member rescue teams. Amateurs living in areas without local mountain rescue teams might also want to participate in search and rescue (SAR) communications. One way they can help is through membership in the Civil Air Patrol (CAP) which is the Air Force's civilian auxiliary. CAP flies about 80 percent of all air search and rescue within the inland areas of the United States and last year alone was credited with saving 57 lives. CAP also provides airlift of supplies and aerial damage assessment during times of natural disaster. Communications is a vital part of this effort and qualified operators are always needed for both mission and administrative nets. Amateurs interested in more information about CAP should contact their local unit (which is usually listed in the telephone-book white pages under Civil Air Patrol) or they may write to: National Headquarters, Civil Air Patrol, Maxwell AFB, AL 36112. — *Gary C. Wilson, WB2BOO, Captain, CAP, Westbury, NY*

□ Each month in *QST*, there is a Public Service Honor Roll. As a recently licensed Novice and now Full Member of the ARRL, I would like to strongly propose an addition to this fine feature. The current system of gaining enough points to make the honor roll is nearly impossible as far as a Novice operator is concerned. I vehemently urge that a Junior Public Service Honor Roll specifically for Novice operators engaged in traffic handling be established. The structure of the Junior Public Service Honor Roll could be much like the current Public Service Honor Roll. Scoring for Junior Public Service Honor Roll might be as follows: (1) Checking into cw nets, 1 point each, maximum of 10; (2) Serving as NCS of cw net, 5 points each, maximum of 10 (a very difficult job for a Novice operator); (3) Performing assigned liaison, 1 point each, maximum of 10; (4) Handling emergency traffic directly with a disaster area, 1 point each message; (5) Serving as net manager for entire month, 10 points. To be considered for the Junior Public Service Honor Roll, a Novice would have to earn 30 points during a month. The ARRL has established an Official Relay Station-II for Novice operators, to encourage traffic handling. Why not promote this fine aspect of ham radio further by establishing a Junior Public Service Honor Roll? The Novices of today are tomorrow's higher-class licensees. — *Jay Camac, WN4QBB, Pensacola, FL*

MORE FOR 20

□ Can you remember or explain why W/Ks are limited to 14.200-14.350 kc in the 20-meter band? Isn't this policy a relic of the a-m days when the Europeans worked below 14.2 and kilowatt alley crowded down to the 14.2 edge? As I recall, part of the idea was to protect the low-powered Europeans from the affluent Yanks. All of this is now changed. With ssb and the Europeans matching the Americans in power and antennas working right inside the so-called American band, the 14.1 to 14.2 strip is underutilized, relatively speaking. Isn't it time for a fresh look at the 20-meter band allocations? — *Reuben E. Gross, W2OXR/4X4CY, Staten Island, NY*

ODD ACCESS

□ We have a strange situation here in Pittsburgh. Otto Schuler, K3SMB, has an unusual voice. It's so unique that at least once a week while driving to work in the early morning, he brings up the WR3AFZ 69/09 autopatch (or should it be called an "Otto-patch"?). All he usually says is his call and comments on the weather. Otto's unique tonal qualities also serve as an alarm clock for WA3LUM who leaves his HT on at night while asleep. — *Joe Fenn, WB3AGB, Pittsburgh, PA*

LET IT HAPPEN

□ Just a short note to let you know that I enjoy the "Happenings" column. I hope you will continue and enlarge it. — *Glenn McMichael, VE3CGU, Goderich, Ontario, Canada*

SUGGESTIONS — *QST*

□ Publishing the dynamic range specs as measured by the ARRL lab on both rigs reviewed in September *QST* allows the reader to make a direct comparison of this most vital statistic. I hope you continue to use dynamic range specs as part of your evaluation of new products.

The articles on microprocessors and RFI were both written in plain language that can be easily comprehended by even the most casual reader. Even more important however, both articles lay an excellent base for further reading. Hopefully *QST* will publish some follow-up articles on each topic. — *Michael J. Willis, WA3VJA/4, Chamblee, GA*

□ I would like to see a monthly bulletin of special and commemorative call signs published in a prominent section of *QST*. The "How's DX" or "Operating Events" departments would be ideal for this purpose.

Often I mistake these calls for rare DX when I do not find them on the ARRL Countries List or other similar operating aids. It appears to me, that somewhere in the world, there is at least one such call sign in use at any given time. After working a station with a special call, I am only later disappointed to find that the station I have worked is stateside or some all-too-common country. Even more thwarting is the fact that I sometimes never find out where the station is at all!

I am sure that this problem troubles other hams as well. A bulletin of these calls would eliminate the problem of mistaking them for sought-after locations and would very likely bring more pleasure and recognition to those who sign them. — *Arthur E. Pizer, WA1NDJ, New Haven, CT*

RE: QUALITY VS. QUANTITY

□ It is interesting to observe the cyclical nature of amateur radio regulation. The latest happenings, using Novice phone on two meters for example, remind a good many of us that we've been here before.

The old "quality vs. quantity" argument is as unresolved today as it was in 1953 or 1967. Today we have talk about safety in numbers and the need to swell the ranks at any cost in order to protect our frequencies at the upcoming conference. How soon we forget that "incentive licensing," which was designed to meet the same need (April, 1967, *QST* editorial), was perpetrated upon us with the "quality" side of the argument in mind. How come the apparent flip-flop?

At the same time we are so concerned with the need to protect our frequencies by shaping up the ranks of amateurs, it is ironic that the 28, 200 and 420 Mc bands are going to the "unlicensed hordes" by default.

Which way are we going? If ARRL has in fact decided to do away with one side or the other of the "quality-quantity" question in favor of the other, let's make sure there's something in it for all classes of amateurs besides a great letdown in 1979. — *Chuck Crisler, WA5ERC, Ft. Smith, AR*

RECENTLY RIPPED-OFF?

□ In the February, 1976, issue of *QST* (page 61), Lew McCoy noted that 1975 was a "Rip-Off Year for Mobile Rigs!"

Sadly, this is to report that 1976 appears to be a bonus year for this sort of nonsense. At least here in the metropolitan New York-New Jersey area, amateurs have been losing gear at a great rate.

My rig was forcibly removed from my locked car while it was parked in New York City during my attendance at an evening meeting. I had carefully removed the antenna but left the trunk lip mount showing, had shrouded the under-dash unit, and had removed and concealed the microphone. Nonetheless, despite a super-sturdy mounting bracket and a bodacious padlocked assembly, the thief had no difficulty in entering the car, crowbarring the entire unit — the bracket, lock and all, from the dash, pulling the coax and power leads from under the dash bracket and finding the concealed microphone. Furthermore, he knocked the cylinder lock from the trunk and stole some other equipment.

The point of all this is to remind amateurs that security locks, safety brackets, slotless mounting screws, and the like provide no security at all against a "professional" out to get your rig.

I surmise that the trunk lip mount, sans antenna, and/or my call letter license plates were enough to arouse suspicion. Once the antenna mount was spotted, a quick flashlight into the car revealed my carefully shrouded unit. Once entry had been made, stickers noting "This is Ham — not CB" etc. were of no avail. The risk at this point was too great; better to take it anyway than to admit a mistake.

So, until trunk-mounted rigs with mini-control heads are available, it seems absolutely necessary to hide the antenna and mount entirely, e.g., a fold-away trunk unit, or a removable magnetic mount. Further, it is recommended that the rig be mounted with a quick disconnect — e.g., slide bracket or magnetic mount to the dash or hump support — and *that it be removed when leaving the car*! Finally, check your insurance. Here in New Jersey, transceivers are no longer covered by a comprehensive policy. Gear to be protected must be listed on a separate rider — paid for in addition to regular policy charges. We have come a long way from the days when leaving a KWM2 on the transmission hump was standard practice! — *Al Hirsch, K2SKV, Summit, NJ* QST

YL News and Views

Conducted By Louise Moreau,* W3WRE

YLRL – A Backward Glimpse

Organized in 1939 and initiated as a response to a challenge, YLRL is the oldest worldwide club for women amateur radio operators. Founder Ethel Smith, K4LMB (whose call then was W7FWB), answered that challenge with a summons to all women operators who were interested in forming a club. The replies rolled in. By October of 1939, the Young Ladies Radio League had been formed.

The next 37 years saw continuous growth both in membership and activity. Launched as a mimeographed bulletin, the club publication *YL Harmonics* is now a bimonthly publication that has received several awards from AREA. The magazine features membership news, certificate and contest information, as well as a yearly "Directory Issue" of the members.

YLRL sponsors four contests: "Howdy Days," a get-acquainted, informal activity; YLAP, the annual autumn Anniversary Party; DXYL to North American YL Contests, limited to YL participants as is YLAP; and the popular YL/OM contest, for all licensed operators. Of the four club-sponsored certificates, only one is restricted to YLs only – DX YLCC. WAC-YL, WAS-YL, YLCC certificates are available to all amateurs.

A major club activity is the "Adoptee Program" whereby YLRL members or affiliated clubs sponsor DX women for membership. Similarly outstanding is "Tape Topics," a program in which club members record *YL Harmonics*, *QST*'s "YL News and Views," and other related YL news for use by blind operators.

Present membership includes nearly 900 women in all 50 states, and 113 gals representing 32 DX countries on all continents. All YL operators are welcome, regardless of license class.

YLRL 1977 OFFICERS

The following women have been elected to serve as officers of YLRL beginning January 1, 1977. President, Beth Newlin, WA7FFG; Vice President, Carol Bourne, WA9NEJ; Secretary, Jackie van de Kamp, W6YKU; Receiving Treasurer, Rose Ellen Bills, WA2FGS; Disbursing Treasurer, Rosemary Davidson, WA8VXE. District Chairwomen: 1st Dist., Edna Bennett, K1VEB; 2nd Dist., Roberta Newman, WB2BHS; 3rd Dist., Norma Vanderhoff, WA3KKT; 4th Dist., Thelma Bolvin, WB4AUR; 5th Dist., Sue Hutton, WA5FVH; 6th Dist., Sandra Heyn, WA6WZN; 7th Dist., Beth Taylor, W7NJS; 8th Dist., Dorothy Higgins, W8RZN; 9th Dist., Dori Leiser, W9VNG; 10th Dist., Mary "Peg" Campbell, WB0LFO; KH Dist., Sarah Wright, KH6CBT; KL7 Dist., Geraldine Baker, KL7ALZ; and VE Dist., Barbara Newman, VE3BFN.

1976 SPECIAL YLAP AWARD

Myrtle Cunningham, 1976 YLRL president, will present a special cup to the DX YL with the highest phone score using low power. This cup is to be presented in memory of Evelyn Scott, W6NZP, who visited so many DX YLs.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

YLRL CERTIFICATE CHAIRWOMEN

In answer to requests for the various certificate custodians in YLRL, they are WAS-YL, Agnes Helinski, WA3GBJ, RD 4 McClain Timms Lane, Belle Vernon, PA 15012; WAC-YL, Miriam Blackburn, W3UUG, Box No. 2 Ingomar, PA 15127; DX-YL, Emma Berg, W0JUV, RFD 2, Box 171, Lawrence, KS 66044; YLCC, Onie Woodward, 14 Emmett St., Marlboro, MA 01752; DX-YLCC, Phyllis Shanks, 3 Honey Lane West, Miller Place, NY 11764.

FIRST GERMAN YLS

The records of German YLs prior to WWII show one possible YL call, D4KAK, Eva Kapelle. Neither the date of her license nor station location is available. There may have been others but Eva is the only one we can find so far.

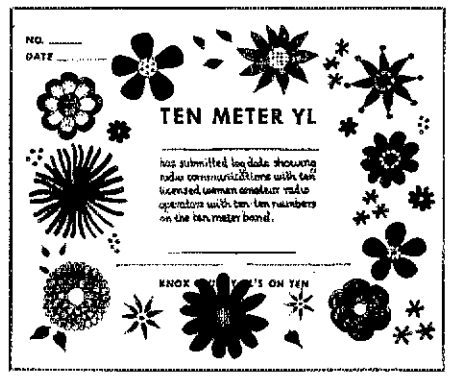
More recently, however, the first YL to receive a West German license was DL3LS, Ursula Buerger, and in East Germany, the first YL was DM2COI, Betty Kuchfeldt. Our thanks to WA8EBS and DL3LS for this information in the YL story worldwide.

YLRL 1976 officers: (l-r) WA2FGS, Rose Ellen Bills, receiving treasurer; Beth Newlin, WA7FFG, vice president; WA6ISQ, Myrtle Cunningham, president. Beth, WA7FFG, will be the 1977 YLRL president. *(W2EEO photo)*

YL CONTEST REQUESTS

Many YLs have requested that the gals who are anxious for more contacts in the YL contests try a "listening check" 10 kHz each side of the frequency on which they are working: It might pay off. "Call," they ask, "and if no one answers, tune around; a rare one may be there." Novices are reminded that YLRL has an award for the Novice submitting the highest score. QST

MINOW Net officers: (l-r) President, Pat, WA7GMX; Vice President, Margaret, WA7RBR; Secretary-Treasurer, Marion, WA7TLL. *(WA7RBR photo)*



Knox County YLs are offering this 10-meter YL certificate to all amateurs who qualify with evidence of working 10 YLs of the 10/10 net. WB4NDX is the certificate custodian.

International News

Conducted By David Sumner,* K1ZND

How to Promote the Microwaves, British Style

The development of amateur radio is the history of countless individual experimenters who confronted and conquered the challenges of ever-higher frequencies in the radio spectrum. Amateur radio was born in the vicinity of "200 meters" or 1500 kHz, moved through the high-frequency spectrum to 28 MHz (which was known as the "Ultra-Highs" in the 1930s), then on to 56 and 112 MHz before World War II intervened. After the war, work as high as 1296 MHz became commonplace.

For most amateurs, however, the next step, into the bands above 2300 MHz, was a difficult one. At this point, or so the conventional wisdom went, equipment became too sophisticated for the home constructor without a machine shop; besides, everyone *knew* that those frequencies were useful only for short distances.

Fortunately, some key people in the Radio Society of Great Britain did not possess this "wisdom." With the 1979 World Administrative Radio Conference (WARC) fast approaching, the relatively low level of amateur activity at these frequencies was a source of some concern. They decided to make a determined effort to promote microwave experimentation and activity. Their approach was to depart from the usual practice of stepping from one band to the next highest one, such as from 1215 MHz to 2300 MHz, and instead to leapfrog all the way to 10 GHz (10,000 MHz). By doing so, they reasoned, they would not be prejudiced by past experience at lower frequencies.

One of the most enthusiastic proponents of 10 GHz is Dain Evans, G3RPE, who is co-author (with G6JP) of the RSGB *VHF/UHF Manual*. The new Third Edition of this excellent publication contains 35 pages of information on how to construct simple 10-GHz equipment and antennas, and one page of the RSGB's monthly journal, *Radio Communication*, is devoted to a microwave column conducted by G3RPE. In a recent letter, Dain described the thoughts which went into the selection of 10 GHz as a target band:

"We realized that if we were to wait until heavy occupancy or some other natural development forced us to the higher frequencies, then we probably would have lost the bands through sheer neglect long before we had reached 10 GHz. Besides, 10 GHz appeared to be a most interesting band in its own right, involving lots of new constructional and operating techniques, and a good starter for the bands at still higher frequencies. Also, we had done some sums for once which gave us a pleasant surprise and showed us just how prejudiced we had been. These indicated that virtually any equipment we could conveniently build, even poorly working low-power wide-band gear, would work any line-of-sight path in the world – and such paths could be several hundred km in length. It was this last observation that provided the initial stimulus to get things going."

Once there was widespread activity at 10 GHz, the band proved to be far more useful with simple equipment than had been believed. To date, British amateurs have exchanged 10-GHz signals with 10 DXCC countries over non-optical paths as long as 521 km. A phenomenon known as "superrefraction" on paths over water is responsible. Most of this work has been done with transmitters generating 1- to 20-mW feeding dishes only one or two feet in diameter. According to G3RPE, "Most of the more significant efforts have been made by ordinary amateurs having no special microwave background or test equipment using homemade equipment built literally on the proverbial kitchen table. Indeed, one can suggest seriously that 10 GHz makes a better band for beginners than most!"

One reason for the British effort to popularize 10 GHz was WARC. Has it had any effect? To quote G3RPE: "We thought that by concentrating our microwave efforts on one band we would be more likely to influence events at the 1979 conference. Judging by the reaction of professionals to our results, we already have made some progress is this direction. But what seems to be worth emphasizing is that, given the will, there is just about time for amateurs in other countries to produce even more spectacular results by taking advantage of the more favorable geography they enjoy. . . . It seems to me that the real pioneering area is now above 10 GHz, and that a deliberate attempt must be made to increase activity there. . . . Microwaves can be as different from vhf as vhf is from hf; to regard it simply as an extension of vhf can really hold things back. After all, 10 GHz is 70 × 144 MHz."

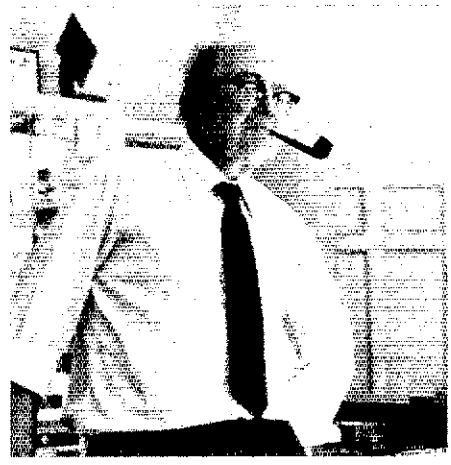
The British 10-GHz effort has relied in part upon the availability of beacon transmitters. Two beacons have been constructed and installed in locations relatively free of obstructions in order to provide experimenters with signals of known characteristics. Another important factor in the British success has been that the experimenters have shared their results with one another, through meetings and correspondence and in the pages of *Radio Communication*.

The RSGB has shown what can be done to popularize the microwave bands, and to justify and defend their continued allocation to the Amateur Radio Service. Will other societies follow suit? QST

*Assistant General Manager, ARRL

Any national amateur radio organization relies heavily on its volunteer officers. In addition to I4SN, the Italian organization has two more of the hardest-working volunteers we've ever encountered: General Secretary Sergio Pesce, I1ZCT (right), and Vice Secretary Tony Capogna, I2VIE (left), shown here at ARI hq. in Milan flanking visitor K1ZND.

Since his return to Italy after participating in the IARU Fellowship Program at IARU hq. (*QST* for July, 1976, page 73), Marino Miceli, I4SN, has traveled to several countries in Western Europe to speak on WARC preparation. Here he gives his report to the convention of the Associazione Radiotecnica Italiana (ARI), the organization which sponsored his attendance.



Co-author of the famous RSGB *VHF/UHF Manual* with G3RPE is the Society's General Manager, George Jessop, G6JP.

Public Service

Conducted By Robert J. Halprin,* WA1WEM

And Now for Something Completely Different

What's completely different? Traffic that becomes garbled during the journey between originator and addressee, that's what. The event is not as extravagant as described by W6ISQ in May *QST*, but it happens. Names, addresses and texts get roughed-up and even such things as handling instructions are mysteriously uncoupled from the rest of the message, like the attack on the mail car during the Great Train Robbery.

Strange things take place. A message bound for Dudley, MA, is detoured to Dudley, ME . . . W4EH AA becomes W4EHA . . . AA7VGA winds up as AA7STG . . . Renton, WA, becomes Reton, MA. So on and so forth.

Why? More often than not, garbles are caused by poor band conditions. It's a case where the receiving operator just isn't aware that he didn't get it right. Other problems stem from poor traffic-handling habits, on all modes. Then there are some hams who just don't care.

One who does care is K4TH, who experienced some trials and tribulations last December: "During the holiday season, this station received between 30 to 40 percent undeliverable messages. Not until considerable time and effort was spent at the library with city telephone directories, were these messages reluctantly serviced back through the system. For example, I received a message from California, addressed to 'Banterman,' with a phone number. I called the number and got into a hassle with a woman who thought I was making an obscene phone call. The telephone directory showed no 'Banterman' at that address or with a telephone number that approximated the given number. Fortunately, the signature on the message rang a bell and after searching through a year's file of messages, I found that the addressee was 'Gunterman' and a three should have been a four in the telephone number. So that one was a winner, but there are still too many losers."

Some amateurs contend that there are two separate and distinct classes in existence in the National Traffic System today, those that originate and deliver traffic on the section and local level and those that act as relay stations at the regional level and above. The latter are accused of being solely concerned with rate and not accuracy. WA1VMV contends that a number of hams, perhaps a silent majority, are reluctant to initiate traffic since they feel it will not be delivered as sent – therefore, why bother sending it at all?

Let's look at these cw culprits. This can be at any level of NTS or independent nets for that matter. This is the situation: The transmitting station wants to impress his opposite number with his great sending speed. He cranks his keyer way up but his sending gets totally out of control. Dits and dahs start sprouting all over the frequency.

The receiving operator thinks he'll lose face if he asks the other guy to QRS. Above all else, he wants everyone to be impressed with his superior copying ability. So he acknowledges each message, abstaining from requesting badly needed fills. This deal is called peer group pressure.

Contrary to popular belief, however, this cadre of effete, careless, cw hotshots aren't the only villains. Certain messages come through the system in perfect shape, only to be amputated on the last leg of the journey. This is the section or local phone net, immediately prior to delivery.

Many of these phone chaps aren't used to handling much traffic. Their normal *modus operandi* is to check in and wait patiently for their "informals." They're not too fluid with operating procedures. When they're called upon to accept a message for delivery, rustiness and/or inexperience result in mistakes.

Nevertheless, out of all the messages circulated each month, garbles are the exception, not the rule. But what's the point of it all if even a small portion of the participants don't care enough or are unable to make sure their copy is accurate? Will John Doe be impressed with our traffic-handling skills if his message is *born again*, with a completely different address or text?

In a crisis situation, garbled messages could really cause problems. It's much easier to get used to ensuring accuracy during normal times. Traffic handling is a public service and as such we should gear our efforts with the general public foremost in mind.

PUBLIC SERVICE DIARY

□ Linden, NJ – October 31 (1975). A routine daily sked of W2KJJ was interrupted by a plea from ZP5NP, who needed immediate emergency assistance in obtaining medical treatment for a six-year-old girl who had swallowed an herbicide. W2KJJ patched a doctor in Paraguay to the FDA in Washington, DC, where the remedy was found in minutes through FDA's index system. A letter from the U.S. Ambassador to Paraguay later confirmed that the girl's life was saved through these hams' selfless efforts. (James V. Redding)

□ Cleveland, MS – March 20. Tornadoes touched down in northeastern Mississippi but hams were ready to provide communications for civil defense authorities. The reports were highly valued. (WB5DCY, SCM MS)

□ Canton, MS – March 29-30. When a tornado destroyed telephone service, nearly 100 hams supplied emergency communications for the town and handled large amounts of welfare and inquiry traffic for the area. (WA5ZLX)

□ San Diego, CA – May 30. The humanitarian spirit of hams was demonstrated clearly when WB6IXC made a plea on a local repeater for $1700 to bail out an ill American prisoner who was near death in a Mexican jail. Only hours were available to raise the money, but Southern California hams responded with the vigor for which all hams are renowned. A successful evacuation via air followed, and a life was saved. (WB6IXC)

□ Chicago, IL – May 30. W9MOL spent his day reporting an auto accident and broken traffic lights, but then topped it off by aiding in the reporting (with WB9KAZ) of an armed robbery. WB9KAZ witnessed the crime while walking his dog, and the Chicago police were able to quickly apprehend the suspect because of hams' quick action. (WA9LAY)

□ Hayward, CA – June 24. Another life saved: W6RGG called for medical help at the site of a baseball injury, and WA6GSN responded. An ambulance was dispatched in one minute, arriving in time to restore the victim's breathing. (AAØENP/6)

□ Canary Islands – June 25. Hams worldwide assembled on 14,310 kHz to aid an ill passenger on the yacht *Topaz*. They gathered in response to a plea from VP2GAT, who was aboard the yacht. Extensive relaying through several European stations brought the needed medical advice. (D. M. Markwith, Sr.)

□ Tazewell, VA – July 9. At least 98 amateurs assisted in passing 27 messages when a train and truck collision disrupted telephone service and isolated the community. (WB4DTG, SEC VA)

□ Hawkeye Downs, IA – July 15. WØHUP, a spectator at the All Iowa Fair, immediately called for an ambulance when a participant fell beneath a tractor. (WØLFF)

□ Baja Peninsula, Mexico – July 21-28. Sixty messages were passed on the San Diego Section AREC Net (3905 kHz) during an intensive search for two missing motorcyclists. The emergency communications also involved XE2AZR of Club VHF de Mexicali, and the 23 U.S. and Mexican hams worked together superbly. Communications included requests for food, water, gasoline, vehicles, aircraft, and air and ground search coordination. (W6TET)

□ Seattle, WA – July 27. K7NZU drove 200 miles, set up a portable station, operated 14 hours, and returned home within 24 hours – to provide emergency communications in a 200-man search for a missing boy. The boy was found unharmed. (W7RJW)

□ South Carolina – August 8. Forty-nine hams tracked storms and tornadoes in the state, providing Red Cross and civil defense hq. with vital information. (WB4TNS, SEC SC)

□ Papeete, Tahiti – August 10-13. Amateurs linked the Los Angeles Veterans Hospital with a Tahitian ham to provide emergency assistance to a man found in a stream on the island. While U.S. Coast Guard in Honolulu stood by (monitoring through Hawaiian hams), a successful transfer of the patient to a Tahitian hospital was accomplished. (WB6YID)

□ Arlington, WA – August 14. The life of an injured steeplechaser was saved because local hams were ready at the event to help. Upon the girl's fall, ham radio was used to speed an ambulance to the scene. Authorities remarked that the rescue had been successful by only ten minutes. (WA7UQB)

□ San Jacinto Wilderness, CA – August 22. Eight amateurs played vital roles in helping to rescue a hiker suffering from appendicitis. Their providing of emergency communications in a remote mountain wilderness area proved once again the tremendous service ham radio can provide in search and rescue work. (W6AQB, SEC Org)

□ Iron Mountain, OR – August 29. K7QCW

*Assistant Communications Manager, ARRL

WB6IXC, among others, was instrumental in saving the life of an American in Mexico. See Public Service Diary. (*WB6IXC photo*)

and WBØSXE/7 worked together with the Jackson County Sheriff's Office to effect the successful rescue of a hiker who was stricken ill on the trail. (W7HLE)

□ *Repeater Log.* According to reports to date, repeaters were used to report 23 automobile accidents and related occurrences and once to report an attempted robbery of a pedestrian. Repeaters involved were WR3s ACM AHQ, WR5ADC, WR6ABN, WR9s ABY AGL and WRØACW.

□ For August, 32 Section Emergency Coordinators reported a total AREC membership of 11,776. At this time in 1975, 35 SEC reports were received with a membership of 12,758. Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, ENY, EMass, Ga, Ind, Kans, Ky, Mich, NLI, NC, NFla, NTex, Ohio, Okla, Ont, Org, SDgo, SBar, SCV, Sask, SFla, SNJ, Utah, Va, WVa, WMass, WPa.

□ A belated half-year summary of SEC reports is as follows: 227 reports have been sent in from 51 different sections. At the same time last year, 246 SEC reports were received from the same number of sections. Sections with 100 percent reporting: Alta, Ariz, Colo, Conn, Del, EMass, Ind, Ky, Me, Mich, Miss, Mont, NC, NFla, NNJ, Ohio, Org, SDgo, SCV, Sask, SFla, SNJ, STex, Utah, WVa, WPa.

NATIONAL TRAFFIC SYSTEM

RN7 is getting a big boost from WB7AIX, a 15-year-old YL, who is PAN liaison twice a week. TWN/PAN helped out following the Big Thompson River flood. WA1FCM has become assistant manager, 1RNd. EAN welcomes back W2ZRC and K2SIL late of DJØBG and KH6RS respectively. 4RNd is now meeting at 1800Z and 2100Z, with the second session on 3955 kHz. VE7DKY has taken over the managership of RN7d and he is looking for stations to assume section liaison and net control duties. "Demon static" (so titled by a 1922 issue of *QST*) has departed in favor of unsettled winter band conditions. QST

August Reports

1	2	3	4	5	6
EAN	31	1725	55.6	1.213	94.1
DEAN	62	757	12.2	.658	96.0
DCAN	56	271	4.8	.216	87.1
PAN	31	1240	40.0	1.066	97.3
CTN	31	406	13.1	.444	97.8
1RN	58	656	11.3	.512	89.6
1RNd	29	169	5.8	.328	75.5
2RN	92	674	7.3	.647	95.0
2RNd	52	260	5.0	.443	78.7
3RNd	31	88	2.8	.429	97.8
4RN	60	565	9.4	.412	93.3
4RNd	59	187	3.2	.214	48.9
RN5	62	691	11.1	.427	92.8
RN5d	31	203	6.5	.241	78.6
RN6	60	592	9.8	.420	96.7
RN6d	31	209	6.7	.193	93.2
RN7	62	409	6.6	.420	83.6
RN7d	56	101	1.8	.150	57.0
8RN	58	395	6.8	.344	83.3
8RNd	31	149	4.8	.621	82.8
9RN	62	504	8.1	.390	91.9
9RNd	31	208	6.7	.310	86.2
TEN	53	451	8.5	.378	51.0
ECN	62	267	4.3	.392	95.6
TWN	61	481	7.8	.297	90.6
TCC Eastern	111[1]	680			
TCC Central	87[1]	654			
TCC Pacific	118[1]	862			
Sections[2]	3943	15383	3.9		
Summary	5196	29237	5.6		
Record	5520	31117	16.4		

[1] TCC functions not counted as net sessions.
[2] Section and local nets reporting (106): WQV/UHF (PQ), AENB AEND AENJ AENM AENR AENW (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NCN (CA), CWN (CO, WY), CN CPN NMVTN (CT), DEPN DTN (DE), FAST FMTN GN NFPN QFN QFNS SPARC TPTN (FL), GAREC GSBN GSN (GA), IMN (ID, MT), ILN (IL), I75MN TLCN (IA), QKS QKS-SS (KS), LAN LRN LSN LTN (LA), PTN (ME), MDCTN MDD (MDC), EMRI EMRIPN EMRI2M WMN WMPN (MA), MACS MI6MN MNN QMN WSSBN (MI), MSN MSPN MSSN PAW (MN), MTN (MS), MON MOSSBN PHD (MO), BARTEN NJN NJPN NJSN (NJ), SWN (NM), NLI NLS NYS RTN (NY), CN CNN NCSSBN PX SCSSBN THEN (NC, SC), BNR COAREC 10 OSSBN O6N OSN (OH), OAN OFON OLZ OTWN STN (OK), OSN (OR), PTTN WPA (PA), TN TPN (TN), TEX TTN (TX), BUN UCN (UT), VFN VSBN (VA), NSN (WA), WVN (WV), BWN WIN WNN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.

Transcontinental Corps

K5MAT has completed four years as TCC-Pacific Director and compliments the Pacific gang for making his job much easier than he would have expected. VE3SB has been appointed Assistant Director, TCC-Eastern, to permit W2FR more time for "cherchez la femme," (le trafic formidable!).

1	2	3	4	5
Eastern	120	93.3	1966	680
Central	93	93.5	1260	654
Pacific	124	95.2	1727	862
Summary	337	94.0	4953	2196

1 — AREA
2 — FUNCTIONS
3 — & SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC roster (August): (W2FR, Dir.) — W1s NJM QYY, K1s EIR GMW SSH, WA1s MSK WEM. W2s FR GKZ MTA. K2s HI/VE2 SIL/1, WA2s DSA ICB PJL, WB2s CST UBW, K3MVO, WA3VBM, W4UQ. K4KNP. W8s LTA PMJ, WB8ITT, VE3s AWE GOL SB. Central Area (W5GHP, Dir.) — WB4s LCR SKI, W5s GHP MI RB UGE UJJ, K5s TFG TTC, WA5IQU, W9s CXY DND NXG, WA9EED, WB9NOZ, WØs AM HH HI LCX, KØCVD, WAØTNM, WBØHSP. Pacific Area (K5MAT, Dir.) — W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF TYM VZT YBV ZRJ, K6HW, W7s DZX GHT, K7s IWD NHL QFG, WA7WXY, WØs IW LQ, KØs DRL TER, WAØKKR/7, WBØQOT, VE7ZK.

Independent Nets (August)

1	2	3	4
Central Gulf Coast Hurricane	31	60	1870
Clearing House	31	283	533
Hit & Bounce	62	989	527
Hit & Bounce Slow	18	43	35
IMRA	26	308	800
Mike Farad	25	61	260
North American SSB	28	248	41
7290 Traffic	44	437	1958

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll August 1976

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 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. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

928
WBØLYU
104
ABØNIE
69
W4OGG
66
WBØQOT
65
WB5KGP
WB5RLR
WBØODJ
64
K1PAD
WB2CST
63
WA6FTY
62
WB2RUZ
61
WA1MSK
WA1UGJ
AA1VEI
W2MTA
WB2VTT
WB4OBZ
WA5ANV
W5GHP
WB5NKD
WA5YEA
W7OCX
WB8JGW
59
WA3QOZ
58
WA4EPJ
57
WB4OXT
56
WA2DSA
WA2ECO
W2MLC
WA2UYK
K4BKX
WA4FBI
WB4IGX
W5KLV
W6RNL
WB6YID
WAØKKR/7
VE3GJG
55
WA6TVA
KØCVD
WBØHBM
53
WB4ARJ
WB5NUM
W6RFF
WB9ICH
52
K5MAT
K9LGU
51
WA3SXU
WA3YJG
WA5RKU
50
WA2ZJP
K3YHR
AA3YKK
W7VSE
WBØOCT
WØOTF
49
WA2AIV
WB2EMU
WB2LZN
WB4EKJ
K4YFC
W6INH
WA7MEL
K9ZTV
KØMRI
VE1AAO
VE3FQZ
48
K4FLR
47
WA2PJL
WA3WPY
W6AUC
VE1AVL
46
W4WXZ
45
WØOYH
44
W1BVR
WA1TBY
AA1UDB
WA1WYL
WA2RKI
WB2RMK
WA2VEN
/Ø
WB2VVS
W2YJR
W3IPX
WA3VBM
WB4DXN
WA4EUD
WB4FHT
WB4LCR
W7IWN
WA8ETX
/VE3
WB8PAV
W9NXG
KØEVH
WØNUB
WBØTAQ
KL7JDO
VE1BDT
VE3GOL
43
W6BGF
42
W4ANK
WA5VBM
WB8MAZ
41
WB4CAK
WA4NID
WAØGSG
WBØRWN
VE3DZK
40
WA2SLF
W5UJJ

Brass Pounders League August 1976

BPL Medallions (see December, 1973 *QST* p. 59) have been awarded to the following amateurs since last month's listings: K4TH, W4YZC.

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.

Winners of BPL Certificates for August Traffic

1	2	3	4	5	6
WØWYX	56	1184	313	871	2424
WBØLYU	224	256	224	224	928
AB2CST	19	403	357	49	828
WBØQOT	37	338	376	23	774
K9CPM		378	53	279	710
W8PMJ	5	293	318	5	621
W5GHP	198	89	294	12	593
KØYFK		286	18	268	572
WØHH	5	249	255	46	555
WB4ARJ		262	287	2	551
WB6EIG	18	247	247		512

More-than-one operator station

KMØMO	462	2	462	2	928

BPL for 100 or more originations-plus-deliveries

WØFIR	408	W7TZK	185
W1DMH	284	WA5VBM	183
W9IOH	201	WA6YWS	148

1 — CALL
2 — ORIG.
3 — RECD.
4 — SENT
5 — DEL.
6 — TOTAL

How's DX?

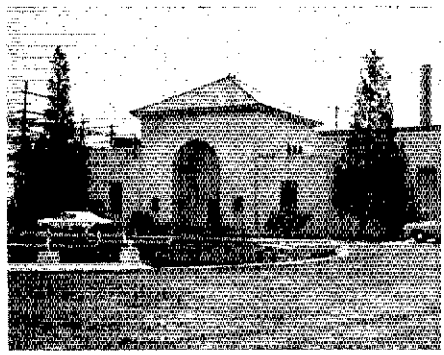
Conducted By Rod Newkirk,* W9BRD

Lengthening Shadows at Rocky Point

Wizards of newfangled wireless were QSOing the world from RCA's rf bastion at Rocky Point, New York, years before your conductor was born. Marconi, Alexanderson, Beverage – most of radio's founding immortals passed through its gates at one time or another to observe their inventive genius in action. When young W9BRD joined the ranks of hamdom with a hot 6L6 in '37, old R. P. had long been synonymous with high-frequency heaven. Hall upon hall of umptykilowatts, mile on mile of huge antenna arrays, team after team of communications experts, all intensely dedicated to the DX art.

Now as we enter our thirtieth year on this cheery *QST* assignment we report with due nostalgia that famed Rocky Point's high-frequency days draw near to end. The "second spectrum" that ARRL's K. B. Warner editorially hoped for long ago has become stark reality, satellite-relayed point-to-point channels that never (well, hardly ever) QSB or QRT. So rows of 40-kW R. P. juggernauts, some roaring continuously since 1927, were permanently switched off last year. The Point's sister complex, vast Riverhead receiving station, is officially closed, corridors of painstakingly engineered multimode diversity equipment, cold and silent.

W2LYH, long an active League booster and a Riverhead staffer for 35 years, affectionately recalls the halcyon hf days of RCA and, with colleague K2GMF, supplies rich data for this end-of-an-era theme. Many of their fellow techs and engineers have departed for space/microwave/computer frontiers; but, thanks to seniority, Bob and Tom still hold forth at historic Rocky Point. "The whole thing blurs into a kaleidoscope of fond memories and I consider myself lucky to have been part of it," writes W2LYH. "I think I had the best, the romantic years – plucking signals out of the shortwave air."



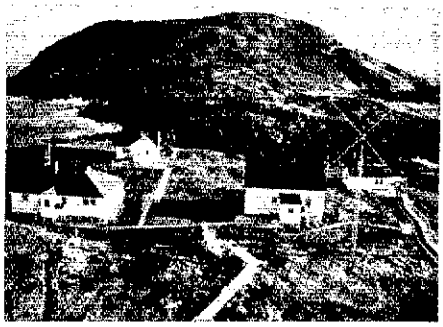
Rocky Point, RCA's "Radio Central," where dozens and dozens of multikilowatt rigs simultaneously pounded the high-frequency ether for more than half a century. Main building, left; main hall, right. Just down the road stands more wireless history, a lab built by prodigious Nikola Tesla. *(W2LYH photos)*

GETTING 'EM ON THE WALL

NORTH AMERICA: "How's" bows low to W1CW who takes on a solid challenge in cutting the ribbon for your new ARRL Outgoing QSL Bureau at League headquarters. Bob's superb quarter-century performance as great white father of the Communications Department DXCC desk is a terribly tough act to follow, but game WA1VCG moves up to give it his all. At their new posts Bob and Dave welcome your encouragement and assistance. If fairness, dedication and capacity for mountains of hard work will do the job both enterprises are in dependable hands. . . . Yes, W1CW and WA1VCG have my best wishes in their new responsibilities. For the record I'm managing QSLs for FK8BG, VP2s KA KN and VR1AF. (W7OK) . . . Regarding my ZF1RE QSLs, the old Cincinnati QTH won't do it. Please use the Louisiana route indicated in the listings to follow. (WA8TFJ/5) . . . September 1, 1976, is the date effective for my FG7AS managership. (W7RUK) . . . Since ex-HR1DH-K8WHB/HR1 now can QSL from his new W9NXD address I no longer act as Dale's manager. Also, I find that a portion of mail has not been reaching me. Anyone who previously tried my address for HR1DH, ZE4JA and/or ZL1BIL should reapply. (WA4UPR) . . . If anybody still needs a VP7DX QSO confirmed, that's me. (VE2WW) . . . Unclaimed incoming QSLs are on hand here for ZF1s AG AU CC CD CN CW DM GE GI JC JE JH JS KXJ LG MB QP RD RF SE SM SV TT TP TW VW WM WN and WW, some doubtless attempting to confirm pirate activity. As one of the handful of resident ZF1s let me repeat my constant appeal that QSLers clarify UTC dates and times of QSOs. Be accurate – even ten minutes off can mean a different log page in contests. And spell out the month! My own policy is to reply to QSLs within 24 hours of receipt. (ZF1AK) . . . Ex-VE1ASE still holds Sable logs for QSOs of ten years back. If your log is a lucky one write R. Burke, 68 Iroquois Ave., Oromocto, New Brunswick, E2V 2A1, Canada. (DXNS) . . . 8P7s are Barbados variants, suffixes mostly unchanged. . . . WA4NRE joins K3RLY as a QSL route for International DX Association ventures. . . . K3s HVG and LLL recently retrieved HR6SWA QSL receipts stored away by the Weather Service as far back as last October. Patience! (WCDXB) . . . 'Aip! Petitioners parenthesized plead for pushes toward pasteboards of targets indicated: (W2IBZ) 7X2AA '75; (W6PQZ) XW8CO '75; (K5BZU) FW8ZZ '66; (WA1POJ) FO8DF '74, HR6SWA '75, IS0XBL '75, 7X2AA '75; (WA7RKJ) CR9AJ, CX2XA, JW4FG, OY2OU, UG6GAF, ZK1s AA DA; (WA8FIO) EL2CN, 2X0ITU, 9H1EL; (WB4SXX) TF3SV, 3A2CN, 5Z4MO all 1971-'72; (WB5MOX) C6AMU, VX9A; (WB5OFB) OX3OA, VP2KR, 8P6GN, 9G1JC, 9J2GJ; (WB8NYP) FP8AP, FY7AA '74, HK3QQ '73, HR1RF '74, VPs 2SU '73, 5MC '74, VQ9R '73, 4U1ITU '74, 9G1AR '74; (VE6AUP) CE6DT '74, DU6IV '72, KX6GS '74, VP2EY '74, 9J2BO '75; (DL8WX) KP4s DFA DJE DKX EBV and TIN. Any aid? . . . We volunteer for duty as QSL reps for ops at the DX end, the rarer the better. (WA2AJM, WB0NMW, WN2AYY) . . . In the full spirit of Thanksgiving we hear from Ws 4LVP 7HPI, WA8FIO, WBs 4WHE 5KUJ 5OFB 0NMW, KH6CF and DL8WX who recommend these rapid and reliable QSLers of the Month: CE0AE, CM2ZU, CP6EK, CR6IK, CT1LV, EA6DF, F6DJV, FL8JC, Gs 4AMT 5DS, G16VU, HK3LT, IS0OSK, JA2AJA, KC4AAB, KH6IJ, LU1SH, OA4ANR, OE3PUW, OX3ZM, PJ9JT, PY8RC, SM3DBU, TI2LA, UAs 6PD 9UF 9YAR, VPs 1MPW 2KR, VRs 1AF 3AK, YS1WPE, ZS4AG, 3D2KG, 5T5CJ, 9G1FF and 9Q5DM, along with QSL aides Ws 3HNK 4BAA 5QPX 7OK 8CNL, K7ODK, WA3HUP, WBs 5OAV and 9IWN. Any quickies over your way?

ASIA: After surviving a 33-month wait for UG8AC's card I can now report 100-percent per-country QSL returns at 290 confirmed. (K9VQK) . . . Bet you don't quit while you're even, OM! (W9BRD) . . . I'll act as EP2VW's QSL manager on the traditional self-addressed stamped envelope, or s.a.e. plus International Reply Coupons, basis. Cards arriving without same will be answered by the bureaus route eventually. (K4DAS) . . . QSL tender WB8DKQ finally received QSL stock from the printer in July and promises to keep caught up. Sorry for the earlier delay. (EP2LA-W0PEV) . . . QSLs arriving for 7J1RL contacts were filed in order of arrival and were answered in that sequence. Cards received without IRCs were answered via bureaus. (JH1VRQ, JARL) . . . Sorry, no DX QSLing arrangements here, Chinese or other. (W7VB) . . . 4Z4s BG EV and PX accepted my QSL managerial services as of this July. (WB4FSV) . . . Still a few HL9TF blanks on hand. Anyone who worked me in Korea 'way back in 1962-'63 and still needs confirmation can use my *Callbook* QTH. (K2GMF) . . . Sure would like to confirm a QRPp contact with XW8CO on May 1, 1975. (W6PQZ) . . . Note that my QSL handling for TA1MB, effective in July, goes only for Stateside contacts, s.a.s.e. requisite. (WA1UEO) . . . 4J0KAA radiated from Wrangel isle in August-September. (DXNS) . . . HZ1TA specifies QSLs from W/Ks via W4UN, Germany via DJ0AP, U.K. via G3RSI and others via P.O. Box 195, Riyadh. (VERON)

*c/o ARRL, 225 Main St., Newington, CT 06111



XJ3ZZ/1 amassed 4300 contacts in a May foray to desolate St. Paul Island thanks to (from left) VE3s BMV BBH DU and KZ. *(VE3BMV photo)*

EUROPE: Concerning oft-expressed experiences with slow U.S.S.R. QSL receipts, I agree. My Russian returns are about forty percent, 130 cards, some appearing years after QSOs. (VE6AUP) . . . My own QSL jinx is Puerto Rico, of all places. Have yet to receive a card for many KP4 QSOs since '71. (DL8WX) . . . I've been OY1M's QSL aide since February of '74, adding OY1s A and AT as of June 1, 1976. (W6TCQ) . . . I receive cards regularly via our IRTS bureau but a few sent to me for March-April '76 QSOs may have slipped out of cover and strayed. I strive for 100-percent QSL reply so anyone in need should make a second try. The rising cost of postage and IRCs apparently reduces the overall volume of DX QSL exchanges. (EI9J) . . . G4AMT is a confirmational rarity, indeed. Terry QSLed a lowly WB5 first! (WB5KUJ) . . . Swedish Air Force's fifty years were saluted by SL7DM as 7SL7DM. . . . Rs 1SKW 3FL 3MSK 5TV 6ER 6TB 8SM 8TA ØBAM ØKR ØWL, 4Is 4A 8F ØIAP, etc., were Russian commemorative specials this summer, all reachable via Box 88N. (DXNS) . . . Army-amateur station HB4FE disports its unusual Swiss tag from time to time. . . . GW4BLE has it that Jersey and Guernsey will adopt distinctive GJ and GU prefixes. (WCDXB) . . . A card from UK2BAS, eleven months after contact, is my fastest Russian response so far. (WB4WHE)

OCEANIA: 5W1AB lost QSL manager W6DAB to Silent Keys in July. QSL direct to Apia. (DXNS) . . . JAØCUV says QSLing got under way early for sessions as YJ8CW, VRs 1AK 4CW and 8D but Tack stresses that two-way bureau exchange can take months and months. (WCDXB) . . . Despite spurious contrary evidence I have no connection with DX QSLing, VR6 or otherwise. (W2UBJ) . . . July's *QST* says I have a QSL manager but it's not so. Still get a kick out of answering my own cards, even after all the chores associated with digging out from supertyphoon Pamela. (KG6JAR)

AFRICA: Botswana introduced its 805 prefix commemoratively in July, A2s CED and CJP signing 805s ED and JP. S7 labels will be worn by Republic of Seychelles amateurs courtesy International Telecommunications Union. As of September no Angola bureau was yet operational according to D2AAI. (DXNS) . . . K4BAI expected to hit the bureaus with a large batch of my Liberian QSLs in mid-September. (EL2T-5L2T) . . . Those seeking cards from 5VZJS, 5Z4OD, 9G1s JX and JY should take note of my new address: Backnangerstr. 11, 1000 Berlin 28, West Germany. (DL7SI) . . . D6A and FL8CB QSLing was up to date by mid-August. (K5QHS) . . . FL8JC sends a super-sized QSL direct so I suggest s.a.e. larger than the "business" variety. (KH6CF) . . . Good news — Europa's FR7ZL/e believes in thorough QSLing. (VERON)

SOUTH AMERICA: 5K3LR was a Bogota International Fair special in July, QSLs okay via bureau. (DXNS) . . . My PY2GAB QSLing assistance is only for activity in July, 1976. (W2LEJ) . . . WØGX kindly takes over my confirmational chores as of August. (CP1AT) . . . When soliciting the services of QSL managers don't fail to include s.a.s.e., or s.a.e. plus IRCs, when appropriate. Good practice when initiating *any* exchange of correspondence these expensive days. And do you have a supply on file with your local ARRL Bureau Manager? Now the customary collection of individual QTH specifications but be mindful that each suggestion is not necessarily accurate, complete or "official."

A2CJP, P. Johnson, P.O. Box 649, Gaborone, Botswana
A9XBO, Box 14, Bahrain
ex-AH3FG, E. Wasosky, Box 15562, Montour, Pennsylvania, 15244
C31KB (via DC8YP or DK8BH)
C31s KH KI KJ KM KN (via DJ9NT)
CM2HB, P.O. Box 1, Havana, Cuba
CP6BD, P.O. Box 1568, Santa Cruz, Bolivia
CT3BM, P.O. Box 490, Funchal, Madeira Islands
D2AAI, J. Chaves, Box 43, Gabele, Angola
D2AZB, Box N175, Luanda, Angola
D6AA, H. Laugaudin, Box 289, Moroni, Comoros
FK8CK, P.O. Box 1966, Noumea, New Caledonia
FKØAO, P.O. Box 3956, Noumea, New Caledonia
FL8JC, Box 1205, Djibouti, T.F.A.I.
FW8CO, M. Pierron, Hihifo Airport, Wallis Island
GC5s BTK BTN BTP (Fs 6ARC 6DLA 5GY, all via REF)
HC1BU, P.O. Box 4797, Quito, Ecuador
HC6TA, T. Altamirano, Box 239, Ambato, Ecuador
HKØDMA, P.O. Box 145, San Andres Island, Colombia
HKØs LA LE, P.O. Box 225, San Andres Island, Colombia
HKØWJ, P.O. Box 270, San Andres Island, Colombia
HM2JN, P.O. Box 3481, Seoul, South Korea
ex-HR1DH-K8WHB/HR1, D. Holloway, W9NXD, Box 948, Marion, Indiana 46952
IF-IH9HLO (via IT9KZW)
IF9WFE, Box 9, Marsala, Italy
IT9DQZ, P.O. Box 22, Trapani 91100, Sicily, Italy
K3YSJ/HR1, Radio HRVC, Aptdo. 145-C, Tegucigalpa, Honduras
K4II/AH3/AH6/ZL (to K4II)
K4LDR/WB2FVO/WB2SXD/VP9 (via WB2SXD)
KC6DK, Box 487, Ponape, E. Carolines, 96941
KG4SC, Box 581, FPO, New York, New York 09593
ONs 5NT/LX 5SY/LX 6HH/LX (to ONs 5NT 5SY 6HH)
OY1s A AT M (via W6TCQ)
TY9ER, R. Egner, P.O. Box 1587, Cotonou, Dahomey
VK6IZ, K. Khuen-Kryk (W3ZVK), Box 73, South Fremantle, W.A., Australia
VP2DQ, P. Searle, Portsmouth, Dominica, W.I.
VP8s HZ NX (via GM3ITN)
ex-VR8A, J. Thompson, ZL2BJU, Box 722, Wellington, New Zealand
WA4ZGJ/C6, W. Keesee, P.O. Box 8159, Nassau, Bahamas
WA6s QFN/KM6 QFO/KM6 (to WA6QFO)
XN2AB, E. Graham (VE3EJD), Box 251, Station A, Goose Bay, Labrador, Canada
YB2SV/SU, Box 88, Semarang, Indonesia
YB8ACK, F. Olano, c/o PT Inco, Soroako, Sulawesi, Indonesia
YN1AZ, Box 105, Managua, Nicaragua
ZF1RE, A. Jehle, WA8TFJ/5, 6960 Bunker Hill Rd., New Orleans, Louisiana, 70127
ZK1BA, T. Grantham, Box 269, Rarotonga, Cook Islands
3A2HN, S. Salganik, 31 Blvd. des Moulins, Monte Carlo, Monaco
4Z4s BG EV PX (via WB4FSV)
9K3TC, P.O. Box 71, CH-9500, Wil., Switzerland

A4XGB (G4CTQ)
A4XGQ (G3UKP)
A7XA (DJ9ZB)
AH3FF (W6KLI)
AH3GK (KH6EQO)
C21ME (WA5OCN)
C31HL (F6BKP)
C31JT (SM7FQX)
C31JW (HB9AYX)
C31JY (DL6VW)
C31KC (DK1RV)
C31KF (F2NY)
C31KO (ON4ER)
C31KR (F6ECS)
C31MJ (EA3NE)
C31MK (EA3WZ)
C31MS (EA3MS)
C6AEY (WB9HAK)
C9MJO (W8CNL)
CE9BSA (CE2MZ)
CP1AT (WØGX)
ex-CR6AI (D2AAI)
CT2BL (W1FXD)
CZ20 (VE2VY)
D6A (K5QHS)
DFØAFZ (DARC)
DK8KQ/HBØ (DK8KQ)
DL7NS/OHØ (DL7SI)
DL7SI (see text)
EI9J (see text)
EL2T-5L2J (K4BAI)
EP2NC (I2YDX)
EP2VW (K4DAS)
FØACO (K1IXG)
FØCFB/FC (HB9AAA)
FØCNA (PAØLBD)
FØCQK/FC (OE1NPW)
FØCQZ/FC (G3KFT)
FØCXA/FC (DK8DV)
FG7AS (W7RUK)
FGØGD/FS7 (W9MR)
ex-FH8CE (D6AA)
FL8CB (K5QHS)
FL8KP (W2KF)
FO8EX (F6AUS)
FPØAG (K8SWW)
FPØLP (W3LPL)
G5BAT (K1IXG)
GB2LC (G3XEP)
GB2MT (G8ITS)
GB2USA (G4APN)
GC4DAA (G3ZQW)
GD3RFK (W5MYA)
HC5EE/6 (WA8TDY)
ex-HL9TF (K2GMF)
HM9A (KARL)
HZ1TA (see text)
I4CDH/ØX (I4CDH)
IØKLV/IH9 (IØKLV)
IBØBOQ (I2BOQ)
IBØJN (I8JN)
IBØODP (I1ODP)
IE9SEZ (IT9SEZ)
IF9JOY (IT9TAI)
IL7WT1 (I7VCA)
ISØTCF/IMØ (ISØPEM)
IT9SKO/IG9 (IT9PUG)
IZ9JMV (IT9AZS)
JH1KSB/JD1 (JE3AFS)
JT1AN (JH1LBR)
JW1SO (LA1SO)
JW5DQ (LA5DQ)
JX2FL (LA4YF)
KG6JAR (see text)
KG6SZ (JA1EMX)
ex-KX6MJ (WB8ONA)
LZØBFR (LZ1FW)
OA8CD (K1HMO)
ON8XB/IBØ (ON8XB)
OX3CM (OZ6HS)
OX3VO (OZ9DP)
OX3YY (OZ7YY)
OX4KP (W1TW)
P29BN (W3LPF)
PY2GAB (see text)
ST2SA/Ø (WB7ABK)
TA1MB (see text)
TA2SA (DJØZG)
TR8BJ (DJ5DA)
VK3BGB (K4II)
VK6HG (G2BOZ)
VKØLB (VK2RS)
VP2MB (ON5YL)
VP2MFB (W2OFB)
VP2LGN (WB9IWN)
VP8OB (G4DIF)
VP8PB (LU4EGE)

FC2CH enjoys collecting W/K/VEs from sunny Corsica. You'll often find Roland batting the key on 14,060-14,070 kHz around 2300 UTC. Last year he worked 44 states on cw, 31 on voice. WA8TDY manages QSLs for his Stateside QSOs, DK4EB for European contacts.

VQ9IOS (ON6FN)
VR1AF (W7OK)
VR3AN (K6VIB)
VR4BT (G4CRY)
WA2ZQY/4X (WA2ZQY)
WA6EGL/VQ9 (W4FLA)
WB5LSU/TI (W4MYA)
WNØQFB/HR (WB9ELT)
XE1FR (W5QK)
XE1LFH (ON5NT)
XE1UFA (WB4KPZ)
YI8KW (K6KII)
YN1DW (W5USM)
YN8KMA (WA5WCT)
YR3AC (YO3AC)
YU8DX (YU3CM)
YUØOM (YU2AAU)
ZB2BD (G3TTG)
ZB2FX (G3RFX)
ZF1BT (W5UFF)
ZK1DP (FO8DP)
ZK2AR (JR1ATU)
ZS3LK (DK3GI)
3AØGS (W2HSB)
3AØHG (F6DRW)
3AØHM (HB9AFI)
3D6BD (JA3CMD)
4W9GR (DK4PP)
5K3LR (HK3LR)
5N2NBG (RSGB)
5VZJS (DL7SI)
5Z4OD (DL7SI)
5Z4PS (VE3AUI)
8O5ED (K4EHY)
8O5JP (A2CJP)
9G1JY (DL7SI)
9K2EH (OZ8EH)
9M2FK (YU4HA)
9Q5DM (WB5OAV)
9X5SM (ON4ER)
9X5VF (ON4LM)
9Y4TO (W7ATO)

QTH catalog courtesy Ws 1CDC 1CW 2LEJ 7HPI 7OK 7YF 9NXD, Ks 11XG 2GMF 4DAS 4EPI, WAs 1SQB 1VCG 4ILR 8FIO, WBs 2SXD 4SXX 4WHE 5OFB ØGFV, WN4EHS, KH6CF, DC6XT, F6DLA and literature of clubs, groups and individuals to be credited subsequently. Your turn at the mill?

DXCC Notes

Announcement is hereby made of one deletion from the ARRL Countries List – Portuguese Timor, shown on the list at CR8.

This deletion is made in view of the fact that what was Portuguese Timor has become the 27th province of the Republic of Indonesia. Only contacts made prior to September 15, 1976, count as Portuguese Timor. Contacts made September 15, 1976, and after, count as Indonesia.

The deletion of Portuguese Timor will be reflected in the next Honor Roll listing, to be shown in March, 1977. The bottom number on the Honor Roll will again be 312, with a total of 361 countries possible before deletions.

DXAC Notes

The following recommendations from the DX Advisory Committee were submitted to Headquarters by the DXAC chairman in August, 1976:

1) The Finnish and Swedish Sovereignty Islets should not be added to the ARRL Countries List.

2) None of the Israeli-occupied areas in Jordan, Syria or the Sinai should be added to the ARRL Countries List.

3) The Pribilof Islands should not be added to the ARRL Countries List.

4) CR8, Portuguese Timor, should be made a deleted country.

5) No further additions should be granted to the ARRL Countries List under Rule One (1) of the Countries List Criteria unless such additions are made by reason of government until such time as the DXAC can conduct a survey to find out the DXers' feelings on the matter.

All five recommendations were accepted by the Communications Manager. For more information on the function of the DXAC, see p. 90 of *QST* for December, 1974.

DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from August 1, through August 31, 1976.

New Members

CW/F

269 DL9DY
170 JA2CMM
165 JA3CHO
151
DJ3GE
144
VE3HBX
131
HC5EE
122
HA5HA
118 JA4FCV
109 W6TJI
108 K5DEC
WA3WHL 107 VE2RO WA3WNU 105 GM4DKO
JH2FKV KØLIR 104 K3PNS KØOAM PAØJFH
5MØGMG W1CQS WB4DHO WB4WBP W5RKR WBØCCF
YU2EZA 103 K2YGM WB4LFT 102 JA3ARM 101
SVØWX WA5VUW 100 K5MHG/6 WB4WHE WB5FZJ W8KEL

Radiotelephone

271 EA4JF
232 F6BDS
224
PY5YC
180
WB5HVY
166
WA1STN
143 DL7SP
122 JA8IXM
121 F5RC
119 DK2QL YBØAAN 114 DK8KF 113
JA4FCV 112 K4FZU 109 PAØHWM 108
K5DEC WA3WHL 106 WA4EDX 105 HB9ARE
WAØMYM/4 W6OIC 104 VE3MV 103 YV4ACY
102 WB5IFY WB6PEF 100 I5KKW VE3BJP

CW

125 K8MFO
108 DL1LZ W9FD
104 WA6ETN
103 JA8CFR K6TZX
102 WB8DTT 101 JA1QXY K6LLE SMØGMG
WA2JOC W6TCQ 100 K5FVA W4HOS WA9MOE

5BDXCC

#511	#512	#513	#514	#515	#516
VE3BVD	JA9BE	VU2GDG	WA4EYR	WA2BCK	CT1MW

Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, from 250 through the 300 level in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

CW/F

350 DL3RK
335 PAØLOU W1WY W8DA
330 HB9PL SMØCCE
325 DL7BK I5ARS K4CIA VE4OX
320 OZ3PO W9BGX
315 DJ5LA K6BCE KL7PI OH2VB W1ELR W1OHA
310 W3DBT ZL1ARY
305
DJ6RX K4EKJ WA5JMK
300 JA1FDU W3LB W4AOU WA8PYL WA9JDT
290 KP4DJE W1OR WA2BCK
280
PAØTAU W1BGY W3BBO W3BTX W4AFS 270 W6VD WB8ABN 260 WA4LDM 250 G3VBL HB9KC K3ZOL W3AX
W4DQD WB4PUD W8GIO W9LJL YU2CBM 240 K7PFU PY5YC WA3GNW 220 K6AG PY1SJ VE3BHZ WA1IJC WB4EDD
WAØTAS 200 I7CZI JA2JSF K4UEE 160 K8LUU W1JAA WA1NSF WA8LTX W9IIL 4X4FU 180 DL7RT JA3BRB VE3FCW
W2CML W3BZN W5CPI W7LR K8LUU K9PKQ K9GSC K7LAY VE3AKG WA1EOT W4BTZ WB8JHQ W9LUH WA9EZJ 140
K5AZ K9KGA WB2QCF W9YH WAØNBZ 120 HB9ANM HB9NO K4DFI K4LRA K6LLE OE2BZL VE3HLC VK2BAN XE1PF

Radiotelephone

320 G3NLY
315 W9BGX
310 DJ5LA F5II
300 CT1MW W4AOU W6OBH
290 ZL1AH
280
W9MIJ/4 WA8PYL
270 DL9SV JA1FDU WB4TPU
260
K6BCE LUIBAR/W3 W8AQF WØHBH 250 G3VBL
W4DQD 240 W2FCR 200 I7CZI JA2JSF WA1EUO
W5DMM 180 I1CSP I8ACB K6SMF K8LUU W2CML WB4INC
160 VE3FCW WA8LTX W9LJL W9LUH 140 DA2KD I2OMF
K7LAY W1JAA WA5WMC WA6ETN 120 VE3AKG WB4KTR W5SAA

CW

220 W1DAL
180
K2TQC
160 K4LRO
K4TBN 120 JA1KWV
SM6CRH SMØCCE W4NBP W7LR WØBN

Here are corrections to the DXCC listings in September QST: In the CW/F Honor Roll listing, W2BOK should have been shown at 320 with 350 before deletions. In the Phone Honor Roll, W5LZZ should have been shown at 312 with 323 before deletions. K3GBZ's call was shown as K3BGZ at 112 in the CW/F New Members. W6ID should have been shown at 120 in the CW Endorsements.

Strays

□ Did you know that Hq. has a sheet detailing schedules of stations useful for code practice purposes – amateur, weather, MARS, Navy. Write and ask for Form CD-139 (with an s.a.s.e., please!).

I would like to get in touch with . . .

□ collectors of old or new baseball picture cards found in bubble-gum packages or from cigarettes and tobacco products before WWI. Also, DX stations with information about collections of soccer, rugby and hockey cards. Interested, too, in program guides and other items sold at arenas where associated sport events are held. Will Wiehe, WB2FEL, 113 Farragut Pkwy., Hastings-on-Hudson, NY 10706.

□ CQ pacemaker wearers: As a pacemaker wearer since April of 1975 and a ham since 1924, W. R. Schoppe, WB4DWA, has been compiling data on electromagnetic interference (EMI). He requests that readers wearing pacemakers write to him and describe any experience which seemed to have been EMI related. To elicit maximum information, he has prepared a short questionnaire which is available for an s.a.s.e. to WB4DWA at 481 89 Ave. N., St. Petersburg, FL 33702.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV

Do We Need a VHFAC?

The advisory committee system was established by the League Board of Directors in 1968, first on a trial basis and then permanently in 1970. The first two such committees set up were the Contest Advisory Committee (CAC) and the VHF Repeater Advisory Committee (VRAC). Later, advisory committees dealing with DX matters and emergency communications were directed by the Board. The purpose of the advisory committees is to supplement Headquarters staff committees already functioning, and the Board, itself, in order to broaden the base of League decision-making and provide an additional channel for membership participation in the decision-making process. Since their institution, there has been a great deal of praise of the advisory committees and practically no negative comments. True, problems still exist in these specialized areas, but most would agree that many constructive changes have taken place since the advisory committees began functioning.

From time to time, various suggestions are made for making life in the world above 50 MHz more interesting and rewarding. One such suggestion offered recently concerned instituting awards for confirmed contact with specific numbers of states, i.e. blocks of ten, on 2 meters and above. Another involved establishing some kind of recognition for accomplishments on the 6-meter band, in addition to WAS. There are outstanding problems related to the handling of the standing boxes. We broached this hot subject in the October column and as yet do not have what could be called a consensus on the matter. Another debatable question raised recently is what constitutes a contact. Must the signals be heard by ear in order to qualify or can signal-processing techniques which give promise of extracting signals from below the noise be used? These are just a few of the knotty problems which have come to my attention since taking over the stewardship of these pages. There are, most certainly, a lot more. There is much wisdom in having available a group of active and knowledgeable vhf/uhf operators to provide counsel on questions like these. At the Central States VHF Conference, ARRL Vice President Vic Clark, W4KFC, brought up the question of an advisory committee to serve the interests of our particular facet of the hobby. What do you think of the idea? Do we need or want a VHFAC? There is another Board meeting coming up just after the first of the year so let your director know your thoughts on the matter. If there is sufficient support for the establishment of such a committee, perhaps we can get action started at this Board meeting. If you do not think that a VHF Advisory Committee is justified, tell your director so. I have heard complaints that the views of vhfers are not listened to by "those who run the League." Here is a fine opportunity to express your opinion one way or the other. I can assure you that you will be heard and that your thoughts will receive consideration. It's up to you. Write your director right away. Should a VHFAC be established or should the idea be dropped?

EAST COAST TO BERMUDA ON TWO METERS

There has long been speculation that the path from the East Coast of the U.S. to VP9 is workable via tropospheric ducting. There have been rumors that contacts have been made via fm repeaters but to this writer's knowledge no substantiation has ever been received as to calls and dates. Now we have the first documented 2-meter work with Bermuda. When well-known OSCAR operator W1NU announced plans to vacation in VP9-Land, many urged him to make a real effort to work across on 2 meters along with his planned satellite operation.

Agreeing to try, Vic set up schedules with WA2CJK/4 in Portsmouth, VA, and K1FJM/4 of Elizabeth City, NC. As of this writing (September 16) contact has not been established with either of these two stations, although WA2CJK/4 has been heard. But on the night of September 14 (about 0200 UTC, September 15), it happened.

W1NU started putting a signal into New England and the coastal areas of New York and New Jersey. At times, signals were quite strong, allowing ssb contacts to be made. To date, stations known to have made the grade for a new country on 2 meters are K1HTV and W1FTX CT, K1WHS ME, K1MNS NH, WA2WOM New York City, K2OVS and WA2BIT Long Island, W2LFI on the New Jersey shore as well as W2AZL Holmdel, NJ. Also worked was a station quite far inland, W3QNS near Coatesville, PA. Bob was able to get through to Vic despite the fact that stations closer to the coast, such as W2EIF, could not even hear the signals from Bermuda. Stations here in the Washington area were not able to hear Vic either, nor was WA2CJK/4.

How about a 70-cm attempt next year, Vic?

*Send reports to Bill Tynan, W3KMV, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

ON THE BANDS

6 Meters — As expected, Es conditions for August were down substantially from those for June and July. K7ICW in Las Vegas reports openings on the 1st, 2nd, 8th, 9th and 20th. The only double hop which Al noted was on the 8th with WB4PXW, FL, coming through briefly. This assessment is echoed by WB4OSN near Miami. Joe noted but a few short openings to Ohio and the Northeast. On the other hand, WAØMRH in Omaha reports openings every day from the 1st to the 23rd except for the 18th. I know of some activity from this area to the Louisiana/Texas area on the 22nd as I have received reports of 2-meter Es on that date but only sketchy accounts of 6-meter activity.

Most would agree that the months of June and July produced outstanding Es conditions. This fact is attested to by numerous reports received from the U.S., Canada, Europe and the Far East. It is interesting to note, however, that except for the great success of YV5ZZ and VP2LAW, conditions for the more southerly stations were not particularly noteworthy. Very few reports have been received this year concerning contacts with the Mexican and Central American stations. WBØRJR of Everton, MO, does note a QSO with XE1GE during the "big opening" of June 26. The "so-so" conditions to the south were confirmed by XE1GE when I had the opportunity to talk with him at the Central States VHF Conference. Jeff said he experienced only a few "good" openings — June 27 being one of them. I guess everyone can't have a bang-up season the same year.

One place where a good season was experienced was Hawaii. During the Bicentennial Contest, July 26, KH6IJ reports working 21 6s and hearing AC5SFW, WB5PSQ, W9UKQ, a K8 (probably K8BDB or VDB) and ??JRG (probably W7JRG). Too bad Nose couldn't come up with 50 contacts on 6 for the contest!

The SMIRK Contest held the first weekend in June did not have the benefit of the tremendous openings that blessed the June VHF QSO Party and Field Day but, nevertheless, a good time was had by all. Unfortunately, many participants did not turn in logs. K5ZMS (SMIRK 1) pleads for a better response next year. Space does not permit us to list all of the state winners but the overall winners are as follows.

High Score Winners — 1976

NAME	*NO.*	*PTS.*
Individual — Trophy		
Joe Muscanere, WA5HNK, TX	12	2808
U.S. Multi-Operator		
Butler County VHF Assn., W8CCI, OH	47	3050
Foreign Multi-Operator		
Toronto VHF Society, VE3ONT, Canada	785	1293
Individual — Foreign		
Andy McLellan, VE1ASJ, Canada	965	1160

An s.a.s.e. to K5ZMS at 7158 Stone Fence Dr., San Antonio, TX 78227 will bring the complete results.

23-Cm Standing

Figures are states, call areas and best DX in miles.

K1PXE	13	5	448	W4VHH	2	1	350
K9AQP/1	7	3	300	W4LDV	1	1	290
WA2LTM	16	6	770	K5LLL	2	2	847
W2OMS	13	5	537	W5LDV	2	2	838
K2UYH	10	5	520	K5PUF	1	1	290
K2JNG	10	4	305	W5HN	1	1	235
W2DWJ	10	4	200	W5HPT	1	1	335
WA2VTR	6	4	330	WA6UAM	1	1	112
K2YCO	6	4	570	K8UQA	6	3	448
WA2FUS	4	5	330	W8YIO	5	4	551
K2OVS	3	2	135	WA9HUV	5	3	525
K2EVJ	2	2	215	W9JIY	5	3	300
W3HMU	10	5	260	W9WCD	3	3	770
K3IUV	7	4	320	W9JTP	3	2	165
K4QIF	12	5	551	VE3HW	1	1	260
K4SUM	5	3	220				
K4NTD	3	2	847				

2 Meters — The 1976 edition of the Perseids lived up to its reputation as *the* best meteor shower of the year, if the stack of reports we have received is any indication. K1MNS in Derry, NH, recorded success with K5WVX OK (1368 miles), WA5TUD LA, and WB4YIH KY. Larry's neighbor, WA1OUB, completed schedules with W4USW SC, WA4ELH KY (for state number 32) and WA9KQG. In addition, Bob had a random QSO with WA9WHJ IL. After some prodding from K5BXG, OSCAR operator W7VEW has been putting Wyoming on the 2-meter map. Steve now sports an 8877 and four, 14-element KLMs at 50 feet on an az-el mount. With this excellent setup, this year Perseids was a far cry from last year when the station was much more modest. Attesting to this are log entires for W4WNH/8 MI; K5BXG, W5WAX, K5WVX all OK; WB5LUA TX; W6PO, W7FN and W7DNU WA; W9CAW IN; K9HMB IL; WA9CAS WI, as well as KØDAS IA. W1YTW of Kittery, ME, is particularly happy with the "shower-of-showers" this year. Frank managed two-ways with WØDRL KS (1350 miles) and K5WVX OK (1408 miles). The contact with Connie marks a culmination of years of trying to work an Oklahoma station. A Perseids report from W9CAW in Chestertown, IN, lists contacts with W7JRG MT and W5LO NM, as well as others. Another happy ping jockey is VE3DSS with six new states to show for his efforts, bringing his total to 35. Using a combination of cw and ssb, Dana hooked up with WØPS ND, K5MWH AR, W4WDH GA, K4EJQ TN, WA9WHJ IL, WB5LUA TX and WA4CQG AL. Another contestant in the states-race is W1FZA. Ken set a goal for himself of working two new states per month during the summer. The Perseids helped this project along with the addition of K5MWH AR and WB4JGG TN, bringing the total to 35. One experienced m.s. operator who was not quite as enthused as some others with the 1976 Perseids is WA4CQG of Auburn, AL. Skeds with W7RUC and W7VEW did not meet with success but he admits that these are quite long paths. Dale says that he had fun with the closer-in stations which he did work including a contact with W2AZL at high noon.

Meteor scatter wasn't all that August had to offer 2-meter fans. There were quite a few good tropo sessions as well and even some Es. The dates of August 1st, 8th, 11th, 12th, 17th, 18th and 20th seem to have been the most notable days for tropo in the eastern part of the country while an OVS report filed by K7ICW describes the first half of the month as "excellent." From his Las Vegas QTH, Al made numerous ssb contacts with stations in southern California and Arizona at distances of up to 400 miles. WBØIUT Lincoln, NB, notes in his OVS report that Aug. 8 was particularly good, producing contacts with W5HFV, WA5VSF and K5WVX (all OK) along with KØHGP and WBØHLC MN and WBØBVC KS. In the East, many reports of fine tropo conditions during August have been received. One from WA4GPM in Norfolk, VA, tells of working W9SUV near Chicago on the 11th. The thing which made this contact noteworthy is that W9SUV was running only 10 watts. Buzz also reports the 21st as being particularly good with VE3DSS, VE3EYR, VE3CWV and K8III all putting in S9 and 20-dB signals. WAØDXZ of Iowa City, IA, describes the 18th as the best tropo opening he has ever heard. Bob said that there were 8s all across the band from 144.1 to about 144.180. Unfortunately his solid-state amplifier decided to quit so he had to settle for QSOs only with K8III and WB9IFC. A 1-kW amplifier should be in place by the time this appears in print. WB9TPV of Washington, IL, near Peoria, found the 9th to be quite good. Jon called into the Midwest Sideband Net which meets on about 145.020. That evening the net had some 67 check-ins in 8 states and Jon's 20 watts was getting into Dayton with an S6 signal. The next night seemed even better with repeaters as far away as Texas putting in good signals. Unfortunately there was only a single ssb station that could be scared up. This was a Kansas station running a TS700A which was 20 over 9. You don't need high power when conditions are good but you do need activity. Es died hard this year. August 22 brought an opening from the New Orleans area to the mid-Atlantic states. WB5SFS reports working some 10 stations from Charlottesville, VA, to Long Island — all on 146.52 fm.

1-1/4 Meters — Working m.s. on 1-1/4 is not exactly commonplace but it can be done. W1YTW in Kittery, ME, turned the trick during the Perseids with K9UVJ IN. Frank urges other inhabitants of the band to try meteors. Although the bursts are not as long as on two meters and completing contacts is somewhat more work, it is a good way to increase one's state total. A letter from WB4LNY of Orlando, FL, says that he is just about ready to go with 1-1/4-meter a-m gear and that W4RLR is on and looking for contacts. W5IRP in Lufkin, TX, reports that 223.5 fm is increasing in popularity in his area. In addition to himself, regulars include K5RVF and W5MOO both of Port Arthur. Activity in the Washington, DC, area on 223.5 fm is also on the rise with regulars, including WA3NZL, WA3OYW, K3AAF, K3DUA and K4LHB. A 1-1/4-meter repeater is under construction by the Potomac Area VHF Society.

70 Cm — The good tropo conditions affecting two meters during August were also felt on 70 cm. WB5LUA reports from near Dallas that the evening of the 9th produced contacts with W9AAG and K9ZGT, both IL. Al was a new state for both of them. Incidentally, he lists "baker's dozen," 70-cm stations active in Texas so the Lone Star State should not be a problem when the conditions are right in that direction. K2UYH notes tropo contacts on the 12th (UTC, evening of the 11th, local) with VE2LI, W9JIY IN and WAØTXV, St. Louis, MO. On the 21st, W9ZIH Chicago and W8IDU Detroit were worked. A near miss was experienced with KØWOW IA, who was hearing Al but couldn't quite make the grade with a barefoot Echo 70. On the same night, WA4GPM from Norfolk, VA, worked K2RIW, Long Island, with 40-over-9 signals as well as a new state in the form of W1AJR RI. Buzz decries the lack of 70-cm activity letting the good conditions go to waste.

Wednesday evening from 2100 to 2200 local is the main 70-cm activity time in New England according to W1JAA. Joe lists K1LOG, VE2LI, WA1LXU, WA1FFO, K1PXE, K2RIW, K1WHS, W1YTW, K1NZQ, K1GAO, W2OMS and K2UYH among those frequently active.

A note from W2KPQ announces that the LIMARC ATV repeater is now operational serving the Long Island area. Input frequency is 439.25 and the output is on 427.25 MHz.

Microwaves — Europe is accounting for a substantial portion of the amateur work in the upper reaches of the spectrum. This fact can be gleaned from scanning some of the foreign ham magazines such as the RSGB publication *Radio Communications* which devotes an entire monthly column to microwaves. A recent letter from G3RPE tells of some of the exciting work going on over there. In what is probably a new 3-cm (10-GHz) world's record, on August 14, G4BRS and GM3OXX worked across a 324-mile overwater path. Despite the use of low power, 10 to 15 milliwatts from Gunn diode oscillators and small antennas (2.5-foot dishes), signals were reported as very strong. The secret was that these fellows waited for just the right weather conditions to produce a good duct. There are quite a few places in this part of the world where similar attempts would appear potentially fruitful. Across the Gulf of Mexico from Florida to Texas is one example. The path from Long Island or Cape Cod to the Outer Banks of North Carolina is another. Who's for breaking some microwave records?

CENTRAL STATES VHF CONFERENCE

As expected, this was one of the year's high spots for those in the world above 50 MHz. Technical talks included a presentation by Mel Wilson, W2BOC, of the huge June 27 Es opening that affected both 2 and 6 meters and a review of meteor-scatter techniques by Walt Bain, W4LTU. Joe Reisert, W1JAA and Gary Frey, W6KJD, gave up-to-date information on design of solid-state gear. The conference was held at the Astroworld Hotel in Houston, TX, August 20-22.

Dick Allen, W5SXD, 1976 Central States VHF Society president, discussed digital techniques. A fascinating look into the radio astronomy world was provided by Tom Clark, WA3LND, and he suggested methods to improve our weak-signal detection capability through signal-processing techniques. Attendees were kept current on the amateur space program with an overview of AMSAT activities by Jan King, W3GEY and John Fox, WØLER, talked on telemetry data analysis.

Banquet activities were lively. The 1976 John Chambers Award went to Joe Reisert for his many vhf/uhf contributions and especially his help in getting others started. Dick Hart, KØMQS, received the ARRL VHF Achievement Award for completing the first 2-meter WAS. He's featured on page 49 of this issue. And ARRL First Vice President Vic Clark, W4KFC, noted current amateur problems ranging from long FCC-licensing delays to 1979 WARC preparations. QST

A proud moment at the Central States VHF Conference: Joe Reisert, W1JAA, displays his plaque representing the 1976 Chambers Award.

Strays

Want your *QST*/ARRL membership to continue without interruption at renewal time? Then don't wait until a few days before expiration to renew. If you renew within two or three weeks after receiving your first notice of expiration, *QST* service will be continuous. Overseas members can insure similar continuity by renewing promptly via airmail.

Field Day 1976 Results

Battery of 1300 clubs demonstrates resistance to adversity, capacity for hard work in generating new Field Day records.

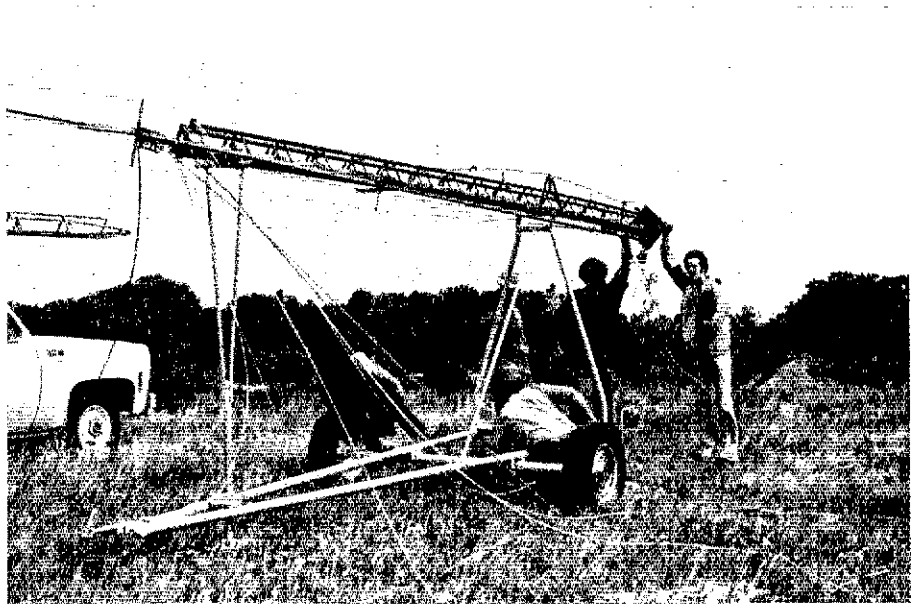
By Bill Jennings,* WA1AHI and Jim Cain,** WA1STN

"Roll out those lazy, hazy, crazy days of summer," as the song of a decade or so ago goes. Field Day 1976 rolled in, as it always does, and the adjectives applying to summer in the tune seemed pretty inappropriate for FD again this year. Lazy? Hardly, as untold thousands of man-hours of planning, preparation and doing went into the operation of 1323 reported FD stations, using 3372 transmitters. Hazy? Maybe, if one indulged in the song's third choice ("Those days of soda and pretzels and beer"). Crazy? Yes, if one wishes to avoid such typical FD hazards as inclement weather, insects and dangerous fauna and flora. Time heals the wounds, though, and most of this year's 16,120 FD participants have probably already forgotten this was the year they swore off FD forever.

We tried the two-point bonus for cw contacts for the second time in 1976, and the consensus of opinion ran twelve to one in favor of making it permanent, so that settles that; can't argue with popularity.

A number of FD entries were submitted lacking all the necessary information; follow-up letters were sent to all concerned, 122 total, and all but 31 replied with the additional information to complete their entries. By and large, the 122 used homemade summary sheets. 'Nuff said?

For the record, the total number of stations, transmitters and participants listed above was a substantial gain over 1975; the most stations ever reported previously were 1313 in 1970. Class 3A was most popular, with 279 entries, followed by 262 in 2A, 190 in 1A and 134 individual entries in class 1B.



Members of the Marshall RC (3A) preparing to erect the 40-meter quad at WØBMJ/Ø.

Murphy's Marauders station W1VV/1 broke the previous FD record for total contacts, making 10,010 two-ways running kilowatts in class 15A. Potomac Valley Radio Club also broke the old record, W3IN/3 making 7943 contacts in class 12A, also running maximum legal power.

The value of the low power-battery-cw multiplier is reflected in the 1A battery score of W8NP/8, Massillon ARC, with 705 QSOs and 6680 points

Bill Sullivan, WA1MYA and Cindy Blain, WA1NWD, operating FD as WA1MYA/1 in the 1B category.

*Communications Asst., ARRL
**Asst. Communications Mgr., ARRL

Group photo of the operators of the Novice position, WN1TWK at W1TKZ/1, Wellesley ARS (3A).

and the 2A battery entry of W1TX/1, the Connecticut Wireless Assn. with 855 QSOs and a total score of 8865, whose scores compare quite favorably with winning entries in the *higher* transmitter classifications.

Two of the more unusual FD operations involved stations outside of the United States and Canada.

Dale Meade, WB8QMG/HK9 (1B), operated from a 50-foot canoe, using a gasoline-fueled generator to power an SB-102 transceiver, while on a 200-mile trip on the Guaviare and Ari Ari Rivers in the jungle of southeastern Colombia. Using a vertical antenna on 10, 15 and 20 meters, with radials cut for each band trailing in the water behind the canoe, Dale was able to record 77 QSOs in 26 of the United States and 1 Canadian province.

From the summertime jungles of Colombia we move to winter in Antarctica and the Field Day operation of Tom Frenaye, WB6KIL/KC4. Due to a rather limited mail schedule to and from the frozen continent, Tom's logs were received too late to make the listings. Tom described his activity as follows. "During the 1976 FD, operation was

"...the sheep's in the meadow, the cow's in the coax?" One of the visitors at W1VV/1, Murphy's Marauders (15A).

Club Aggregate Mobile Scores

No. Cal. Contest Club	3460
RAMS, Inc. of Sacramento	2739

Class-A Call-Area Leaders

(Calls in *italic* represent overall class leaders)

1A

VE3FOX/3
W1TM/1
WB2AXV/2
AA3GAY/3
W4QJU/4
W5YL/5
K6YNB/6
W7SP/7
W8NP/8
K9BGL/9
KØDIA/Ø

2A

VE1FO/1
W1TX/1
W2RR/2
WA4TLB/3
W4HJ/4
W5RTX/5
W6PIY/6
W7ZQ/7
WA8IAX/8
WA9UVE/9
WAØCVS/Ø

3A

VE2CVR/2
K1JNQ/1
K2KN/2
W3BGN/3
W4TRC/4
K5RWK/5
K6UM/6
W7KIS/7
W8ON/8
AC9HOQ/9
WØERH/Ø

4A

VE3RC/3
W1YR/1
WB2NRP/2
W3BN/3
W4SKH/4
K5CA/5
W6AB/6
K7AUO/7
WB8JBM/8
W9TE/9
WØEQU/Ø

5A

VE7UI/7
K1MUJ/1
W2YD/2
K3SSC/3
W4IZ/4
W5TI/5
W6PAA/6
W7VN/7
K8HUT/8
W9LM/9
WØMXW/Ø

6A

VE3DRT/3
W1OC/1
W2OYH/2
WA3PJQ/3
K4BFT/4
K5EIS/5
K6QEZ/6
K7LED/7
W8BQV/8
W9HN/9
KØKKV/Ø

7A

VE3VM/3
W1MV/1
W2DMC/2
W3PIQ/3
WB4GBI/4
W6TRW/6
W7DK/7
W8VPV/8
WØRTI/Ø

8A

VE3DC/3
K2AA/2
W3SGJ/3
K4AAK/4
W5MS/5
K6IS/6
W9KQ/9
WØWAS/Ø

9A

W1NEM/1
W6RA/6
W9JZ/9

10A

K1RPB/1
W6LFJ/6

11A

W5SC/5
W7FR/7

12A

W3IN/3

14A

VE3MRC/1

15A

VE3NAR/3
W1VV/1

16A

VE3WE/3

21A

W2RJ/2

Class-B Call-Area Leaders

(*Italic* = overall class leaders)

1B

VE2BYR/2
AC4OZF/1
WB2KBH/2
W3TQM/3
W4BRB/4
AB5QDW/5
W6SOR/6
WA7QQD/7
WA8ZFM/8
AA9CSS/9
WAØUCU/Ø

2B

K1FWE/1
K2PLT/2
W3PNL/3
WB4DNP/4
W5NQC/5
W6IBR/6
AA7KLK/7
K8GIV/8
WB9NIQ/9
WAØUWF/Ø

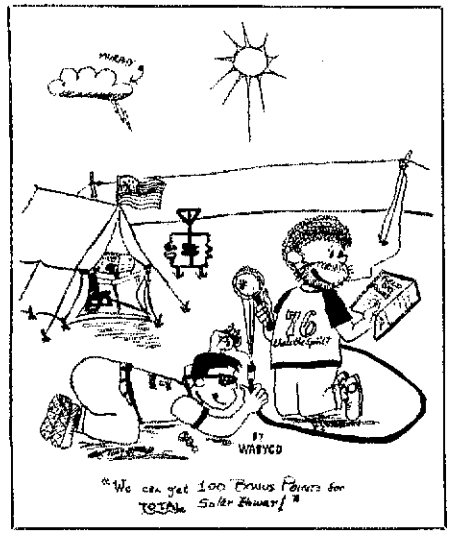
A solar panel provides the natural power for WB5IIU, operating at W5GIX/5, Baton Rouge ARC (3A).

from Palmer Station, Antarctica, using generator power. Operation was primarily limited to 40 and 80 meters as the higher bands simply are not usable during winter here. A lot of people thought I was pulling their leg with my call." Tom logged 114 QSOs in 55 sections on 80, 40 and 20 meters.

In several instances FD operators were able to utilize the unique positions in which they found themselves, to render assistance to others as needed. WB2ABD/2 (1B), Paul Antos and second operator WB2PAY, Tim Brown, responded to a serious automobile accident at a state highway intersection near their FD location. Tim, a New York State registered paramedic, was credited with providing life-sustaining aid to an elderly victim of the crash for the 30 minutes that it took for medical assistance to arrive.

In a narration titled "Field Day 1976 – Simulated Emergency Becomes The Real Thing!", Ray Kydney, WAØWOT and Eric Juhre, WBØARZ, relate the experiences of their FD operation at WØEQU/Ø (4A) the Ak-Sar-Ben ARC of Omaha, Nebraska. After an auspicious start, with FD operations set up and running smoothly, the Ak-Sar-Ben operators found themselves in the middle of rapidly deteriorating weather conditions. Damaging hail and rain storms, coupled with hurricane-force winds, wrecked havoc, destroying antennas, towers, operating shelters and automobiles. Deciding to accept the challenge and set up operations again, rather than pack up and leave, the Ak-Sar-Ben group was able to completely rebuild their installation and return to the air in a short time. Upon learning that Minden, a small community to the northeast of Omaha, struck by tornadoes, had fared even worse than themselves, WØEQU/Ø dispatched operators and radio communications equipment to help provide emergency communications in conjunction with the local AREC effort. In summary, Ray and Eric write, "Many lessons were learned from our club's Field Day experience this year. We learned a lot about operating procedure, antenna construction (and reconstruction), about the fickle summertime Nebraska weather. But most of all, we saw that through hard work and cooperation any emergency communications effort can succeed."

Maybe that's what it's all about.

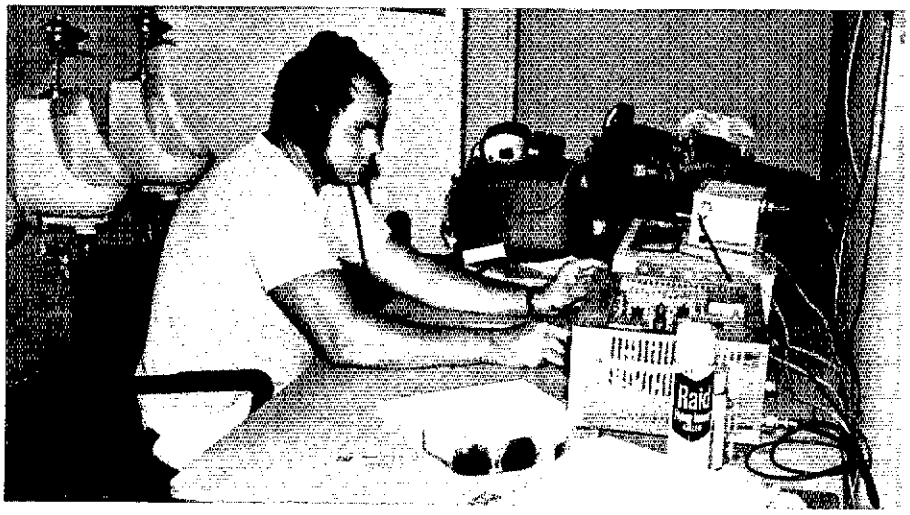


Soapbox

We had a real bad storm on Saturday, which bent over our 20-, 15- and 10-meter quad. I cannot be sure but our 20-fone team said that the quad worked better that way. – (K2IQ/2) It seemed to me that the quality of operating was the highest in many Field Days. Perhaps the cw multiplier is attracting more experienced hands into the fracas. – (K6YNB/6) Of course it always starts by listening to the weatherman and deciding whether or not to bring a small boat in case of a flood. Somehow this year we were spared the usual bad weather; someone up there must have goofed. – (WA1DER/1) But the most unusual form Murphy had taken came Sunday morning. Our cw station got a knock on the door from the neighborhood minister. Seems like the parishioners did not like dits and dahs on their PA system. Somebody suggested that we switch to phone and announce, "This is God speaking," but we did not think that would be good ham PR. – (AC9HOQ/9) WA9UVE's formula for a natural power contact: Four human-power in equals two-watts out. – (WA9UVE/9) Being forced to find a new Field Day location, we searched for a place with good Field Day credentials. Most important, of course, a creek and a pond. Again, the pond proved to be an efficient method of heatsinking overheating operators. – (WB8JBM/8) Notice on our summary sheet that we didn't claim the 100-percent emergency power bonus. We used commercial power for our portable refrigerator. We wouldn't dream of parting with it. – (WA1FKF/1) Best Field Day exercise we ever had – Put us down in favor of continuing 2 points for each cw contact

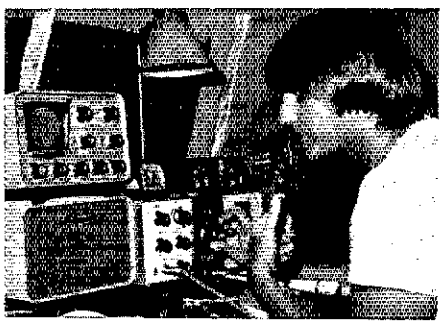
The "tower and rotator" for the OSCAR station at W9NB/9, Motorola Engineers-Shaumburg ARC (5A).

The Northern Carolina Murphy Entertainers appear aptly named as this photo, taken at the AA4DEQ/4 FD site, shows. As the group at this 2A operation writes, "This is as high as the hydrogen balloon ever got. Can't do much with 150 feet of wire if the balloon never collects enough gas."

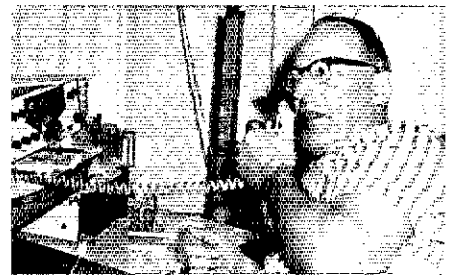


W4LXF in the cw headquarters of W4NLX/4, Indian River ARC (2A).

— The rules are good. Like the idea of using the "Dupe" sheets to satisfy rule 13. — (K7CBP/7) Our Field Day was really different this year. We had two old-fashioned hayrides and a hot dog roast on Saturday nite . . . Everyone had a fine time; just look at our score, hi. — (AD4BV/4) Discovered . . . Montcalm County, Michigan, breeds the world's largest June bugs and most vicious mosquitoes. — (W8NLC) VFO blew at 2010Z Saturday after 13 QSOs (an omen there?). Worked with xtal, until after 13 more QSOs the antenna fell down. — (WN4SSS) We have chosen to submit our logs as the list of stations worked, since it is much more readable than our check sheets. These are stained with coffee, cherry juice, and a few dozen swatted mosquitoes. — (WØAW) Our roadside station attracted lots of folks — CBers, motorcycle "gangs," hams who had forgotten that it was Field Day, etc. etc. etc. One citizen got a bit upset when he learned we were talking to people outside of the state (we *did* make a couple of "5-land" contacts). He was sure that we were doing something illegal and vowed to report us. (I have no idea whom he reported us to.) — (W6BKY/6) All went well except for an invasion of curious honey bees and the poison ivy apparently growing in the briars between us and the ends of our antenna. — (K2KI) Since no logs were sent in by the last two Field Day chairmen, club threatened court action if they were not in on time this year — WHEW, made it. — (K5SLD/5) (Postmark of 30 July — 3 days to spare. — Ed.) Novice classes paid off. More ops and over 250-percent increase in score over last year. — (W9AZ/9) Once again the "killer humidity" engulfed the Rolla area, but aside from losing a 12AT7 in one of the rigs, Murphy stayed well-hidden. However, I think we spent a bit too much time figuring out the "ultimate strategy" (not to mention soaking up the sunshine) on Sunday morning. No one was shot with arrows while in a tree attempting to raise an antenna this year, but bugs flying into the cooling fans and the subsequent "ping-splatt" did cause some lighter moments, hi, hi. — (WBØGQP/WØEEE/Ø) Now we know what transistor rigs have to offer . . . ever "turn the crank" for natural power with a filament rig? — (K6AA/6) Last year it was 1D in my garage. This year, 2A, using commercial mains. Next year — the world! — (WBØNCJ/Ø) One large beetle lit on the swinging end of my old "bug" . . . — (W6ANB) This year we beat Murphy — 2-meter opening to Florida in the last hour and a half of Field Day. Afterwards, receiver section of the 2-meter rig blew out. — (WB8BUQ/WA8RUF/8) We must have set a new Field Day record at W2OK/2: We were on our fifth generator within five hours. — (K2INO) Field Day came in the middle of a record-breaking heat wave. It was so hot that two cooling fans burned out. — (K6YA/6) One of the sadder events this Field Day was the one minute of silence to observe the

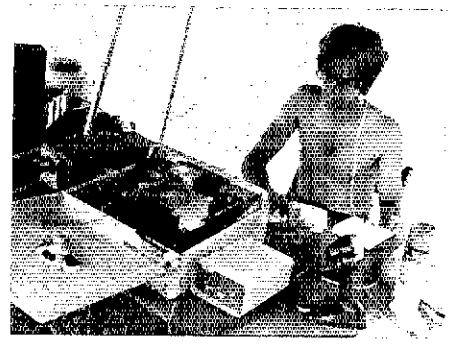


40-meter "Team Captain," WB6BGO, of the TRW ARC. W6TRW/6 posted the highest score in the 7A category.

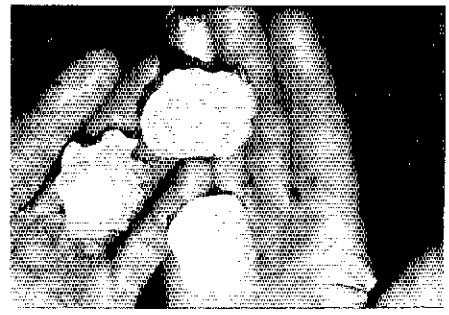


Even an unexpected hospital stay cannot deter Martin Goodwin, W5YQ/5, from his yearly participation in Field Day. With help from friends WB5FWN and W5FZ, Martin was able to erect an antenna system and operate right from his hospital bed (1B-Commercial).

Publicity at W9LM/9, the Northwest ARC (5A), provided by local TV Station WBBM, Chicago. They had coverage by two TV-news teams and hope next year to try for a special award, which they jokingly refer to as the WAN or worked all networks. The radio operator is John Siepman, W9ZAV, at the 40-meter cw station.



Jim, WA3BGE, manning the keyer for the Shenango Valley Amateur Radio Field Day group, W3VK/3, which placed third in the highly competitive 3A Class.

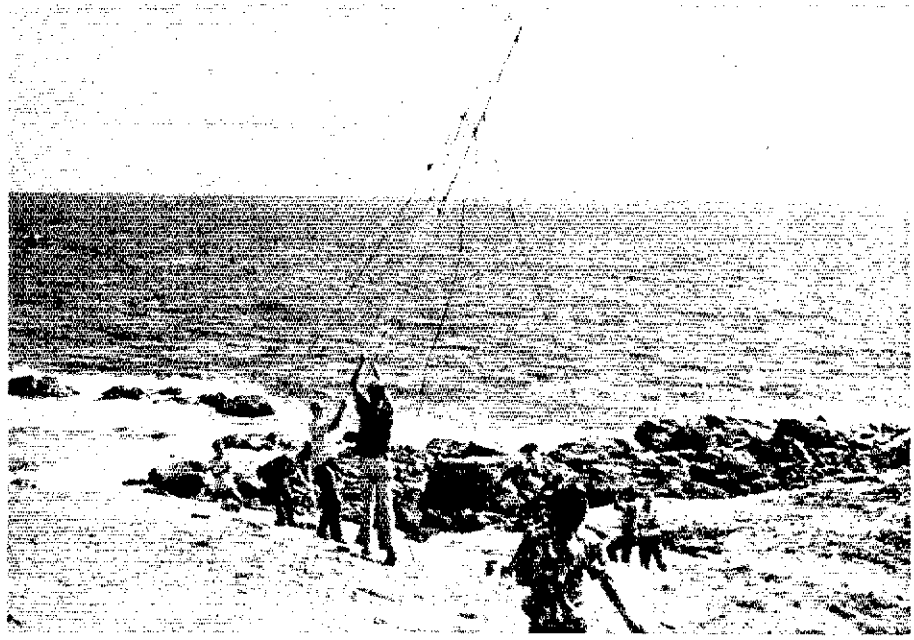


Hail at the FD site of WØEQU/Ø (4A), the Ak-Sar-Ben ARC, one-half hour *after* the hail-storm, accompanied by hurricane-force winds, which almost completely destroyed the installation.

passing of Joe Ham, the natural-power hamster (see picture in Field Day Report in Nov. 1975 *QST*), who succumbed to cancer in June. — (WB2NRP/2) Several club members came down with "Murphy Flu," neither generator would work, a "picnicker" became tangled in one of our antennas and wanted to run us off the area, we lost most of the blank log sheets, everything was ready for the coffee except the pot was left behind, etc. . . . WE HAD A GREAT TIME!!!! — (Anon.)

Scores

Class A stations are clubs or groups operating portable, with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation at each station. The scores list club or group name, total number of contacts, letter indicating power classification (determined by dc input power where A is 10



Everyone turns out to erect one of the forty-foot towers used to support the rhombic antenna for the Maui ARC, KH6RS/KH6 (1A).

Class-C Call-Area Leaders
(*Italic* = overall class leaders)

1C

K1FJM/aero
WA2FUI/2
W3AA/3
AC4MLA/4
WA6LBP/5
WB6CEP/6
WA7GOO/7
WB8RRQ/8
K3ZAW/9,8,3
KØPFV/Ø

2C

W8CRR/8

3C

WB4GQX/4

Class-D Call-Area Leaders
(*Italic* = overall class leaders)

1D

VE3HOU
AA1UZH
W2KUL
K2PLF/3
K4FOK
WA5SDV
K6FB
WA7TZO
WA8UON/8
WB9PIR
KØGXR

2D

WB2FYS

WA3EPT
WB6KGM
WA7SCS
WB8ZLK/8
W9KX/9

3D

W1KBN
WB2WWP

4D

WBØANT

Class-E Call-Area Leaders
(*Italic* = overall class leaders)

1E

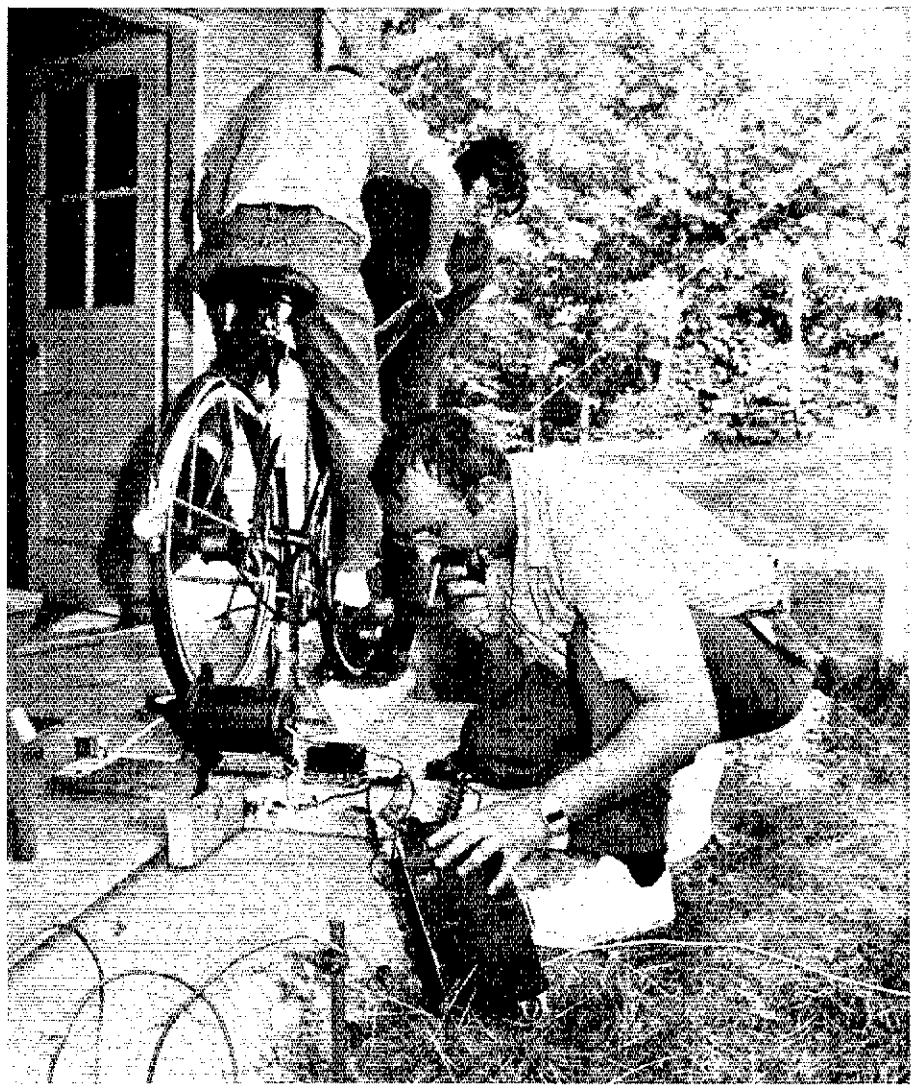
WA1WVK
W2HVO
K3GJD
W4WHK
K6FO/6
K7UWT
W8VND
K9DVB

3E

W8FT
W9QYO

4E

W2OW



Natural-power contact at W9PIL/9, the Indianapolis Power & Light Co. ARC (2A). Operating is Gary, K9LNX; supplying power, Ron, WB9DKL and holding the bike is Mike, WA9BWY.

1A - Battery

Massillon ARC		
W8NP/8	705	A-12-6680
Aether Tweakers		
K@DIA/@	426	A- 6-4410
QRP QRO QSK CW Lid Stompers		
WB2AXV/2	393	A- 4-4080
Noah's ARC		
WA6HUR/6	504	A- 3-3430
St. Andrew Bay Contesters		
K4VFY/4	326	A- 3-3260
Colorado Trafficers		
W@HXB/@	864	B- 3-3134
Governor's Island , N.Y. ARC		
WA2BT1/3	159	A- 8-1815
Grass Valley ARTS		
W6WD/6	156	A- 4-1660
Adult Shop Employee's ARC		
WA7IHO/7	253	A- 3-1365
REFAR		
WB9ITH/@	606	B- 9-1362
Huron ARC		
W@NOZ/@	510	B-10-1320
Explorer Post 285		
WB8EDZ/8	190	A- 4-1265
Teledyne Wah Chang/Mid-Willamette Valley RAC		
W7LBH/7	433	B-10-1160
Cucaming ARC		
W7YS/7	112	A- 6-1120
Non Club Group		
WN9PUP/5	86	A- 4-1010
Kent ARC		
VE7KAC/7	63	A- 5- 465

1A

Cannabis Corp Contest Club		
W8JII/8	2561	B- 3-5324
Brubaker, DesLoge and Overbeck		
K6YNB/6	1766	B- 3-4548
AKW RWU AKU EHU RIJ		
W8LW/8	1027	B- 6-4182
Belleville Amateur Radio Foundation		
K@BGL/@	1372	B- 3-3994
Rotten Radio ARC, SSB-only		
Splinter Group, Inc.		
W4QJU/4	1911	B- 3-3972
Rhombic Raiders		
K@@XC/@	1779	B- 4-3863
Lake County ARC Inc.		
W9LJ/9	1128	B-13-3806
Thibodaux ARC		
W5YL/5	1795	B-20-3740
Non Club Group		
K4PUZ/4	1205	B- 3-3578
La. Tech. Univ. ARC		
W5HGT/5	1135	B- 3-3518
Southern Ohio DXers Assn.		
WA8QUQ/8	1276	B- 4-3296
Non Club Group		
W1TM/1	941	B-13-3098
Steelworkers ARA		
WB8MNX/8	1039	B-15-3042
Owensboro ARC		
K4HY/4	659	B-35-2936
Ozark Contester's		
W5INT/5	801	B- 7-2844
Univ. of Delaware ARA		
AA3GAY/3	1080	B- 4-2833
Medina Two Meter Group, Inc.		
W8RV/8	948	B-15-2828
Tri-County Radio Telegraphy Society		
K8RMN/8	694	B- 7-2794
Texins ARC		
K5OJI/5	1299	B-14-2756
Purdue ARC		
W9YB/9	1073	B-25-2708
Lebanon AR Klub		
K@DEW/@	673	B-11-2570
Big Spring ARC		
W5AW/5	1113	B-10-2562
Non Club Group		
W@AWB/@	598	B- 5-2522
W4BRB's Competition		
WB4PKP/4	542	B- 5-2466
Tower of Power		
WB8OCR/8	812	B- 4-2452
Univ. of Cinti. ARC		
W8YX/8	888	B-10-2412
RCA Amateur Club		
WB9JDY/9	1024	B-10-2408
W5RMZ-WB5KSS-WA5YTX-W5RE-K5MAT		
W5RE/5	728	B- 5-2342
Amateur Radio Transmitting Society		
W4CN/4	846	B- -2324
Twin Cities DX Assn.		
W@AW/@	703	B- 4-2244
Candlewood ARA		
W1QI/1	586	B-16-2216
Gulf Coast ARC		
WA4GDN/4	882	B-12-2210
Hillbilly ARC		
K4EJQ/4	624	B-12-2194
Rocky Points		
K2KI/2	507	B- 7-2174
MVV/BZT/EIH FD Ops		
W6MVV/6	844	B- 3-2164
Utah ARC		
W7SP/7	874	B-31-2074
Normally Lazy Kilowatts		
WA@NLK/@	647	B- 6-2026
Maui ARC		
KH6RS/KH6	575	B-15-1998
Ogden ARC Inc.		
WA7SNR/7	852	B-20-1996
Independant Ontario Operators		
VE3FOX/3	640	B- 5-1978
THERE		
AA6MQS/6	645	B- 5-1968
Lima Area ARC, Inc.		
W8EQ/8	558	B-27-1942
Cedar Valley ARC		
W@GO/@	447	B-30-1938
Raccoon Hollow Gang		
W@IVN/@	709	B- 5-1904
Wallingford C.D.-ARC		
WA1BZS/1	568	B- 3-1872
The Area 8 Soothing Libations Consumers Corp; Ham Radio,Softball, and Social Divisions-Northern Expedition		
WB8FMX/8	441	B- 7-1850
Hopkins County ARC		
WB4JRO/4	707	B-12-1848
Sorel Tracy		
VE2CBS/VE2	396	B-20-1784
Red River Valley ARC		
WB9RDD/9	510	B-11-1754
St. Peter's Prep ARC		
K2OQJ/2	540	B- 6-1750
Humboldt ARC		
K4BEZ/4	799	B-25-1748
First State ARC		
K3QBD/3	672	B-14-1736
Green Hills Field Dayers		
K5TVT/3	521	B- 3-1708
Rockingham County ARC		
W4JF/4	748	B-14-1696
Missouri Western State College ARC		
WB@OKX/@	750	B- 6-1650
Base Amateur Radio Service		
VE7CFB/7	701	B-21-1612
Santa Fe Trail VHF Club		
WB@KRX/@	673	B-10-1602
Friends Of Smokey		
AA2AMV/2	427	B- 6-1602
Duluth Guns RC		
K@ZXE/@	382	B- 7-1578
Lottes,Nygren,Oreill,Spears and Tzouanakis		
W1OR/1	523	B 3-1564
Hole-In-The-Day Gang of Minn.		
WA@IDK/@	693	B- 6-1556
Albany ARC, Inc.		
W4MM/4	614	B-10-1538
Poison Ivy Wireless Rainmakers Assn.		
W9CHO/9	465	B- 5-1522
Chateauguay ARC		
VE2CAR/@	432	B- 8-1506
Limestone ARC		
W4LHW/4	350	B- 6-1484
Tuscaloosa ARC		
W4KCQ/4	489	B-20-1476
Signal Hill ARC		
W@PHP/@	600	B- 9-1464
Calaveras ARS		
W6PNY/6	332	B- 8-1460
Arlaconda ARC		
AC7VNE/7	413	B-10-1454
Wheeling Emergency Net, Ohio County AREC & Northern Panhandle ARC		
W8ZQ/8	413	B-20-1452
Motorola ARC - Ft. Lauderdale Chapter		
AA4LZR/4	451	B- -1424
Beaches ARS		
W4BSO/4	588	B-12-1422
Charles River Wireless Society		
WA1EOT/1	519	B- 6-1402
R.F. Radiation Fraternity		
WB6DAW/6	501	B- 4-1360
Wheaton Community Radio Amateurs		
W9CCU/9	426	B-17-1358
Paducah AREC Club		
WB4ECB/4	403	B-14-1358
The Dr. Loomis Memorial Jr. Mechanics League		
WB4FJJ/4	421	B- 6-1342
N.E. Miss. ARC, Inc.		
K5KIR/5	525	B-15-1324
Non Club Group		
K9EUI/9	585	B- 7-1320
Indian Hill ARC		
WA9WSL/9	818	C-10-1316
Morton ARC		
W9EEB/9	467	B- 7-1310
Hawaii CW Operators		
KH6IJ/KH6	302	B- 6-1308
Non Club Group		
WB8SVN/8	306	B- 4-1298
Non Club Group		
WA4BEZ/@	1175	C- 6-1280
Annapolis Valley ARC		
VE1CD/1	323	B- 4-1280
Crescent Bay Emergency Radio Net		
K6LDA/6	524	B-10-1266
Non Club Group		
K7LTV/7	399	B- 3-1254
The AGE Group		
WB5HRI/5	497	B- 7-1252
Nutty Net		
W9CCD/9	483	B-16-1240
Non Club Group		
WA3TJB/3	469	B- 3-1202
Concord Carlisle High School ARC		
W1RNV/1	314	B- 2-1202
Lasalle Radio Club		
W9OWT/9	322	B- 3-1194
Redbud ARC		
W8JCU/8	272	B- 5-1188
Southside ARA (VA)		
W4WWD/4	441	B- 7-1182
Hersey High School ARC		
WB9KCT/@	392	B- 8-1182
Pottsville ARC		
WB8MWG/8	382	B- 3-1180
EMARC		
W6ASH/6	250	A-21-1178
Northwest Alabama ARA		
K4ZGB/4	511	B- 6-1156
Butte ARC		
W7FO/7	967	C-13-1151
Southeast Wireless RC		
K4VB/4	311	B-25-1144
Pine Ridge ARC		
W@FLO/@	345	B- 7-1142
Non Club Group		
WB9PIA/9	361	B- 6-1140
Won Ton Club		
WA5ZKP/5	483	B- 4-1116
Univ. of Idaho ARC		
W7UQ/7	474	B- 7 1098
Nelson Ledges Gang		
AB8RRQX/8	439	B- 3-1098
Non Club Group		
VE4GV/4	324	B- 4-1092
The Principia College ARC		
W@PZY/@	401	B-12-1084
Theo. Roosevelt ARC		
W@IRY/@	451	B-10-1052
Univ. of Wyoming ARC		
W7O@E/7	366	B-20-1043
Univ. Sch. Chamber Orchestra ARC		
WB8UAA/8	255	B- 3-1038
Skyline Plant ARC		
W5LJO/5	722	C-10-1032
Stu Rockafellow ARC		
W8NJN/8	341	B- 6-1024
Tri-State ARC		
K@KYK/@	423	B-10-1016
Montgomery ARC		
W4AP/4	367	B- 6-1014
Hiawatha ARC		
K@NL/@	398	B-14- 996
Non Club Group		
K6KD/6	288	B- 4- 980
Beaver Valley ARC		
VE7BWI/7	290	B- 9- 974
Murphy's Law-yers		
WA6AXA/6	372	B- 4- 952
Martys Marauders		
K3OBF/3	842	C- 4- 942
Villanova Univ. ARC		
W3YP/3	335	B- 4- 936
McDonnell Douglas Astronautics RC		
W6VLD/6	359	B- 7- 918
The Electron Club of Denver		
W@ICR/@	406	B-10- 912
John Marshall High School and Alumni ARC		
WB8PIY/8	398	B- 2- 901
Naval Research Laboratory ARC		
AC3NKF/4	247	B-13- 898
MORAD		
WA9DNZ/9	382	B- 4- 868
Hellgate ARC		
W7EKB/7	199	B- 7- 844
Walla Walla Valley RAC, Inc.		
W7P/7	311	B- 9- 822
Chilliwack ARC		
VE7ASC/7	355	B- 820
Non Club Group		
WA8YXI/8	251	B- 5- 820
Lubbock ARC		
K5LIB/5	649	C-30- 801
Non Club Group		
AA3JVG/3	322	B- 3- 794
Non Club Group		
WA8BNS/8	273	B- 5- 784
Des Moines Radio Amateur Assn.		
W@AK/@	341	B- 6- 782
Cedar Valley ARC		
W@WSV/@	333	B-30- 766
Pictou County ARC		
VE1JV/1	293	B-12- 764
Point Comfort ARC		
W5BQN/5	271	B- 4- 764
Maryland Area U.S. Navy-Marine Corps MARS		
WA3KBN/3	299	B- 3- 748
N.D. Feedback ARC		
K@FRP/@	257	B- 6- 734
TCK ARC		
VE7DRW/7	231	B- 5- 730
Franklin-Southampton, VA AREC		
WB4ONB/4	255	B- 6- 721
Dennison ARC		
WA@KWH/@	219	B- 5- 710
Minot ARA		
K@AJW/@	536	C-10- 686
Non Club Group		
WN6KZA/6	141	B- 9- 664
Noisy Novices		
WN1VEK/1	127	B- 9- 658
Oswego County ARA		
W2PGS/2	247	B-22- 656
Runestone RC, Inc.		
WB@DDX/@	249	B-13- 648
Lake Geauga ARA		
W8OXS/8	271	B- 3- 642
Non Club Group		
W8ZTA/8	213	B- 3- 642
Windsor ARC		
VE3OW/3	239	B- 6- 628
Collins Radio and Company		
KH6HQG/W3	224	B- 4- 624
Mound ARA		
W8DYY/8	421	C-10- 621
Queens County ARC		
VE1QW/1	113	B-20- 608
Neosho Valley ARC		
WB@RAF/@	228	B- 7- 606
Non Club Group		
VE3GT/3	269	B- 6- 600
Dade RC		
K4IC/4	159	B-12- 600
Marshall Gulch Gang		
K7IPZ/7	141	B- 9- 598
WN8VXL Memorial FD Group		
WB9LFE/@	233	B- 4- 566
Salmon ARM		
VE7AED/7	204	B- 5- 558
Brandon ARS		
WB4BIM/4	151	B-15- 539
Southern Wisconsin VHF Society		
K9REE/9	203	B- 3- 516
Elmira ARA		
W2ZJ/2	155	B-16- 510
Central Alabama ARC		
W4NCK/4	154	B- 5- 508
Fossil Creek Wireless Society		
WB5TGK/5	106	B- 7 498
Friendly Amateur Radio Transmitters Society		
W3TV/3	142	B- 3- 464
S.A.R.A.		
W4QQI/4	77	B- 4- 458
Minnis & Morrice		
WB6HYD/6	146	B- 3- 432
Non Club Group		
K2LD/2	82	B- 7- 428
Charlotte ARS		
WB4TFH/4	100	B- 3- 416
ARC of Savannah		
W4KGP/4	246	C-15- 401
Rogue Valley ARC		
W7OEK/7	60	B- 2- 310
Chippewa ARC		
WB8AAA/8	154	B-10- 308
Non Club Group		
W2LOP/2	49	B-15- 198

Commercial Mains

West Side RC, Toronto		
VE3JJ/3	275	B- 5-1100
Ringgold Wireless Radio Assn.		
WB@SGP/@	300	B- 3- 850
Phillips Academy RC		
W1SW/1	76	B- 3- 202

2A - Battery

Conn. Wireless Assn.		
W1TX/1	855	A-17-8865
Walton Radio Assn.		
W2LZ/2	583	A- 7-6095
Dismal Harmony Prop. Soc.		
K2CW/2	1031	B- 7-3086
Mile-High Milliwatts		
K4IQT/4	146	A- 3-1135
Non Club Group		
WB@APG/@	359	A- 5-2400
Seldom Heard Amateur Radio Keying Society		
K3EXE/3	130	A- 5-1595
Ten-J ARC		
WB@KCD/@	264	B- 4- 778

2A

Central Virginia Contest Club		
W4HV/4	3235	B- 9-8072
Buffalo Area DX Club		
W2RR/2	3041	B-11-7991
Miami Valley AR Contest Society		
W8OK/8	3010	B-12-7978
Non Club Group		
W7ZQ/7	3177	B-10-7864
Colorado Contest Conspiracy		
WA@CVS/@	2383	B- 7-6950
Logan County ARC		
WA8IAX/8	2726	B-11-6672
Ohio Valley ARA		
W4FU/8	1643	B-15-6548
RAGS Eschewers		
W2FR/2	1927	B- 7-6184
Delta DX Assoc.		
W5RTX/5	1855	B-10-5765
Mecklenburg ARS		
W4BFB/4	1967	B-21-5608
The ARC of The Ohio State Univ.		
W8LT/8	1637	B- 9-5498
Central Florida DX Club		
W4YUU/4	1641	B-10-5440
Old Barney ARC		
W2EQK/2	1783	B-15-5382
Oak Park (Mich.) ARC		
W8MB/8	1858	B-14-5298
The Glen Gates Gang		
WA9UVE/9	1675	B-21-5242
KSU ARC		
WA@QQ/@	1702	B-22-5149
Douglas County ARC		
W@GI/@	1623	B-20-5054
West Valley ARA		
W6PIY/6	1553	B-18-4838
Pete's Peak Penetrators		
AA@TKJ/@	1666	B- 7-4782
Radio Am. Megacycle Society		
W9DY/9	1223	B-18-4704
Arapahoe RC, Inc.		
W@LQ/@	1559	B-28-4688
Halifax ARC		
VE1FO/1	1481	B-23-4496
Ten Four Good Buddies		
WB4AIN/4	1442	B- -4310
Univ. of Michigan ARC		
W8UM/8	1228	B-20-4296
Canton ARC		
W8RTR/8	1464	B-25-4294
Southeastern DX Club		
K4EZ/4	1303	B-14-4186
South Lyon Area ARC		
WB8QXB/8	1327	B- 9-4170
W/K RC		
W9MVS/9	1308	B- 7-4030
Kemper ARC		
W9RBD/9	1506	B- 9-3892
Charlotte ARC		
W4CQ/4	1214	B-15-3798
AC - ARTS		
W9HF/9	1426	B-103774
Motor City RC		
W8MRM/8	1253	B-35-3770
East Bay Amateur Wireless Assn.		
K1AAG/1	1149	B- 7-3770
Champlain Lookout Field Day Group		
VE2CV/2	1100	B-12-3758
Oshkosh ARC, Inc.		
K9LWV/9	1178	B-15-3730
West Park Radiops		
W8VM/8	1325	B-20-3704
Northwest Arkansas ARC, Inc.		
K5AS/5	1433	B-15-3698
Pennsylvania Valley RC		
WA4TLB/3	1295	B- 3-3698
Southwest Missouri ARC		
W@EBE/@	1530	B-11-3688
Hastings ARC, Inc.		
W@WWV/@	1321	B-22-3686
Tippecanoe ARA		
W9REG/9	1372	B-28-3646
Randallstown ARC		
W3BNS/3	1147	B- 7-3640
Wichita Amateur Club, Inc.		
W@SOE/@	791	B-34-3636
Indian River ARC		
W4NLX/4	1080	B-24-3548
Red Oak Invitational Field Day Assn.		
WA4IMH/4	1374	B- 7-3538
Hosier Lakes RC		
W9UM/9	1342	B-20-3534
Kanawha ARC		
W8GK/8	2221	C-19-3500
Overlook Mountain ARC		
K2BK/2	1146	B-11-3494
Columbus ARA		
W8TO/8	1016	B- 6-3474
Southern Peninsula AR Klub		
WB4ABT/4	989	B-20-3444
Racine Megacycle Club		
W9UDU/9	1112	B-15-3432
U.C.L.A. ARC		
W6YRA/6	1175	B-11-3406
Grand Island ARS		
W@AIH/8	1064	B- -3386
Penn State ARC		
K3CR/3	1141	B-10-3352
Gastonia Gas Lighters		
K4TP/4	1223	B-16-3324
Willamette Valley DX Club		
AC7AC/7	1199	B- 6-3252
Derry ARC		
WA1UBC/1	999	B- 7-3238
Hewlett-Packard ARC		
W1HJS/1	1174	B- 7-3230
Lehigh Valley ARC		
W3DI/3	999	B-22-3226
Industrial Nucleonics RC		
W8HCYE/8	1011	B-13-3190
Hart House ARC, Univ. of Toronto		
VE3UOI/3	860	B-10-3184
Cedar Springs Red Flannel Contest Assn.		
K8WSN/8	746	B- 4-3172
Northern Carolina Murphy Entertainers		
AA4DEQ/4	937	B- 3-3102
Marshall County ARC		
K9ZLQ/9	1094	B- -3078
RHO Epsilon Amateur Radio Frat.,		
Washington State Univ. ARC		
W7YH/7	935	B-14-3078
North Augusta-Belvedere ARC		
K4FR/4	751	B-28-3072
Point Radio Amateurs Ltd.		
W9NN/9	912	B-12-3040
Iowa City ARC		
W@JV/@	1284	B-25-3038
Armstrong Memorial ARC		
W8FU/8	912	B-11-2986
Holland Area RC		
K8DA/8	1010	B-12-2976
Baltimore ARC		
W3FT/3	850	B-17-2974
Smith Hill Gang		
WA2UNN/2	919	B- 8-2968
Arizona Mountain Moguls		
W7YE/7	1020	B-31-2946
GYE, Inc.		
WA3GYE/3	843	B- 8-2936
Crater ARS		
W4DYV/4	945	B-22-2932
Order of Boiled Owls (N.Y.)		
W2HO/2	1739	C-12-2925
Indianapolis Power & Light Company ARC		
W9PIL/9	1154	B-15-2920
Stonewall Jackson ARA		
WB8ZVS/8	958	B-15-2908
Tioga ARC		
W2MTA/2	950	B- 8-2830
Well ARC Mountaineers		
WA1HRC/1	1081	B- 7-2805
Middlesex ARC		
W1HEB/1	994	B-15-2778
Blue Grass ARC		
K4KJO/4	947	B- -2762
Holdrege Area ARC		
WB@RWR/@	1025	B-16-2708
Regina ARA		
VE5SS/5	840	B-15-2706
Northland Emergency Amateur Radio Team		
WB@BTT/@	1090	B-15-2682
Irvington RAC		
K2GQ/2	888	B- 8-2682
Explorer Post 11 ARC		
W@EMA/@	798	B- 4-2674
Green Bay Mike & Key Club		
K9EAM/9	1946	C-30-2673
Warrensburg ARC		
AB@LRX/@	1086	B- 9-2664
Northland United Telecommunications Society		
K@HMN/@	945	B-15-2644
Univ. of MO - Rolla RC		
W@EEE/@	740	B- 6-2610
Los Alamos ARC		
W5PDO/5	917	B-16-2598
Lake Shore ARA		
W3ALD/3	1163	B- 6-2526
Five Flags ARA		
W4UC/4	1285	B-25-2478
Blossomland ARC		
W8MA1/8	812	B-20-2444
Northern Calif. DX Club		
K6QZ/6	734	B- 7-2436
Univ. of Md. ARA		
W3EAX/3	833	B- -2416
Ottawa Valley Mobile RC, Inc.		
VE3RAM/VE3	707	B- -2402
WECUMO ARC		
W@IE/@	606	B-20-2378
Great River ARC		
W@OM/@	1012	B-15-2344
Chicago F.M. Club		
WA9ORC/9	889	B-15-2334
Northern Alberta RC		
VE6NC/6	676	B-10-2314

U.W. of Platteville ARC
WA9YAK/0 973 B- 8-2294
Post 640 Livewires
W0IR/0 850 B-14-2285
Assoc. Radio Amateurs of Southern New England
W1AQ/1 682 B-22-2277
Radio Amateurs of Frackville & TASBAR
K3HXS/3 690 B-12-2266
Mooreville Repeater Assn.
WA5TPM/5 672 B-11-2252
Alamogordo Bunch
W4GHV/5 874 B- 7-2240
W0LJF Novice/General Class
W0LJF/0 687 B-10-2220
Barker's Bandits
AC8DSO/8 709 B- 7-2218
Westside ARC
W5ABD/5 682 B-13-2182
Great South Bay ARC
W2TE/2 680 B-21-2178
Ski Country ARC
W0KLE/0 1251 C-12-2165
Motorola Schaumburg ARC
W9LXV/9 567 B- 7-2158
Rock River RC
WB9IDU/9 829 B- 9-2148
Blue River Valley ARS
W9RTP/9 834 B-20-2146
Minneapolis RC
W0CKF/0 652 B-11-2142
Southwestern Manitoba ARC
VE4IW/4 727 B-20-2140
Va. Tech ARA
K4KDJ/4 864 B-15-2108
Never Aggin Gang
W5DW/5 705 B-15-2104
Rideau ARC
VE3BPC/3 603 B-16-2094
Murray State Univ. ARC
WB4NTB/4 896 B-10-2092
West Jersey Radio Amateurs
W2UJG/2 722 B-15-2088
Non Club Group
W7PZ/7 740 B- 4-2076
Friendship ARC
K3AW/3 709 B-15-2052
Hagerstown Dead Tired F.D. Ops., CW & Sideband Divisions
W9PPD/9 575 B- 7-1994
Sacramento ARC
W6AK/6 792 B-11-1988
Beaumont Repeater Club
AC5RIN/5 608 B-17-1966
Central Washington ARC
W7WMO/7 543 B-11-1954
Victoria ARC
VE3DSJ/3 506 B-10-1946
Monongalia Wireless Assn.
AC8CUI/8 526 B-10-1924
Calhoun County ARA
WB4GNA/4 809 B-12-1920
Delaware Lehigh ARC
W3CIK/3 782 B- 9-1914
Tri-State ARA
W8VA/8 602 B-30-1904
Broward Amateur Radio Friends
WA4NFF/4 608 B- 4-1902
Vancouver ARC
VE7ARV/7 628 B-25-1892
Brightleaf ARC
W4AMC/4 611 B-12-1874
The Hilltop Gang
KH6WO/KH6 532 B- 8-1868
South Platte ARS
W0NS/0 739 B-13-1848
Hampton Roads Radio Assn.
W4NPT/4 693 B- 9-1816
York North ARC
VE3CWO/3 547 B-15-1808
Oxford County ARC
VE3AT/3 647 B-19-1802
Tri-City Radio Amateur Club
W0VQN/0 669 B-12-1788
Medford Senior High ARC
WA7USX/7 645 B- 6-1774
Albert Lea Spiderweb ARA
W0FIT/0 602 B-15-1774
BAJ's Bombers
WA6IDN/6 459 B- 6-1765
State Line RC of NY and NJ, Inc.
K2LSA/2 651 B-12-1760
Three Rivers ARC
K0PYZ/0 571 B-14-1732
Mesabi Wireless Assn.
W0NO/0 623 B-25-1720
Thurston County AR Breakfast Club
K7IUT/7 614 B-25-1708
Chicago Radio Traffic Assn.
W9USS/9 511 B- 7-1696
Communications Club of New Rochelle
K2DN/2 453 B-15-1692
Twin Base ARC
K4FDY/4 684 B-26-1686
Lynchburg ARC, Inc.
K4HEX/4 952 C-37-1672
Hillsborough ARS
WA4AJ/4 509 B- 6-1670
Hayward RC
K6EAG/6 454 B-16-1666
Northeast Philadelphia ARC
K3UIB/3 655 B-12-1656
Bristol RC
W1DHT/1 520 B-10-1650
Norfolk Peninsula Electronics Club
W6PMK/6 545 B-14-1646
Washington County AREC
W9SIZ/9 477 B-10-1636
Brook Haven Nat. Lab. RC
W2ZV/2 525 B- 6-1634
Sarasota ARA
W4IE/4 610 B-20-1618
Black River ARC
WB1GV/8 540 B-16-1590
Keith County ARC
WA0VMT/0 657 B- 8-1564
Poinsettia ARC
WA6BMH/6 506 B-16-1542
Radio Amateur Transmitting Society
W0QQQ/0 515 B-19-1516
Georgian Bay ARC
VE3HIP/3 506 B-19-1502
Bellevue ARC
W0WYV/0 403 B- 7-1494
Mt. Baker ARC
K7SKW/7 595 B-18-1490
Scottsdale ARC
W7WL/7 594 B- 4-1488
Univ. of Mississippi ARC
W5YE/5 507 B-13-1488
Non Club Group
K5EJO/5 499 B- 3-1442
Redwood High School ARC
WB6NVY/6 489 B-10-1434
Very Fine Operators
WA6OFM/6 325 B-10-1434
Non Club Group
WA9THM/9 469 B-15-1410
Chippewa ARC, Inc.
K8VED/0 398 B-15-1406
North Arkansas ARS, Inc.
K5THO/5 890 C-10-1403
Explorer Post 204, B.S.A.
WA2OYR/2 410 B-11-1382
Explorer Post 296
WB5FIL/5 556 B-12-1380
Non Club Group
K8NKQ/8 499 B- 4-1380
So. Oregon ARC
W7FDU/7 398 B-13-1362
Ozarks ARS
W0GJ/0 500 B-16-1348
Louisville Hams
WB4FBM/4 441 B- 5-1348
Cosi Radio Students
W8ELE/8 396 B-12-1328
Smoky Valley RC
W0CEM/0 500 B-10-1324
Comox Valley Wireless Club
VE7CVW/7 440 B-15-1296
Boeing Employees ARS
K7NWS/7 437 B-30-1294
Greater New Orleans ARC
W5UK/5 703 C-10-1291
Fontana High School RC
WB6HJJ/6 357 B-15-1288
Lake View ARA
WA9DDS/9 527 B- 6-1266
Newport ARC
W8TZZ/8 367 B- 4-1266
Newton ARC
W0BZN/0 470 B- 6-1260
Non Club Group
WA6WWJ/6 383 B- 7-1256
Ky Colonels ARC
WB4DQM/4 745 C-16-1247
Austin ARC
WA0RPS/0 471 B-17-1242
Northeast Missouri ARC
W0CBL/0 272 B- 9-1232
Fort George RAC
VE7FG/7 771 C-25-1223
State Technical Institute at Memphis ARC
WB4RSJ/4 367 B-14-1212
Sierra Nev. ARS
W7TA/7 380 B-14-1202
Hub City RC
W0QHJK/0 389 B-10-1200
Penn.-Mar ARC, Inc.
W3MUM/3 461 B- 5-1172
Lake County ARS
W6JKK/6 224 B- 2-1136
Fraser Valley ARC
VE7ASM/7 310 B- -1134
Chippewa Valley AR Group
K9FIF/9 672 C- 8-1120
Bell ARC
W0GV/0 379 B- 8-1104
Winnipeg ARC
VE4BB/4 287 B- 8-1084
Arrowsmith ARC
VE7EMO/7 288 B-15-1080
Crawford AR Society
AA3DET/3 424 B-19-1078
Delta Co. ARS
K8ZAS/8 350 B-12-1068
Palmerston District ARC
VE3ETF/3 405 B- 8-1064
Springfield ARC
W8OG/8 242 B- 9-1044
Chesapeake Bay Repeater Assn.
WA3SFJ/3 688 C-12- 988
Central Kansas ARC
W0KQU/0 254 B-10- 986
McLean ARA
W4NM/4 258 B-10- 976
Santa Cruz ARS
K6CS/6 262 B- 5- 958
Spirit Valley Amateurs
WB0SVA/0 305 B-12- 949
Non Club Group
VE3AMK/3 353 B- 6- 948
El Dorado County ARC
W6JOJ/6 295 B-12- 948
Hamfesters RC
W9AA/9 340 B-11- 946
Richmond ARA
W9MGQ/9 332 B- 8- 936
Non Club Group
WA4AZE/6 306 B- 3- 910
Central Arkansas Emergency Net
W5DI/5 221 B-10- 900
Non Club Group
VE1AZM/1 202 B- 4- 874
Southeast La ARC
WB5NET/5 270 B- 7- 840
New River Boys
W4LCI/4 309 B- 6- 834
Storm Lake ARC
WB0AGP/0 292 B-10- 834
Comsat-Andover ARC
WA1MMC/1 277 B- 3- 816
Gratiot Co. ARA
WA8AEG/8 200 B- 3- 774
Panoche Land ARC
W7JTR/7 209 B- 8- 772
TRW ARC
WA8WSO/8 455 C-15- 752
Columbia ARS
WB4MLD/4 100 B-15- 750
Tulsa ARC
WF0J/5 241 B-10- 746
Oak Park River Forest H.S. ARC
WB9TOD/9 220 B- 6- 734
Hopkins Grammar School RC
WA1DER/1 220 B- 6- 728
Tri-County AREC
K2DHR/2 194 B- 4- 716
Raritan Bay Radio Amateurs
K2GE/2 215 B- 8- 708
Remlap's Serfs
WB9HSS/9 232 B- 4- 698
Wheatstraw ARC
WA5IPE/5 189 B- 7- 678
Non Club Group
K6LRN/6 223 B- 6- 660
Over The Hill Gang
W7BYK/7 164 B- 4- 654
Tenafly High School ARC
AB2ZZM/2 163 B- 9- 644
Oakland RC
W6OT/6 172 B- 4- 622
MT.A ARC
W5CFX/5 184 B-12- 618
Murdocksville Modulators
WA3JDX/3 305 B- 8-610
Metropolitan State College ARC
WB0ONQ/0 188 B- 3- 576
Boeing Employees ARS
WA7EEL/7 52 B- 9- 408
S. Tex. 160M Group
W5EVL/5 89 B- 5- 384
Loup City ARC
WA0ZPM/0 333 C- 4- 383
Metropolitan ARC
K8NOW/8 128 C- 6- 328

Commercial Mains

Goochland County Farm Boys
WA4KBG/4 2751 B- 6-6608
Bloomfield ARC
W1CWA/1 410 B- 5-1050
Scotland County ARS
WB4ERO/4 295 B-10- 808
51st State ARC
WA8WPI/8 277 B- 4- 614
Edina West Electronics Wizards
WB0NCJ/0 170 B- 9- 398
Mountain ARC
WA4YZY/4 255 B- 6- 310

3A - Battery

Kankakee Area RS
W9AZ/9 (+WN9RDI) 662 A-30-5425
Middlesex ARS
W1EDH/1 485 A-30-4835
Southern Michigan ARS
W8DF/8(+WN8UEJ) 642 A-35-4335

3A

Richardson Wireless Klub
K5RWK/5(+WN5RBC) 3148 B-33-9638
B.A.R.F.
W3BGN/3(+WN2AWS) 3058 B-17-9074
Shenango Valley Amateur Radio Field Day Group
W3VK/3(+WN3BAK) 2932 B-11-8631
Kingsport ARC
W4TRC/4 2575 B-57-7716
Ft. Belvoir ARC
K4WCC/4 2335 B-10-7522
Poughkeepsie ARC
K2KN/2(+WN2WMC) 2267 B-22-6726
Johnson County ARC
W0ERH/0 (+WN0OLB) 2085 B-40-6434
Sharon ARA
K1JNQ/1(+WN1VHY) 2079 B-16-6152
Libertyville and Mundelein ARS
AC9HOQ/9(+AK9TIY) 1625 B-40-5518
PENNARC
WA3RCA/3 1990 B-29-5430
Adams-Brown Counties AREC
WB0N/8(+WN8VND) 1630 B-17-5386
New Providence ARC
W2SE/2 1510 B-20-5364
Old Natchez ARC
K5OCM/5(+WN5TBU) 2308 B-12-5306
The Thomas A. Edison ARA
WB2SUO/2(+WN2AXG) 1449 B-14-5228
Sterling Park ARC
W4RL/4 1682 B-13-5200
Radio Assn. of Western N.Y.
W2PE/2(+WN2EOM) 1411 B-21-5030
Plano Amateur Radio Klub
K5AT/5(+WN5OHM) 1802 B-20-4982
Northorp RC
K6UM/6(+WN6QCF) 1754 B-30-4930
Mississippi Valley RC
W0BX/0 (+WN0TLE) 1451 B-20-4819
Hattiesburg ARC, Laurel, Jones County AR and Repeater Club
W5ZR/5(WN5RAA) 1532 B-30-4776
Providence Radio Association's Orange Pumkin Contest Group
W1OP/1(+WN1WXB) 1731 B-19-4760
ARINC ARC
W3IHP/3 1545 B-14-4680
Livonia ARC
K8LUU/8(+WN8YRY) 1431 B-35-4602
Tombigbee ARC
W5LIL/5(+WN5QFR) 1673 B-18-4518
Jersey Shore ARS
W2OK/2(+WN2DZK) 1222 B-25-4504
Suburban ARC, Inc.
K3MTK/3(+WN2DQM) 1502 B-28-4480
Lakefield ARC
WA2PNU/2 1366 B-35-4450
Wantagh ARC
W2VA/2(+WN2DJF) 1473 B-30-4442
Carroll County ARC
K3PZN/3(+WN3YEA) 1868 B-15-4436
Comsat/IBM Radio Club
K3AK/3 1387 B-18-4436
ARA of The Tonawandas
W2SEX/2(+WN2CJL) 1411 B-23-4374
Huntington Co. ARC
K9WFL/9(+WN9ODS) 1419 B-15-4366
Palo Alto ARA
K6YT/6(WN6DLH) 1358 B-22-4318
Pike's Peak ARA
WA0VTU/0 (+WN0TIC) 1380 B-20-4290
Central Michigan ARC
AC8MAA/8(+KB8VQX) 1359 B-29-4266
Club De Radio Amateur De La Vallee Du Richelieu
VE2CVR/2 1120 B-12-4263
St. Louis ARC
K0LIR/0 1408 B-27-4248
Columbia (MD) ARA
W3WI/3(+WN3BAN) 1208 B-30-4238
Central Illinois RC
W9AML/9 1419 B-21-4234
Memphis ARA
W4EM/5 1572 B-12-4150
Foothills ARS
K6YA/6 1351 B-18-4080
Barrington ARS
K9HWI/9(+WN9QBU) 1338 B-22-4050
Bicentennial ARC (Seventy-Sixers)
K5LMG/5(+WN5TMW) 1125 B-15-4038
G.E. Evendale ARS
K8LUC/8 1198 B-15-4026
Nutley ARS
W2GLQ/2(+WN2ANK) 1244 B-16-4018
Elgin ARS
W9IKN/9(+WN9SES) 1361 B-11-3980
Keene Radio Amateur Society
AA1GUD/1(+WN1WJE) 1289 B-13-3960
North Hills ARC of Pittsburgh,PA, Inc.
K3OTY/3 1318 B-12-3930
Norwood ARC
K1JMR/1 1395 B-12-3920
Tri-Town ARC
W9VT/9(+WN9SIR) 1213 B-40-3900
Delmarva ARC
W3WD/3 1229 B-10-3850
St. Charles ARC
W0HSI/0 (+WN0QZY) 1366 B-25-3816
Joliet ARS
W9OFR/9 1506 B-23-3806
Radio Club of Quebec
VE2CQ/2 1030 B-12-3764
Kaw Valley ARC
W0CET/0 (+WN0SAS) 1243 B-50-3758
Cambridge ARC
AC8VP/8 1178 B-26-3752
Blackstone Valley ARC
W1DDD/1 1399 B- 4-3750
Van Wert ARC
W8FY/8(+WN8VRV) 1293 B-16-3750
Opequon Radio Society
WB8IJW/8(+WN8VAZ) 1239 B- 8-3734
Aero Amateur Radio Club
W3PGA/3 1167 B-15-3718
Tulsa Repeater Organization
W5OK/5 1191 B-25-3717
Miss. Coast ARA
W5BW/5 1355 B-58-3710
Motorola ARC of Arizona
W7KIS/7(+WN7OPM) 959 B-10-3672
Central Texas ARC
W5ZDN/5(+WN5OXR) 1018 B-25-3662
Battelle RC
W8CQK/8(+WN8UGP) 1173 B-11-3632
Southeastern Illinois Ham Society
W9BFO/9 1600 B-13-3630
Vicksburg ARC
W5RUB/5 1078 B-25-3561
Rocky Mtn. VHF Society
W0IA/0 1178 B-11-3548
Old Pueblo RC
W7GV/7(+WN7DQP) 997 B-16-3456
Warminster ARC
K3ZAC/3(+WN3ZOX) 1192 B-25-3334
Pilot Knob RC
W0VZG/0 (+WN0PRA) 984 B-20-3326
Cres ARC of Western Electric Co., Inc.
W2ZPF/8 993 B-23-3292
Scientific - Atlanta ARC
WA4LOJ/4(+WN4DOL) 926 B-16-3280
Estero ARC
W6KW/6(+WN6AGE) 954 B-28-3264
Decatur ARC
WA8FBM/4(+WN4NRA) 1087 B-33-3240
Northern Ohio ARS
K8KRG/8(+WN8UHE) 1066 B-25-3240
Independent FD ARC
W0SCM/0 1112 B-11-3224
Orlando ARC
W4PLB/4(+WN4RMS) 1229 B-36-3204
York RC, Inc.
W9PCS/9 1063 B-12-3116
Greater Norwalk ARC
W1WHZ/1(+WN1WTB) 1003 B-50-3100
Shiawassee ARA
W8QQQ/8(+WN8VET) 1060 B-18-3082
Canal Zone ARA
KZ5USA/KZ5(+KZ5BVN) 1106 B-20-3062
Gwinnett ARS
WB4EMF/4(+WN4UIS) 1043 B-30-3026
Milford (Ohio) ARC
WB8WSV/8(+WN8VNV) 1225 B-38-3014
Band Dit-Dahs
W2MPM/2 1040 B-13-3010
Spartanburg ARC
K4JLA/4(+WN4NQW) 898 B-13-3004
United Radio Amateur Club
K6AA/6 973 B-30-2970
Neenah - Menasha ARC
W9JCL/9 835 B-15-2968
South East ARC
K8EMY/8(+WN8TTO) 1044 B-20-2938
Texas DX Society
K5DEG/5(+WN5MYO) 1874 B-20-2928
West Allis RAC
W9FK/9 918 B-22-2892
Wellesley ARS
W1TKZ/1(+WN1TWK) 902 B-22-2892
Bartlesville ARC
W5NS/5(+WN5RWN) 850 B-50-2866
HDL Radio Club
WA3IBA/3 843 B-13-2864
Prairie Dog ARC
W0OJY/0 (+WN0OZY) 1015 B-20-2862
Arlington RC
K5SLD/5(+WN5SDT) 1090 B-57-2836
Broken Arrow ARC
W5DRZ/5 981 B-15-2829
Suffolk County RC, Inc.
W2DQ/2 985 B-19-2790
Cherryland ARC
WB8VKB/8 977 B-40-2716
New York City Repeater Assn.
K2AHP/2 953 B- 6-2716
Montgomery ARC
WA3EWJ/3 883 B-17-2694
Elkhart Red Cross ARC
K9HDH/9 886 B-15-2686
Saline County Radio Amateur Club
WB5QQV/5 909 B- -2674
Marshall RC
W0BMJ/0 1038 B-18-2666
Hot Springs ARC
WA5BRF/5 1059 B-20-2660
P.H.D. ARC
WA0UGU/0 803 B-41-2630
Central Penna. ARC
K3SEW/3 819 B- 9-2626
North Country RC
W2LCH/2 1031 B- 6-2602
Mobile ARC
W4IA/4(+WN4ILC) 752 B-33-2594
Crescenta Valley RC
W6HS/6 874 B-12-2572
Ada ARC
WB5NBA/5 952 B-13-2564
Free State ARC
K3DJ/3 976 B-23-2560
Farinon Amateur Radio Team
W6OS/6 694 B- 9-2540
Berrys Mountain ARC
WA3GJA/3(+WN3BJV) 693 B-10-2532
Key Klickers
WB5EBK/5 604 B- 6-2528
Catalina ARS
W6CQ/8 847 B-12-2498
Anne Arundel RC
W3VPR/3 865 B-15-2492
Austin ARC
W5KA/5(+WN5MKX) 759 B-35-2490
Cape Fear ARS
K4KCZ/4(+WN4ETY) 983 B-28-2468
Fond DuLac ARC
W9LUQ/9(+WN9TRN/9) 757 B-15-2466
Irvine ARC, Inc.
AA5CKF/5(+WN5RRG) 866 B-25-2452
Baton Rouge ARC
W5GIX/5(+WN5SCY) 746 B-30-2446
Va. Beach/Norfolk AREC
WA4LLX/4 860 B-11-2438
Yellow Thunder ARC
WB9FDZ/9(+WN9UIP) 629 B-18-2420
Parma RC
K8UZW/8(+WN8UDA) 742 B-19-2416
Aerojet RAC
K6CLZ/6(+WN6BZU) 892 B-22-2408
Portland Amateur Wireless Assn.
K1GAX/1(+WN1VER) 773 B-20-2406
Lanierland ARC
W4IKR/4(+WN4CYN) 846 B-22-2400
Three Rivers ARC
W0BRN/0 (+WN0NYD) 793 B-16-2390
Alvin Community AC
K5EWU/5(+WN5SJF) 767 B-17-2390
Ole Virginia Hams ARC, Inc.
AA4FPM/4(+WN4ODG) 1864 C-22-2372
ARC of Knoxville
W4BBB/4 985 B-10-2372
Copper Country Radio Amateur Assn.
K8VOA/8(+WN8VQI) 754 B-20-2370
Telco ARC
WB9HJ/5(+WN6MNP) 907 B-12-2364
Lincoln Trail ARC
WA4AGH/4(+WN4JMQ) 808 B-23-2360
Grant Co. ARC
W9EBN/9(+WN9TNB) 758 B- 8-2352
Westchester Emerg. Comm. Assn.
W2OC/2 747 B-15-2328
Saratoga ARA
WB6HIA/6(+WN6LKF) 752 B-25-2326
Oakville ARC
VE3HB/3 776 B-30-2300
Lexington ARC
AC1HWM/1(+WN1VDA) 799 B-17-2294
Oakland County ARS
WB8NOT/8(+WN8UWU) 1745 B-20-2275
Grand Rapids ARA
W8DC/8(+WN8YNS) 642 B-17-2269
Morris/Passaic Counties AREC
WA2DIW/2 732 B-11-2266
Fresno ARC
W6TO/6(+WN6FXL) 700 B-41-2223
Northern Colorado ARC
W0UPS/0 835 B-18-2212
Shenandoah Valley ARC
W4RKC/4 726 B- 7-2180
Albany ARA
K2CT/2(+WN2AXJ) 805 B-15-2176

Quinte ARC	VE3BSQ/3	689	B-30-2170
Valley RC of Eugene	W7PXL/7	658	B-15-2152
Twin City Hams ARC	W5EA/5	976	C-21-2142
The Clang Gang	WA3PIR/3	779	B- 7-2116
Farmington ARC	W8NBN/8(+WN8ZBT)	817	B-23-2114
Meriden ARC	W1NRG/1(+WN1VVA)	640	B-23-2106
Carson ARC	W6UDE/6(+WN6MOA)	532	B-30-2096
Clark County ARC, Inc.	W9WWI/9(+AK9RVL)	608	B-15-2088
Fair Lawn ARC	W2FIW/2	653	B-12-2085
Milford ARC	W8YDK/8(+WN8UDO)	625	B-19-2040
Mtn. View High ARC	WA6AEG/6(+WN6HHD)	556	B-12-2038
Foothills ARC	W3LWW/3	756	B-12-2017
Great Bay Radio Assn.	K1UTI/1	587	B-10-1994
Columbus ARC	WB9PEL/9(+WN9TWQ)	550	B-12-1990
RVARA	K2BG/2(+WN2YOF)	500	B-11-1970
Port City ARC	W1WQM/1	485	B-18-1964
Miami ARC	K5JOA/5	622	B-10-1958
Trident ARC	K4QF/4(+WN4FEX)	681	B-32-1944
SOCORRO ARA	W5UXH/5	684	B- 6-1940
Kingston ARC	VE3KAR/3	522	B-20-1938
Petaluma DX and Experimenters Society	WB6EGE/6(+WN6MRQ)	697	B-18-1934
Kent County ARC	W3HZW/3(+WN3ZFY)	733	B-10-1930
Murphy's Radio Class	W6WC/6	708	B-90-1930
Mount Vernon High School RC	K2VSU/2	518	B- 9-1924
Tampa ARC	W4DUG/4	512	B-25-1922
San Juan County ARS	K7IRO/7	580	B-23-1918
Piedmont Tec ARC	WA4PRW/4	666	B-23-1914
Harrisburg Radio Amateurs Club	W3UU/3	479	B-25-1888
Lawton Fort Sill ARC	W5KS/5	663	B-15-1878
Kodak Park Athletic Assn. Radio Communications Club	K2SSB/2(+WN2EHF)	737	B-13-1866
Gopher Creek Group	VE4OW/4	482	B-12-1858
Sand Hills ARC	WØMI/Ø(+WNØTEQ)	651	B-25-1852
Zepp's Zappers	WA1FKF/1	623	B- 3-1846
Foothill High School ARC	WB6RXH/6	565	B-17-1832
North Central West Virginia Field Day Assn.	K8GNZ/8	517	B-15-1828
Abington ARC	K3CSG/3	552	B-15-1814
Non Club Group	WA8RUF/8	640	B- 9-1793
McKean County ARC	W3VV/3(+WN3AOK)	541	B-12-1790
Huntingdon County ARC	W3VI/3	421	B-12-1786
ARC of Shreveport	WB5LEP/5	698	B-20-1756
Ozark ARC	W5UTN/5	533	B-20-1756
East Kootenay ARC	VE7IP/7	576	B-13-1754
Charleston AFB Hams	WB4KLR/4	703	B- 4-1726
South Waterloo ARC	VE3SWA/3	648	B- 7-1724
Mid-South VHF Assn.	K4VBA/5	628	B- 6-1724
Tri-County RC of Deming, N.M.	W5TJ/5	556	B- -1724
Broad Mountain Boys RC	K3EDS/3	483	B- 8-1718
Inter-City RC	W8WE/8(+WN8VDJ)	526	B-22-1712
Burnaby Amateur RC	VE7BAR/7	397	B-30-1702
HFEA ARC	K6QEH/6	555	B-15-1672
Muskegon Area Amateur Radio Council	W8ZHO/8	604	B-30-1664
Pueblo Ham Club	KØPHF/Ø	466	B-10-1612
Menomonee Falls ARC	K9RHH/9(+WN9RKF)	558	B-18-1592
San Mateo RC	W6LMN/6(+WN6HDF)	520	B-12-1590
Rappahannock Valley RC	K4TS/4(+WN4PAN)	476	B-15-1556
Academy ARC	WA7IYB/7	542	B-11-1550
Thumb ARC	W8AX/8(+WN8WJX)	397	B-14-1540
Northern Va. RC	W4PAY/4	581	B- 8-1508
Bellow's Bellowers	KH6IOZ/KH6(+WH6IQK)	480	B-15-1494
Santa Cruz County ARC	K6BJ/6	402	B- 5-1480
Pampa ARC	W5TSV/5	551	B-16-1468
Non Club Group	WA2YKM/3	583	B- 6-1466
Goodrich High School ARC	WB9PNL/9(+WN9TOC)	342	B- 8-1448
Elks In The Meadows	WB9FZN/9(+WN9RTB)	478	B-17-1442
M.A.S.I. ARC	WA1RJI/1(+WN1UKN)	436	B-20-1416
Rio Hondo ARC	WA6GEV/6	402	B-21-1408
Mary's County ARC	K3HK/3	497	B-16-1404
Santa Clarita ARC	W6JW/6	378	B-20-1402
Kearny ARC	K2BDX/2	355	B-16-1376
Explorer Post 308	WA7NDB/7	420	B- 9-1354
Rome RC	W2OFQ/2(+WN3BHE)	484	B-15-1352
Non Club Group	K9SEM/9	470	B- 6-1310
Wisconsin Rapids ARC	W9DQA/9(+WN9RZJ)	603	C-19-1293
Lassen ARC	K6JKC/6	349	B- 6-1284
Missouri Valley ARC	WØNH/Ø	439	B-18-1278
Rock Creek ARA	W3RCN/3	535	B-10-1258
North Bay ARC	VE3NBC/3	418	B-18-1258
Moose Horn ARC	KL7IEJ/KL7	418	B-10-1254
Central VT ARC	W1BD/1	469	B- -1252
North Suburban Wireless Assn. & North Star HiBanders	KØVPM/Ø	463	B- -1236
West Branch ARA, Inc.	W3AVK/3	423	B-12-1196
Southern Alberta ARC	VE6PD/6	361	B-15-1190
Ogdensburg ARC	WA2UIR/2	360	B-11-1186
Juniata Valley ARC	K3DNA/3	332	B-10-1176
Pearl River High School RC	WB2ABJ/2(+WN2YLN)	403	B- 9-1174
Prince Georges Wireless Assn.	K3CEZ/3(+WN3ZMX)	368	B-13-1170
Delta ARC	W4BS/4	348	B- 6-1169
St. Maurice Valley ARA, Inc.	VE2MO/2	439	B-15-1164
Elmwood Park ARC	K9YHB/9	376	B-10-1158
New Ulm ARC	KØUC/Ø(+WNØQFN)	370	B- 9-1152
Meridian ARC	WA5WUX/5	392	B- 8-1150
S.E.M.A.R.A.	K8BY/8	376	B-20-1148
Miami County ARC	KØJPW/Ø(+WNØSXJ)	368	B-17-1130
DESC RC	W8IEU/8	579	C- 7-1124
Kamloops ARC	VE7UT/7	562	C-15-1119
Casper ARC, Inc.	W7VNJ/7	347	B-25-1098
Straits Area RC	W8GQN/8	271	B-11-1098
Iowa-Missouri ARC	KØGFV/Ø(+WNØTMM)	297	B- 6-1080
Lake Area Radio Klub	WBØMWJ/Ø	337	B- 5-1057
Sierra Foothills ARC	K6CBP/6	339	B-10-1054
Beloit ARC	K9WIP/9	335	B- 5-1008
Non Club Group	WB9PKZ/9	272	B- 5-1002
Club Radio Amateur Outaouais	VE2CRO/2	240	B-10- 990
Hall of Science Club	WB2ZZO/2	321	B- - 962
Non Club Group	W7PN/7	192	B- 3- 962
Suburban RC	WØDCW/Ø	601	C-12- 937
Tu-Boro RC	W2BMW/2	309	B- 6- 923
Playground ARC	W4ZBB/4	242	B- 6- 916
Housatonic Scouts	K1PTI/1	284	B- 5- 910
Kentucky Mountains ARC	K4AVX/4	262	B- 7- 906
Mammoth Cave ARC	WA4JZO/4	142	B- 7- 886
Six Pack	WA9VKD/9	251	B- 6- 852
Jay Hawk ARS	WØLB/Ø(+WNØOYB)	443	C-25- 827
Montcalm AREC	W8NLC/8	205	B- 8- 770
Valley VHF Club, Inc.	W9JGV/9	157	B- 6- 754
Panhandle ARC	WB5IUC/5(+WN5QFV)	418	C-13- 730
Blue Valley ARC	WAØHOU/Ø(+WNØQYW)	169	B-16- 730
Knox County ARC	WB9DDF/9(+WN9QOP)	173	B-10- 720
Triangle ARC	W4LEN/4	163	B-10- 704
Emmett ARS	W7OTL/7	121	B- 5- 662
Anchorage ARC	KL7AA/KL7	238	C-20- 653
Non Club Group	WN8YDP/8	41	B- 3- 464
Aberdeen Proving Ground ARA	K3WA5/3	39	B- 5- 456
Dial RC	W8BLV/8	151	B-15- 424
Cape Ann ARA	WAØBYJ/1(+WN1UCG)	55	B- 6- 210
Racy Loafers	WØOIZ/Ø	6	B- 3- 24

Commercial Mains

Rock Hill ARC	K4YTZ/4	768	B-12-1686
St. Clair ARC	K9GXU/9	488	B-14-1176
Livingston AR Klub	WC8ACA/8	195	B- 9- 510

4A - Battery

Ringgold ARC	W4ABZ/4	795	A-15-4715
Carthage ARS	WØCZT/Ø	1464	B-26-4658
Fongo Mt. RC	K6TCN/6	546	A- 7-4300
Tektronix Employee RAC	K7AUO/7	468	A-16-4235
80 M thru 70 CM QRP'ers	WA3UDS/3	204	A- 6-1755

4A

North Ridgeville, Columbia, Elyrea & Bay Village, Pond Swimming, Creek Stomping, Mud Sliding, Tree Climbing, Operator Drowning, Renegade RC	WB8JBM/8(+WN8YFZ)	3153	B- 8-9714
Fort Wayne RC	W9TE/9(+WN9QEZ)	2938	B-55-9117
The Mobutu Gang	W9BS/9	2697	B- 9-7610
Oak Ridge ARC	W4SKH/4	2213	B-27-7066
Columbus ARC, Inc.	W4CVY/4(+WN4PGF)	2252	B-35-6568
Alamance ARC	K4EG/4	2232	B-32-6518
Radio Amateur Technical Society	K9TZZ/9(+WN9SIO)	2201	B-20-6420
Ozaukee RC	W9LO/9(+WN9QIY)	2263	B-30-6384
Reading RC	W3BN/3(+WN3AAL)	1898	B-30-6209
Radio Society of Greater Brooklyn	WB2NRP/2	2114	B-12-6134
Satellite ARC	W6AB/6(+WN6HFD)	2043	B-32-5582
Two Rivers ARC, Inc.	W3OC/3	1746	B-45-5233
Birmingham ARC	W4CUE/4(+WN4LQU)	1893	B-68-5167
Ottawa ARC	VE3RC/3	1595	B-42-5066
Orange County ARC	W6ZE/6	1914	B-40-4896
AK-SAR-BEN ARC, Inc.	WØEQU/Ø(+WNØSMR)	1812	B-140-4786
Kettle Moraine Radio Amateurs	WB9USH/9(+WN9SVO)	1492	B-18-4760
Raleigh ARS, Inc.	W4DW/4	1670	B-24-4670
Citrus Belt ARC	W6JBT/6	1372	B-20-4600
Inter-County ARC	W2DMM/2	1353	B-16-4294
Palisades ARC	W6GAA/6	1621	B-20-4220
G.G.V.R.C.	WB8JOS	1253	B-12-4076
Cary ARC	K4SG/4(+WN4AFV)	1299	B-25-4000
San Francisco RC	W6PW/6	1249	B-20-3960
Metuchen YMCA RC	K2YNT/2(+WN2AET)	1101	B-35-3875
Boulder ARC	WØDK/Ø(+WNØOJB)	1229	B-20-3766
Santa Barbara ARC	K6YD/6(+WN6DNN)	1121	B-25-3692
West Island ARC	VE2CWI/2	1010	B-18-3664
Confederate Signal Corps	W4VTA/4	1551	B-65-3660
Gadsden ARC	K4JMC/4	1140	B-30-3628
Mahoning Valley ARA	W8QLY/8(+WN8UPE)	1009	B-57-3472
Hughes El Segundo Employees Assn. ARC	W6DL/6	1054	B-20-3452
Salem ARC	W7SAA/7(+WN7DPU)	989	B-20-3414
Santa Fe ARS	AB4IJR/4(+WN4MJU)	1187	B- 7-3306
IBM Owego ARC	W2VDX/2	1025	B-10-3288
Sanders ARC	W1YR/1(+WN1VIK)	1056	B-25-3262
OHKYIN-VHF-Radio Society	K8SCH/8(+WN8WQB)	1168	B-17-3214
Utica ARC	K2IQ/2(+WN2FHM)	1104	B-25-3142
Smoky Mountain ARC	W4OLB/4(+WN4CNY)	858	B-23-3114
Quad City RC	WØIS/9(+WNØSGU)	796	B-30-3070
Rockford ARA	W9AXD/9	949	B- -3058
Arizona ARC	W7IO/7	967	B-35-3007
Southern Westchester Amateur Transmitters	WB2FVX/2(+WN2DYZ)	1005	B-15-3002
Pilgrim ARC	W1GDB/1	835	B-10-2994
Lera ARC	WA6GFY/6	928	B-16-2975
Lancaster Field OPS	K3ITG/3	963	B- 8-2944
Winona ARC	WØNE/Ø(+WNØSTL)	884	B-10-2928
London ARC	VE3LON/3	936	B-50-2917
Sioux Falls ARC, Inc.	WØZWY/Ø(WNØOQZ)	762	B-20-2856
Michigan City ARC	W9CSF/9	511	B-20-2778
East Whittier ARC	W6NI/6	980	B-20-2766
Conejo Valley ARC	W6HE/6	982	B-18-2748
Onslow ARC	WA4TLI/4	1074	B-17-2744
Mt. Diablo ARC	W6CX/6(+WN6LJE)	928	B-20-2726
Genesee County RC	W8ACW/8	815	B-40-2722
Monsanto ARA	WBØBBN/Ø	1084	B-18-2674
Portland ARC	W7KYC/7	775	B-12-2630
Monessen ARC	W3CSL/3(+WN3ZFQ)	946	B-28-2618
Warren ARA	W8VTD/8(+WN8ZLH)	948	B-18-2600
Vienna Wireless Society, Inc.	K4HTA/4	790	B-16-2550
Wenoca Twin City ARC	WB4KIF/4	958	B-15-2466
Silver Springs ARC	WB4GZY/4	731	B-18-2448
Marin ARC	W6SG/6(+WN6CLK)	825	B-22-2415
East Alabama ARC	K4RY/4	817	B-10-2370
Monroe Co. Radio Communications Assn.	WA8MTX/8	745	B- 8-2366
Tri-City ARC	W1BLM/1	702	B- 8-2352
Hamden ARA	W1GB/1	620	B-25-2330
Welland County ARC	VE3WCA/3	711	B-13-2312
Tidelands ARS	K5CA/5(+WN5TNI)	633	B-26-2306
Richmond ARC	W6IFZ/6	616	B- 9-2300
Westminster Amateur Radio School	VE2CWR/3	699	B-15-2250
Hoodview ARC	WB7AUF/7	874	B-11-2226
Piedmont ARS	W4CS/4	789	B-12-2202
Miami Co. ARC	AB9GMS/9	691	B- 5-2166
Seneca RC	W8ID/8(+WN8WKP)	749	B-12-2148
Non Club Group	W9LTU/9	606	B-10-2140
North Shore RC	VE3NSR/3	800	B-15-2118
Longmont ARC	WØONF/Ø	713	B-12-2105
Tri-State ARS	K4DT/4	619	B- 7-2104
Whitman ARC	WA1NPO/1	572	B-15-2074
Peel ARC	VE3PRC/3	590	B-12-2042
Orange County ARC	WB2SON/2(+WN2FOM)	562	B-12-2038
San Diego Univ. ARC & "The Amateur Club"	WA6GRF/6	591	B- 7-1954
Rats Mouth Radio League	K4FAU/4	645	B-24-1940
Antietam Radio Assn.	W3CWC/3	1093	C-20-1921
TARCOM	W2FWG/2	493	B-19-1890
South Bay ARS	K6HQH/6(+WN6RZL)	486	B-15-1810
Daytona Beach ARA, Inc.	AD4BV/4(+WN4FGG)	410	B-34-1798
Hampden County RA	W1NY/1(+WN1WSR)	636	B-20-1790
Cowichan Valley ARC	VE7CVA/7	484	B-25-1778
Hams of Western Labrador	VO2WL/2	443	B-11-1764
Pentagon ARC	K4AAF/4	558	B-10-1742
Story Country ARC	WØYL/Ø	525	B-15-1740
Burlington ARC	W1KOO/1	491	B-10-1728
Alexandria RC	W4HFH/4	491	B-12-1700
Coos County RC	K7CCH/7	475	B-12-1700
Provin Mt. Am. Repeater Assn.	WA1VQD/1	755	B-12-1688
Radio Amateurs of Skagit County	W7UF/7(+WN7BMW)	379	B- 9-1646
McDonnell-Douglas St. Louis ARC	WAØCGV/Ø	950	C-18-1635
Non Club Group	WA2QZW/2	412	B- 7-1626
Willmar Area E.A.R.	WØBHA/Ø	572	B-13-1604
Steel City ARC	AC3KWH/3	412	B-20-1599
Faribault Amateur RC	WBØKRA/Ø	581	B- 8-1564
Explorer Posts 88 and 96	W2DIQ/2(+WN2FGC)	338	B-22-1532
Montgomery Co. AREC	W9BXR/9(+WN9UDN)	432	B-45-1508
Plateau ARC	K4VMO/4	533	B-10-1486
Terre Du Lac Repeater Club	WAØUTH/Ø	510	B-13-1460
Delaware ARA	W9DUK/9	768	B-15-1418
Clearwater ARS	WB4BZF/4	384	B- 8-1364
Non Club Group	WB7HV/8(+WN8WKB)	269	B-10-1347
Onalaska ARC	W9HWQ/9	322	B- 7-1325
Non Club Group	AA7ZRI/2	290	B- 5-1292
Clinton County VHF ARC	W9LMP/9(+WN9SDR)	317	B-15-1236
Allegheny Co. AREC	WA4DHH/4	320	B-10-1190
Society Newfoundland Radio Amateurs	VO1AA/1	279	B-10-1182
Henry County ARC	K8IT/8	660	C-15-1128
Mich-A-Con ARC	W8JWN/8	466	C-10- 965
DuPont Glasgow Site RC	K3DEA/3	145	B- 5- 964
Tulare County ARC	WA6BAI/6(+WN6KAD)	169	B- 8- 809
Non Club Group	W8LKY/8	133	B-10- 750
East Bay RC	W6CUS/6	59	B-12- 658
Kootenia ARS	W7NV/7(+WN7DPE)	113	B- 7- 634

Commercial Mains

Loudon County ARC	W4WVJ/4(+WN4OTO)	812	B- -2302
Catamont RC	W1MEP/1(+AK1UYU)	1421	C- 8-1729
Explorer Post 73	WB5OBF/5	408	B-10- 926
St. Cloud RC	WØSV/Ø(+WNØRUO)	438	C- 6- 461
Bad Kreuznach	DA1PQ/P	88	B- 4- 216

5A

Wireless Institute of the N.E./American Red Cross Emerg. ARC	W2YD/2	4431	B-47-12,678
Northern Calif. Contest Club/SCCDRC	W6PAA/6(+WN6MZP)	3778	B-40-10,918
Delmont RC	K3SSC/3(+WN3YEO)	3160	B-30-9232
Northwest ARC	W9LR/9	3115	B-33-9204
R.F. Hill ARC	K3HTZ/3(+WN3ZHA)	2768	B-35-8738
L'Anse Creuse ARC	K8HUT/8(+WN8VAF)	2415	B-40-7988
Schaumburg ARC	WB9TXO/9(+WN9SBD)	2374	B-35-7220
North Florida ARS	W4IZ/4(+WN4MST)	2309	B-65-7068
Southern Maryland ARC	WB3BCC/3(+WN3AEQ)	2345	B-32-6838
Portsmouth Radio Club	W4POX/4	2124	B-29-6742
Rochester ARC	WØMXW/Ø	2188	B-40-6644
Kilocycle Club of Fort Worth	W5TI/5(+WN5NKG)	2165	B-100-6372
Motorola Engineers-Schaumburg	W9NB/9(+WN9TPP)	3886	B-22-5953
Chicago Suburban Radio Assn.	W9IC/9(+WN9RRO)	2150	B-50-5940
Wabash Co. ARC, Inc.	W9JOO/9(+WN9QZT)	1887	B-14-5688
Grumman ARC	AA2LQO/2	1594	B-41-5436
Anaheim ARA	K6SYU/6	1707	B-44-5401
Nevada ARA	W7VN/7(+WN7ATE)	1479	B-27-5194
Saginaw Valley ARA	K8DAC/8(+WN8UXD)	1649	A-43-6018
Green Country Chapter of The Ten-Ten Net	W5NNL/5(+WN5SFP)	1777	B-12-4698
Buncombe County ARC	W4MOE/4	1316	B-15-4526
Eastern Conn. ARA	K1MUJ/1	1386	B-26-4522
William Penn RC	W3FPC/3	1227	B- 8-4448
Delaware ARC	W3SL/3	1016	B-15-4418
Bolivar Washington RC	WB5OES	1506	B-19-4396
Hazel Park ARC	W8JXU/8(+WN8ZPN)	1405	B-50-4288
Schenectady ARA	K2AE/2(+WN2CFP)	1202	B- -4192
New River Valley ARC	W4CBM/4(+WN4AHL)	1312	B-14-4126
DuPage RC	W9DUP/9(+WN9QXT)	1555	B- -4006
Arlington ARC	W4DRW/4	1274	B-12-3990
Southern Chester County ARC	W3QT/3	1469	B-12-3852
Indian Hills RC	W8ICS/8	1019	B-15-3624
Cherryville Repeater Assn.	WA2CVK/2	1265	B- 8-3610
Garland ARC	K5QHD/5(+WN5PRD)	1305	B-39-3556
York Area Amateurs	W3HZU/3	1092	B-15-3538
Lower Columbia ARA	AC7DG/7(+WN7EHD)	1014	B-15-3480
The El Paso Bicentennial Bi-Club Field Day Group	W5ES/5(+WN5POT)	1164	B-26-3434
Denton County ARC	W5SAN/5(+WN5RQZ)	1172	B-13-3394
North & West Vancouver ARC	VE7UI/7	1088	B- 9-3364
Mid-MO ARC, Inc.	KØETY/Ø(+WNØPLY)	1238	B-25-3296
NEIRAA	WØDDW/Ø	1021	B-40-3280
Rip Van Winkle ARS	W2FSL/2(+WN2DOA)	936	B-14-3073

Cranford ARS/AREC
W2DED/2(+WN2EBY) 972 B-23-3062
Palomar RC
W6NWG/6 981 B-21-3008
Radio Amateurs of Greater Syracuse
W2AE/2 938 B-12-2992
Delaware Valley RA & Scout Troop No. 44
W2ZQ/2 996 B-20-2920
Antelope Valley ARC
K6QX/6 904 B-12-2920
WPI Wireless Assn.
W1YK/1(+WN1WXY) 919 B- 8-2874
Fort Smith Area ARC
AD5AAR/5 1150 B-12-2866
Middle Tennessee ARS
W4UOI/4 1157 B-15-2864
Tri-Lakes ARC
W@QQ/@(+WN@QCX) 804 B-25-2704
Madison County (Indiana) ARC, Inc.
W9EJH/9(+WN9UQY) 846 B-36-2692
Surrey ARC
VE7SAR/7 840 B-12-2668
Spokane Dial Twisters
W7HNZ/7 849 B-25-2548
Marion Area Conglomeration of Anti-Football Associates of The Marion ARC
W8GVB/8(+WN8VRJ) 809 B-10-2426
Parsons Area ARC
WA@GSG/@ (+WN@TER) 615 B-12-2390
Granite State ARA
W1TFS/1(+WN1YDC) 788 B- 7-2356
Silverado ARS
W6CQ/6(+WN6DXR) 462 B-10-2346
Fredericton ARC
VE1ND/1 645 B-10-2246
Fox River Radio League
W9CEQ/9(+WN9SWS) 751 B-19-2174
Tri-State ARS
W9OG/9 545 B-10-1954
Gloucester County ARC
W2MMD/2 1081 C-24-1915
Algonquin Radio Amateurs Club
W1VJF/1 622 B- 6-1884
PRAC
W@BXR/@ 427 B-12-1812
Jackson ARC
W5MUG/5 576 B-20-1796
Drumlins ARC
WA2AAZ/2(+WN2AUW) 399 B-15-1740
Argonne ARC
W9QVE/9 376 B-14-1690
Southern Calif. Amateur Transmitting Society
WB6LRU/6 473 B-13-1566
Ten-Ten Gateway Chapter
W@QX/@ (+WN9SLW) 801 C-14-1497
Cascade RC
W7EK/7 457 B- 9-1470
Broward ARC, Inc.
W4AB/4(+WN4PTE) 337 B-11-1262
Ashland Area ARC
W8OD/8(+WN8VWA) 554 C-12-1220
QRA
W1EKT/1 571 C-25-1190

6A

Huntsville ARC, Inc.
K4BPT/4 3308 B-24-9634
Mike & Key ARC
K7LED/7(+WN7DTI) 3080 B-70-8680
Maryland Mobileers
WA3PJQ/3 2855 B-30-8200
Penn Wireless Assn.
W3SK/3(+WN3BLE) 2389 B-40-7746
Woodbridge Wireless, Inc.
K4JVG/4(+WN4NFS) 2250 B-41-6876
Lincoln ARC
K@KKV/@ 2003 B-55-6254
Ampex Employees ARC
K6QEZ/6 1710 B-15-5874
Morris RC
W2OYH/2(+WN2FSQ) 1697 B-23-5830
Carolina Repeater Society
W4MN/4 1457 B-26-4770
Whitewater Valley ARC
W9HN/9(+WN9TNT) 1401 B-15-4706
Skywide ARC
VE3DRT/3 1286 B-14-3860
Concord Brasspounders
W1OC/1(+WN1VRO) 1559 B- 3588
Poway ARS
K6CD/6 1125 B-25-3300
Chelmsford ARA
WA1QYM/1(+WN1VLT) 854 B-13-3092
Chicago ARC
W9CAF/9(+WN9TOT) 897 B-28-2856
Triple States Radio Amateur Club
W8BQV/8(+WN8TPX) 714 B-34-2741
Tompkins County ARC
W2HBC/2(+WN2DUP) 664 B- 6-2412
Southwest Dallas County ARC
K5EIS/5(+WN5SDE) 773 B- 2368
Key City ARC
W5GSN/5(+WN5TEG) 631 B-24-2364
Sunset Empire ARC
W7FBM/7(+WN7DEZ) 674 B-20-2164
Kern County RC
W6LIE/6 532 B-25-2066
Monterey Park ARC
K6GIP/6(+WN6JHQ) 675 B-20-2048
Maple Ridge ARC
VE7CMR/7 555 B-12-2044
Mobile Sixers RC, Inc.
WA3MRV/3 669 B- 6-2036
Staten Island ARA
W2CWW/2 434 B- 7-1736

7A

TRW ARC
W6TRW/6(+WN6HEU) 2126 B-30-6770
Crystal RC
W2DMC/2 1815 B-12-6600
South Hills Brass Pounders & Modulators
W3PIQ/3 1924 B-53-5999
Radio Club of Tacoma
W7DK/7 2218 B-45-5958
Niagara Peninsula ARC
VE3WM/3 1593 B-25-5466
Long Island Mobile ARC
W2VL/2 1894 B-37-5244
Clark County Radio Amateur Club, Inc.
W7AIA/7 1432 B-20-4414
Non Club Group
WB4GBI/4(+WN4HOQ) 1347 B- 9-4140
Cuyahoga Falls ARC
W8VPV/8(+WN8VEL) 1318 B-28-3814
Bergen ARA
K2GH/2(+WN2CCG) 1403 B-24-3660
Victor Valley ARC
K6QWR/6(+WN6AEP) 1068 B-12-3492
Greater Toledo ARA
K8ALB/8 818 B-15-3122
Empire RC
W@RTI/@ (+WN@PJN) 926 B-12-2798
Massasoit ARA
W1MV/1(+WN1UAF) 591 B-23-2582
Associated Radio Amateurs of Long Beach
W6RO/6(+WN6NHV) 795 B-35-2592
Klamath Basin ARA
K7CBP/7(+WN7BML) 792 B-15-2534
Clallam County ARC
W7FEL/7 422 B-12-2152
Toledo Mobile Radio Assn.
W8HHF/8 791 B-30-1632
San Fernando Valley RC
W6SD/6(+WN6JPA) 408 C-50-1359

8A

South Jersey RA
K2AA/2(+WN2DUE) 3706 B-35-11,570
Twin City ARC
W9KQ/9 2617 B-40-7684
Hamilton ARC, Inc.
VE3DC/3 2154 B-32-6664
Tri County RA, Inc.,
W2LI/2 2156 B-36-6140
Peoria Area ARC
W9(IVI/9(+WN9QLO) 2215 B-29-6046
Beaver Valley ARA, Inc.
W3SGJ/3 1221 B-23-3778
No. Hills RC
K6IS/6(+WN6ANV) 1282 B-30-3750
ARC of El Cajon
WA6BGS/6(+WN6HGA) 1123 B-32-3696
Corpus Christi ARC
W5MS/5 784 B-25-3020
Northern Lakes ARC
W@WAS/@(+WN@TDO) 823 B-10-2762
Central Georgia ARC
K4AAK/4(+WN4FNO) 623 B-25-2378
Turlock ARC
W6BXN/6 531 B-25-2294

9A

Four Lakes ARC
W9JZ/9(+WN9RNF) 2466 B-60-7430
Hartford County ARA
W1NEM/1 1731 B-20-5756
Sangamon Valley RC
W9DUA/9(+AK9PID) 1807 C-30-3451
AMCOM Repeater Club
W6RA/6 558 B-13-2368

10A

Mt. Tom Amateur Repeater Assn.
K1MTB/1(+WN1YJS) 1052 B-18-4043
Sonoma County Radio Amateurs, Inc.
W6LFJ/6(+WN6CQE) 857 B-18-3314
North Shores ARC and Convair ARC
K6HAJ/6 836 B-11-2852

11A

Western Wash. DX Club
W7FR/7(+WN7BND) 4358 B-50-12,678
San Antonio RC, Inc.
W5SC/5(+WN5NOR) 2617 B-80-7632

12A

Potomac Valley RC
W3IN/3(+WN3BSV) 7943 C-20-11,645

14A

Metro ARC
VE3MRC/3 2346 B-35-8314

15A

Murphy's Marauders
W1VV/1 10,010 C-25-14,651
Nortown ARC
VE3NAR/3 2846 B-60-10,198

16A

Scarboro ARC
VE3WE/3 3263 B-52-10,931

21A

Englewood ARA, Inc.
W2RJ/2(+WN2CIJ) 2845 B-55-10,186

1B - Battery

AA9CSS/9(+WA9FSB)	318	A-	-3280
W3TQM/3	261	A-	-2760
K9EIV/9(+WN9TLW)	260	A-	-2685
WA3TBW/3(+WA3UCI)	255	A-	-2650
WA6EUZ/6(+WB6OVV)	252	A-	-2620
K2JOC/2 (2 oprs)	348	A-	-2605
W4BRB/4(+WB4OUH)	231	A-	-2510
WA3LHG/4(+K3IMC)	224	A-	-2440
K6LLE/6(+K6EBH)	555	B-	-2096
WB4SYC/4(+WA4AQF)	189	A-	-1990
AA3V5X/3(+WA3YRU)	177	A-	-1970
WA1VUO/2(+WA2IRS)	211	A-	-1910
WA@UCU/@	170	A-	-1800
AA8TYF/4(2 oprs)	163	A-	-1780
W3AZR/3(+WN2EPT)	167	A-	-1770
W3RWW/3(2 oprs)	290	A-	-1630
WB@CJX/@	167	A-	-1550
K2GKV/2	139	A-	-1490
AC9PNE/9	127	A-	-1470
W9LNQ/9(+W9NLE)	132	A-	-1420
W9LYH/9(+W9MPS)	121	A-	-1385
K6TG/6	128	A-	2-1380
K2YAZ/2(+W2UYQ)	138	A-	-1285
WA@AGN/@	150	A-	-1200
WB2WQA/2	103	A-	-1130
WB6AGS/6	95	A-	-1050
WA@ZPT/@(+WA@NSY)	80	A-	- 900
K4EVH/4	70	A-	- 800
W9VOO/9(+W9VAK)	60	A-	- 800
WA3R5G/3	70	A-	- 795
WA4GRO/8	111	A-	- 790
WA2WDZ/6(+WA6OWR)	60	A-	- 735
WB5KUS/5(+WN5MTU)	181	B-	- 676
K4KJP/4	54	A-	- 640
WB9LKC/9(+WB9ICH)	39	A-	- 590
WA1UIG/1	220	B-	- 540
W7FSF/7(2 oprs)	43	A-	- 530
VE2AKI/2(+VE2AYL)	35	A-	- 450
WB3OLA/2	44	A-	- 440
WA5BVI/5(WA6IPS, WN5RCA oprs)	33	A-	- 430
WB2ENJ/3(2 oprs)	58	A-	- 390
K7BFL/7(+W7FSF)	138	B-	- 382
WA4BPL/4	135	B-	-- 370
W@RE/@(+WB5NEN)	52	B-	- 368
AD6CSL	25	A-	- 350
W8RTU/8(2 oprs)	23	A-	- 330
WN6HPB/6	54	B-	- 316
WN6EDQ/6	21	A-	- 310
WN6BYH/6	21	A-	- 310
WA@AGM/@	101	B-	- 302
W7TU/7	18	A-	- 280
WA3GSB/3	74	B-	- 260
AD7CPC/7	16	A-	- 260
W6BKY/6(+WB6FLD)	52	B-	- 246
WB8EHS/8	13	A-	- 230
KL7DQ/KL7	2	A-	- 170
W2WSS/2	8	A-	- 140
WA5NHI/4(+WN4QGP)	2	A-	- 120
W6JTH/KP4	1	A-	- 10
WA3IUV/2	12	B-	- 24

1B

W6SOR/6(+WB6JYQ)	1070	B-	-3348
W3HHV/3(+K3ONW)	918	B-	-2678
WB2KBH/2(+WB2LPX)	1013	B-	-2654
AB2ABD/2(+WB2PAY)	713	B-	-2504
WB6MKY/6(+WA6SNK)	742	B-	-2440
WA8ZFM/8(+WB8SWG)	634	B-	-2404
W6RFU/6(WA6s MWH, PAD, oprs)	598	B-	-2350
AB5QDW/5(+WB5SQG)	697	B-	-2274
K8MFO/8(+K8HHZ)	659	B-	-2262
K@CVA/9(+K@UYN)	1073	B-	-2246
AC4QZF/1(+WA1BXQ)	611	B-	-2192
WB5JJT/5(+WB5KUF)	538	B-	-2092
AA6OWM/6(+WA6BCO)	242	A-	-2090
WB8PIW/8(+WB8OWU)	682	B-	-2058
K6RQ/6(+WN6HET)	843	B-	-2058
WA1QJU/1	630	B-	-1916
WA2ASM/2(+W2OPE)	541	B-	-1912
W6ANB/6	564	B-	-1788
WA2OFV/@	504	B-	-1754
AA@KXJ/6(+WB6MPM)	153	A-	-1650
VE2BYR/2	457	B-	-1626
WB9SOC/9(+WA9MVZ)	503	B-	-1586
WA7QQD/7	351	B-	-1504
WA6WHC/6(+WB6GYJ)	374	B-	-1500
K2EVW/2	309	B-	-1436
AB8RQX/8	439	B-	-1098
WA2LOF/2(+WB2DGW)	448	B-	-1290
KL7IGP/KL7(+KL7EWA)	108	B-	-632
WA4BTK/4	198	B-	-1090
AA4GAJ/4(+AA4BTQ)	262	B-	-1084
WJER/3(+WA3RPO)	356	B-	-1042
K6BET/6(+WB6UTA)	270	B-	- 978
VE3EJE/3(+VE3GXZ)	302	B-	- 964
WA1MYA/1(+WA1NWD	405	B-	- 960
WB@QXN/@(2 oprs)	435	B-	- 936
W3EAN/3(+W3EBY)	272	B-	- 896
W2VSG/2(2 oprs)	364	B-	- 828
WA@MJY/@	351	B-	- 802
AA7YOK/7(+WN7AFL)	290	B-	- 750
W4EIS/4(2 oprs)	206	B-	- 738
WB4RVD/8(+WB4PLL)	301	B-	- 702
AA7ZTT/7(+WA7YFE)	176	B-	- 700
W9BIU/9	288	B-	- 676
WA@GMX/@(+W@YHE)	273	B-	- 646
AB9OAO/9	177	B-	- 600
K4QMD/4(+AK4OWC)	169	B-	- 582
WA3UXZ/3(2 oprs)	173	B-	- 580
WB@KTH/@	114	B-	- 552
WA6VHU/6(+K6OTW)	211	B-	- 522
WB@OBB/VE2	134	B-	- 518
WA6KHH/6	206	B-	- 518
WA6HLV/6(+K7YSV)	197	B-	- 494
WN7DUL/7(+WA7CNP)	94	B-	- 476
WB@LSI/@ (+WB@OFQ)	75	B-	- 446
WB9NSI/9	220	B-	- 442
WB6LSP/6(+WA6DOA)	160	B-	- 438
XJ2XI/3	147	B-	- 394
WA7THF(+WA7VYI)	126	B-	- 390
KL7HER/KL7(+KL7ILA)	75	B-	- 386
WA1TSJ/1(+WA1SHM)	124	C-	- 348
AB6KUM/6(+WB6VVQ)	124	B-	- 298
WN@QFV/@	46	B-	- 284
WB8QMG/HK9	77	B-	- 254
K1CGI/112 oprs)	62	B-	- 224
WA@JYF/@ (+WB@NCR)	40	B-	- 180

Commercial Mains

WA3YQP/3	256	B-	-1010
WB9KZP/9(+WB9GVO)	250	B-	- 922
WB4EDD/4	409	B-	- 818
W5YQ/5	64	B-	- 808
WB5OAO/5(+WB5OAP)	72	B-	- 194
WB@GRJ/@	48	B-	- 192
WN4SSS/4(2 oprs)	46	B-	- 184
WB5ABC/5(2 oprs)	29	B-	- 58
AA8UUY/8	9	B-	- 36

2B - Battery

W5NQC/5(+WB5FTR)	350	A-	-2970
W3PNL/3(+K3NLT)	185	A-	-1570
WA3SVJ/3(+WA3WOE)	137	A-	-1380
WA8QNP/8(+WN8WTR)	265	B-	-1092
WA4GYK/4(+WA4TMG)	244	B-	- 840
WB9NIQ/9(+WN9RHC)	96	A-	- 815

2B

WA@UWF/@ (+WB@ITQ)	1621	B-	-3568
K2PLT/2(+W2DNZ)	715	B-	-2678
K8GIV/8(+K8BQI)	737	B-	-2382
K1FWE/1(+WA1STJ)	526	B-	-1740
AA7KLK/7(+WA7KPH)	639	B-	-1698
WA2BIK(+K2ITT)	362	B-	-1634
WB4DNP/4(+WA4IAM)	586	B-	-1436
WA3KEY/3(+WA3RXP)	390	B-	-1306
W6IBR/6(+WB6JTF)	294	B-	-1276
WA4KKL/4(+WB4PJW)	320	B-	- 890
K1EUM/1(+WA1RTC)	241	B-	- 870
WA2VHH/2(2 oprs)	214	B-	- 660
WB9IYV/9(+WB8KWN)	161	B-	- 598
WB@INJ/@ (+W@PZS)	181	B-	- 562
WN9TIL/9(+WN9SND)	19	B-	- 276

Commercial Mains

WB4TNB/4(+WB4WFU)	530	B-	-1264
WA@MHP/@ (+AK@QJE)	670	C-	- 748

1C

WB6CEP/6	662	B-	-2060
W3AA/3(11 oprs)	473	B-	-1670
W3NZ/3	221	B-	- 984
WA@GSN/6	361	B-	- 852
WA7GOO/7	231	B-	- 754
WA6GTH/mm(2 oprs)	165	B-	- 572
W6FRE/6(5 oprs)	227	B-	- 554
K1FJM/aero	206	B-	- 512
W7LNG/7	119	B-	- 500
WB8RRQ/8	37	A-	- 470
WA6LVS/6	83	B-	- 424
K3ZAW/9,8,3	134	B-	- 368
WA6ITV/6	119	B-	- 338
AC3LG/3	57	B-	- 334
WB6KZN/6	45	A-	- 325
AC4MLA/4	54	B-	- 316
WA6LBP/5	67	B-	- 310
W6QHP/6	102	B-	- 306
WA5VNV/5	99	B-	- 298
K@PFV/@	89	B-	- 278
W6TEE/6	89	B-	- 278
WB@NNK/@	86	B-	- 272
W8VSK/8	51	B-	- 264
WB8JYP/8	74	B-	- 248
K6SMH/6	29	A-	- 245
W87CBA/7	69	B-	- 238
WA@GFS/@	59	B-	- 218
W6HJP/6	58	B-	- 210
K6YS/6	22	A-	- 210
WA@ATY/@	54	B-	- 208
WB4DTS/4	26	B-	- 204
K5MVZ/6(3 oprs)	48	B-	- 196
K4UK/4	47	B-	- 196
WA2FUI/2	46	B-	- 192
WA6KHD/6	30	B-	- 160
WA6ACF/6	10	A-	- 150
WB6IHB/7	14	B-	- 128
WB8TGY/8	9	B-	- 118
WB6PHQ/6	9	B-	- 118
WA6UAF/6	7	B-	- 114
WA6RWR/6	7	B-	- 114
WB6DFO/6	2	A-	- 110
WA6CFI/6	2	B-	- 104

2C

W8CRR/8(7 oprs) 525 C- - 726

3C

W6GQX/4(3 oprs) 836 B- -2162

1D

K4FOK	508	B-	-1978
K@GXR(2 oprs)	1351	C-	-1885
K6FB	888	B-	-1776
WA8UON/8	353	B-	-1412
K2PLF/3	329	B-	-1316
WA5SDV	329	B-	-1272
K3TEJ	306	B-	-1224
W3EWL	343	B-	-1030
WA8LBR/8	961	C-	- 961
W2HUL(WB2FRH opr)	306	B-	- 960
AA4KKP/4	259	B-	- 947
WA5ZUP(2 oprs)	467	B-	- 934
WA3YMA	445	B-	- 890
W5UKH	192	B-	- 768
WN4NKU	187	B-	- 748
AC3ARK	177	B-	- 708
W3PQX(2 oprs)	169	B-	- 676
AA2GKF	219	B-	- 670
W2FPG	303	B-	- 670
W6RNU	313	B-	- 668
WA7TZO	265	B-	- 662
WB9PIR(2 oprs)	197	B-	- 626
W9NIN	601	C-	- 601
WB9IIS(2 oprs)	208	B-	- 590
WA4HWH	149	B-	- 522
AD5MHG/6	128	B-	- 512
K1SZN/@	177	B-	- 480
AD8CVJ	150	B-	- 450
W6IKW	108	B-	- 424
W2RUI(3 oprs)	267	C-	- 424
WB6FHC(2 oprs)	137	B-	- 408
WB6ZWP	178	B-	- 386
WN8TRW	86	B-	- 344
WB4DFV	315	C-	- 315
WB8DSG	120	B-	- 296
WA6CFO	139	B-	- 292
K9DKW/7(2 oprs)	122	B-	- 272
AA1UZH	135	B-	- 270
WA4BIX	65	B-	- 260
KA2AHQ	124	B-	- 250
AD5LZJ	233	C-	- 248
W4MGX	145	B-	- 226
K1TFA	59	B-	- 222
WA@WAU	105	B-	- 210
K7UZP	98	B-	- 196
WB2CLH	67	B-	- 188
VE3HOU/3(3 oprs)	97	B-	- 182
K3YK	70	B-	- 180
WB@JYA(3 oprs)	76	B-	- 180
WB@NWZ	89	B-	- 178
WN2DKF	43	B-	- 172
WB9TPD(multiop)	82	B-	- 170
W6PFE	81	B-	- 162
K8UFW	80	B-	- 160
K6AYB	59	B-	- 154
AK4CMF	38	B-	- 152
W@KFX	70	B-	- 140
WB4YLK	138	C-	- 138
WB@KSD(multiop)	69	B-	- 138
W2HF	69	B-	- 138
W6RQZ	68	C-	- 136
WB4WPI	120	C-	- 120
WB5CVA	56	B-	- 112
W5BWM	53	C-	- 106
WN9RXV	23	B-	- 92
XJ8RO	85	C-	- 85
AA5QPA	40	B-	- 80
AA9FTS	70	C-	- 70
WB4LZS	18	B-	- 72
WB3AYZ	18	B-	- 72
W4OT	61	C-	- 61
WA6HAD	15	B-	- 60
WB7CTJ	18	B-	- 48
K3MGQ	24	B-	- 48
W4IZI	10	B-	- 40
WB8LFD	14	B-	- 36
WA7NWP	14	B-	- 28
WB6ICN	11	B-	- 22
WN4PSL	5	B-	- 20
W7PSS	15	C-	- 15
W@ICG	6	A-	- 12

2D

WB2FYS(6 oprs)	1382	B-	-3460
W9KX/9(5 oprs)	2419	C-	-2601
WA3EPT(4 oprs)	1537	C-	-1886
NN3SI	1238	C-	-1563
WB6KGM	381	B-	-1224
W3PIE(7 oprs)	503	B-	-1092
WA7SCS/7(20 oprs)	351	B-	- 708
W3EGK(2 oprs)	265	B-	- 530
WB8ZLK/8(2 oprs)	33	B-	- 66

3D

WB2WWP(12 oprs)	1076	B-	-3432
W1KBN(4 oprs)	175	B-	- 362

4D

WB@ANT(5 oprs) 4173 C- -4631

1E - Battery

W4WHK	275	A-	-2750
W2HVO	225	A-	-2050
WA1WVK	163	A-	-1630
WB4ZDW	303	B-	-1006
K6FO/6(4 oprs)	218	B-	- 488
WA4GSA	39	A-	- 390
WA6GVV	36	A-	- 360
K9DVB	173	B-	- 346
WA2RHA	27	A-	- 135
K7UWT	59	B-	- 134

1E

K3GJD(9 oprs)	1030	B-	-3292
W8VND(9 oprs)	881	B-	-2172
W2DUS	76	B-	- 304
WB4CKY	115	B-	- 230
WN2EYA	42	B-	- 168
K6SMH	34	B-	- 68
W1BB/1	11	B-	- 44

3E

W9QYQ(10 oprs)	726	B-	-2094
W8FT(10 oprs)	595	B-	-1464

4E

W2OW(8 oprs)	465	B-	-1396
W2YKQ(7 oprs)	392	B-	- 822

The Ten-Four Good Buddies, WB4AIN/4 (2A), from top to bottom are Bob Kappes, WA4WWT, WB4ASW, WB4HNH, WB4AIN, WB4HEK and WA4LIP.

Check Logs

VE3AWE, VE3GVD, VE4IN, K1VBS, W1DMS, AA2EJZ, W3AEA, W3QDI/3, K4WHZ, W4RYZ, WA4GNI, K5CF, K5MXO, W5KR, W6BVN, AA6BFK, WA6MBZ, W7TO/7, K8MJZ, W8JFT, W8NCD, WB8UPZ, K9LOD/9, W9PTI.

watts or less, B is greater than 10 watts but less than or equal to 200 watts, and C is greater than 200-watts input), number of participants (if known), and total score. Listed in descending order from highest to lowest score.

Class B stations are those portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power (same as class A), and final score.

Class C are mobile stations. These are listed by call (no. of operators), number of contacts, power (same as class A), and final score.

Class D are home stations using commercial power sources. These are listed by call, number of contacts, power, and final score.

Class E stations are home stations utilizing emergency power sources. The listings include call, number of contacts, power and final score.

Feedback

In 1975 FD listings, category 5A, K9BPL/9, Motorola Engineers-Schaumburg were credited with the wrong score. Instead of 4756 the score should read 8674. This moves K9BPL/9 from the 14th position in the standings to 4th place. Also the photograph on page 62 "FD Results" in November 1975 *QST* was really submitted by WB2EGR, *not* WB4CMQ/4. QST

Strays

STOLEN EQUIPMENT

□ Stolen during break-in to home. Collins 75-S-1 and 32-S-1, serial no. 10129; Heath HW-12; 75A4 receiver, serial no. 1593. Contact M. K. Peters, W3FBI, 2238 Clairmont Dr., Pittsburgh, PA 15241.

□ Drake TR-22, serial no. 640139. Rick Simpson, KØUZP, 2723 Rigel Drive, Colorado Springs, CO 80906.

□ Wilson T1402, serial no. OR6427. James Hettle, PSC 1, P.O. Box 2493, Peterson AFB, CO 80914.

□ Yaesu FR-101SD1G, serial no. 6C31339; Yaesu FL101, serial no. GE306276. Associated Electronics Service, 404 Arrawana, Colorado Springs, CO 80909.

□ Stolen from auto in Rockland County on Aug. 29. Drake MN-2000, serial no. 6485; Heath SB-650 freq. counter. Cliff Cooley, Jr., WN2GHL, 4 Camp Hill Rd., Pomona, NY 10970.

□ Kenwood TS-520, serial no. 340130, inscribed with soc. sec. no. 125-56-4056 and M. Ornstein; Murch Elec. UT-2000A, serial no. unknown. Marc Ornstein, WB2JUF, 158-08 72 Avenue, Flushing, NY 11365.

□ Stolen from auto in Downey, CA, on Aug. 10. Swan 2X, serial no. 11590. Percival R. Henkelman, VE6AXK/W6, 7349 Via Amorita, Downey, CA 90241.

□ Complete repeater station stolen from Mingus mountain site. Two IC22A transceivers, serial nos. 3410443 and 3410424; IC30A, serial no. 3803669; PRO-7 scanner. Wm. Oliver Grieve, W7WGW/WR7AFC, licensee WR7AFC.

□ Stolen from parked car in Kansas City, MO. Drake TR 22, serial no. 410839. Steve Lufey, WBØLFY, 4111 Harrison, Kansas City, MO 64110, or Kansas City Police Dept., case report no. J-02222.

□ A Drake TR22C, serial no. 850008, taken from auto Aug. 11 in Long Island City, NY. J. Garry, W2UKJ, 36-05 218 Street, Bayside, NY 11361.

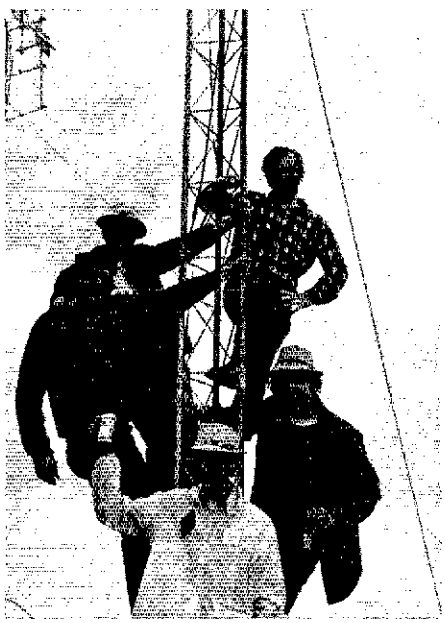
June VHF QSO Party Results

ZAP! KAPOW! WHAM! THUD! WA1PID's 1974 expletives are repeated, not deleted, for this 1976 record-breaking vhf activity.

By Jim Cain,* WA1STN

Good band conditions and activity sounded the death knell for many records in the 1976 June 12-13 VHF QSO Party. The all-time division leader listing elsewhere in this report shows what happened to over a dozen single- and multi-operator station records. The six-meter band really played beautifully, with K9DKW/7 leading all with 68 multipliers, best ever on six. The weekend was quite a warm-up for more good 50-MHz propagation during Field Day a few weeks later. We raised the minimum number of six-meter multipliers to 40 (for listing in the multiplier box) and still had more stations there than ever before. Log returns were up about 14 percent this year over the last several, 406 total.

*Asst. Communications Mgr., ARRL



K7KOT/7 operators (top to bottom): WA7NAN, W7DNU, W7GLS, K7WTG and K7KOT. Safety first, of course; man with canned drink is standing on ground (or else he has a hook in his back).

Top Ten

SINGLE OP		*MULTI-OP*	
K6YNB/6	60,342	W3CCX/3	144,979
VE3ONT	56,108	WB2WIK/2	106,399
K8III	29,748	W6AMT	105,080
K9DKW/7	29,250	WB6PXP	101,016
W2CRS	27,375	W1DC/1	89,046
K8LEE	25,346	WA2SMA/2	85,293
W5QDB	24,824	WA6JUD/6	81,213
WA4GPM	19,264	W3BBS/3	80,544
W6KQG	18,762	W2SZ/1	74,000
K1PXE	17,820	WB2FKJ/2	72,030

K6YNB's single-operator score of over 60 kilopoints is another new all-time record. (Wayne set the previous record in 1974.) This was the fourth year in a row that he has led the entire field in single op; 89 multipliers on five vhf bands is certainly all-time tops for a station in the western reaches.

Close on K6YNB's heels was VE3ONT, making good use of what is obviously a fine geographic location for the type of band conditions we had in June. Plenty of locals, plus six meters for DX.

Pack Rats station W3CCX/3 led all multi-operator entries with another new high for them, 144k; three California-type multis made the top-ten listings, making use of fm on two meters with much success. Only four call areas are represented in the multi top-ten box, but *eight* appear in the single-operator listings, only the sixth and eighth call areas managing two listings. Nice representation from all over.

That W2SZ/1 you heard was the old WA1MUG group, somewhat diminished in size this year. They still made West Massachusetts readily available. Mountaintopping was, of course, the order of the day just about everywhere, with most all the usual spots staffed by one group or another. The W4BFB/4 contingent continued to set new Roanoke Division records, up-and-coming W4VO/4 (the Northwest Georgia ARC) held sway in the Southeastern Division, WA6JUD/6 and Northern California Contest Club friends dominated Pacific, and on and on.

Comments on the fm rule, new in June and tried again in September (as this is written), were virtually unanimous in favoring the idea; in fact, probably half the comments were to the effect that "the new rule is OK, but let's go all the way and outlaw fm contacts altogether." The CAC will be looking at the situation very carefully this winter, keeping your comments in mind.

Please note a slight change in the coded listings of bands operated, in the line scores for each station. At the suggestion of Dick Knadle, K2RIW, we added codes for the following bands: 2304 MHz (F), 3300 (G), 5600 (H) and 10,000 (I). Where there wasn't enough room on a line to list, say, all bands 50 through 10,000, we used the code A-I. In the future, make sure your summary sheets clearly indicate bands operated above 1215, so we can make the proper notation in your line score.

Those of you who worked WØNRI as three sections may be surprised to find that entry listed as "Montana." At their request Montana it was, although those who claimed all three multipliers were given credit for all three. Policy has been to count borderline operations competitively as only one state/section; the CAC is presently investigating the procedure and would welcome your

The WØOHU/Ø group says, "We're in front of the 6-meter operating position . . . it's 95 degrees F., the band is terrible, and we are out of beer." Left to right: WØOHU, K9AKS, WA9CWY, K9UYK, WBØSJJ, WB9QPI and K9CHZ.

comments. And while you're at it, go back and reread the report of the last VHF SS (August *QST*) and send the CAC your comments on the items mentioned in that article. Thanks to those who sent comments in with their QSO Party entries; all have been forwarded to the CAC, and special thanks for all the pictures! Vhfers are way out in front when it comes to submitting pictures and soapbox comments, and we do appreciate it.

Finally, a few corrections to that VHF SS report. The single-operator score of K8LEE, Ohio section, was calculated incorrectly; his multiplier should have been 42, and revised score of 26,544, instead of 55 multipliers. The Maryland-DC section winner was W3CJK, *not* W3CKJ as listed. Finally, we dealt a double blow to the group at W4VO/4; not only should they have been listed as Southeastern Division multi-operator winners, they should have also been listed as the all-time division leader in the box on page 81. Sorry!

Soapbox

50-MHz E-skip sure helped score, but why, oh why, did the 144-MHz Es, prevalent just hours before the contest started, not reappear? 1296 sure is

Mary, WAØCSL, was a welcome addition to 160 logs on 6 meters. She's obviously active on other bands, as the picture shows.

interesting . . . why don't more guys use that band? — (WB2WIK) Gary (WA7FSI) and XYL, Laurii, set up at Frost Peak, 5832 ft., s.w. of Kellog, Idaho. . . . Lots of snow, in fact, the peak was in the clouds both Saturday and Sunday, but we were fortunate in that it only snowed all day Saturday and half of Sunday. The wind blew over the 6-meter beam so much, that the

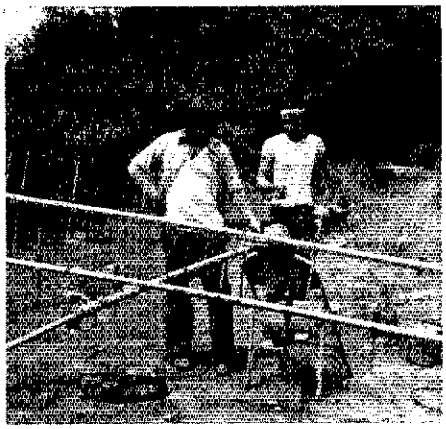
Multipliers Per Band

Min. Sections / *MHz*	*40* / *50*	*15* / *144*	*5* / *220*	*3* / *432*	*2* / *1215*
VE3ONT	46	19	10	8	
VE3FHK	41	8			
K1PXE	1	21	13	15	5
WA1IOX	28	17	4	6	
WA1LOU		19			
WA1EXE		15			
W1FAJ		9	5		
WA1FFO*	49	21	10	15	
AC1AW*	20	6		5	
W1JAA	29	13	7	13	1
WA1KIR	40	3	2		2
WA5IDD/1	27	7	4	3	
K1LOG		15		3	
W1MX*	42	15	12	15	
WA1OAM	36	17	1	8	1
W1YTW	22	13	8	6	
K1MNS	33	13	6	9	
WA1OUB	33	15		2	
W1DC/1*	42	16	13	18	3
W1FMF*	46	15	6	8	
WA1IWK	31	12	5	3	1
K1KEC/1	1	1	3	3	1
W1FJH		19			
W2SZ/1	42	18	15	18	7
W2CRS	41	17	5	10	
WA2TEO	12	18	9		
W2CXC				9	
W2HKT				7	
WB2FKJ/2*	41	20	14	16	6
K2CBA	34	19	1	8	2
K2OVS		17		6	
K2RIW				16	2
WB2TCC		16			
W2HI		18			
WB2NED		5		3	
WB2VWW	22	20			
WB2CUT		18			
W2OMS				17	6
WB2WIK/2*	47	21	15	15	5
WA2SMA/2*	39	21	11	10	
WA2FZW	32	18	10	6	
WA2UDT/2*	32	18		6	
K2DEL/2*	39	10	6		
W2EIF	16	19	10	9	2
K2BWR*	46	16	12	11	
K2KNV	35	20		5	
WA2ZJF*	33	14		9	

Min. Sections / *MHz*	*40* / *50*	*15* / *144*	*5* / *220*	*3* / *432*	*2* / *1215*
WA3QPX	16	11	1	4	
WA3VJU/3	40	11		5	
WA3UFU	17	19	5	7	
K3IPM	33	9		5	1
K3IWK	28	15			
K3HTZ		16		7	
K3WHC		11		11	
W3CCX/3*	50	21	15	17	10
W3BBS/3*	41	22	14	15	4
W3TMZ		21		18	
W3KMV	19	13		55	
WA3LND		17		4	
WA3NNZ		15			
K3IVO*	25	16	1	10	
W3PGA	24	13	8	8	
W3OMY		18			
WB4YAB	57				
WB4VLH	49				
K4LWZ	44	4			
WA4MVI	26	8		3	
W4VHH		10		6	
W4BFB/4*	42	11	1	3	
W4PAR/4*	35	9	1	3	
WB4BSZ	43	2			
K2YRZ/4	48	4			
W4OJU	49				
WB4BND	44				
W4SGI*	24	5	1	4	1
W4GZX/4*	40	7		1	
WA4GPM	33	19	1	11	
K2UOP/4	33	10		4	1
W4UCH	22	9	5	5	1
WA2CJK/4		19			
W4FJ				13	
WB4HQE				6	
WA5UUD	59				
WA5CZV	46	6			
W5TRB	52				
WB5AXC/5*	60	1			
K5GMX	49	6			
AC5WAX*	52	10			
W5QDB	54	3		1	
WA5IYX	48				
WA5QCP	51				
K5ZMS	45				
K1VPD/5	42				
W6BXO	29	6	4	6	

Min. Sections / *MHz*	*40* / *50*	*15* / *144*	*5* / *220*	*3* / *432*	*2* / *1215*
WA6JUD/6*	47	7	6	6	3
W6AMT*	48	8	7	7	1
WB6PXP*	55	10	5		2
K6YNB/6	56	11	9	9	4
K6BPC/6*	40	8	4	8	4
K6QAX	39	6	6		
WB6KAP	25	7	2	3	
WB6JNN/6		3	9	2	
K6TJL/6*	38	10	8	8	
K6GSS*	39	7	4	4	4
K6DYD	51	5			2
WB6NMT	33	8	5		
WA6AWM*	40	4	1		
W6KQG	50	6		3	
WA6BMV/6*	9	4		3	
K6QHC	53	3			
K6JKQ	11	6	6	3	
WA6NRV*	52	9		6	
WB6NKM	38	3		4	4
K6RNQ	42				
K9DKW/7	68	6	3	1	
K7PXI	52				
WA3ISY/7	41				
W6LEV/7*	38	9	5	5	
WA7RTA	40	4	2	2	1
K8LZL/7	44				
K7KOT/7*	48	3	2	3	
WB8BGY	45	6		4	
K8III	50	17			
K8LEE	43	13		2	
WA8CLN	47	7			
K8UQA				17	
W2CNS/8*	45	20	12	17	
K3LNZ/8	33	14	7	5	
K9HDE	44	7		4	
W9KDR	47				
WA9HHH*	42	6	2	2	
W9NFE	49				
K9UVJ	35	9	2	4	
WB8HUC/9*	61	11			
WA9HCZ/9		5		3	
KØDAS		9		4	
WØOHU/Ø*	53	10	4	3	
KØTLM*	46	4		2	
WAØMRH	49				
WA2HJF/C6A	39				
ZF1XW	39				

*Mulit-Operator Station



K2OWR (l) and WB2WIK speculate on the chances of that small tower surviving; it didn't, and ended up being replaced by a lowly extension ladder.

XYL-type Armstrong Rotator often became the tower maintenance crew as well. – (WA7FSI) A big thanks to the local fm guys for putting up with all of the simplex DXing. I didn't hear one snide comment during the contest. – (K8DIO) Last year we worked very hard on antennas and ran low power (50 watts). This year we bought long Yagis and worked very hard on an amplifier (250 watts). We should have stuck with last year's antennas. We had to work all contacts off the *back* of our array! – (W3NGR) We had an almost continuous opening to the West Coast during the contest. Very few East Coast stations heard and also spotty contacts with the southern states. Worked ZF1XW for my first foreign QSO on 6 meters. – (WAØCSL) Overall activity in the June contest was up slightly from last year. Band conditions on 2 meters and up were normal until Sunday evening when there was some coastal tropo down to Virginia and North Carolina. I believe 6 meters had E-skip but I couldn't take advantage of it with the one watt out from the HA650 I borrowed. – (K1PXE) I hope to have a 2-meter amplifier next time. One watt just isn't enough! – (WB6EMR) Surprised to hear no A3 emission (a-m) on 50 and 145 MHz! – (WB8DSG) Spent a lot of time listening to K2RTH talking to stations that I couldn't hear – guess I'll have to get the antenna higher. – (K2OVS) Now, THAT was more like it! Excellent 6-meter conditions throughout, including Sporadic E on Saturday afternoon, some scatter Saturday evening and Sunday, and double-hop to California Sunday night! – (K4MSG) Things were pretty spotty here until Sunday night. Then things got as hot as I could handle for a few hours. Actually, that period of Es activity was a real blessing. Being an apartment dweller, I was using an indoor dipole six feet off the floor on 50 MHz . . . and the band opening made it considerably less of a struggle. Thanks to those ops, who were willing to dig through the QRM for me. – (WA9ETW) Construction is already underway on 2304 MHz. Look for us there next June (as well as 6 thru 1296). – (WB2FKJ) Where, or where were all the local folks on 223.50- and 446.0-MHz fm simplex? – (W3MSN) Apparent misunderstanding. Thought we had permission to stay on 2700-foot Mount Tamalpais. However, at 9 A.M. Sunday, rangers approached and told us to get off in an hour. We were forced to find a new QTH and ended up at a spot of only 100-foot elevation. However, that's the fun of mountaintopping(?)! –

WA9HHH, WØDYI and WAØIYY do their thing at the HoHoHo station.

Division Leaders

SINGLE OP	*DIVISION*	*MULTI-OP*
K2KNV	Atlantic	W3CCX/3
K9HDE	Central	WB8HUC/9
WAØCSL	Dakota	WØOHU/Ø
WA5UUD	Delta	W4SGI
K8III	Great Lakes	W8ULC
W2CRS	Hudson	WB2WIK/2
WØSEA	Midwest	KØTLM
K1PXE	New England	W1DC/1
WA7RTA	Northwestern	K7KOT/7
W6KQG	Pacific	WA6JUD/6
WA4GPM	Roanoke	W2CNS/8
W5TRB	Rocky Mt.	WB5AXC/5
K2YRZ/4	Southeastern	W4VO/4
K6YNB/6	Southwestern	W6AMT
W5QDB	West Gulf	AC5WAX
VE3ONT	Canadian	VE3US/3

(WA6BMV) I say the operation was atypical because, contrary to tradition, we were pretty well set up before the beginning of the contest, and had remarkably little equipment trouble during the bash. – (WA9HHH) Guess the highlight of the contest was the late night E-layer opening into California and other western states. The XYL loved it as she worked 6 mostly. – (WB4EXW and WA4NOY) We encountered snow, high winds, and rain at the 8172-ft. campsite. You can just imagine what it was like with one cold wife, two bored kids (3 and 10 years old), one soaked German shepherd, and me (very frustrated!), all crammed in a 1962 Ford Econoline Van. – (WB7AOB) It was certainly nice to hear all that activity on 432. Had a ball even if my score is modest. – (W2HKT) I worked K1WHS for the first time and we'd been trying, unsuccessfully, daily for a month! I worked multiple stations in EMA, NH, CT and Maine, many of whom were running low power. Tropo lives! – (K1FJM/4) A veritable traffic jam on 1296 MHz!! A considerable increase in activity and equipment quality since last year. Looking for bigger and better things to come! – (K6ZMW) I picked up 5 new states and would have gotten a lot more if my XYL hadn't had such a long "honey do" list. Hi! – (WA7LHZ) Two meters was something else! – absolutely dead at this QTH (save for the local 2-meter fm crowd). Two bonus states were picked up on random meteor-scatter skeds. Anybody in Alabama and Georgia interested in meteor skeds? – (K2YRZ/4) Sunday morning produced a good tropo opening in the Wisconsin, Minnesota, Illinois, Iowa and Nebraska areas. – (KØDAS) Plenty of activity on 6-meter ssb. Wish that more ssb operators, who have a-m capabilities on their rigs, would come up on a-m and exchange points with us a-m-ers. – (WA1GDR) The contest was active and enjoyable on Saturday afternoon, but it died on Sunday afternoon,

CANADA

Maritime-Newfoundland

VO1MO 162- 18- 9-A

Ontario

VE3ONT 56,108-650-83-ABCD
VE3FHK 9800-200-49-AB
VE3EYR 924- 66-14-AB
VE3AVN 637- 49-13-B
VE3FHM 174- 29- 6-B
VE3WL 114- 19- 6-A
VE3US/3(+VE3s ABG DOX FKU GVH) 1365- 66-21-AB

Manitoba

VE4AS 4305-120-35-ABD
VE4YW 224- 28- 8-A

Saskatchewan

VE5DX 3600-120-30-AB

British Columbia

VE7ASM/7 9048-232-39-AB
VE7SL 3737-101-37-A
VE7XF 2744- 98-28-A
VE7AZG 1200- 58-20-ABD

U.S.A.

1

Connecticut

K1PXW 17,820-236-55-ABCDE
WA1IOX(K1ZND opr) 14,630-243-55-ABCD
W1GRW 3277-113-29-A
WA1GTP 2496- 78-32-AB
WA1LOU 1919-101-19-B
WA1EXE 1485- 99-15-B
WA1EHI 636- 53-12-B
W1FAJ 602- 37-14-BC
W1FEZ 460- 46-10-B
WA1UBX 160- 20- 8-B
W1HDQ 144- 24- 6-B
K1ZZE 135- 27- 5-AB
WA1INL 110- 22- 5-B
W1WEE 96- 24- 4-B
K1TFA/1 71- 18- 4-B
WA1FFO/1(+K1HTV,W1DGL, WA1NGR) 62,605-593-95-ABCD
K1ZKR(+K1SYI,WA1s HYN LMZ) 15,317-289-53-AB
AC1AW(WA1s NRF OCU,WA3JSU oprs) 3565-106-31-ABD

Eastern Massachusetts

W1JAA 15,183-197-63-ABCDF
WA1KIR 9776-202-47-ABCE
WA1MKE 6240-160-39-AB
WA5IOD/1 6109-134-41-ABCD
K1OAT 3668-131-28-A
AC1CRL 1176- 54-21-ABD
WA1NQV 1160- 58-20-AB
K1LOG 882- 44-18-BD
WA1LXP 80- 10- 8-A
W1JOT 75- 10- 5-BDE
W1MX(WA1s RLI TWD,W2QHQ, WA4TTG,WAØUCU oprs) 51,996-556-84-ABCD
WA1OAM(WA1s DRO ONB OZI PBU QWF VFJ,K1VSK) 31,915-464-65-A-F,I

Maine

W1YTW 9947-176-49-ABCD

New Hampshire

K1MNS 14,823-218-61-ABCD
WA1OUB 9100-178-50-ABD
W1JSM 946- 42-13-B
WA1GDR 45- 9- 5-A
W1DC/1(K1s KEC MUC NZQ SVF TWF,W1s BXI GUU OOP PFX PVF QXX, WA1s GVH IRH IZO LXU MHJ MSK NPN NVC QGJ QYH QYM RSP TZV UGJ YAM,WN1s VEO YCR oprs) 89,046-816-97-A-I
W1FMF(+K1MFQ,W1BXM,WA1s ABV FSZ GUD RWP) 37,875-481-75-ABCD
WA1PQY/1(+WA1RGA) 240- 40- 6-B

Rhode Island

K1COW/1 572- 44-13-AB

Vermont

WA1IWK(WA2BLM opr) 14,522-259-53-A-F
K1GYT 5194-106-49-AB
W1AIM 4092-124-33-AB
K1KEC/1(+K1NZQ,W1PVF) 216- 13- 9-ABCDE

Western Massachusetts

W1FJH 1064- 56-19-B
WA1AIP 28- 7- 4-B
W2SZ/1(K1RQF,WA1s IQJ KQL NWG,WB2BXP oprs) 74,000-630-100-ABCDE
WA1UOL/1(+WA1s WRL WRM) 2408- 86-28-AE

2

Eastern New York

W2CRS 27,375-346-73-ABCD
WA2IED 5889-139-39-ABC
W2CXC 234- 13- 9-D
W2IP 147- 21- 7-B
W2HKT 126- 9- 7-D
WB2FKJ/2(K2s ARO ONR UKE, W2s AWX CXC HCQ HHC KBH KGC,WA2s HAQ ZPT,WB2s DVV NCT NKN SUH UCY YQU, K8BBC oprs) 72,030-623-98-A-E,I
K2CBZ(+W2KHQ,WA2s LNA PVV UYE,WB2s BYP DUS KRS QFS) 18,046-265-64-ABCDE
WB2NPR/2(+K2BGU,WA2HRE) 5298-134-37-AB

New York City-Long Island

WB2GLQ/2 4270-122-35-AB
K2OVS 2737-103-23-BD
K2RIW 2232- 60-18-DF
WB2TCC 1392- 87-16-B
W2HI 1332- 74-18-B
K2PAY 1280- 64-20-AB
WA2SRH 938- 67-14-B
K2YGM 720- 90- 8-B
WA2SLY 630- 45-14-B
WA2EUS 414- 37- 9-BCD
WB2NED 168- 16- 8-BD

Northern New Jersey

WB2VWW 6930-165-42-AB
WB2CUT 2124-118-18-B
W2OMS 1978- 40-23-DE
WB2TMD 940- 47-20-A
WA2CLM 10- 5- 2-B
WB2WIK/2(+K2OWR,WA2s OBD NXO,WB2s OHV UIJ YGT) 106,399-903-103-ABCDE
WA2SMA/2(WA2s AXB HDE HLE RIV UPK,WB2s JCP QEA QOQ UXA VBS oprs) 85,293-936-81-ABCD
WA2FZW(+W2HVA,WA2s GEZ QOJ) 20,262-282-66-ABCD
WA2UDT/2(+WA2WSK,WB2LDE) 14,896-256-56-ABD
K2DEL/2(K2s IXE KDQ TKR, WA2s BSU CRF CXS JIM RYC, WB2s KKO UAN VLC oprs) 13,860-242-55-ABC
WB2YGF(+WA2WJY) 8188-176-46-ABC
W2ODV (WA2s FUI JVK, WB2JVN oprs) 140- 35- 4-B

Southern New Jersey

W2EIF 11,368-164-56-ABCDE
WB4NXY/2 585- 39-15-A
WA2QUI 455- 35-13-AB
WA3IUV/2 108- 27- 4-B
K2BWR(+K2ZRJ) 23,885-245-85-ABCD
WB2LCC(+WA2IVO) 707-101- 7-B

Western New York

K2KNV 17,040-277-60-ABD
WA2IKO 5032-134-37-ABCD
WA2TEY 2320- 80-29-AB
WB2DHR 779- 41-19-AB
W2WGL 468- 36-13-B
WA2HYK 429- 39-11-B
K2EVJ 220- 20-10-AE
WA2ZJF(K2s IJ JJI RKW, WA2s RQC TOI,WB2s BGI ERK FBP oprs) 13,328-226-56-ABD
W2OW(WA2s BSN YYH ZJP ZRO, WB2s FLO GHH SGS oprs) 5994-161-37-ABD
AA2BPE(+WB2RKD) 2790- 90-31-AB
K2LDT(K2GUG,WA2s CEH KUO NHP OLW ZZZ,WB2CHR oprs) 2172-181-12-AB
WB2BRP/2(+WA2s AJQ DKC, WB2VUO) 1230- 81-15-ABD

3

Delaware

WA3QPX 2816- 83-32-ABCD
W3BDP 1200- 75-16-AB
WA3THL 176- 22- 8-AB

Eastern Pennsylvania

WA3VJU/3 10,696-181-56-ABD
WA3UFU 9702-173-49-ABCDE
K3IPM/3 9118-194-47-ABD
K3IWK 6923-161-43-AB
WA3RJM 4356-121-36-AB
WA3CSP 3008- 94-32-AB
K3HTZ 2461- 94-23-BD
WA3EYD 1848- 88-21-AB
K3WHC 1804- 60-22-BD
K3SWZ 784- 56-14-B
W3ETB 420- 39-10-ABC
WA3KFT 380- 37-10-ABC
AA3HIT 266- 36- 7-ABC
W3CCX/3 (K2EVW,W2EIF, WA2MWB,K3s BPP DLS EOD GAS IGX IUV JJZ MWV MXM,W3s CL CXU ELX HMU HQT KKN YXF ZD,WA3s AXV JUF NFV NGK NUF OVH UDS UXM YUE YZC ZRE,WB3CIT oprs) 144,979-1052-113-A-I
W3BBS/3(+K3s CP FFX FMF IJX RYL,W3s AAX BW GPX OWP ZMN, WA3s BRW KOZ UGP VQR VVG WIM YRK ZCP,WB3AMY, WN3ABE oprs) 80,544-752-96-ABCDE
WA3IEM/3(+WA3IGV) 6118-133-46-AB
W3LP(W3s GFN JUZ,WA3CUQ oprs) 930- 60-15-ABC
W3HZU(K3s FHC GDI SZY, W3FLD,WA3GYG oprs) 708- 59-12-AB

Maryland-D.C.

W3TMZ 7605-150-39-BD
WA3DMF 6230-170-35-ABCD
AC3KMV 6179-150-37-ABD
K3FPE 5824-182-32-AB
WA3LND 3045-135-21-BD
WA3NNZ 1170- 78-15-B
W3MSN 770- 53-14-ABCD
W3JPT 728- 56-13-AB
W3RWW 272- 34- 8-B
W3TFA 189- 18- 7-ABCD
WA3YKI 185- 37- 5-AB
WA3UPH 141- 47- 3-B
W3HZP 28- 5- 4-ABCD
K3IVO(W3DPU,WA3s TID YBY, WB3AMF,WB4ACJ,WB8CXB oprs) 13,572-234-52-ABCD
W3PGA(K3s FME FRX PHH ROJ YZY,W3VRD,WA3s HZJ LAW, WB3AJW,WN3BIT oprs) 13,091-222-53-ABCD
W3EAX(WA1NQG,WA3YTP oprs) 1197- 53-19-ABCD

Western Pennsylvania

WA3ANO 1710- 90-19-AB
W3ANX 1660- 83-20-AB
W3OMY 1494- 83-18-B
AC3BWU 1440- 80-18-AB
W3HDH 520- 40-13-AB
W3DJM 261- 29- 9-AB
K3YVN 48- 16- 3-B
W3BRG 45- 9- 5-B
K3HKK(K3s EZS LVO PLX RBH, W3s HDH KJM,WA3s IGF LKW oprs) 4851-147-33-AB
W3NGR/3(+WA3BUX) 507- 39-13-B

4

Alabama

WA4NPL 1566- 58-27-AB
K4WHZ 275- 25-11-A
WA4CQG 209- 19-11-B
WB4OQT 190- 19-10-AB

Georgia

WA2JVO/4 4824-134-36-AB
WB4WXE 2025- 75-27-A
W4ISS 234- 22- 9-ABD
W4WDH 224- 32- 7-B
W4SHL 26- 13- 2-B
W4VO/4(K4s AEK CKS, WA4s JTH PFP, WB4s AEG YWK, WN4IBI oprs) 17,682-421-42-AB

Kentucky

WB4YAB 14,307-251=57-A
WB4VLH 5635-115-49-A
WB4MCC 4224-132-32-AB
W4SMU 624-104- 6-B

North Carolina

K4LWZ 10,032-209-48-AB
WA4MWI 5587-147-37-ABD
WB4LDO 4676-167-28-AB
WA4GBE 2088- 66-29-ABD
WA4WZQ 2000- 80-25-AB
K1FJM/4 1140- 76-15-B
W4VHH 1056- 52-16-BD
WB4LDP 261- 29- 9-AB
W4BFB/4(K4s BWS GHR LVV MQG SAN SLC, WA4s APD ICM VCG,WB4s AMU BXW CCW IBW YFC,WN4s BQC CJA oprs) 30,666-526-57-ABCD
W4PAR/4(K4s FMC HGK, W4s IPP LYV OTI UIJ WAU,WA4s HAZ JVO KFF oprs) 10,272-204-48-ABCD
WA4NOY(+WB4EXW) 3480-116-30-AB

Northern Florida

WB4BSZ 6570-146-45-AB
W4CSS 2380- 70-34-AB
WB5MAC/4 1792- 56-32-AB

South Carolina

W4IQQ/4 (K4s ADI LQO, W4LZW, WB4s HKZ NBK PGG YII oprs) 6231-201-31-AB

Southern Florida

K2YRZ/4 12,012-231-52-AB
W4OJU 10,633-217-49-A
WB4BND 5324-121-44-A

Tennessee

WA4ALJ 6513-163-39-ABD
WA4IAX 1820- 70-26-AB
W4SGI(+K4WS, W4s LQE ZXB, WA4IRG)11,480-321-35-ABCDE
W4GZX/4(WA4s IWN NIV ZXD, WB4JGG oprs) 10,320-215-48-ABD

Virginia

WA4GPM 19,264-278-64-ABCD
K2UOP/4 9696-193-48-ABDE
K4MSG 5358-141-38-AB
W4UCH 5208-110-42-ABCDE
WA4MMP 4699-126-37-ABC
WB4RDT 3842-113-34-AB
WB4WLW 3120-130-24-AB
WA2CJK/4 1501- 79-19-B
WA4SIQ 1416- 59-24-AB
K5DZF/4 1068- 89-12-B
K4FTO 903- 43-21-AB
AC4WSF 549- 61- 9-B
W4FJ 520- 20-13-D
W4KMS 490- 35-14-A
K4CFB 464- 58- 8-B
WA4EPI 330- 29-11-ABD
WB4HQE 180- 15- 6-D
K4FJW/4 126- 18- 7-A
WB4NTV 75- 15- 5-A
K4LHB 40- 5- 4-C
W4QCW(+K4ZRX, WA4s FMS KNP QOC,WB4BVY) 7888-232-34-AB

West Indies

KP4AHQ 1026- 57-18-AB

5

Arkansas

K5MWH 408- 34-12-B

Louisiana

WA5UUD 14,396-244-59-A
WB5CZV 8268-159-52-AB
WB5LYF 4280-107-40-AB
W5JFB 1081- 47-23-A
WA5YOU 1008- 42-24-AB
WA5QBX 940- 47-20-A
K4CHE/5 160- 18- 8-ABD

Mississippi

K5TYP(WA1JUP,K7VAY, WBØRHV, Len Potter oprs) 4060-116-35-AB

New Mexico

W5TRB 9464-182-52-A
WB5AXC/5(WA1GFM,K5EFW, WA5MHR,WB5FSQ oprs) 23,424-384-61-AB
W5IXS(+W5IXR) 2070- 90-23-AB

Northern Texas

K5GMX 14,672-262-56-ABE

Oklahoma

WB5DSH 1272- 53-24-A
AC5WAX(+K5s BXG LUR WVX) 19,654-317-62-AB

Southern Texas

W5QDB 24,824-426-58-ABD
WA5IYX 9456-197-48-A
WA5QCP 9435-185-51-A
K5ZMS 6255-139-45-A
K5LZJ 5940-165-36-AB
AA5MCU 5852-154-38-AB
K1VPD/5 5040-120-42-A
WB5IZN 2992- 88-34-A

6

East Bay

W6BXO 12,240-235-45-ABCD
K6ERF 280- 40- 7-B
WA6JUD/6(+K6KLY, W6s OAT YKM) 81,213-1000-69-ABCDE

Los Angeles

WB6TDE 2100- 84-25-AB
WB6MBO 104- 26- 4-AB
W6AMT(WB6s ASK FER RAL RIV VZY oprs) 105,080-1359-71-ABCDE
WB6PXP(+W6PVB,WB6YBL) 101,016-1228-72-ABCI
WB6JCD/6(+W6PJM, WB6s AAG DGT HJO) 13,019-264-47-ABC

Orange

W6ABN 3280- 77-40-AD
W6CG 176- 19- 8-BG

Santa Barbara

K6YNB/6 60,342-593-89-ABCDE
WB6IDK/6 455- 33-13-ABC
K6BPC/6(WA6s BFW ENI HXD LCF MEM QJP, WB6s IMV RAJ YVP oprs) 28,416-420-64-ABCDE

Santa Clara Valley

K6QAX 10,965-197-51-ABC
WB6KAP 4588-106-37-ABCD
WB6JNN/6 392- 40- 7-BDE
WB6EMR 114- 38- 3-B
K6TJL/6(K6s DTR KVX,W6s ADF VG, WA6s GYD KKK MGZ, WB6TJO oprs) 30,124-377-68-ABCDE
K6GSS(+WA6HCI,WB6s JAX KBZ) 26,432-424-56-ABCDE

San Diego

K6DYD 10,640-190-56-AB
WB6NMT 6486-134-45-ABC
WA6AWM(+WA6MHZ) 10,980-239-45-ABC

San Francisco

W6KQG 18,762-307-59-ABD
WA6JYU 902- 40-22-ABC
W6FAW 574- 41-14-AB
WA6BMV/6(+WA6s HPX VEF, WN6OYZ) 6608-355-16-ABD

San Joaquin Valley

K6QHC 12,208-218-56-AB
AC6YKS 5320-133-40-AB
K6JKQ 2158- 67-26-ABCD
WB6LBR 1239- 59-21-AB
W6DPD 820- 40-20-ABC
K6ZMW 84- 7- 4-E
WA6NRV(+WB6YIK) 26,838-355-71-ABDE

Sacramento Valley

WB6NKM 5445-115-45-ABD
K6RNQ 4242-101-42-A
WB7AOB/6 220- 20-11-AB

Pacific

KH6BZF 1- 1- 1-B

7

Arizona

K9DKW/7 29,250-371-78-ABCD
K7PXI 11,336-218-52-A
WA3ISY/7 6232-152-41-A
W7KMV 5890-155-38-AB
WA7ZWO 1422- 79-18-AB

Idaho

WA7FSI/7 4860-135-36-A
WA7YAX 1248- 52-24-A
WA7WXI 920- 46-20-A

Montana

W7JRG 4686-142-33-A
WØNRI/7(+WØLJF) 6970-205-34-A

Nevada

K7ICW 4773-129-37-A
WA7LHZ 736- 46-16-A
W6LEV/7(+K6JYO, W6s GGV KJD, WB6s CXF OKK) 21,054-333-58-ABCDH

Oregon

WA7RTA 10,896-205-48-ABCD
W7TYR 5054-124-38-ABCD
WA7TDU 3640-103-35-ABD
W7NFC 1768- 68-26-A
K7GZB 120- 18- 5-BCD
K7ZCB/7(+K7DYH, WA7s BJU ECY) 8865-190-45-ABCD
K7HSJ(+WA7ZAP) 3410-108-31-ABCD
WA7ECY/m(+K7DYH) 104- 13- 8-AB

Utah

K8LZL/7 7040-160-44-A

Washington

W7KFS 6825-195-35-AB
WA7UQV 6732-187-36-AB
K7QFW 6708-172-39-AB
WA7RIB 5474-161-34-AB
WA7PVE 3400-136-25-AB
W7UGK 3094- 91-34-A
W7FIV 2914- 93-31-ABD
K7DBU 1612- 61-26-AC
WA7NSM 555- 37-15-AB
K7KOT/7(+K7WTG, W7s DNU GLS, WA7NAN) 31,584-534-56-ABCD
WB7EFH(K7IPQ, WA7s NIW HQG RJW TOM oprs) 14,868-351-42-ABC
WA7EHE/7(+K7IEY) 1056- 48-22-AB

Wyoming

W7VDZ 4743-153-31-A

Alaska

KL7HLE 1596-114-14-A
K7MWC/KL7 4- 2- 2-AB

8

Michigan

WB8BGY 13,090-231-55-ABD
WA8EUU 2461-107-23-AB
WB8DSQ 720- 45-16-AB
WB8RNY 649- 59-11-AB
WA8WWM 481- 37-13-AB
AB8TGY 216- 36- 6-AB
K8QJO/8 32- 8- 4-A
WA8JXE/8(+WB8BTC) 850-50-17-AB

Ohio

K8III(WA3SZX opr) 29,748-444-67-AB
K8LEE 25,346-435-58-ABC
WA8CLN 17,442-323-54-AB
WB8IGV 5106-137-37-ABD
WA8HPY 4719-121-39-AB
WB8AMI 4191-127-33-AB
W8SGX 2548- 98-26-A
K8UQA 1530- 45-17-D
WA8TLZ 1134- 59-18-ABCD
WB8WCE 1003- 59-17-AB
K8DIO 830- 83-10-B
WA8STX 708- 59-12-AB
K8RXD 40- 10- 4-B
WB8MMF 2- 1- 1-D
W8ULC(+WA8s JDH TYF WQC WVY, WB8EEX) 17,388-378-46-AB
AC8VP(WA3OPN,K8ITH,WA8AHD, WB8s ERB UXX oprs) 3160-158-20-AB
WA8WCU/8(+WA8PBF,WB8JRZ) 2398-109-22-AB

West Virginia

W8HAX 4655-133-35-AB
W2CNS/8(+K2s LDU LZF, WA2s SEY WVL ZKD, WB2s BGJ KAO, WA4EVC) 51,418-489-94-ABCD
K3LNZ/8(WB2s DIN YGP, K3DUR, WA3s EOG NZL OYW, K4LHB, W4PSJ, WA4LJQ, WBØIWG oprs) 24,249-381-59-ABCD

9

Illinois

K9HDE 16,120-253-56-ABDE
WA9LEF 10,506-206-51-AB
W9KDR 7708-164-47-A
WB9RJQ 4402-135-31-ABD
K9KQR 612- 45-12-BD
W9IVI 264- 32- 8-BD
W9ABA 168- 24- 7-B
W9NVX(+WA9WDP,WB9GCS) 17,262-274-63-AB
WA9HHH(+WB9CLN,WØDYI, WAØIYY) 16,120-299-52-ABCD

Indiana

W9NFE 10,731-219-49-A
K9UVJ 8450-161-50-ABCD
WA9MEM 6192-144-43-AB
WB9CEP 3822-147-26-AB
K9DZS 3161-109-29-AB
WA9PKL 2128- 76-28-AB
W9CGI 736- 46-16-A
WB8HUC/9(WB8s GEU GEW GEX GEY GFA oprs) 26,568-369-72-AB
WA9DFZ/9(+K9s JRK SEW ZUH, WB9s OKB PXR SLD) 492- 41-12-AB

Wisconsin

K9REE 6318-162-39-A
WA9KVS 4130-118-35-A
WA9KGQ 2304- 96-24-AB
WA9ETW 1220- 61-20-AB
AD9OXY 990- 45-22-AB
WB9JUD 848- 53-16-A
K3JYD/9 310- 27-10-BD
WA9HCZ/9 232- 26- 8-BD
WA9JFM 196- 28- 7-B

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Colorado

W9MHL/Ø 7308-203-36-A
WAØTVZ 6432-201-32-A
WØOHF 5952-186-32-A
WØDYB 720- 48-15-A
WØICG 4- 2- 2-A

Iowa

KØDAS 767- 53-13-BD
WAØDXZ 161- 23- 7-B

Kansas

WØSEA 5940-165-36-AB

Minnesota

WAØPDA/Ø 738- 41-18-AB
WBØKEK 150- 15-10-A
WØOHU/Ø (+K9s AKS CHZ UYK, WA9CWY, WB9QPI, WBØSJJ) 23,730-331-70-ABCD

Missouri

WØKC 1560- 65-24-AB
ACØJRP 945- 45-21-AB
WB8IAY/Ø 70- 14- 5-A
KØYMB/Ø 58- 29- 2-B
WBØOGK 27- 9- 3-B
KØTLM(+WBØTTA) 9464-180-52-ABC

Nebraska

WAØMRH 7791-159-49-A
WØDYK 551- 29-19-A
WBØRWR(WAØTRO,WBØs CBI CLP FNZ JRM NPR SAO oprs) 5628-201-28-AB

North Dakota

WAØCSL 6422-169-38-AB
KØALL(+WAØs KSB ZNJ ZOK) 5053-163-31-AB

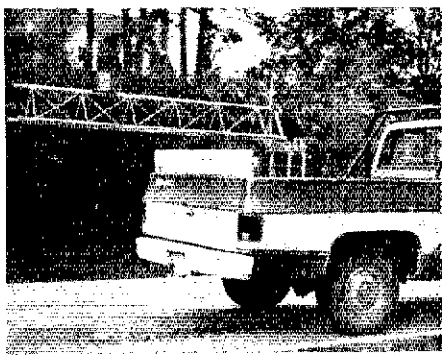
DX

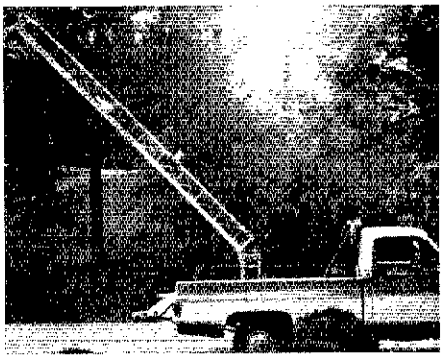
Bahamas

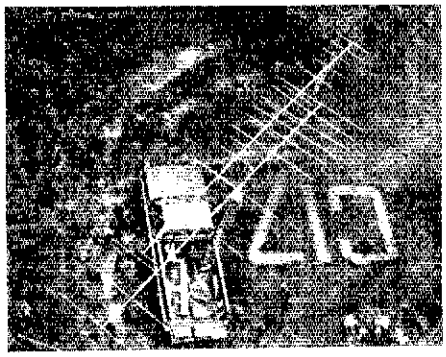
WA2HJF/C6A 6436-165-39-A

Cayman Islands

ZF1XW(WB4PXW opr) 4797-123-39-A







Not much explanation needed here, except that the installation belongs to WB4JGG and was used this year at multi-op W4GZX/4.

never to return! – (W3ANX) Managed to foil Murphy's efforts by having the rig problems a week before the contest. Band conditions were encouraging – can't wait 'til September. – (WA3IEM) My first try, portable from a pickup cab on local hilltop. – (KØYMB) Heard quite a few of the boys but couldn't contact them as my cw/ssb rig was disabled and was limited to a-m only. What a sad state of affairs! – (WA2CAK) Spent most of the weekend out with the club (WB2FKJ/2) but couldn't resist going home for a while and putting the new Echo 70 on; nine sections on 432 in just a few hours operating time shows what that band can do if a few more people get on (and I heard at least one more section I didn't work). – (W2HXC) I was getting pretty disappointed in band conditions and my 10-watts PEP output rig (on six) until Sunday evening when the band finally opened to the east; after that I can't remember when I've had more fun in two hours. – (WB9JUD) Of my 78 QSOs on 2 meters, 20 were on cw or ssb; in past years, four or five QSOs there were average. – (WA4MVI) Thunderstorms in the area made me lose about an hour on Sunday; watching a bolt hit a telephone pole down the street convinced me to ground everything and stay in the other half of the house! – (WA4MMP) "Boy they picked a good day to have a vhf contest!" – (WA7TDU) I enjoy working vhf contests because the operating etiquette is far superior to that on the low bands. Only gripe is lack of cw operation on six meters. – (WB2VWW) Best vhf contest in years. – (W4WDH) Six meters was fun, but the highlight was calling "CQ contest" on 1296 and having somebody come back to me. – (K6GSS) This contest marked my return to 2 meters after an absence of 23 years; I found the same fun, good fellowship and sportsmanlike conduct I remembered from past events. – (W3RWW) Worked VE4MK on 8-level RTTY on 147 MHz for a contest contact – is this a first? – (VE4AS) Highlight for me was QSO with KL7IBG for state number 49; now where's Hawaii? – (WA5QCP) Attention – vhf activity does exist in the Pacific Northwest! We set another division record this year, and will rotate to another call sign next year; our group is a spin-off of last year's K7IPQ/7. We took time out this year to play a liaison role between several Oregon stations in their efforts to work into Washington and BC on 2,220 and 432, and feel this is an important part of the QSO Parties. – (K7KOT/7) QST

All-Time Division Leaders

SINGLE OPERATOR			*DIVISION*	*MULTI-OPERATOR*		
CALL	*SCORE*	*YEAR*		*CALL*	*SCORE*	*YEAR*
K3IPM	37,989	68	Atlantic	W3CCX/3	144,979	76
K9HMB	18,886	72	Central	K9HMB	40,468	75
KØALL/Ø	13,068	74	Dakota	WØOHU/Ø	23,730	76
WA5RMS	16,740	70	Delta	W5UK/5	18,535	74
K8LEE	37,114	74	Great Lakes	WA8BCA	61,656	75
K2RTH	37,875	74	Hudson	WB2WIK/2	106,399	76
W9ECV/Ø	15,822	68	Midwest	WØOHU/Ø	33,120	74
WA1NGR	33,259	74	New England	WA1MUG	172,142	74
K7GWE	20,515	74	Northwestern	K7KOT/7	31,584	76
K6YNB/7	19,654	72	Pacific	WA6JUD/6	81,213	76
WA4GPM	19,264	76	Roanoke	W4BFB/4	30,666	76
W7VDZ	13,110	74	Rocky Mtn.	WB5AXC/5	23,424	76
W4GJO	32,292	62	Southeastern	W4VO/4	17,682	76
K6YNB/6	60,342	76	Southwestern	W6AMT	105,080	76
W5QDB	24,824	76	West Gulf	K5WVX	33,696	74
VE3ONT	56,108	76	Canadian	VE3ONT	82,188	74

Strays

QST **Congratulates . . .**

□ Benjamin F. Borsody, K4EC/W2AYN, recently included in *The Marquis Who's Who* listing which is limited to individuals demonstrating outstanding achievement in their own field of endeavor and who have, thereby, contributed significantly to the betterment of contemporary society.

□ Les Mitchell, G3BHK, the "father" of radio scouting, recipient of the British "Silver Wolf" award.

□ Nic Holter, LA5CH, who recently received the "Order of the Golden Key" awarded by the Norwegian Radio Relay League for his radio scouting work.

□ Dr. Edmun B. Richmond, W4MGN, promoted to assistant professor of German at the Georgia Institute of Technology.

□ Kurt Meyers, W8IBX, pastor of the Good Shepherd Lutheran Church, elected chairman of the Cleveland Conference of the American Lutheran Church.

Rules, ARRL 160-Meter Contest

Try our top band for some real surprises the weekend of December 3-5.

The 7th annual ARRL 160-Meter Contest will be held December 3-5, 1976. Please remember to keep the "DX-window" (1825-1830 kHz) clear. This is the spot DX goes to get away from stateside QRM. Don't call there; they usually listen from 1800-1805 and, in any case, will announce exactly where they are listening. Listen for KH6-types in the 1995-2000 range.

Don't forget to use the 1830-1850 portion. It will help spread out the QRM that is so noticeable in the bottom 25 kHz.

Rules

1) This contest will start at 2200 UTC Friday, December 3, and end at 1600 UTC Sunday, December 5, 1976. This is a 42-hour period with no limitation on operating time. Cw only.

2) The contest is open to all amateurs. A QSO with an amateur in an ARRL section (see page 6, *QST*) is worth 2 points. QSOs with amateurs not in an ARRL section are worth 5 points. DX to DX QSOs will not count.

3) Multipliers are the 74 ARRL sections, VE8 and each foreign country worked.

4) The exchange will be the report, plus ARRL section, for those in an ARRL section. Those participants outside of an ARRL section will send a report and the name of their country.

5) Competition is within the section and non-W/VE country for certificate awards. Division high scorers will have their section award endorsed with an appropriate seal. Multi-operator work is permitted with scores to be shown after single-operator listings (no certificates).

6) Contest work may be reported either on the forms available from Hq. or on a reasonable facsimile. An entry consists of the log and summary sheet. Check sheets are not mandatory.

7) Entries become the property of ARRL; none can be returned. Awards Committee decisions are final. Send an addressed stamped No. 10 envelope for appropriate entry forms. All entries must be postmarked no later than January 10, 1977, to be eligible.

8) Standard disqualification criteria apply; see *QST* January, 1976, p. 73. QST

ARRL Bicentennial Celebration

High Claimed Scores:

ARRL Bicentennial Celebration, July 24 - 25, 1976

Following are high scores received as of September 8; all those over 1776 QSOs and, for Novices, all over 200 QSOs. Final tabulations will appear in an upcoming issue of *QST* and certificates will be mailed shortly thereafter.

K7NHV	3299	W6PAA	2375	XJ7WJ (VE7BBQ opr)	2088	AC9YH (WB9NPB opr)	1892	WN5SDN	302
W7YB (WA7WXY opr)	3034	AA8PLZ (WB8AYC opr)	2370	WAØCPX	2057	AD3GJD	1890	WN5STD	247
WBØDJY	2765	W7MRS	2328	W7TML	2042	WAØLKL	1861	WN9SBD	235
K7RSC (K7JCA opr)	2711	AC6RTT	2320	WA1STN	2016	AD4TIG	1856	AK5RPU	224
WA7NIN	2675	W5RUB	2300	AC5TMN	2015	W6HX	1855	AK2EAL	218
AB6YBL	2622	AB4FZQ	2294	WA2IYH (WB2FLF opr)	2012	WA4TYL	1851	WN4QQY	211
W5WZQ	2543	W8FAW/4	2255	AA1LKX	2006	WA3HRV	1847	WNØSNG	209
W5MYA	2530	AC5RTX	2249	AD5YMY	1993	WA6WZO	1845	WN3AAL	209
WA3WIK (WA3SZX opr)	2492	KØGXR	2245	W3CRE	1981	AB2RJJ	1836	WN4OZT	208
AD5FVA	2491	AD4BAI	2237	AA4KKP	1972	AC9SZR/3	1829	WN4JKP	207
W2GXD (WA2UOO opr)	2480	WA2WMT/Ø (WBØIKN opr)	2212	W1AF (WA1UIK opr)	1921	W1FLM/3	1820	AK4DWZ	205
K4PUZ	2436	AD8RMK	2196	AA4LZR (WA4FCT opr)	1915*	AC8CQN	1818	WN4NXM	204
K6OVJ (WB6ZVC opr)	2418	AD3EST	2189	AC4OZF	1910	WA1QNF/1	1816	AK7EME	203
K5PFL (WB5QDW opr)	2398	K9BGL	2186	W1ZA (K1LPA opr)	1903	K5DGI	1814	AKØSID	203
		W3ABT (W3IFG opr)	2103	W1BGD/2	1895	AA2PJL	1789	WN2DQM	203
		W8LT (WB8JXS opr)	2101			KØSCM	1787	WN9SHL/8	202
						W5ZSX	1784	WN4AME	201
						AA8NYB	1781	WN8YJF	200
						AC9MIJ/4	1778	AK9SAK	200

*Adjusted Score

Rules, ARRL 10-Meter Contest

If Old Sol won't help us and the muf is too low this year, then think sunspots for 1976 and bring out enough activity to create an ionosphere.

Good or poor? Who knows if the propagation gods will smile down upon or vent their wrath on the 10-meter band on the weekend of Dec. 11-12? The only certainty is that now is the time to plan to operate in the fourth annual ARRL 10-Meter Contest. An s.a.s.e. to Headquarters will fetch the necessary entry forms; a summary sheet, log sheets with space for 100 QSOs per page, and an Op. Aid 6 ("dupe sheet"). One unit of first-class postage will suffice for five sheets of paper.

The only change from last year's contest involves the four points per QSO for a Novice contact. As the FCC will be doing away with the "N" in the prefixes of the new Novice calls by this time, Novices should include "Novice" in their exchange.

The contest covers the 36-hour time period from 1200Z Dec. 11 to 2359Z Dec. 12, with no limit on the number of hours one may operate within this time slot. Cw contacts must take place *below* 28,500 (except OSCAR). Suggested frequencies are cw, 28,000-28,050; Novice, 28,100-28,150; ssb, 28,500-28,600; a-m, 28,800-29,000.

Be sure to avoid the OSCAR 6 down-link frequencies: 29.45-29.55.

GL! – *WA1STN*

Rules

1) *Eligibility:* This contest is open to all amateurs worldwide.

2) *Object:* To exchange QSO information with as many amateur stations in any and all parts of the world as possible on 10 meters.

3) *Contest Period:* The contest shall run from 1200 UTC December 11, 1976, to 2359 UTC December 12, 1976. This is a 36-hour period with no limitation on operating time.

4) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

5) *Entry Classification:* Entries will be classified as single- or multiple-operator stations. Single-operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multiple-operator stations are those obtaining any assistance, such as from spotting or relief operators, or keeping the station log or records. Multiple-transmitter stations are prohibited. The use of electronic or mechanical devices and/or any other method of simultaneous operation of two or more transmitters is prohibited.

6) *Exchange:* Amateurs in the 50 United States and Canada will transmit signal report and state or province. Others will transmit signal report and consecutive serial number starting with 001. Note: Those amateurs licensed by the U.S. government or branch thereof not located in a state (i.e. KP4 KW6 KZ5 KC6, etc.) will transmit the consecutive serial number. Stations that are not land-based transmit signal report and ITU Region. The District of Columbia is considered part of Maryland.

7) *Valid Contacts:* A station may be worked once on cw and once on phone. All contacts must be either cw to cw or phone to phone. Crossmode contacts do not count for contest credit. OSCAR contacts may be counted. All cw QSOs must take place between 28.0-28.5 MHz except those made through OSCAR.

8) *Scoring:* Two points are earned for each completed two-way exchange. Four points are earned for a completed two-way exchange with a W or K Novice or Technician. Incomplete QSOs will not count for contest points and/or multipliers. Multipliers: The multiplier will consist of the number of different states, Canadian call areas (VE1-VE8, VO), ITU Regions (as sent by non-land-based stations) and countries as determined by the ARRL Countries List. A state or province cannot be counted again as a country. Final score = QSO points times the multiplier.

9) *Reporting:* Contest work may be reported either on the forms available from Hq. or on a reasonable facsimile. Send a self-addressed stamped envelope to ARRL for the appropriate forms. All entries must be postmarked no later than January 19, 1977, in order to be eligible for *QST* listing and awards. An entry consists of the log and summary sheet. Check sheets are not mandatory.

10) *Awards:* Awards will be issued on a section or country basis. A certificate will be awarded to the highest-scoring single-operator station in each section, Canadian call area and foreign country. Multiple-operator and Novice stations will receive an award if three or more such entries in a section are received or if the entry displays exceptional effort. Regional awards for non-land-based stations will be issued if participation warrants.

11) *Judges:* All entries become the property of ARRL and none can be returned. All entires will be passed upon by the ARRL Awards Committee whose decisions will be final.

12) Standard disqualification criteria apply; see *QST* January, 1976, p. 73.

Operating News

Conducted by George Hart,* W1NJM

Are Repeaters for Real?

Back in the early twenties, a few amateurs started fooling around with vacuum tubes, and some of them had the temerity to claim that a relatively low-power cw signal from such a device would outperform spark, using a great deal less spectrum space in doing so. Not too many people believed it, but the trans-atlantic tests of 1921 proved that cw was superior in many ways to spark. Just a fad, many of the old timers said; it'll die down. But it didn't. Instead, cw took over and spark died down.

Then, some time around the early fifties, amateurs started using a-m phone with the carrier almost completely suppressed and with half of the sidebands lopped off – "single sideband suppressed carrier" it was called, and eventually became just ssb, or "sideband." Won't last, said the diehard a-m-ers; quality too poor, receiver BFOs not stable enough for carrier insertion. But today sideband is *the* high frequency A-3 mode and the older a-m is obsolescent.

So, a few years back some of the vhfers started emulating commercial practices by putting repeaters on mountaintops and atop high buildings and towers. Again amateur ingenuity reared its head so that commercial equipment could be modified for the purpose, or rigs were built from scratch by those technically skilled and qualified. It started out as a fad, took hold, manufacturers started building repeaters. Just temporary, said the old-timers. It'll pass, like all fads.

But it didn't, as many "fads" don't, and today a high percentage of amateurs are operating by this mode – by vhf-fm, low power, through repeaters. Mostly the newer amateurs, right? Wrong! The other day we ear-witnessed a repeater round table consisting of five diehard old-time cw men. Everybody is doing it. It's so easy! Latest statistics indicate that better than 50 percent of the active amateur population is on vhf-fm using repeaters. The latest *ARRL Repeater Directory* lists over 2000 repeaters in operation throughout the U.S. and Canada, with more coming into operation all the time. The 146- to 148-MHz segment of two meters is bulging, we have a coordination problem, repeaters are in operation on 220 MHz, on 440 MHz, on 6 meters and even on 10. It won't be long before having a small box containing a little rig capable of accessing at least one local repeater will be as common an accessory to the amateur station as a telegraph key once was. In the "Public Service" column, in *QST* for November, 1973, we ran an item entitled "Is the Repeater King?" in which the advantages of simplex (direct) communication over repeaters were expounded. Those advantages still exist and should be kept in mind; but repeaters have that one big advantage: coverage! Direct communication, on a practical basis, from point to point is strictly line of sight. An average repeater extends the coverage at least tenfold. Out west where peaks over 10,000 feet high are commonplace, coverage of 200-300 miles is not unusual. We conducted perfect communication, for example, from a high point in Mesa Verde National Park in Colorado, using a one-watt rig with a *most* inefficient antenna, with W5PDY and W5RE in Albuquerque, through the Mt. Taylor repeater, a total airline distance of over 170 miles. Unusual? No, commonplace. In fact, W5PDY was sitting in a restaurant in downtown Albuquerque having a cup of coffee at the time.

And it's only the beginning. Operating repeaters in tandem will extend ranges even farther, and when we get a practical satellite repeater up (note I say *when*, not if) there will be no more limit to repeater coverage than there now is to hf coverage through "skip." From that point on, the possibilities boggle the imagination. Nothing gets too fantastic to be considered a possibility. The wildest science fiction suddenly steps into the realm of reality.

As new frontiers are opened up by the experimenters and technical explorers, established ones are developed by the operators. That's us, boys and girls. There comes a time when something new, exciting and unique loses its adventurous appeal and we cast about for ways of utilizing it, of doing things with it other than just making contacts. The experimenters and technically inclined pass on to other fields. Those left behind start considering how to use these new developments, how to keep them under control, how to handle the great influx of followers who climb aboard the bandwagon and start loading it down. Our two-meter band has long since reached that stage and the process of controlling and regulating is well under way. Just listening on repeaters around the country indicates the need for some standards in operating procedures and ethics.

Many of these are listed on the back page of the *ARRL Repeater Directory*, and we don't intend to dwell on them here. What we would like to do is talk briefly about some more basic matters relevant to phone operation in general and repeater operation in particular.

First of all, and this is *most* basic, better than 50 percent of the operators we have heard on repeaters don't know how to talk. The narrow-band deviation used on vhf-fm is not conducive to the highest quality to begin with, so this fault shows up badly – more so, for example, than on wide-band fm or double-sideband a-m. Most of us could use elocution lessons, no doubt about it; but we know that this admonition won't drive many people to public-speaking classes, so consider this: Speak more slowly, using more lip, mouth and tongue movement. When you are driving a car with four kids in it, with all windows open and 18-wheelers passing you on both sides, it's difficult not to shout – but restrain the impulse because it will detract from, not add to, your intelligibility. Speak close to the mike, but not directly into it. Turn the mike sideways, so your breath goes across it, not into it. Breath makes a lot of noise, makes your speech sound mushy, muffled. When you compound the difficulty with poor enunciation, you are all but unintelligible. Take the time and trouble to pronounce your final Ts and Ds, and don't drop your voice so much on last syllables and last words of sentences.

Most voice operators talk too loud and too fast, and this shows up most blatantly on vhf-fm. Fast-talking is not the equivalent of "snappy" operating. Quite the contrary, it makes operating sound sloppy, slovenly. The competent operator talks evenly, distinctly, enunciates carefully, omits ums and ahs, says what he has to say and then relinquishes control of the repeater to another, who hopefully also has something to say.

Alas, so much of the conversation one hears on repeaters is about nothing – which is not too surprising, actually, since most casual conversations are apt to be on the inane side. We are all prone to engage in idle chitchat, and there is nothing really wrong with it. In ham radio, we call it ragchewing. The League even offers an award for it. The skillful and thoughtful ragchewer avoids going on and on about himself, his activities, his interests, his opinions. It's a knack that can be acquired. If each participant shows an interest in the other person's conversation and tries to draw him out, then each will wind up talking enough about himself to satisfy his own ego.

In the list of "dos" and "don'ts" on the back cover of the repeater directory, we want to point out one of the latter, which perhaps should be moved up to a more prominent position: "Don't monopolize a repeater." It goes on to point out that the best repeater operators are those who listen much, transmit little. Unfortunately, most of us are more inclined to talk than to listen, whether in private conversation or on the air; so the admonition *not to monopolize* is a most important one, in view of the crowding now being experienced, especially in high population areas. The practice of pausing momentarily between transmissions is widely followed, and it is a good one. A corollary practice shoud be to avoid breaking in on such pauses unless you have a good reason for doing so. What's a good reason? Well, maybe you have something you feel you can contribute to the conversation. Maybe you are looking for someone in particular and would like to take just a moment to call him. Or maybe you have an emergency or something at least more urgent than what the present occupants are discussing (and maybe this is a matter of opinion!).

The repeater you are using, whether as a member or a guest, is a "party line." Long-winded ragchews about nothing in particular are to be avoided; otherwise, opportunity for

*Communications Manager, ARRL

interruption should be afforded, even if it's only opportunity for someone else to ragchew with someone else, or to join the group. And, of course, the repeater should always be released *immediately* for something more urgent than chitchat.

Yes, repeaters are for real and are here to stay. While technological and experimental developments are still in progress in some phases of repeater activity, most of it, and especially that in the 146- to 148-MHz segment, is past that stage. We now must do something with it. Establishment of standard operating practices and a code of ethics is just the first step. Others are in the making or already in various stages of development. Your Headquarters, as usual, will take the lead but, also as usual, it is largely responsive to membership requirements. Your individual reactions may not be reflected in ultimate action taken, but the Headquarters has only the vocal and recorded response to go by. So don't stay mute and then be outraged. Get your two-cents-worth in *now*.

W1AW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.M. (all local Eastern time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you. The station will be closed Dec. 24-25, Dec. 31, 1976; Jan. 1, Feb. 21, Apr. 8, 1977.

Staff: Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC):

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

Code Practice

Approximate frequencies: 1.82 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references. Details on Qualifying Runs appear monthly in *QST* Operating Events. The 0230Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	*EST*	*UTC*
5-7½-10-13-20-25		
	9 A.M. MWF	1400Z MWF
	9:30 P.M. TThSSu	0230Z MWFSu
10-13-15	4 P.M. M-F	2100Z M-F
	7:30 P.M. Dy	0030Z Dy
35-30-25-20-15		
	9:30 P.M. MWF	0230Z TThS
	9 A.M. TTh	1400Z TTh

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* text to be sent in the 0230Z practice from the issue of *QST* 2 calendar months past.

11/5 It Seems to Us 11/18 Public Service
11/9 Correspondence 11/22 World Above
11/17 League Lines 11/29 YL News

Bulletins

Columns indicate times in EST-PST-UTC(Z).

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0200Z Dy
2330 M-S	2030 M-S	0430Z T-Su

CW Bulletins at 18 wpm (1.82 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2130Z M-F
2000 Dy	1700 Dy	0100Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 T-Su	2100 M-S	0500Z T-Su

RTTY Bulletins at 170-Hz shift are repeated at 850-Hz shift when time permits (3.625 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2230Z M-F
2300 M-S	2000 M-S	0400Z T-Su

OSCAR Bulletins (18 wpm on cw frequencies):

0840 M-F	0540 M-F	1340Z M-F
1400 M-F	1100 M-F	1900Z M-F
1600 Su	1300 Su	2100Z Su

OSCAR RTTY:

1700 Su	1400 Su	2200Z Su

5BWAS AWARD

(Updating the October listing) No. 262 VP9GE.

Operating Events

NOVEMBER

3: West Coast Qualifying Run, W6OWP prime, W6ZRJ alternate, 10-35 wpm at 0500 UTC. (Universal Coordinated Time, abbreviated UTC, Z used as a designator), on approximately 3590/7090 kHz. This is 2100 PST the night of November 2. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e., 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify that the copy was made without aid, and send to ARRL for grading. Please include your full name, address, call (if any) and enclose an addressed stamped envelope of legal size (known as an s.a.s.e.).

6: Frequency Measuring Test, p. 94 Oct.

6-7: Sweepstakes cw, p. 75 Oct. RSGB 7 MHz DX Contest phone, p. 92 Sept. Trilliums Contest, p. 94 Oct.

9-10: YL/AP phone, p. 92 Sept.

11: W1AW Qualifying Run, 10-35 wpm at 0230 UTC, transmitted simultaneously on 1.82 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. (Note, please, that this is 2130 EST, 9:30 P.M. local Eastern time, the night of November 10.) Underline one minute of the highest speed you copied, certify that the copy was made without aid (use of a typewriter is, however, OK), send to ARRL for grading. Please include your name, call (if any) and complete mailing address. A large s.a.s.e. will help to expedite your award/endorsement.

13-14: WAE RTTY, Missouri QSO Party, Delaware QSO Party; p. 94 Oct. North Dakota QSO Party, sponsored by the Fargo Repeater Assn., 1800Z Nov. 13 through 2400Z Nov. 14, 160 through 10 meters. Exchange signal report and state or country. All modes, though special attention will be given to the General class portion of each band. Scoring: North America 1 point per band per contact, outside N.A. 2 points per band per contact. A station may be worked more than once per band by employing a different mode. However, the same frequency may not be used to make a contact with different modes. Awards. Mail logs to: Fargo Repeater Assn., Box 1841, Fargo, North Dakota 58102. CQ-WE, sponsored by the Oklahoma City chapter (WB5LTI) 1500Z Nov. 13 to 2000Z Nov. 14. Suggested frequencies: 160; 3530 3580 3700 3750 3910 3960, 3605; 7030 7080 7100 7150 7260 7300, 7140; 14030 14080 14280 14330, 14085; 21030 21080 21100 21120 21355 21405, 21095; 28030 28080 28100 28200 28600 28650, 28095; 6 meters; 146.52 146.94. Retiree 5 points, novice 10 points, RTTY 5 points; all others 1 point. Cw multiplier of 2. Information submitted by L.F. Keun, WB5LTI, 4200 N. Reeder, Oklahoma City, OK 73122.

14: OK DX Contest, p. 94 Oct.

20-21: Sweepstakes phone, p. 75 Oct.

25-28: WL2USA Operation, from Liberty Island in NY harbor, the site of the Statue of Liberty, from 8 A.M. to 5 P.M. daily. Doc Levitt, WB2NDI, Communications Mgr. of the Kings County RC of Brooklyn, sends information that QSL details will be given on the air during the operation.

27: Ten-Meter Groundwave Contest, p. 95 Oct.

27-28: CQWW cw, p. 92 Sept.

DECEMBER

2: West Coast Qualifying Run.

4-5: 160-Meter Contest, rules this issue. North Carolina QSO Party, sponsored by the Alamance Amateur Radio Club Inc., from 1900Z Dec. 4 through 0100Z Dec. 6. Suggested frequencies are plus/minus 10 kHz: cw, 3560 7060 14060 21060 28060; Novice, 3720 7120 21120 28120; ssb, 3900 7270 14290 21390 28590. Out-of-state stations transmit RS(T) and state, province or country. NC stations send RS(T) and NC county. Out-of-state stations count 1 point for each NC contact (same station worked on different band, mode, or in different NC county, counts as new contact); multiply by the total number of NC counties worked for final score. NC stations count 1 point for each contact, multiply by total of states, provinces, foreign countries for final score. NC mobiles use the number of counties operated FROM for additional multiplier. Your log must be signed, none can be returned. Log must show RS(T)s, bands/modes, time (Z), state, province, country or NC county. On a separate sheet please show name, call and mailing address plus your total score and where you operated from. In the case of multi-operator stations, this sheet must also list the call of the operators. Awards. Logs must be postmarked no later than Jan. 10, 1977 and sent to: Alamance ARC Inc., 2822 Westchester Dr., Burlington, NC 27215. Telephone Pioneers QSO Party, twelfth annual, sponsored by the Stanley S. Holmes Chapter No. 55 of the Telephone Pioneers of America, from 1900Z Dec. 4 through 0500Z Dec. 6, open to all telephone pioneers. All bands may be used and the same station may be worked on more than one band, except one mode per band, and any mode permitted by FCC. Call CQ TP on cw, CQ Telephone Pioneers on

phone. Suggested frequencies are plus/minus 10 kHz: phone, 3969 7275 14,295 21,365 28,675 50,100-50,250 144,275-145,500 kHz; cw, 3,565 7,065 14,065 21,065 MHz. Score 1 point for exchanging reports with a Pioneer in any chapter, 1 point for an exchange with a different chapter. Exchange signal report, contact number, chapter name and number (I.T.P.A. chapter name only). Send log extract showing date/time/stations/ chapter name and number/ QSO numbers, postmarked not later than Jan. 10, 1977 to: Eugene Przebieglect, WB2ZMU, 100 Central Ave., Kearny, NJ 07032. Don't forget to turn your beams east for member F2CA.

11-12: 10-Meter Contest, rules this issue. **Spanish Contest,** cw, sponsored by the EA Society, the URE (Union de Radioaficionados Espanoles), from 2000Z Sat. to 2000Z Sun. Non-EA stations try to work as many EA stations on as many bands as possible in EA districts 80-10 meters. Send a 6-digit no. representing RST plus QSO no. starting with 001. Two points for each EA QSO, repeat QSOs with EAs on different bands permitted. Total points times the sum of EA districts on each band represents final score. Full log info. should be sent to the URE, along with the call of the station, the operator, and full mailing address. Usual declaration. Report within a month following the contest to: URE International CW Contest, Box 220, Madrid, Spain.

17: W1AW Qualifying Run (+40 wpm!).

26: HA5-WW Contest full period UTC, single ops, multi-ops SWLs. Call CQ WW Test de. Exchange RS(T) and ITU zone no. Contacts within continents count 1 point, between continents 3 points, with HA/HG5 stations 4, with HA5 stations 5 points. Multipliers are the different ITU zones contacted. Final score equals the sum of QSO points multiplied by the sum of different ITU zones. Usual logs, declaration, postmarked no later than Jan. 15. Send to: 6RAL, Contest Committee, Box 2, Budapest 134, Hungary.

29: W1AW Morning Qualifying Run.

JANUARY

1: Straight-Key Night.
5: West Coast Qualifying Run.
8-9: VHF Sweepstakes.
11: W1AW Qualifying Run.
15-16: CD Party, cw.
22-23: CD Party, phone.
29-30: Simulated Emergency Test.

FEBRUARY

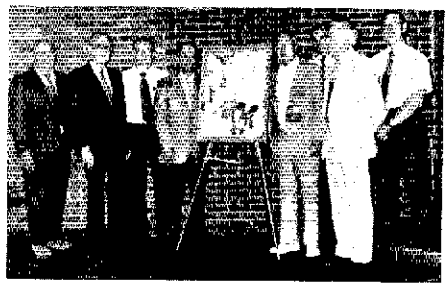
5-6: DX Competition, phone.
5-13: Novice Roundup.
15: FMT.
19-20: DX Competition, cw. YL/OM Contest, phone.

MARCH

5-6: DX Competition, phone.
19-20: DX Competition, cw.
26-27: WPX.

Strays

Already in this Bicentennial year Jack Keller, WB9ETQ, has completed Worked All States on the 80, 40, 20 and 15 meter bands. He only needs a few more states for WAS on 10 and 6 meters. Meanwhile, Jack's pet raccoon, Corky, has migrated from a home in the surrounding woods to a 3.5-acre backyard and antenna farm in Crawfordsville, Indiana. The printing plant for the ARRL *Handbook* is in the same town, so Corky really knows amateur radio and might give a few hints.



Murphy may always be with us, but that never stopped Nick Starvou, W4TB, from being one of the slow-scan television pioneers. At his retirement from 37 years with Western Electric many of his fellow employees and hams gathered to honor him. From left to right: John Schoderbek, W4PRN; Earl Fox, W4DWP; Bill Bain, W4LRG; Starvou; Chick Reynolds, W4MTB; Jim Hill, K4BCZ; "Chip" Chipman, W4PRM; and Bill Hanks, W4YSA.

□ Put unused gear to work: A CQ goes out to owners of unused hf rigs collecting dust on shelves. International Field Studies, a public, non-profit, educational and scientific organization, has established a small marine biology field station on Andros Island, Bahamas, for use by high school and college students. Their permanent staff includes a ham and they would like to set up an amateur radio station on the island. Money to purchase gear is scarce, so donations – which would be tax deductible – would be appreciated. Address any communications to Craig Kramer, WB8NEC, c/o International Field Studies, Capital University, Columbus, Ohio 43209.

I would like to get in touch with . . .

□ anyone interested in starting a WAS net on 15 in the Novice band. Jeffrey P. Lynch, WN1VQY, 29 Cottage Ave., Tiverton, RI 02878.

□ hams interested in setting up regular DX skeds on 10 meters (28.5 up), any QTR and regardless of solar-flux index. Fluent in English, German, French, Spanish or Portuguese. Ernesto Schlapfer, CE7BAL (ex-7DW), P.O. Box 714, Puerto Montt, Chile.

□ An improved AMSAT-OSCAR orbital data calendar which contains all orbits for 1977 for both OSCARs 6 and 7 has been published by Skip Reymann, W6PAJ, in cooperation with AMSAT. Designed so that it may be hung on the wall, the calendar includes information on the operating schedules and frequencies for both spacecraft and also telemetry decoding information. Also included is step-by-step information on how to determine times of passage of the two satellites. The calendar is available postpaid for five dollars U.S. funds or 30 IRCs ($3 to AMSAT members, and free to AMSAT life members). All proceeds benefit AMSAT. Orders and payment should be made to Skip Reymann, W6PAJ, P.O. Box 374, San Dimas, CA 91773.

The ARRL Foundation received $100 from a special fund-raising project at the Pacific Division convention. Here, Pacific Division director J. A. "Doc" Gmelin, W6ZRJ, accepts the check from Ralph Michelson, WA6RXB, general convention chairman. Other members of the convention committee pictured here are (left to right): Bernie Cline, WA6LFN, registration and finance chairman; Michelson; Gmelin; Bill Stevens, W6ZM, prize chairman; and Al Gordoy, K6LHQ, prize distribution.

Sponsor of the Labor Day event was the Associated Radio Clubs of San Jose. They expressed a desire for other conventions to follow their lead in holding special fund-raising activities. Foundation funds are used for WARC preparation, AMSAT projects and other programs to broaden the frontiers of amateur radio.

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤

CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. PAM: VE6AFO. ECs VE6WJ VE6AW VE6CAS VE6AVV VE6ASL. OOs VE6MJ VE6XO VE6TY. VE6AAT has moved into Grande Prairie from the Lookout station and expects to be active again shortly. VE6XO and XYL had enjoyable trip to Winnipeg. VE7HW and XYL were visitors in Edmonton on way to Kingston. The VE6SS repeater on 34-94 has good coverage. VE6AMM is active on CW nets and is handling a lot of traffic. VE6VS is keeping twice a week skeds with VE8RCS. VE6XO has moved and hopes to get his antenna up before the snow flies. The northern Alberta Radio Club is moving its meeting time to the third Wed. at the same location. Traffic: VE6FS 97, VE6AMM 31, VE6VS 12, VE6BCZ 4, VE6HO 2, VE6WN 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — VE7DFY has requested to be relieved as Net Manager BCEN Sept. 30. We are going to miss Jim's great knowledge and experience in traffic and nets. Since 1949 Jim has been ORS, SCM, RM and you name it when he was back East. Coming out West has been real tonic for the BCEN, and sure hope he will remain a member of the net, and later take over again. Our QSL Mgr. VE7AFY is really moving the QSLs. I have heard he is digging into his pocket for stamps to keep them moving. So please let your conscience dictate and see that he receives your stamps and envelopes. VE7DKY is Mgr. Seventh Region Net (Daytime). RN7(D) is on 7270 at 1700 GMT. Traffic: (Aug.) VE7ZK 128, VE7DFY 79, VE7CDF 35, VE7SE 18. (July) VE7ZK 120, VE7DFY 88. (June) VE7ZK 167, VE7HQ 14.

MANITOBA: SCM, Steve Fink, VE4FQ — RM: VE4PG. PAM: VE4JP. With summer over activity is quickly picking up. VE4LB was named Ham of the Year at the Peace Garden Hamfest. New Life Member VE4UL is the newly-elected ARLM pres. VE4OW is QSY to Gillam, while VE4VZ is on the DEW-line. MSN, the late session of MTN, has now been elevated to a full net by itself, with VE4AAJ as mgr. The net meets 20:00 local time on 3660 and all newcomers are invited to join this slow-speed operation. New ORS this month is VE4UQO. Reports for this column are always welcome. MEPN (Aug.): 31 sessions, 952 QNI, 39 QTC. Traffic: VE4UO 73, VE4JP 16, VE4YE 16, VE4CR 11, VE4HR 10, VE4NE 4, K3ZVH/VE4 4, VE4HA 3, VE4JK 2, VE4NM 2, VE4FK 1, VE4LQ 1.

MARITIME & NFLD.: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: Maurice Gladden, VO1FG. RM & APN Mgr., VE1AAO, Nfld. Traffic Mgr.: VO1GW. HARC hosted successful Hamfest '76. VE1BDT won cw copying contest also Brown-Holder DX Trophy and Doug Moser Trophy for most cw contacts. VE1ABR won 2-meter Hidden Transmitter Hunt. New NSARA executive: VE1UT, pres.; VE1AMJ, 1st vice-pres.; VE1ZB, 2nd vice-pres.; VE1ALB, secy-treas. Recent hospitalizations: VE1ALP VE1BB VE1EK VE1UB VE1UG VE1XJ. Speedy recovery to all. VE1ARN has 200 countries confirmed for DXCC. VE1EO relayed medical tfc from EA3APK to YV4VT. VO1NP kept skeds with VE0MEA. New ECs: VO2BD Goose Bay, VE1QJ Madawaska Co. NB. VE1BAN runs 5 watts ssb from wind power. VE1KR looking for parts to build equip. for new amateurs. Ex-VE1JL & VE1AY now VE1CP, VE1AMK is VE1SJ. VE1AMZ instructing prospective amateurs at NSIT. MAARC reports successful Lobster Car Rally. VE1AJZ active on Oscar as VE1SAT. VO1NP new QTH, Shoal Harbour, Clarenville. VO1EF gave talk on history of activities on CBC Radio. St. John's repeater operating on 146.34/146.94. APN: sessions 29, QNI 124/22, QTC 85. NTN: sessions 26, QNI 91, QTC 26 (July), sessions 15, QNI 40, QTC 16. Traffic: (Aug.) VE1AAO 134, VE1BDT 75, VE1AVL 57, VE1ACU 49, VE1OC 38, VE1YO 30, VE1RO 26, VO1GW 18, VE1BFV 14, VE1BIV 12, VO1KE 8, VE1QJ 7, VE1BEC 6. (July) VO1GW 24.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: Noreen Nimmons, VE3GOL. Congratulations and good luck to the new slate of officers for the Ontario Trilliums, VE3s CLT EVA CCO BBD GVQ FQK and BFN. Their annual contest weekend will be held Nov. 5 and 6. Logs to VE3EVA. VE3CLT back after attending the Houston YLRL Convention. OARC operated a booth at the CCEA using the call VE3RC/P. VE3ARS was able to pass their traffic thru GBN OSN and OPN Section NTS nets. VE3CDK earned his Olympic Contest Award. VE3CJ and VE1SH attended the official opening ceremonies of the Olympic Amateur Station CZ20. Congrats to new Life Member VE3CMV. Amateurs involved in court battles over municipal zoning by-laws in so far as antenna structures are concerned are requested to get in touch with CRRL Counsel VE2VW. As of July 31, full and associate membership CRRL stands at 5249. VE3BVG has become a TOT Life Member. We regret to report VE3HZF has become a Silent Key. Joyce was an active volunteer with VE3RDH. We welcome the following newcomers, VE3s GPJ IVC and IVE. VE3s BDS and IVA now active on 2 meters. New Advanced amateurs are VE3s FJJ and HWU. VE3BJK and ICX spent two months in Montreal at the Olympic site. VE3SB is the latest member of the PL Club. New radio control model plane enthusiasts include VE3ETX and AKJ. VE3HTT latest addition to the OSN gang. VE3FRG back on the air after some rig problems. Apologies to the CARTG gang for not publicizing their world-wide sweepstakes held last month but I didn't have the info in time. After many RTTY QSOs over the years VE3AYL and G8LT finally met in London, England. At a recent ARRL Directors meeting in Denver, an RTTY endorsement for DXCC was approved. Traffic: (Aug.) VE3SB 331, VE3GOL/3 199, VE3FQZ 168, VE3GFN 161, VE3GJG 137, VE3DPO 131, VE3AWE 116, VE3DZK 113, VE3RC/3 107, VE3GT 91, VE3HTT 76, VE3CDK 73, VE3HGJ 46, VE3EBC 28, WA8ETX/VE3 14, VE3EKC 10, VE3DH 7. (July) VE3DVE 38.

QUEBEC: SCM, Larry Dobby, VE2YU — It has been brought to my attention that the ARRL membership in Que. has been a very steady 500 for the past few years. Each League member in Que. is encouraged to go out and preach the good word. As clubs reorganize for the fall sessions and as code and theory classes start up again, don't forget to put in a good word for the ARRL. My compliments to VE1SH for his prompt answers to my recent inquiry concerning the name CRRL. VE2IJ is Asst. Dir. (Que.) and should you have any questions regarding the League contact him. Members wishing to announce activities in their areas may do so through this column but several months advance notice is required. RTTY activity higher these days with VE2QO VE2DKK VE2AW VE2GA VE2GV and VE2YU heard on 20 and 80 meters. The ST-5/AK-2 combination provides an inexpensive package to get you on the air quickly and for the author has netted 10 DX countries. VE2QO has managed WAC and WAS on RTTY! Traffic: VE2WT 108, VE2EC 56, VE2BP.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — VE5HE is working for the CNIB demonstrating the use of electronic aids for the blind. We are encouraging more of the Blind to take up Amateur Radio as a hobby. The Saskatoon Club have set up a display of Amateur equipment in one of the shopping malls, which large groups of people were most interested in seeing Amateur radio in operation. Traffic: VE5HP 39, VE5YK 30, VE5BO 14, VE5DN 12, VE5RP 8, VE5NJ 4.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: WA3DUM. RM: W3EEB. Congratulations to the hard workers of the Delaware ARC and the Hamfest Comm. on a most successful '76 Delmarva Hamfest. Let's get more workers from more clubs in Del. for next year. FD Scores, Single Transmitters: U. of Del. 2833, 1st State ARC 1736; Multiple Transmitters: Delaware ARC 4390; Delmarva ARC 3650, Kent Co. ARC 1906. VHF: Del. ARC 187, Kent Co. 20. The Del. ARC made an Oscar Contact while both the U. of Del. & 1st State Clubs made "Natural Power" contacts. WA3WUL working Del. from W9YB at Purdue U. while WA3LMY is a Graduate Asst. at Princeton. DTN: QNI 392, TFC 62. DEPN QNI 188, QTC 10. Traffic: (Aug.) W3EEB 86, WA3WPY 70, WA3DUM 30, W3DKX 28, AD3YHR 27, AA3GAY 16, W3WD 13, W3YAH 7, WA3UUN 6, WA3WIY 3. (July) WA3DUM 30, AA3GAY 12. (June) AA3GAY 1. (May) AA3GAY 2.

EASTERN PENNSYLVANIA: SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: K3MVO WA3OGM WA3SXU. PAMs: W3AVJ WA3PZO. Net reports: CMSMN QNI 27, QTC 13; PTTN QNI 89, QTC 49; PFN QNI 392, QTC 380; AREC 2M QNI 6; AREC 10M QNI 7. BPL: W3CUL W3VR WA3YJG. P5HR: WA3YJG WA3NDQ W3IPX WA3QOZ WA3SXU. OVS reports from W3GOA WA3BJQ W3CL K3TRM WA3NDQ W3ID. OO reports K3RDT K3OIO W3NC. OBS reports WA3SXU W3ATJ W3ID WA3GOZ. W3CUL & W3VR converting to solar cells to save electricity! WA3YJG keeps hamming at camp and seashore. Summer takes its toll but this time it seems to be EPA CW net. Can anyone help? W3WRE still going thru junk piles looking for old keys. Several ECs reported alerting their nets but Hurricane went another way! WN3CJU got his big G. LVARC running classes every Fri. for Novice and up. K3VZI & WA3VGS got their big A tickets. Getting time for club elections so let me know who the new ones are! NE Phila ARC getting quite a collection of gear on all bands! The summer now over so how about those reports and at the end of the current month please! W3EU reports 160 getting better. Club papers I have been receiving are getting better all the time. Some wild band openings have sent the 2M fm repeater gang just as wild. Don't forget, work a Novice once in a while give him a boost. Have you signed up for AREC? Start saving its getting close to Christmas! Traffic: (Aug.) W3CUL 3011, W3VR 822, WA3QOZ 283, WA3YJG/3 233, WA3THT 230, W3IPX 146, AA3SXU 117, K3OIO 73, W3WRE 51, W3ID 47, W3AVJ 35, WA3NDQ 27, WA3YMV 26, K3RVC 18, W3ATJ 17, K3GJL 16, W3CL 14, WA3YHR 14, WA3CFU 13, WA3QYY 11, WA3MQP 8, WA3TMP 8, WA3ZRE 8, W3ADE 6, W3BNR 5, W3HK 4, WA3BJQ 2, W3EU 1, W3GMK 1, W3GOA 1, AA3QLG 1, WA3VDQ 1, WA3VUE 1. (July) WA3SXU 52, WA3CFU 13. (June) WA3SXU 103.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — The Md Emerg Phone and Tfc Net, MEPTN, went into continuous session escorting hurricane Belle from the Outer Banks to Atlantic City. WB3BUA W3FA K3ORW WA3UYB and WA3ZNJ served as NCS. A hearty well done to all 166 participants during the 11 hour session. EC W3HJH and the St. Mary's AREC/RACES gang have been conducting tests to determine coverage. Regular drills on WR3ACP Wed. nites. W3ZNW has 7 actives in Calvert county. EC K3ORW has Carroll county lined up for the coming season. Active OOs this month WA3KCY AA3UHJ WA3NSA W3ABC WA3JSZ and AC8BZY/3. WA3ZAS operates the delivery truck botching up his early evening skeds. MDD-MEPN-MDCTN picnic was a fun affair with 51 different stations earning net certificates. W3FCI received a White House certificate, congrats. He then becomes a 30 day GM3 and back to doubling tower height to 80 feet. WA3SJY keeping skeds on 10 meters. WA3KCY plans a KV4 vacation. W3CDQ finds NN3SI a nice set up for operations. WB2TJR/3 is back with the actives. WA3FYZ is now settled in Laurel. W3RRX has returned from the Mid-East. WA3UYB has the antennas back up and plans a tri-bander to round out his coverage with his new Advanced ticket, congrats. K3ORW has good things to say about the participants during Belle. WA3SJS has been busy on the eastern shore with traffic. AA3UHJ hosted G3HCT and G3WJN for a week's visit. W3BHE having a ball with

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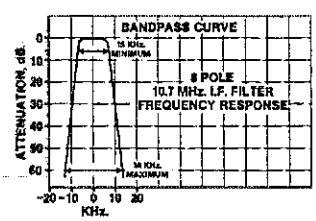
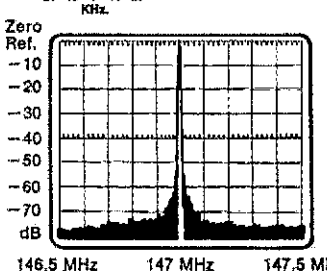
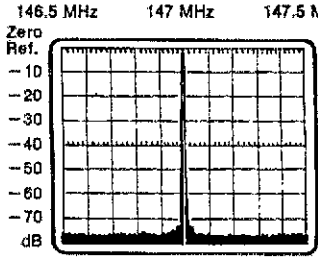
Receiver: Sensitivity: 0.5 μV for 12 dB SINAD (or 15 dB of Quieting). Squelch Threshold: 0.3 μV or less. Audio Output: 1.5 watts at 10% T.H.D. typically 2 watts. (5 kHz deviation). Image Rejection: —45 dB or greater. Spurious Rejection: —50 dB or greater. IF Rejection: —80 dB or greater. Internally Generated Spurious: Below 1 μV equivalent. Bandwidth: 6 dB at 15 kHz min. and 60 dB at 30 kHz max. Modulation Acceptance: 7.5 kHz, min. Transmitter: Power Output: 10 watts min. at 25°C and 13.8 VDC, into a 50Ω load. Harmonic & Spurious Output: —70 dB within 20 MHz of carrier; —50 dB elsewhere, —40 dB harmonics. Modulation: FM, 0 to 7.5 kHz, adjustable. Duty Cycle: 100% with infinite VSWR. Tone Encoder: 3 tones, 70 to 200 Hz, approx. ±700 kHz deviation. Transmitter Offset: 0 (simplex), —600 kHz, +600 kHz with crystals supplied. Provision for one additional offset crystal. General: Frequency Coverage: Any 2 MHz segment from 143.5 to 148.5 MHz. Both receiver and transmitter must be aligned for the same 2 MHz segment. Frequency Increments: 5 kHz. Frequency Stability: ±.0015%. Operating Temperature Range: 15° to 125° F. (—10° to 50° C). Operating Voltage Range: 12.6 to 16 VDC (13.8 VDC nominal). Current Consumption: RX: 700 mA max. squelched. TX: 2.6 A max. at 13.8 volts. Dimensions: 2¾" high x 8¼" wide x 9⅞" deep. Weight: 6.25 lbs.

Actual spectrum analyzer photos of HW-2036 operating at 147 MHz. Spurs within 20 MHz of carrier are down a full 70 dB.







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The new Heathkit 2-meter frequency-synthesized transceiver combines state-of-the-art technology with operating ease, convenience and versatility in an easy-to-build kit that's about HALF THE COST of comparable synthesized transceivers. It's the one to buy and build for real 2-meter PERFORMANCE!

Operation is easier than ever! The front panel lever switches select any frequency in any 2 MHz segment of the 143.5 to 148.5 operating frequency range. You select the last four digits, three with lever switches which display the frequency directly and the last with a 0/5 kHz toggle switch which makes ALL 2-meter frequencies in the band available. If you inadvertently dial up an out-of-band frequency, the transmitter simply will not key.

And the signal is solid! The HW-2036 puts out a minimum 10 watts at 25° C and 13.8 VDC. And it operates into an infinite VSWR without failure. The transmitter output is extremely clean, with spurious output greater than 70 dB below carrier. True FM circuitry means you transmit and receive with excellent audio quality too.

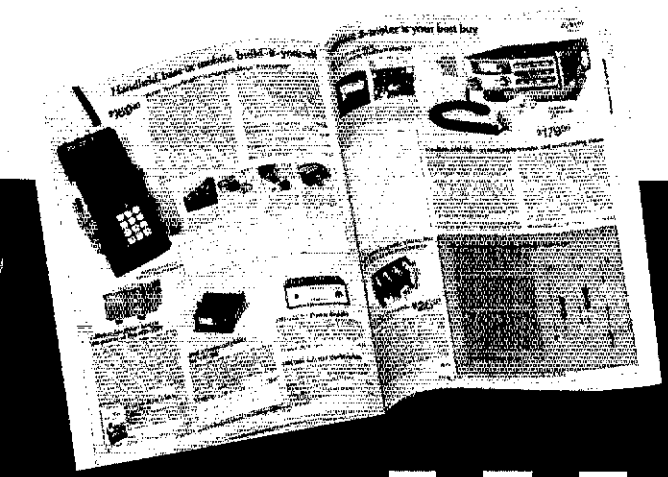
The receiver is hot! Sensitivity is an outstanding 0.5 μV for 12 dB SINAD. An 8-pole IF crystal filter provides an ideally shaped bandpass for excellent adjacent channel rejection and its superb selectivity makes it the one to have for crowded signal areas.

Complete operating versatility! A built-in continuous tone encoder with three customer-adjusted tones selectable on the front panel accesses most repeaters. The HW-2036 provides all the offset capability you'll ever need — built-in simplex, plus and minus 600 kHz offsets, and an Aux. position that lets you add a crystal for any other frequency. And, if you order the HW-2036 with the Heathkit Micoder microphone/auto patch encoder, you'll be able to make phone calls through repeaters equipped with auto patch input! (And save $19.95 in the bargain!) The HW-2036 operates mobile from your vehicle's 12 VDC battery, or you can use the optional HWA-2036-3 AC power supply for fixed station operation.

The HW-2036 is our best 2-meter transceiver! Check it out for yourself and you'll see it's the one to have for years of reliable 2-meter communications!

Our HW-2021 hand-held 2-meter transceiver is the one to have if you're working portable. It gives you a full 1-watt output plus 5 receive and 5 transmit channels and flexible simplex/offset. It's hand-held, battery-operated, and there's an optional auto patch encoder to add telephone versatility at low cost. Crystal-controlled, with better than 0.05% frequency stability. Sensitivity is 0.5 μV for 12 dB SINAD.

The HW-2036 and HW-2021 are two of the finest 2-meter transceivers around. Use 'em both for complete 2-meter versatility! Read more about them, and all the other superb Heathkit Amateur Radio products in the new Heathkit Catalog. Send coupon below!



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2CQ Spkr/Q-mult 29
2AC Xtal cal 9
2NB Noise blanker 15
2LF Low freq conv 19
R-4 Ham Rcvr 269
R-4A Ham Rcvr 289
R-4B Ham Rcvr 339
FL-6000 Filter 35
MS-4 Speaker 15
SW-4A SWL Rcvr 225
SCC-4 Xtal cal 19
SC-6 6m conv 59
CPS-1 Conv ps 12
CC-1 Conv console 39
TC-2 2m xmit conv 275
TR-3 Xcvr 299
RV-3 Remote VFO 89
TR-4 Xcvr 389
TR-4C/NB Xcvr 459
RV-6 Remote VFO 69
T-4X Transmitter 339
AC-3 AC supply 65
AC-4 AC supply 85
DC-3 DC supply 75
DC-4 DC supply 95
WV-4 VHF wattmeter 59
ML-2 2m FM Xcvr 199
TR-22 2m FM Xcvr 149
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Galaxy III Xcvr 149
Galaxy V Xcvr 189
Galaxy V Mk II Xcvr 229
Galaxy V Mk III Xcvr 259
GT-550 Xcvr 279
GT-550A Xcvr 299
AC-35 AC supply 69
AC-400 AC supply 75
DC-35 DC supply 65
RV-1 Remote VFO 69
RV-550 Remote VFO 89
VX-35C VOX 15
CAL-25 Xtal cal 15
SC-35 Speaker 12
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SR-150 Xcvr 249
SR-160 80-20m Xcvr 169
PS-150-120 AC supply 75
PS-150-12 DC supply 49
SR-400 Cyclone II Xcvr 495
SR-400 Cyclone III Xcvr 675
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HAMMARLUND
HQ-110 Ham Rcvr $109
HQ-110C Ham Rcvr 119
HQ-110A/VHF Ham Rcvr 219
HQ-145XC SW Rcvr 179
HQ-170 Ham Rcvr 149
HQ-170C Ham Rcvr 159
HQ-180 SW Rcvr 259
HQ-180C SW Rcvr 269
HX-50A Transmitter 199

HEATHKIT
HR-10B Ham Rcvr $ 69
HRA-10-1 Xtal cal 9
HR-20 Ham Rcvr 69
RX-1 Ham Rcvr 149
SB-300 Ham Rcvr 199
SB-301 Ham Rcvr 229
MT-1 Transmitter 49
DX-20 Transmitter 39
DX-60 Transmitter 59
DX-60A Transmitter 69
Tx-1 Transmitter 99
SB-10 SSB adaptor 75
HX-30 6m Xmtr 149
SB-401 Transmitter 249
HA-10 Linear 175
HW-10 6m Xcvr 99
HW-32 20m Xcvr 75
SB-100 Xcvr 299
SB-650 Freq display 149
HW-30 Two'er Xcvr 34
HW-17 2m AM Xcvr 89
HWA-17-1 DC supply 9
HW-17-2 FM adaptor 24
HP-10 DC supply 24
HP-13 DC supply 45
HP-13A DC supply 49
HP-13B DC supply 54
HP-20 AC supply 24
HP-23 AC supply 45
HP-23A AC supply 49
HP-23B AC supply 54

ICOM
IC-21 2m FM Xcvr $269
IC-21A 2m FM Xcvr 299
IC-22 2m FM Xcvr 149
IC-22A 2m FM Xcvr 189

JOHNSON
Challenger Transmitter $ 49
Navigator Transmitter 75
Ranger I Transmitter 89
Ranger II Transmitter 139
Invader 200 Transmitter 319
Invader 2000 Xmtr 449
KW Matchbox/SWR 199
6N2 VHF transmitter 89
6N2 VFO VHF VFO 39

KLM
Multi-2000A 2m Xcvr $450
Echo II 2m SSB Xcvr 279

KENWOOD
TS-900 Xcvr $569
PS-900 AC supply 89
TS-700A 2m Xcvr 525
PS-511S AC supply 79

KNIGHT
TR-108 2m Xcvr $ 89

NATIONAL
NC-300-C2 2m converter $ 29
XCU-27 Calibrator 15
NCX-5 Xcvr 279
NCX-5 Mk II Xcvr 299
NCXA AC supply 69
NCXD DC supply 75
VX-501 Remote VFO 125

P & H
2-150 SSB converter $149

PEARCE SIMPSON
Gladding 25 2m FM. ps $149

RADIO INDUSTRIES
Mk II Linear $275

REGENCY
HR-2 2m FM Xcvr $149
HR-2A 2m FM Xcvr 159
HR-2B 2m FM Xcvr 169
HR-212 2m FM Xcvr 189
HR-2MS 2m FM Xcvr 199
HR1-2 2m FM HT 129
AR-2 2m FM amp 89
HR-6 6m FM Xcvr 149

ROBOT
70 Monitor $239
61VF Monitor 349

SBE
SB-33 Xcvr $169
SB1-DCP Inverter 25
SB1-LA Linear 149
SB1-MIC Microphone 9
SB-34 80-15m Xcvr 249
SB2-VOX VOX 15
SB2-CW Codaptor 29
SB-450 450 FM Xcvr 199

SPECTRONICS
DFD-K Kenwood display $129
DD-1C Collins display 129

SWAN
SW-240 80-20m Xcvr $169
TCU Control unit 59
SW-12 DC supply 69
400 Xcvr/410 VFO/ps 289
MB-40 40m Xcvr 199
MB-80A 80m Xcvr 249
160m Remote VFO 75
14A DC converter 29
1200W Linear 199
1200X Linear 199
350 Xcvr (late) 269
350C Xcvr 299
500 Xcvr 309
500C Xcvr 329
500CX Xcvr 369
500CX/SS-16B Xcvr 439
117X AC supply 65
117XC AC supply/spkr 95
14C DC module 49
512 DC supply 69
405 MARS oscillator 39
508 Remote VFO 189
600T Transmitter 399
600R Ham Rcvr 349
600S Speaker 15
ICAF Audio notch/peak 19
250 6m Xcvr 239
250C 6m Xcvr 339
NS-1 Noise silencer 24
TV-2B 2m Xvtr (50 MHz) 249
FM-1210A 2m FM, ps 229
VX-2 VOX 14
FP-1 Phone patch 44

TPL
502B 2m FM amp $ 99

TEMPO
Tempo One Xcvr $299
Ac/One AC supply 75
2001 Linear 499

TEN TEC
Argonaut QRP Xcvr $199
210 AC supply 19
405 Linear 119
Triton I Xcvr 399
Triton II Xcvr 449
Triton IV Xcvr 525
250 AC supply 39
252G AC supply 75
262 AC supply/VOX 99
RX-10 Ham Rcvr 49
315 Ham Rcvr 169

VARITRONICS
IC-2F 2m FM Xcvr $139
IC-3P AC supply 39

YAESU
FT-101 Xcvr $489
FTDX-560 Xcvr 439
FTDX-570 Xcvr 449
FT-401B Xcvr 499
FTV-650 6m Xvtr 129
FRDX-400SD Ham Rcvr 319
FR-101S Ham Rcvr 485
YC-355D Freq counter 169

8-20-76

All items are subject to prior sale. Amateur Electronic Supply reserves the right to sell such items as power supplies with their matching equipment only, not separately - depending upon our stock situation. To insure quality, all used gear is serviced and made ready for shipment after we receive your order. Please allow for a possible delay (approximately 5 to 10 working days).

The following items are NEW Close-outs, Overstock merchandise, New displays, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Terms of sale: Payment in full with order or Mastercharge, no trades.

	reg.	NOW
ATLAS		
210 80-10m Xcvr	$599	479
210M Xcvr with MARS	619	499
180M Xcvr with MARS	519	399
BRIMSTONE		
144 2m FM Xcvr NEW	$650	499
CLEGG		
031 8A 12v supply, spkr	$ 89	69
COLLINS		
30L-1 1kw PEP linear	$973	681
COMCRAFT		
CST-50 2m/220 FM Xcvr	$869	699
DRAKE		
2C 80-10m Ham Receiver	$295	239
L-4B 80-10m linear	895	749
TR-72 10w 2m FM Xcvr	320	189
TR-22C 1w 2m FM Xcvr	229	179
RV-6 Remote VFO for TR-6	110	89
SCC-1 VHF calibrator	26	19
CC-1 Converter console	49	39
TR-22M 1w Marine Xcvr	249	149
SSR-1 Shortwave Rcvr	350	299
DYCOMM		
500C 2m FM amp, 7/20w	$ 69	49
500D 2m FM amp, 12/50w	99	75
500E 2m FM amp, 2/25w	80	59
10-0 2m FM amp, 10/100w	209	149
P-1406 6A 12V supply	65	49
P-1416 16A 12V supply	90	69
PSU-13 'Sniff It' RF probe	5	3
KLM		
Multi-2000A 2m FM/SSB Xcvr	$679	545
ETO		
274 80-10m linear	$995	795
770 160-10m linear	2995	2495
EICO		
751W AC supply wired	$109	59
752K DC supply kit	79	39
KENWOOD		
R-599A 80-10m Rcvr	$459	379
T-599 80-10m Xmtr	479	379
TS-700A 2m SSB/FM Xcvr	700	629
REGENCY		
HR-212 2m FM Xcvr	$259	199
HR-2S 2m FM ac xcvr/scan	349	249
ACT-W-10 Whamo scanner	329	249
Also works on 2m FM DFS-5K Dig freq selector	199	179
STANDARD		
146A 2w 2m FM HT	$298	229
146 1w 2m FM HT DEMO	279	179
Horizon 2 2m FM Xcvr	298	199
826M 2m FM Xcvr	359	199
Horizon 29 CB Xcvr	229	169
SBE		
SB-450 450 MHz FM Xcvr	$399	199
SWAN		
300B 80-10m Xcvr w/ps	$569	469
300B/SS16 16-pole filter	639	539
500CX 80-10m Xcvr	529	439
508 Remote VFO	269	169
160X 160m Xcvr	469	389
117XC AC supply/spkr	159	129
117X Basic AC supply	114	89
SS-100 80-10m Xcvr	699	489
SS-200 As above, 200w PEP	779	549
SS-208 Remote VFO	269	169
MB-80 80m Xcvr	299	225
MB-80A 80m Xcvr	329	249
MB-40A 40m Xcvr	329	249
P-1215A AC supply	75	69
600R 80-10m Rcvr	439	349
600R Custom Rcvr	599	449
600R Custom USED*	599	399
600R Custom/SS16 USED*	659	449
600SP Speaker/patch	86	59
600T 80-10m Xmtr	649	449
600T USED*	649	399
FM-2XA 2m FM Xcvr/ps	249	159
FM-1210A 2m FM Xcvr	319	199
Mk 6B 6m 2kw PEP linear	679	599
TB-3A Tri-band 3 el beam	139	99

*Factory reconditioned - with new warranty.

	reg.	NOW
TEN-TEC		
PM-1 QRP CW Xcvr	$ 69	39
PM-2 QRP CW Xcvr	69	39
RX-10 80-15m Rcvr	59	29
TX-100 CW Xmtr	109	71
315 80-10m Rcvr	249	189
Triton I 80-10m Xcvr	579	449
Triton II 80-10m Xcvr	669	539
KR-40 Squeeze keyer	99	79
VARITRONICS		
FDFM-2A 2m FM port Xcvr	$250	99
FM-20M Mobile 10w 2m amp	150	39
FM-20BM As above, but AC	235	59
PA-50 Mk I 50w 2m amp	129	59
YAESU		
FR-50B Ham Rcvr	$159	99
FL-50B CW Xmtr	189	79
FV-101 Remote VFO	99	89
FT-2FB 2m FM Xcvr	239	159
FT-2 Auto 2m FM Xcvr/scan	379	229
FR-101S 160-10m Rcvr	489	425
FR-101 Digital Rcvr	629	575
FL-101 160-10m Xmtr	545	499

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621 Commonwealth Avenue; Orlando, Florida Phone (305) 894-3238

28/88 in Cumberland. AA3YKK and WA3UYB cleaned up Belle tfc. the next day. W3FZV transfers the MDD record keeping to K3KAJ. WA3EOP was busy off and on the air. WA3UYF is into electronics books. W3DFW postponed a WR PON session to Belle, and notes the FL boys are beginning to come thru. WA3PRW cleaned up his leads only to get a little feedback. WB3AGO eyes a new TS 820. AC8BZY is ready for the coming season. WB3BYT quietly doing his job in Balto. WA3HKR becomes an appointee. WR PON results are 12/12/14.8 for Sessions/Tfc/QNI avg., MEPN has 22/111/25 with W3ADQ W3HWZ and W3MWD. W3LDD made the others list. MDCTN 18/49/19.1 top Honors to AA3YKK WA3UYB and K3ORW. MDD 60/181/7.3 top Brass to K3KAJ. Traffic: W3FA 118, AC8BZY/3 109, W3FZV 78, WA3SJS 76, WA3EOP 56, WA3SJY 51, WA3UYF 34, AA3YKK 30, WA3PRW 28, K3ORW 14, WB3BYT 5, WB3AGO 3, W3FCI 3, W3BHE 2, W3ZNW 2.

SOUTHERN NEW JERSEY:

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GIE — Congrats to K2UYH for WAC moonbounce. W2FGY and WB2KFK are DXing. WB2VTT edits NJPN Bulletin, is Net Mgr. W2APD received 81 Cent. 1093 WAS. W2BV VHF QSOd 13 orig. colonies. K2JLA Vernon, Gary, Stacy welcome back to hamming. WB2CYU leaves for Peace Corps. WB2ESV EC Cape May Co. resigned. W2UNI new EC in Salem Co. We need volunteer ECs for Cape May and Camden Co. W2ZHN former SCM of Canal Zone now signs K2TD at Delran. W2BMC and WA2HBA report using Absecon repeater to QSO K2RPZ 141 miles up on L.I. WA2ZZX has a new 50-ft. tower. W2BAY works 11 different nets every day. W2HOB is OBS/OO in Burl Co. W2GA has new 50-ft. tower. WB2CQJ volunteers for AREC. Shore Points ARC reports a class of 21 new novices waiting for their calls. Congrats to instructor K2MYS. Congrats to Old Barney Radio Club's League affiliation. (SHARK) Stone Harbour ARC looking for new members sez WB2HVD. WN2YOF says Burl. Co. ARC will have technical session at each meeting. Traffic: (Aug.) W2JI 57, WA2ZZX 15, K2BG 12, WB2OSQ 12, W2UI 8, WN2YOF 1, K2TD 1. (July) W2JI 26, WA2LZB 16, WB2LQV 12, WA2AZU 10, W2UI 8, W2FPY 4, WB2GTE 2.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YAH — As I am writing this I'm listening to RaRa and RRRA members participating in a simulated emergency involving a simulated airplane crash and many Rochester area hospitals and public safety agencies. More on participants next month. Thanks to WA2DHB and WB2KXY for their applications for EC and to WA2LCC for ORS application. ROXA is again active as they held a Bull and Fest Feast in East Bloomfield on Sept. 11. AWA had their Annual Radio Conference in Canandaigua on Sept. 30 and Oct. 1, 2, and 3. RaRa had an amateur radio demonstration booth at the Monroe County Fair from Aug. 13 through 21. Fair booth efforts were coordinated by WB2NSD. ARATS had a unique show and tell program for their Sept. meeting with prizes for categories including best unfinished project, best boat anchor, best retread, etc. Congratulations to new Novices WN2FEN and WN2IGO and new Generals WB2CJL WB2AVQ and WB2AUD. W2VCI planning a novice course for ARATS and WB2NSD is doing the same for RaRa. I'm still getting some reports much too late for inclusion in this column. Also please note the two to three month lead time between submission of a column and its publication in QST. SEC WB2EDT reports many area nets stood by during the hurricane Belle watch in early Aug. RAWNY held their annual Family Picnic on Sun. Aug. 29. Thanks to W2KLF for putting me on the RAWNY club paper mailing list. I encourage other clubs to do the same. Regret to report that WA2EYE is a Silent Key. WA2UEB reports WA2UGE W2HXP WA2FMM WB2EDT WB2MDO WA2GTX WB2DPT WA2SSU W2MPM K2EAW WA2SDK WA2SOR K2OIU K2OEQ WA2CER WB2BWQ WB2LZP and WA2CIS provided public safety related communications for a hot air baloon race held near Rochester in late Aug. Traffic: WA2UYK 753, W2MTA 270, W2OE 112, W2RUF 87, W2PZL 68, WA2AIV 57, WA2PTC 57, W2UIE 57, WA2ZJP 35, WA2ICB 27, W2FZK 26, WB2QIX 26, WA2DRC 24, WB2AIO 22, K2OFV 20, W2RQF 16, WA2ECA 2, WA2DHS 1, WB2FNS 1, WA2LCC 1.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: W3ZUH. Asst. SECs: K3SMB WA3LJW. PAM: K3SMB. RMs: W2KAT/3 W3NEM W3LOS W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3985.0	7:00 PM Dy
Pa. Phone	3960.0	5:00 PM M-F
WPA RACES	3990.5	9:00 AM Su

New appointment: W3YO as OO. New officers of the Breeze Shooters of Pgh. for 1976: WA3TFS, pres.; WA3LUM, checker; WA3PHY, treas.; K3SMB K3DE WA3QER K3CHD, dir. The Amateur Transmitter Assn. officers for 1977 are: W3OJW, pres.; W3VF, vice-pres.; W3DHL, treas.; W3NJI, secy.; W3OJM W3OVM K3RAD, dir. The Horseshoe ARC of Altoona and the Nittany ARC of State College jointly organized the Blue Knob Repeater Assn. and are installing a repeater at Blue Knob Mountain on 147.75/.15 MHz. WA3LCO is working on a repeater for Clearfield County. Welcome to the following new Novices: WN3DDY WN3ZRU WN3CKY WN3CKZ WN3DCW WN3DER WN3DCC WN3DGL WN3DRL. New Technicians are WB3ACC WA3ZNO WB3AIQ. WB3BGX upgraded to General Class. WA3HRX and WA3ZLF upgraded to Advanced Class. WA3WXR has moved to Chicago to attend school. Time is near to start preparing for the Simulated Emergency Test (SET) in Jan. Is your county equipped with AREC? Contact W3ZUH for details. The WPA CW Traffic Net had 31 sessions in July, handled 204 messages with 357 QTC. PSHR credits WA3VBM 44. Traffic: WA3VBM 296, W3KAT/3 275, WA3AHP 113, W3EGJ 112, W3KUN 45, K3CHD 37, WA3SWF 25, K3OYB 24, W3SN 23, WA3ZAO 22, W3IDO 12, K3SMB 11, W3KQD 8, W3UT 7, K3SJN 1.

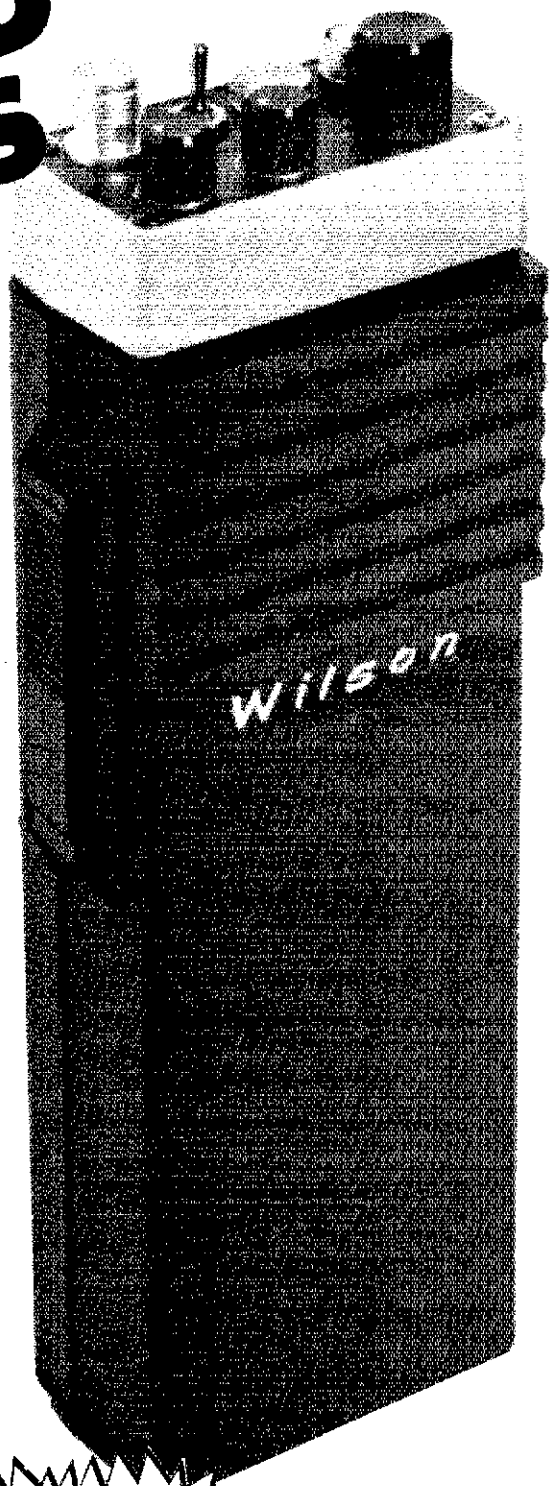
CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. RM: K9ZTV. PAM: WA9KFK. Cook County EC: W9HPG.

Net — Freq.	Time(Z)/Days	Sess.	QNI	QTC
ILN — 3690	0030/0400 Dy	62	429	230
ILL Phone — 3915	2145	31	891	220
NCPN — 3915	1200 M-S	52	1261	268
NCPN — 3915	1700 M-S	52	1261	268
ISSB			254	249

Wilson Electronics Corp.

HAND HELDS



220

FREQUENCY RANGE 220 - 225 MHz

- 6 Channel Operation
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- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 2.5 Watts Output @ 12 VDC
- Current Drain: RX 14 MA, TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

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2. Flex Antenna
3. 223.50 Simplex Installed

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FREQUENCY RANGE 420 - 450 MHz

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- Individual Trimmers on all TX/RX Crystals
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- 21.4 and 455 KC IF
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- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 1.8 Watts Output @ 12 VDC
- Current Drain: RX 14 MA, TX 500 MA
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LC2	LEATHER CASE 1405, 2202, 4502	12.95
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TTP	TOUCH-TONE PAD	49.95
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	INSTALLATION AT LATER DATE, ADD	15.00
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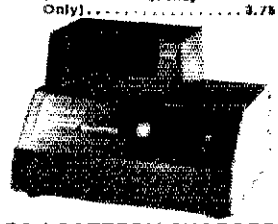
CRYSTALS	TX or RX (Common Frequency Only)	3.75



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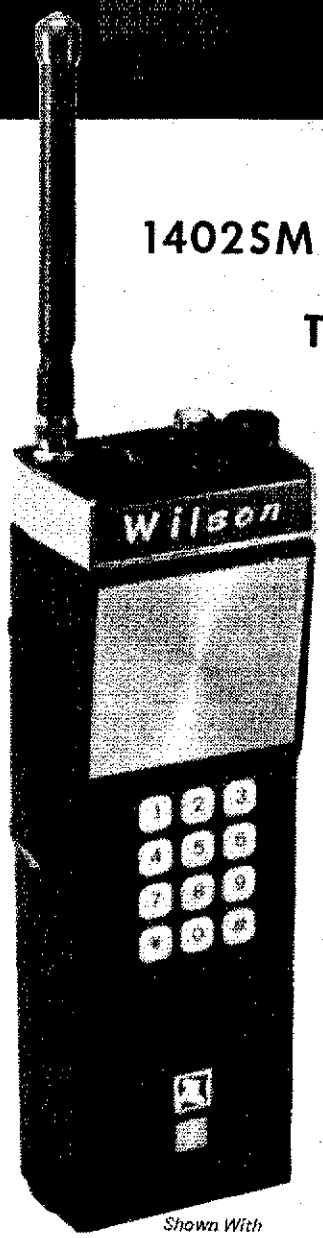

Shown With Optional Touch-Tone Pad

1405SM HAND HELD 5 WATT TRANSCEIVER

144-148 MHz

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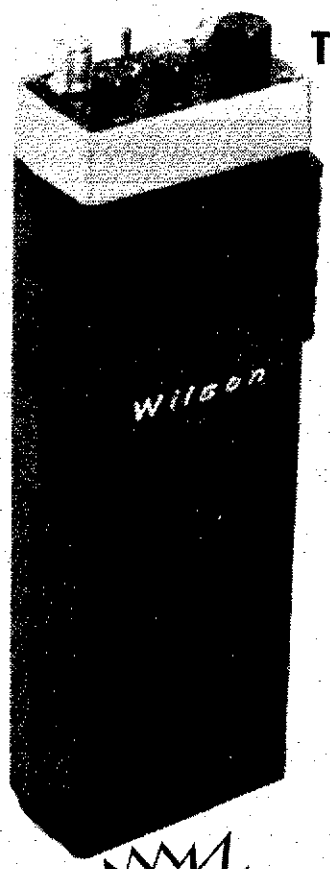

FEATURES

1402 SM	1405 SM
• 6 Channel Operation	• 6 Channel Operation
• Individual Trimmers on all TX/RX Crystals	• Individual Trimmers on all TX/RX Crystals
• All Crystals Plug In	• All Crystals Plug In
• 12 KHz Ceramic Filter	• 12 KHz Ceramic Filter
• 10.7 IF and 455 KC IF	• 10.7 and 455 KC IF
• .3 Microvolt Sensitivity for 20 dB Quieting	• .3 Microvolt Sensitivity for 20 dB Quieting
• Weight: 1 lb. 14 oz. less Battery	• Weight: 1 lb. 14 oz. less Battery
• S-Meter/Battery Indicator	• Battery Indicator
• Size: 8 7/8 x 1 7/8 x 2 7/8	• Size: 8 7/8 x 1 3/4 x 2 7/8
• 2.5 Watts Minimum Output @ 12 VDC	• Switchable 1 & 5 Watts Minimum Output @ 12 VDC
• Current Drain RX 14 MA TX 500 MA	• Current Drain: RX 14 MA TX 400 MA (lw) 900 MA (5W)
• Microswitch Mike Button	• Microswitch Mike Button
• High Impact Plastic Case	• Unbreakable Lexan® Case

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____ 4502SM @ $269.95
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____ BP1 @ $14.95
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____ LC1 @ $12.95
____ LC2 @ $12.95
____ SM1 @ $24.95
____ SM2 @ $24.95
____ TE1 @ $34.95
(SPECIFY FREQUENCY _____)

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____ TX or RX XTALS @ $3.75 ea. Common Frequencies Only.
____ FACTORY XTAL INSTALLATION/ NETTING @ $7.50/Radio
____ MARS or CAP XTALS @ $10.00 ea.

EQUIP TRANSCEIVER AS FOLLOWS:

XTALS	TX	RX	XTALS	TX	RX
A.	52	52	G.		
B.			H.		
C.			I.		
D.			J.		
E.			K.		
F.			L.		

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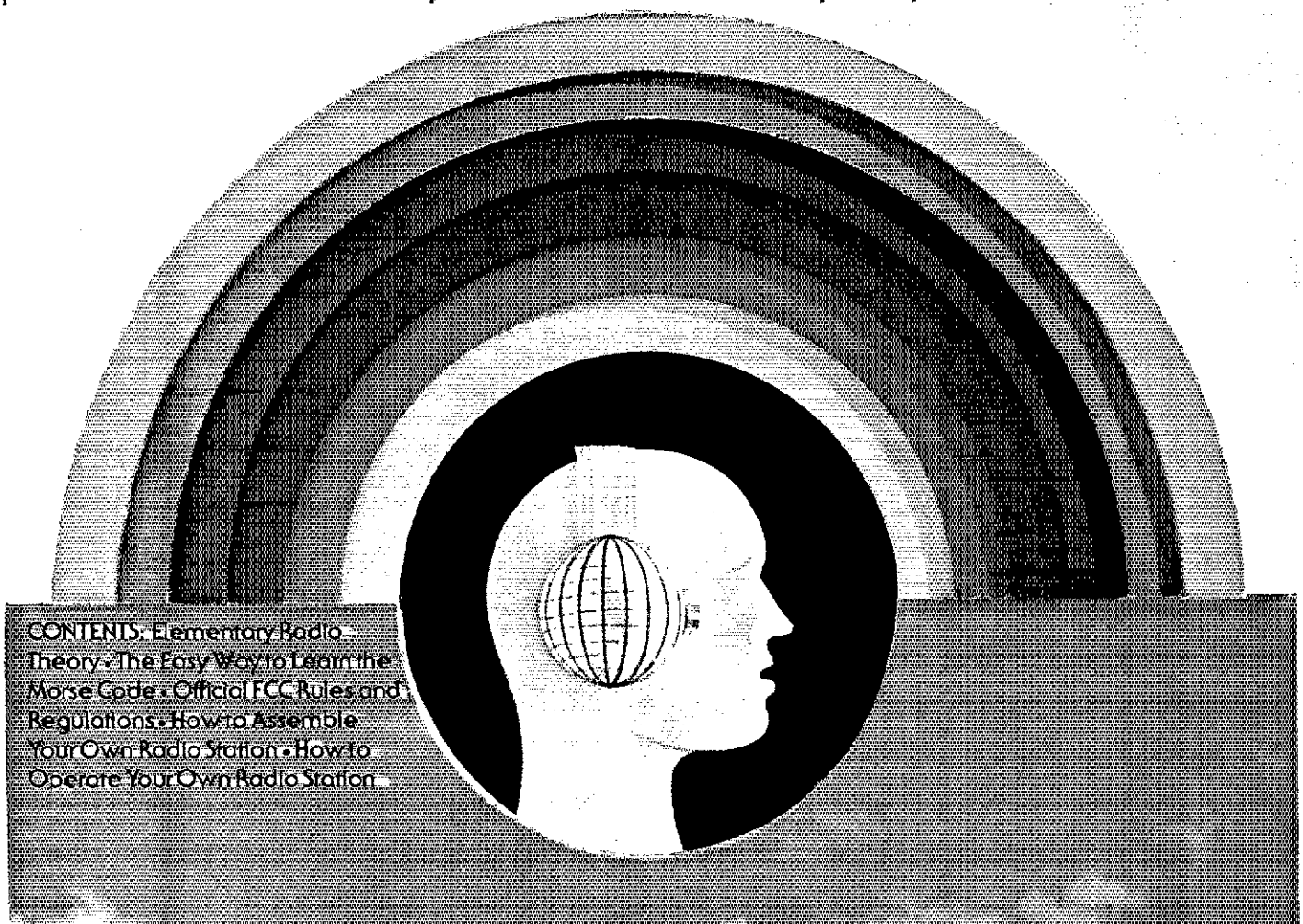

CONTENTS: Elementary Radio Theory • The Easy Way to Learn the Morse Code • Official FCC Rules and Regulations • How to Assemble Your Own Radio Station • How to Operate Your Own Radio Station

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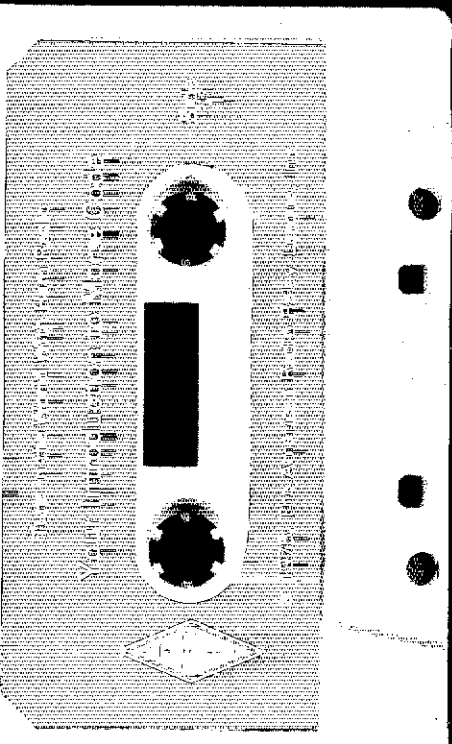

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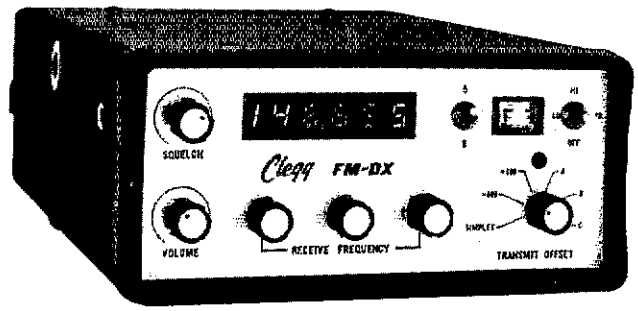

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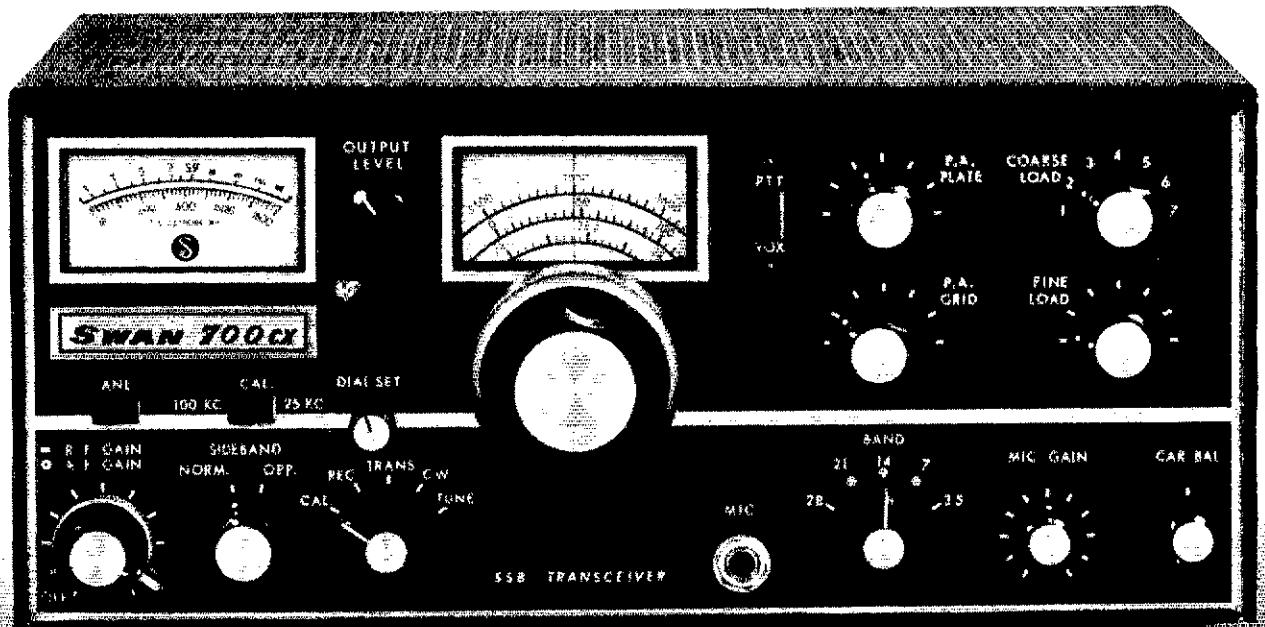

WA9BGW passed his Extra Class and is waiting for his certificate. W9ZAV has a new antenna system featuring an inverted "V." K9EIV is on the air with a new TR-22. The Peoria 25-85 repeater has added touchtone. W9VSX has joined the ranks of Silent Keys and this column's sympathy to his family and many friends. WA3WXR's new QTH is 71 East 32nd Street, Chicago, IL. Members of the Sangamon Valley Radio Club provided emergency communications for the Local chapter of the American Red Cross during the IL State Fair. New officers of the Cenois Amateur Radio Club (Decatur) are K9AWG WN9TJA WN9QQQ and K9BEK. WB9TDR, XYL of K9UQN, received her Technician License. The Starved Rock Radio Club held their annual appreciation dinner on Sept. 25 in Tonica, IL. W9JXV is now W9OK. Macomb's new repeater is on the air with a 147.69 in and 146.09 out. We wish to extend our sympathy to the family of K9MWA on the death of their daughter who was a drowning victim of the CO flood last month. WN9UWZ WN9VFM WN9VFN WN9VGJ WN9VGK WN9VGP WN9VGQ WN9VGR WN9VIP WN9VMI WN9VMJ WN9VMM WN9VMN WN9VMO WN9VMP WN9VUO WN9VUQ WN9VVK WN9VVL WN9VVM WN9VVN WN9VVO WN9VWQ WN9WAC WN9WAL WN9WAM WN9WAN WN9WAP WN9WAQ WN9WAR WB9WBN WN9WFN WN9WFO WN9WMC WN9WMD WN9WME WN9WNQ WN9WOA WN9WQA are the new calls of newly licensed amateurs from the Wheaton Community Radio Amateur Club. WB9TDH is now General and WB9STL has upgraded to Extra. WR9AHU are the call letters of the new Pittsfield Repeater. K9NBH, of the Great Lakes Navy Amateur Radio Club provided communications to coordinate and regulate the Admiral's Cup Boat Race. A Navy citation will follow to the Club. WB9NOZ received his 40 wpm ARRL Code Proficiency award. WB9PLI is working the low ends of 40 meters with a "Tuna-Tin 2" "Hearing Aid Five" and a MFJ VFO, and most likely with a lot of QRP. Traffic: WB9NVN 331, W9NXG 172, W9HOT 168, WB9TWT 159, W9QK 152, WA9BGW 142, WB9NOZ 138, WA9DBP 135, WA9KFK 126, WA9JJE 122, W9NJP 95, WB9SNA 71, K9ZTV 69, WA9AQN 64, W9LNQ 62, W9OYL 45, W9KR 30, WA9CJG 16, W9PRN 16, W9RYU 16, W9ZAV 15, AB9DED 14, W9HPG 2.

INDIANA: SCM, M. P. Hunter, WA9EED — SEC: W9UMH. WB9KSZ and K9EAT were inducted into the Wouff Hong at the Central Div. Conv. at Milwaukee. Congrats to WA9OHX for attaining the Ham of the Year from IRCC at Lafayette. W9UMH and K9SJJ took top prize honors. K9OTB and W9ZRX hosted AP2AD on a recent trip. The Indpls. Star reports an FBI investigation into illegal licensing of ham operators with both local hams and federal personnel under scrutiny. This month marks the start of the contest season — many are drooling for the chance to check the summer antenna work. The QIN bulletin contains a very good article on proper net operation — contact WB9OZW for a reprint. FWRC is boasting quite a number of new hams as a result of their training classes. W9GHK is active from Petersburg after 4 years operation as 9V1RF. Richmond ARA once again handled all communications for the Shrine Parade. The Indy DXers new officers are WA9BWY, pres.; WA9NPM, vice-pres.; WA9FUD, secy-treas. WB9LTY is struggling to get his antennas back up before the bad weather comes in. Please remember to get your activity reports in before the fifth of the month to insure listing in the proper column. Net traffic: QIN 266. Traffic: W9IOH 434, WB9SKA 280, WB9KTR 243, K9TKE 121, WB9OZW 109, WB9FOT 106, W9QLW 104, K8DCX 89, WB9SQH 80, W9HUF 78, WB9IHR 58, WA9TJS 41, K9VBM 41, WA9OKK 40, WB9EIX 38, WB9NAQ 37, WA9OHX 31, W9UEM 24, W9PMT 21, W9RTH 21, W9EI 20, W9JBQ 20, K9PWQ 17, W9DKP 16, AB9HCH 16, WB9QBM 16, W9ENU 14, W9EGV 13, K9LZN 12, WB9ORM 12, K9RGF 12, K9RPZ 12, W9KWB 10, W9DZC 8, W9LWI 8, WB9VKO 8, W9CMT 7, K9EQT 7, WB9KGR 7, WA9QCF 7, K9FZX 5, K9DIY 4, WA9UXP 4, W9JU 3, WB9GHS 2, K9HMC 2, W9BDP 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9PKQ. PAMs: W9AYK W9IEM K9UTQ. RMs: WB9ICH K9KSA W9MFG K9LGU. Nets, Freq., Time, QNI, QTC, Mgr.: BWN, 3985 kHz, 1145Z M-S, 461, 413, W9AYK; BEN, 3985 kHz, 1700Z Dy, 674, 186, W9IEM; WSBN, 3985 kHz, 2230Z Dy, 1075, 241, K9UTQ; WNN, 3725 kHz, 2215Z Dy, 162, 33, WB9ICH; WSSN, 3662 kHz, 2330Z MWF, summer vacation, K9KSA; WIN-E, 3662 kHz, 0000Z Dy, 213, 152, W9MFG; WIN-L, 3662 kHz, 0300Z Dy, 244, 171, K9LGU; Wi XPO net, 3925 kHz, 1701Z M-F, 605, 34, WA9MIX. WA9QVT on 07/67 AREC repeater. WB9NME enjoyed vacation in VE3. WB9TNG received and delivered 12 messages from CO disaster area. WB9SHQ new General from Niagara. New Novices Ashland area WN9VYH WN9ULA WN9VKZ WN9VYG (WN9VYU 10 year old YL of WA9FFV). WN9TDT passed tech. I regret to report W9JZD and WA9UWR Silent Keys. W9EIZ new postmaster in Antigo. New call WB9VQZ now in northern part of state from NE welcome to WI. WSBN certificate to WB9OEC WB9KMW WB9SHK K9JMP. WNN certificate to WB9SXX. WA9QCC WB9SHK WB9TSH passed Advanced. New Novice in Eau Claire WN9VYM. K9CPM made BPL. WB9NME worked FL on 6, MI on 2. New Novice in Custer WN9WDQ. WB9RWZ now General. Traffic: (Aug.) K9CPM 710, K9LGU 213, W9DND 202, WB9ICH 173, K9MZO 158, W9PVH 156, W9IEM 105, K9FHI 90, WB9OEC 77, WB9KPX 75, WB9JSW 61, K9UTQ 52, WB9SHK 52, WA9QVT 51, WB9NME 49, W9IHW 43, K9JPS 39, WB9LKC 38, WB9TSH 31, K9JMP 28, WB9RWZ 25, WB9KMW 24, WB9PYG 23, WB9RRV 22, WB9PKJ 16, K9ANV 12, W9SFL 12, WB9SXX 12, W9NF 11, WB9HLS 6, WB9NRK 2. (July) WB9KPX 166, WB9HLS 7.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K0ZXE — FCC Amateur exams will be given in Fargo, ND, Dec. 17. File form 610 now with St. Paul FCC if you plan to write the exam. ARRL annual SS contest is Nov. 6-8 and 20-22, so get your fist and jawbone ready for the annual marathon. The Handi-Ham bus trip to the ARRL National Convention was a success. W0FCO WA0ATI WA0SGJ WA0CPC and his XYL had a tremendously good time on the long journey. An overturned mobile home in the middle of the highway was reported by them via the Norton 34/94 repeater on the return trip. Police responded to clear the blocked road and fortunately no injuries were reported. W0KE, ARRL Director, solicits your comments on all ARRL and FCC proposals. Summaries of these proposals are aired via official bulletins on W1AW and by your local OBS. The Eveleth machine.

WR@AML, 25/85, should be on at this writing. The Mesabi Wireless Assn. elected W@UKI, pres.; WA@KMR, vice-pres.; W@BQV, secy.; WA@GGU, treas. Congrats to this months upgraders: Tech. WB@VMJ, Gen. WB@YNQ and WB@VCA. The MN Amateur WX Net starts Oct. 15 and operates daily after the MSPN evening session. Duluth's WR@AIM, is working on a user operated bulletin system. K@FLT now on 2MFM. WN@UTV, WA@GLI's dad, has a new TS520. K@SVW is using a new 80 ft. tower with KLM 20M big stick. W@PET is working on a mini-computer. *Traffic:* K@CVD 327, WA@YVT 115, WB@JYT 105, WB@OCI 101, WB@OAG 97, K@ZXE 85, W@PFT 83, WA@TFC 66, WB@CPC 64, WA@WOV 49, WB@OFQ 48, W@HZU 43, AB@LDW 42, AA@URW 41, WB@NZB 36, K@ZBI 33, WB@LSI 29, WB@MAQ 26, K@PIZ 22, WB@PGZ 22, W@NO 14, WB@QNX 13, WB@PMZ 10, WA@GLI 9, W@OPX 9, WB@PKG 9, W@KLG 8, W@RIQ 8, W@UMX 7, WA@LIS 7, K@FLT 2, WB@OUH 2, WB@PBN 8, K@GNI 1.

NORTH DAKOTA: SCM, Mark J. Worcester, WA@WLP — OBS: K@PVG. New call in G. F. WN@SAE. Bismarck ARC trying to reorganize with 25 attending the first meeting. Anyone interested in joining contact WA@WLP. New calls in Bismarck are WN@s SWS SWT SWV SWW SWX SWY SXC SXI SZD SZE TDJ TEE; WB@s PDP UOR VQG. K@SYT and W@ZJZ renewed their tickets. K@GRM and WA@WLP spent a day at WA@SUF working on antennas with some success. Minot, Bis. Picnic at Garrison Dam was a success. The Two Meter SSB Frequency being used in ND is 145.800 with sked times 2600 and 2630Z. So far stations in Minot, Fargo, Bismarck and Fergas Falls, Minn. have been represented. It is with deepest regret that we add the call of WB@MCV to the list of Silent Keys.

Net — kHz	CDST/Days	Sess.	QNI	QTC	Manager
DATA — 3996.5	2300/S-S	30	230	63	WA@SUF

Traffic: WA@SUF 60, WB@BMG 5, W@DM 4.

SOUTH DAKOTA: SCM, Ed Gray, WA@CPX — It should be remembered that when we change to standard time the South Dakota nets will remain at the same time; in other words the 12:15 PM net will still be 12:15. It should be noted the Evening net will be at 6:00 PM instead of 6:30 PM when the time changes. There is interest in a wide area coverage 2-meter repeater, linking, or a 6-meter repeater in eastern SD. There are tentative plans being made for a meeting on this subject. Anyone having any ideas on the matter are asked to contact the SCM. WA@WAS should have a 50-foot tower and TH-6 DXX operating by the time you read this. Gene is at Armour and checks into the evening net quite often.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W6UAU — SEC: WA5VNV. PAMs: W5POH WA5ZWZ. RM: W5MYZ. Nets, kHz, Time/Day, QNI, QTC, Mgr.: OZK, 3760, 175, 38, W5MYZ; APN, 3937, 1200/M-S, 723, 35, W5POH; M-Bird, 3928, 2230/M-F, 565, 20, WA5ZWZ; ARN, 3995, 0030/Dy, 367, 19, K5FUY. Welcome to ham radio, WB5s TIC TJX UDE UDG TSH TUA TWK; WN5s TGO TGP TIJ TSI TSP TUJ TVM TYX TZB TZG UAC UAR UAY UBK. New EC for Lincoln Co. WB5NXV. Regret reporting as Silent Key, past acting SCM, W5ENH. Traffic: WA5HNN 138, K5AO 44, W5MYZ 35, W5POH 23, WB5GWU 21, W5UAU 18, W5EIJ 2, WB5GQH 1.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NYY. SEC: WB5CIQ. RM: WA5PRI. PAM: WB5KFY. VHF PAM: W5VBX. Congrats to the Jerrerson ARC and the Micro-Computer Club of New Orleans on an excellent LA Hamfest. New PAM is WB5KFY of Shreveport, managing LTN, the ssb traffic net. Officers Westside ARC are WB5ADU, pres.; WB5MLH, vice-pres.; W5OUD, treas.; K5MKW, secy.; W5YZC, act. mgr. Call letters for SELARC Repeater are WA5PCE. WB5MXE and K5CAV both active in the Bicentennial Contest. WB5VRO new Advanced ticket, WB5OOM and WB5QCJ new Generals. WB5PTH new Extra ticket. The Alexandria Hamfest well attended. WA5ZOO very active on LTN. WA5PRI again actively managing LAN. WA5QVN reports 2-meter help on two road emergencies as well as on two grass fires. QVN also spoke before the Rayville Kiwanis Club. WA5ZZA back on the air at new QTH in Metairie. W5MI WA5IQU and W5GHP attended the CAS meeting in St. Louis, Oct. 23/24.

Net — Freq.	Time/Days	QNI	QTC	Manager
LAN — 3615	7 & 10 PM Dy	343	222	WA5PRI
LTN — 3910	6:45 PM Dy	795	64	WB6KFY
LSN — 3703	8:30 PM M-F	128	41	WA5ANV
LRN — 3587.5	7:00 PM Su	18	12	WB5FHU

Traffic: W5GHP 593, K5TTC 252, WA5IQU 192, K5TFG 132, W5MI 119, WB5PTH 109, WA5VQE 94, WA5ANV 66, WB5NVB 43, WB5LBR 27, WB5OOM 27, WB5NWO 8, WA5QVN 8, W5YN 4, K5BLV 2.

MISSISSIPPI: SCM, W. L. Appleby, WB5DCY — Chicasaw ARC formed with 46 mbrs. W5TXA now in Biloxi, W4MPC/5 in Meridian, WN4PAF/5 in Amory, WB5NGF WA4KVR/5 and W5GMZ on MTN. WB5SXK upgraded to Tech, WB5OWX to Adv. Welcome to new MS amateurs WN5s V5M UNI UON URA ULD UPN UPO UJS UHT TTF TWC TSR TSQ TTE TRZ TSI TTM WB5s TUC TVF TWU TWT TUE TWL TWS TVN TVG UID UEU UDV UMY UMW UMZ UMF UOW URJ UOV UQX UJY UGI UJZ UME UMX UNA UMT UQL UOS UQQ UOT. MTN Aug. QNI 168, QTC 81; MSBN QNI 1031, QTC 69; MSN QNI 49, QTC 24; CGCHN QNI 1870, QTC 60; Miss-Lou QNI 124, QTC 0; Shrimp Net QNI 107, QTC 2. Traffic: WB5LXX 148, W5EDT 124, WB5FHA 94, WB5MTQ 72, K5OAF 64, WB5DCY 61, WB5NPM 31, W5LSG 18W 16, WB5BUE 8, WB5NJZ 8, WN5OLL 7, W5YTN 7, W5LL 5, W5BW 4, WB5FXR 3, WB5SNB 3.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. PAM: WB4PRF. RM: WB4DJU.

Net — Freq.	Time(Z)/Days	Sess.	QNI	QTC	Manager
TPN — 3.980	1040 M-F	80	3476	249	WA4EWW
	1145 M-F				W4PFP
	0030 M-S				WB4YPO
	1400 SSuH				
TN — 3.635	0030 Dy	26	146	66	K4YFC
ETVHFN — 50.4	1900 MWF	13	120	7	WB4WZJ
ETVHFN — 145.2	1900 TTh	9	14	3	WB4DZG

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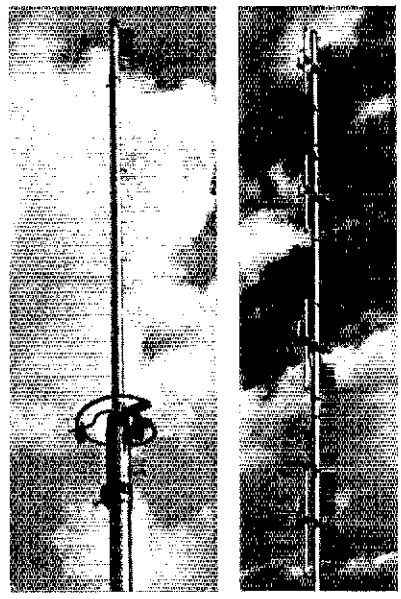
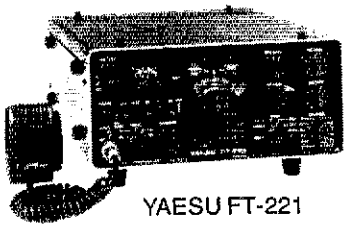
4 pole, gives very substantial gain over 1/2 wave dipole. Length 147MHz, 23'; 220MHz, 15'; 435 MHz, 8'. Includes 4 complete dipole assemblies on mtg. boom, harness, hardware. Less mast.

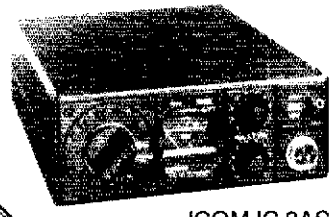


FULL STOCKS

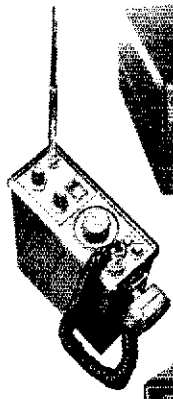
2 METER GEAR



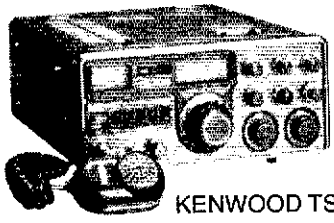
YAESU FT-221



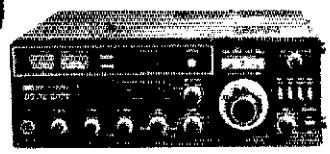
ICOM IC 2AS



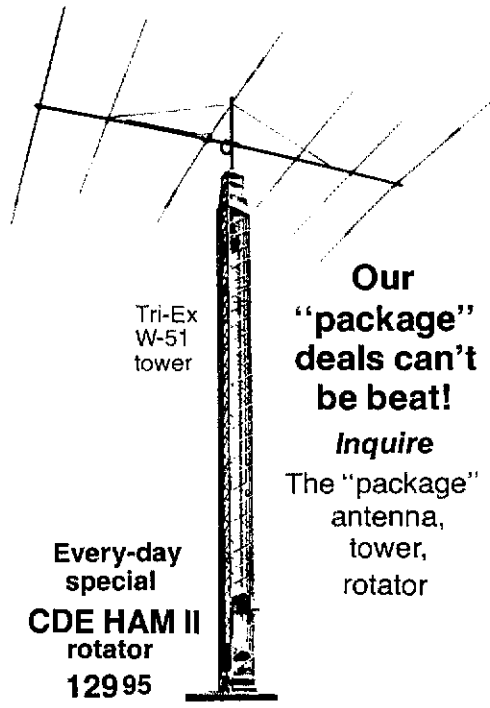
KENWOOD TR-2200A



KENWOOD TS-700A



KLM 2700



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ETTMN — 28.7 WB4NFI	0100 WF	9	129	0
MTTMN — 28.8 W4EAY	0100 TF	9	52	0
TCDARCWN — 146.16 W4CYL 146.76	0100 W	4	141	0

The Music City Hamfest was a success. WB4MSS was first prize winner, WB4DYJ second. The organization of a Repeater Advisory Committee is coming along fine. There have been several training courses in this section, a tabulation is now being compiled. I have had some requests from Amateur Radio Clubs for me to present the ARRL organization to Club meetings, any club wishing to schedule a presentation please contact me. The Cedars of Labanon Hamfest was a success. Traffic: K4CNY 169, WB4LCR 131, W4OGG 82, K4YFC 75, K4ISF 50, WB4DJU 35, WB4BKF 34, WA4GLS 28, W4RUW 26, WB4ZSZ 26, WB4YPO 21, WB4PRF 10, W4VJW 10, K4KCK 9, WA4IDN 8, WB4MPJ 8, W4SGI 7, W4TYV 7, K4AMC 5, K4UMW 5, W4PSN 4, K4PUZ 4, WA4WVW 3, WB4WHE 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	265	29	KYN	333	174
MKPN	880	109	KPON	75	15
KTN	1033	130	SDAREC	62	11
KNTN	177	95	SEKEN	35	4

Time to start thinking of the Jan. SET meeting. It will be held in Louisville the 3rd weekend of Jan. Again, a general section meeting. All appointees and net members should plan to attend. Changes in section organization will be announced. KYN has a new newsletter. Contact K4FUM if you want on the mailing list. W4CDA has a new rig, WA4GHQ has been teaching Novice classes for the Army all summer. K4FUM now in new QTH. Traffic: WB4IGX 184, W4BAZ 116, K4TXJ 114, WA4IGS 69, WB4QVS 56, W4UNW 48, W4CID 48, WB4AUN 47, WB4EOR 35, K4HRF 29, WA4AVV 29, W4CDA 21, WA4GHQ 17, K4HOE 15, WA4FAF 14, K4FUM 11, WA4SAC 10, WA4AGH 9, WN4JJH 6, K4AVX 6, K4LOL 5.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC: W8MPD. RMs: W8JYA K8KMQ W8YIQ. PAMs: WB8JIX K8LNE. VHF PAM: WA8WVV.

Net — Freq.	Time/Days	QNI	Tfc	Sess.
MACS — 3953	1500 Dy	971	345	36
QMN — 3663	2200/0200 Dy	606	301	62
WSSBN — 3935	2301 Dy	845	112	30
BRMEN — 3930	2130 Dy	736	90	30
MNN — 3722	2130 Dy	176	68	22
GLETN — 3952	0030 Dy	805	68	31
UPEN — 3922	2130 Dy	805	64	35
MI6M — 50.7	2300 Dy	212	24	26
VHF PAM Report		398	1	19

I am pleased to note the top three net spots this month are National Traffic System nets. W8RX is winner in Semara raffle. WA8DHB is new manager for the UPEN. W8NDI WA8FON and W8FJU were prize winners at BRMEN Swap-N-Shop. New equipment is reported at: WN8ZCD TS520, WB8AKY Icom, WB8STZ two-element beam. Bond retirement ceremonies were conducted by the ARROW Repeater Assn. New licensees WN8s ZCD ZKA BZP BLQ BLR BLS BLT CBU. WB8VKR and WB8DIY Advanced. WB8RVG, Extra. Congratulations. WB8DKQ is QSL Mgr. for EP2LA. Regretfully I report W8IDK a Silent Key. Traffic: (Aug.) WB8IDKQ 440, WB8RVG 254, K8KMQ 247, WB8ITT 229, WA8OIE 209, K8LNE 131, W8JYA 100, W8MO 95, WB8NCD 95, W8VPW 86, W8OW 77, WA8WZF 77, W8YIQ 65, WB8POL 58, W8TZZ 54, WB8BPY 54, W8NOH 53, K8DYI 49, WB8JIX 48, K8WRJ 45, WN8VOM 49, W7KQU/8 37, WB8FBG 36, WB8HNB 35, W8IHX 34, WA8DHB 33, K8JED 33, WN9SHL/8 32, W8SH 26, WA8UPR 25, WB8DJS 23, W8JUP 21, WB8ZPE 21, K8ZJU 17, W8PDP 16, W8SDB 16, W8IUC 15, K8TIY 15, WB8BYB 13, W8LOU 12, W8RNQ 12, WB8KBZ 11, WA8TBL 11, K8DTG 9, K8GXV 9, WB8LOE 9, KG6JED/8 8, WA8VNZ 8, W8DDN 7, W8CSO 6, WA8FXR 6, WB8GKB 6, W8JAX 6, W8TBP 6, W8CUP 5, W8LDS 5, W8QBE 5, WA8WVV 5, W8BNF 4, WB8VAI 4, W8WVL 4, WB8GLC 3, W8HKL 3, W8JLD 3, WA8MDK 3, W8VIZ. (July) K8KMQ 177, K8DYI 104, W8SH 2.

OHIO: SCM, Hank Greeb, AC8CHT — Asst. SCM: William K. Shaeffer, WA8MCR. SEC: WA8KPN. RMs: K8IKD WB8JGW WA8WAK. PAMs: W8DIL WA8SSI. Net reports:

Net — Freq.	Time(Z)	Sess.	QNI	QTC
O6N — 50160	0200	29	203	46
OSN — 3577	2310	29	154	99
OSSBN — 3972.5	1530/2100 /2345	92	2403	889
BNR — 3605	2200	31	96	137

Amateurs in Belmont/Monroe counties, Cincinnati, Cleveland, Columbus, Toledo, and elsewhere are cooperating with the National Weather Service on severe weather watch information. Those interested in statewide (or larger) coverage (possibly via 75/80 meter links) please contact WA8KPN. Lake Erie Amateur Radio Assn. (Cleveland) provided communications for N. Olmstead homecoming parade. Central Ohio AREC aided an air show for Children's Hospital in Columbus on Aug. 15. Code/theory classes are known to be held in Belmont (WA8KPN), Cincinnati (K8CKI), Massilon (K8JPF), and Milford (K8COT). Milford ARC provided communications for Annual Canoe Races, linking three simplex FM frequencies via 75 SSB. Traffic: W8PTT 342, WA8MCR 331, WB8PAV 235, WB8OZA 203, W8DIL 202, WB8KWD 183, WB8TTP 176, WB8JGW 136, WA8HGH 124, W8QZK 117, AD8MLO 98, WB8PIY 86, WB8KKI 63, K8LGA 51, WA8SSI 51, WB8UIN 50, WB8OMQ 48, K8BYR 47, WA8MAZ 47, W8JD 45, K8LXA 42, WA8SED 42, W8CXM 34, W8OE 33, WN8VLR 32, W8STRK 30, WA8VWH 30, WB8WTS 30, WA8JPX 29, W8BHL 28, AC8CHT 28, W8WEG 28, W8QCU 27, K8VMI 22, WB8VRX 22, WB8DQE 20, W8LZE 20, WB8GGR 17, W8GOE 16, WA8RQQ 16, W8FQD 15, WB8UJM 14, WB8KQJ 10, W8ARW 8, W8QXQ 8, K8QYR 8, WN8UJL 8, W8PNP 7, W8IBX 5, K8CKY 4, WA8FSX 2, AD8JPF 2, W8OUU 2, WA8TSX 2.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, AA2PJL — SEC: K2AYQ. Asst. SEC: WB2VUK. RMs: K2OYG (RTTY), WB2IXW (CW). PAM: WB2QEI. Congratulations on new appointments go to WA2YUL

Sometimes a lot of guesswork goes into your idea of what frequency you're transmitting on.

You know you're in the ball park but you really don't know what the score is.

Now you can put our new FC-76 in your line-up and have the capability of reading out your frequency right down to ±100 Hz if you need it. (Or ±1 KHz at the flip of a switch.)

On a big, bright 5-digit LED display anywhere between 5 KHz and 40 MHz.

The FC-76 also features an "Antenna" connector with two-position sensitivity switch for low signal levels down to 50 millivolts.

So you can use the counter as a sensitive test frequency meter, too. One that's good enough to calibrate receivers, realign transmitters, compare dial readings or wherever you need accurate frequency measurement.

And with built-in 117 VAC power supply plus 13.8 VDC (positive or negative ground) binding posts the FC-76 is all ready for mobile or fixed station duty.

Now here's a score you can't beat: $169.95. So why wait? Use your Swan credit card. Applications at your dealer or write:

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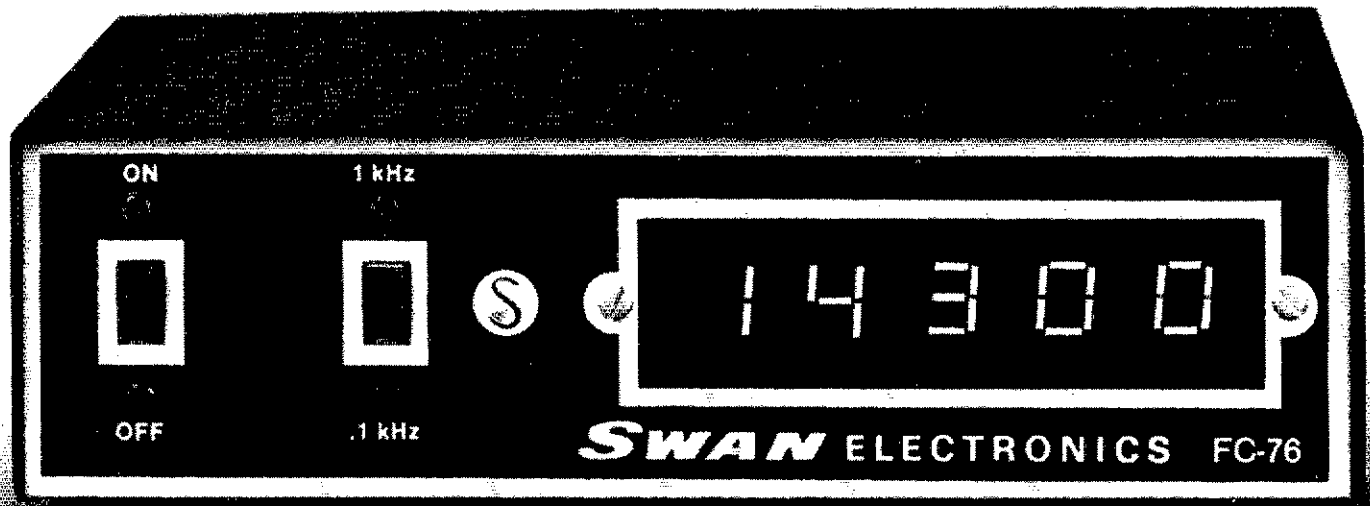
A subsidiary of Cubic Corporation
305 Airport Road, Oceanside, CA 92054
(714) 757-7525

(Price FOB Oceanside, CA)

OUR NEW FC-76 FREQUENCY COUNTER DOESN'T JUST GET YOU IN THE BALL PARK.

IT GIVES YOU THE SCORE.



KENWOOD'S TS-520

...worth waiting for!

Why wait any longer for a rig that offers top performance, dependability and versatility . . . the TS-520 has proven itself in the shacks of thousands of discriminating amateurs, in field day sites, in DX and contest stations, and in countless mobile installations.

Superb craftsmanship is evident throughout . . . in its engineering concepts as well as its construction and styling . . . craftsmanship that is a Kenwood hallmark.

Maybe the Kenwood TS-520 is the one you have been waiting for.

Kenwood offers accessories guaranteed to add to the pleasure of owning the TS-520. The TV-502 transverter puts you on 2-meters the easy way. (It's completely compatibile with the TS-520.) Simply plug it in and you're on the air. Two more units designed to match the TS-520 are the VFO-520 external VFO and the model SP-520 external speaker. All with Kenwood quality built in.

Specifications TS-520

MODES: USB, LSB, CW
POWER: 200 watts PEP input on SSB, 160 w
DC input on CW
ANTENNA IMPEDANCE: 50-75 Ohms, unbalanced
CARRIER SUPPRESSION: Better than -45 d
UNWANTED SIDEBAND SUPPRESSION: Be
than -40 dB
HARMONIC RADIATION: Better than -40 dB
AF RESPONSE: 400 to 2600 Hz (-6 dB)
AUDIO INPUT SENSITIVITY: 0.25μV for 10 d
(S+N)/N
SELECTIVITY: SSB 2.4 kHz (-6 dB), 4.4 kH
(-60 dB), CW 0.5 kHz (-6 dB), 1.5 kH
(-60 dB) (with accessory filter)
FREQUENCY STABILITY: 100 Hz per 30 minutes after warmup
IMAGE RATIO: Better than 50 dB
IF REJECTION: Better than 50 dB
TUBE & SEMICONDUCTOR COMPLEMENT: 3 tubes (2 x 6146B, 12BY7A), 1 IC, 18 FET, 44 transistors, 84 diodes
DIMENSIONS: 13.1" W x 5.9" H x 13.2" D
WEIGHT: 35.2 lbs.
SUGGESTED PRICE: $629.00

VFO-520

Provides high stability with precision gearing Function switch provides any combination w the TS-520. Both are equipped with VFO ind cators showing at a glance which VFO is bei used. Connects with a single cable and obta its power from the TS-520. Suggested price: $115.00.

SP-520

Although the TS-520 has a built-in speaker, addition of the SP-520 provides improved to quality. A perfect match in both design and performance. Suggested price: $22.95.

TV-502

TRANSMITTING/RECEIVING FREQUENCY: 144-145.7 MHz, 145.0-146.0 MHz (optio
INPUT/OUTPUT IF FREQUENCY: 28.0-29.7 MHz
TYPE OF EMISSION: SSB (A3J), CW (A1)
RATED OUTPUT: 8W (AC operation)
ANTENNA INPUT/OUTPUT IMPEDANCE: 50
UNWANTED RADIATION: Less than -60 dB
RECEIVING SENSITIVITY: More than 1μV at S/N 10 dB
IMAGE RATIO: More than 60 dB
IF REJECTION: More than 60 dB
FREQUENCY STABILITY: Less than ±2.5 kH during 1-60 min after power switch is O and within 150 Hz (per 30 min) thereaf
POWER CONSUMPTION: AC 220/120V, Tran mission 50W max., Reception 12W max DC 13.8V, Trans- mission 2A max., Reception 0.4A max.
POWER REQUIREMENT: AC 220/120V, DC 1 16V (standard voltage 13.8V)
SEMI-CONDUCTOR: FET 5, Transistor 15, Diode 10.
DIMENSIONS: 6⅜" W x 6" H x 13¼" D
WEIGHT: 11.5 lbs.
SUGGESTED PRICE: $249.00

CW-520
500 Hz CW Crystal Filter: $45.00.

Prices subject to change without notice

TRIO-KENWOOD COMMUNICATIONS INC.

If you haven't tried the TS-700A ...you haven't experienced the excitement of 2-meters

Experience the excitement of 2 meters. There's more than just FM repeaters, you know. SSB DX, OSCAR Satellite, CW...and do it all with a tunable VFO. Do it all with the Kenwood TS-700A.

- Operates all modes: SSB (upper & lower), FM, AM, and CW
- Completely solid state circuitry provides stable, long lasting, trouble-free operation
- AC and DC capability. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater operation . . . reverses, too
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive capability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

TS-700A Specifications

TRANSMIT/RECEIVE FREQUENCY RANGE: 144-148 MHz
MODE: SSB, FM, CW, AM
RF OUTPUT: CW, FM: more than 10W output. AM: more than 3W output. SSB: more than 20W DC input.
ANTENNA IMPEDANCE: 50Ω (unbalanced)
CARRIER SUPPRESSION: Better than 40 dB
SIDE-BAND SUPPRESSION: Better than 40 dB
SPURIOUS RADIATION: Less than −60 db
MAX. FREQUENCY DEVIATION (FM): ±5 kHz
REPEATER FREQUENCY SHIFT WIDTH: 600 kHz
TONE BURST TIME: 0.5-1.0 sec
MODULATION: Balanced modulation for SSB. Variable reactance frequency shift for FM. Low power modulation for AM.
MICROPHONE: Dynamic microphone, 500Ω
AUDIO FREQUENCY RESPONSE: 400-2600 Hz, within −9 db
RECEIVING SYSTEM: SSB, CW, AM: Single-superheterodyne. FM: Double-superheterodyne.
INTERMEDIATE FREQUENCY: SSB, CW, AM: 10.7 MHz. FM: 1st IF: . . . 10.7 MHz. 2nd IF: . . . 455 kHz.
RECEIVING SENSITIVITY: SSB, CW: S/N = 10 dB or better at 0.25μV. 20 dB noise quieting = Less than 0.4μV. AM: S/N = 10 dB or better at 1μV.
IMAGE RATIO: Better than 60 dB
IF REJECTION: Better than 60dB
PASS-BANDWIDTH: SSB, CW, AM: More than 2.4 kHz at −6 dB. FM: More than 12 kHz at −6 dB.
RECEIVER SELECTIVITY: SSB, CW, AM: Less than 4.8 kHz at −60 dB. FM: Less than 24 kHz at −60 dB.
SQUELCH SENSITIVITY: 0.25μV
AUDIO OUTPUT: More than 2W at 8Ω load (10% distortion)
RECEIVER LOAD IMPEDANCE: 8Ω
FREQUENCY STABILITY: Within ±2 kHz during one hour after one minute of warm-up, and within 150 Hz during any 30 minute period thereafter.
POWER CONSUMPTION: Transmit mode: 95W (AC 120/220V), 4A (DC 13.8V), max. Receive mode (no signal): 45W (AC 120/220V), 0.8A (DC 13.8V).
POWER REQUIREMENTS: AC 120/220V, 50/60 Hz. DC 12-16V (13.8V as reference).
DIMENSIONS: 278 (W) x 124 (H) x 320 (D) mm
WEIGHT: 11 kg
SUGGESTED PRICE: $700.00

Prices subject to change without notice

116 EAST ALONDRA/GARDENA, CA 90248

KENWOOD
...pacesetter in amateur radio

(OPS) and WB2QOH (OPS). Westchester, Dutchess, Columbia and Greene counties all report AREC activity during hurricane Belle. Section nets NYPON, NYS and RTN all report special sessions during the hurricane watch. We were lucky, not much need for emergency communications existed. WB2EMU lost 20, 6 and 2 meter beams to a fallen tree. On the other hand, WB2TDX reports a new quad up 55 feet — after the storm. Overlook Mountain ARC reports repeater WR2ALY in operation in Kingston, 147.84 (in)/147.24 (out), provides 15 miles radius coverage. Novice classes begin in New Rochelle (WB2GMN W2HNX) and Poughkeepsie (WB2GOJ WB2RUZ AA2PJL W2GIO and W2ESM). Worcester Central ARC reports a new Novice, WN2GVP, and new Novice classes about to begin. How about your club? The new ARRL instructor/student guides are super. Albany ARA reports an entire flock of new novices. WA2ZPT worked YV5 and KP4 on 6 meters. A sincere welcome to: WN2FJZ WN2FKI WN2GEW WN2FXC WN2GPB WN2GMW WN2GPD WN2GMP WN2GNN WN2GMX WN2GMZ WN2GMT WN2GYR WN2GYU WN2GYT WN2GMR WN2GUI WN2GUJ WN2GNO WN2GNP WN2GNM WN2HBV WN2HDR WN2GVZ WN2GYY WN2GYX WN2GYW WN2HNS. Good luck! Don't forget the Hudson Division Convention Nov. 13-14. Traffic: (Aug.) WB2EMU 276, AA2PJL 273, W2YJR 192, WA2RKI 145, WB2RUZ 98, WB2VVS 60, W2ACQ 55, WA2UYL 45, W2WSS 39, WB2TGL 25, WB2EKM 21, K2OYG 16, WB2GOJ 15, WA2PAU 13, WB2TDX 13, WB2ELA 12, AA2YXY 4. (July) WB2TDX 4. WA2HGB 2.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: WB2LZN. The following are major AREC/RACES Nets, join one.

Bronx	28.64 MHz	50.35 MHz	146.88 fm
Kings	28.64 MHz	50.35 MHz	146.88 fm
Richmond			146.88 fm
New York	29.5 MHz		146.88 fm
Queens	29.5 MHz	50.52 MHz	145.62 am/fm
Nassau	28.72 MHz		145.68 am
W. Suffolk	28.73 MHz (Hunt)		145.59 am
	28.65 MHz (Smith)		147.21 fm
	28.61 MHz (Babylon)		146.94 fm
			146.94 fm
E. Suffolk			146.82 fm

Note: Net times between 2000 and 2100 local on Mon. Congratulations to WB5UFG and his new XYL. Rich is now 5 in Houston TX, he will be missed here in NLI, but I'm sure everybody will join in wishing him all the best of luck in his new job. Congratulations to WA2RXS who passed his General. WB2SJG spent the summer in Saratoga performing with the Saratoga Jr. Orchestra. Looks like NLI is losing still another station — W2PF will be moving to Bal Harbour FL in Jan., Dave has been very active from the NLI area for a great number of years, all the best of luck in the new QTH. Speaking of new QTH's, please note my new address, after playing "Wandering Nomad" for the past six years, I've finally joined the crowd that pays the mortgage every month, please forgive the delays and errors that have come up, but for the past eight months I've literally been living out of a suitcase, but now I've got a place of my own and will try to keep things running smoothly. K2GCE spent three weeks in W. Germany attending his son's wedding. WB2YKG has finished writing the NLS Bulletin, anyone wanting a copy please contact him if you haven't already received one. WA2EBJ has acquired an ICOM "A," He's the Jr. OP of W2MDM. Welcome to new Novice WN2HQB. W2MQG now W2LG and the QTH remains the same. WA2USJ now in Ozone Park. It is with deep regret that we list W2EUY as a Silent Key. Officers for the Coney Island ARC are: WA2BSR, pres.; WA2ALT, vice-pres.; W2TCR, treas. Congratulations to WA2YGB who upgraded to Gen. WA2CDH is now chief eng. at local radio station in Waterbury CT. Congratulations to new granddaddy WA2TQT. Citibank ARC secy passed his Novice test and now on the air as WN2GXQ, the club also tried a sked with one of its members 5Z4QQ in Kenya in Aug. The NLI CW Net is looking for new members to help out once in a while with the traffic and other duties, more of the regular crowd is off to school. Why not try checking in once to see what it's like. New freq. for LIMARC Bunny Hunt is 147.51 Simplex. Traffic: (Aug.) WB2LZN 269, WA2ECO 241, W2EC 194, W2HXT 59, W2MLC 43, WB2YKG 26, K2JFE 17, WA2TQT 11, WA2USJ/2 10, W2PF 6, K2GCE 4, AB2OYV 4, AB2SJG 4, WA2YEI 3, WA2HSQ 1. (July) AB2SJG 32, WA2USJ 10.

NORTHERN NEW JERSEY: SCM, Louis J. Amoroso, W2ZZ —

Net — Manager	Freq. Time(PM)/Days	Sess.	QNI	QTC
NJN — 3695 WB2CST	7:00 Dy	31	396	178
NJN — 3695 WB2CST	10:00 Dy	31	220	98
NJSN — 3730 WA2WIW	8:15 Dy	29	199	70
NJPN — 3950 WB2VTT	6:00 Dy	31	641	293
NJPN — 3950 WB2VTT	9:00 AM Su	5	72	5

SEC: WB2PBO. PAMs: WA2OPY (VHF) and WB2VTT. RMs: WA2WIW and WB2CST. OO reports rcvd from W2NR W2TPJ K2JFJ WB2TFH and AB2CST. OVS report from K2QBW and AA2GEZ. Congrats to our SEC, to both our NJN and NJPN net Mgrs. and to those COOL NCS during Hurricane BELLE. The years of training paid off and it was nice to be part of HAM radio and listen to the nets perking along. We had a few minor problems but I do consider them minor. The Phone Net on 3950 had 7 extra sessions from 1900Z to 0530Z with a QNI of 467. It added up to 260 different ops in 5 call areas. ALL NJ counties were represented. 19 Priority were QTC. Most of the NJ 2 mtr fm repeaters were on with some using emergency power. It was a good show when we needed it. Congrats again to AB2CST on making BPL and to AA2SLF WB2RMK WA2DSA WB2VTT and to AB2CST on making PSHR. We welcome WN2HRH a new Novice in Elizabeth. Let's hear from you often. New club officers for the Tenafly High School ARC are WB2AYY, pres.; WN2ZES, vice-pres.; WN2FYI, secy.-treas. New officers for the Knight Raiders VHF Club are WA2CXS, pres.; WA2CRF, vice pres.; WB2VLC, secy.-treas.; WB2NTP, sgt at arms; WA2BSU, truetee. NJN welcomes newcomers WA2CQJ WA2VAK WA2REZ WB2DAA WA1GEW/2 in East Hanover and welcomes back K2RXQ. WA2AYY is on 40 cw chasing DX. WA2UDT now has a B-24 Minibeam and Kenwood 2 mtr converter. WB2CST DXCC totals now at 130. WB2HSG has been appointed asst. EC for Monmouth Cty. Those nearby please try to give him some support. K2BHL building the SB-230. WA2QHN has a new HT-146 and completed his keyer. K2EK enjoying 2 mtr fm traveling between DE and NH. K2JFJ off to PA@-Land on business. Traffic: (Aug.) AB2CST 828, AB2ASD 383, WA2DSA 180, WB2VTT 142, WB2HSG 111, W2WHB 81, W2CU 74, WA2RMZ 59, W2SWE 55, WA2PCF 52, WB2RKK 43, WB2ANI 42, WA2RXM 42, K2ZFI 36, W2ODV 35, AA2SLF 35, W2ZEP 30, WN2EMG 24, WB2TDI 22, WA2DIW 18, WB2PBO 14, WA2FUI 13, WA2UOO/2 13, WA2WIW 13, K2BHL 12, WA2QHN 11, AA2CCF 9, W2ZZ 9, WB2PBO 8, W2CVW 6, WA2DIZ 5, AK2EPK 5, WA2QJU 5, WA2SRQ 4, W2WOJ 4, WA2BSN 2. (July) WA2SRQ 8, WA2FZJ 6, WB2YVC/2 3, WA2BSN 2. (June) WA2SRQ 11.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W@LFF — SEC: W@IYW, PAM/VHF: K@LKH. PAM/HF: WA@AVW. WA@YFQ was near Thompson Canyon and was put to work handling over 2000 emergency messages. WA@VBX WB@JGJ and WA@AUX assisted with Iowa tfc. W@BX has new tower. WB@JGS sharing rig with XYL since she became WN@VIE. K@AZJ now W@SS. WB@PLZ received new Tech. ticket and TS-700A the same day. Cedar Rapids welcomes Tech. WB@MQJ. WB@RWN appointed OVS. Marshalltown again hosted a great 75M Net picnic. Congrats to WA@UAG on being awarded the Certificate of Appreciation, and K@AAQ received the Baloney Award. K@AZJ WB@DBG K@EVH K@FLY WB@GXA WB@JYF W@LCX W@LJW WA@LKM W@MOQ WA@ODB W@OMV WB@RWN WA@TAQ and W@YLS received TLCN Net "Ironmen" Certificates. Congrats to K@MQS on being first 2M WAS. After 8 years of dedicated service as mgr. of TLCN, W@SS is giving the chore to K@EVH. The Iowa Novice can use more NCSs.

Net — Manager	Freq. Time/Days	Sess.	QNI	QTC
Iowa 75M — 3970 WA@VZH	1830 M-S	26	1761	134
Iowa 75M — 3970 WA@ACX	0000 M-S	26	1093	55
Tall Corn — 3560 W@SS	0030 Dy 0400 Dy	61	323	152
IA Novice — 3710	0100 Dy	28	31	3

Traffic: (Aug.) WA@AUX 321, W@SS 210, K@EVH 180, W@YLS 156, W@TGQ 53, AB@RWN 52, W@MV 26, W@MOQ 19, WB9AVW 10, W@LFF 10, W@BQJ 6, WB@MCX 2. (July) W@OMV 17.

KANSAS: SCM, Robert M. Summers, K@BXF — SEC: W@KL. PAMs: WA@SEV WB@BCL. RM: K@MRI. VHF PAM: WA@EDA. WB@HBM had a PSHR count of 61 and WA2VEN 44. Summer is about over and net activities should again be picking up. Why not be sure that your area is represented in the State Traffic Nets. Aug. reports are as follows: KSBN 31 sessions, QNI 831, QTC 170. KPN 20 sessions, QNI 181, QTC 170; QKS-SS 28 sessions, QNI 90, QTC 25. Central States Traffic Net QNI 738, QTC 78. The report above for QKS-SS was for July and Aug. report is QNI 70, QTC 30. For those of you who could help as relay stations, please do. Notify all the new Novice operators also of the QKS-SS now meeting 3735 kHz daily at 8 PM. For those more professional, as in cw activity try the regular cw tfc net QKS daily 3610 7 and 10 PM. Aug. tfc for QKS: QNI 417, QTC 203. That new call you hear on cw is cw that is W@AM you know that old guy INH. Several stations report assisting communications in the Big Thompson Disaster. I am sure there will be a write-up in QST by those in command and itope that all your calls do appear and you receive those awaited Public Service Awards. Traffic: (Aug.) W@FIR 416, WA2VEN/@ 210, W@AM 148, WB@HBM 139, W@CHJ 81, WA@LBB 71, W@OYH 68, W5TTS/@ 56, K@MRI 56, WA@SRQ 54, WA@KVP 51, K@BXF 49, WA@GSG 49, WB@ODJ 48, WB@LUN 41, WA@MLE 39, WA@SEV 36, W@PB 26, WB@OCK 25, WB0W@FDJ 17, W@RBO 12, WA@OWH 11, W@ERQ 10, WA@TRO 10, W@KL 8, WB@KDE 4. (July) WA2VEN/@ 313, WB@HBM 108, WA@SEV 41, WA@WXY 36, WB@OCK 10, W@RBO 10, WA@KVP 9.

MISSOURI: SCM, L. G. Wilson, K@RWL — Asst. SCM: Joe Flowers, W@OTF. SEC: WB@DBW. Congratulations to WN@OLF and WN@QOW upon passing their Generals and to Novices, WN@TIJ WN@TIK WN@TIL WN@TIM WN@TIN WN@TIO WN@TKA WN@TQR WN@TUG WN@TUH WN@TVC WN@TVD WN@TVE WN@TVF WN@TVG WN@TVH WN@TVI WN@TVJ WN@TVK WN@UEX WN@UHB WN@UNC WN@UHD WN@UHG and WN@UHH courtesy of the PHD ARC. Silent Key, W@WAI, great supporter of ham radio in Kansas City will be missed by all of us. The Missouri State Fair station, KM@MO was a great success with a traffic count of 928 and approximately 250 prospective amateurs being referred to area clubs. Thanks to all who took part during the operation.

Net	QNI	QTC	Net	QNI	QTC
Tri-Lk.	23	3	MSN	193	151
SCEN	60	4	Hmbtch.	283	98
MON	184	151	MON 2	121	63
MOSSBN	1152	455	PHD	57	11
SL AREC	129	8			

AB@NIE took part in the CO flooding disaster, operating 40 hours and handling traffic into and out of the disaster area. WB@FKY has a new rig and is now active on ssb. Traffic: (Aug.) KM@MO 928, W@HH 555, WB@DBW 328, W@OTF 213, W@NUB 170, W@BV 150, AB@NIE 109, WB@HSP 94, WB@LFY 91, WB@MED 82, WB@FND 76, WA@FMD 68, K@RWL 67, WB@LMW 58, WB@NXX 52, W@EPI 48, W@GUD 40, W@EEE 32, WB@MDZ 32, WB@NPC 28, W@BVL 20, W@OQD 20, WA@EMX 19, WB@DRJ 18, K@AHL 14, K@ENH 12, W@GBJ 11, WB@OUG 10, WA@FKD 9, WA@YEF 7, K@UQV 6, WA@OCU 5, WB@ENV 3, WA@KUH 3. (July) W@OTF 154.

NEBRASKA: SCM, Dick Dyas, W@JCP — W@FQB recovering nicely from an operation, should be back on the air soon. The Blue Valley ARC busy with displays and parades. They had a booth at both the Seward and York Co. fairs, their models of Oscar 6 & 7 were particularly interesting. In the early morning of Aug. 28 K@VTJ and WA@APY assisted in getting emergency vehicles to the site of car accident near Ithica. Received complimentary letter from Net Mgr. of Midwest Novice Net regarding the fine cw work and administrative assistance of WN@QPP. Net reports: Nebr. Storm QNI 1011, QTC 27; Western Nebr. WX QNI 395, QTC 10; AREC QNI 195, QTC 3; Cornhusker QNI 1271, QTC 81; QCWA QNI 72; 2-mtr AREC QNI 360, QTC 26; Sandhills WX QNI 195, QTC 2; Nebr. Morn QNI 1190, QTC 36. Traffic: W@VEA 91, W@GEQ 51, W@GKK 43, W@MW 41, W@HOP 27, K@BRS 25, WA@QEX 25, W@JDJ 18, W@JCP 16, W@NIK 13, WB@PBS 13, WA@PCC 12, K@SFA 12, K@DGW 10, WB@GMQ 9, K@HNT 8,

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$229.95

SPECIFICATIONS TR-33C

GENERAL

• Frequency Coverage: 146-148 MHz, 12 channels (2 supplied: 146.52 and 146.94). Crystal determines receive frequency. • Transmit frequency offset for repeater operation determined by 5-position switch: Simplex, +600 kHz, and −600 kHz supplied; any two additional offsets available with accessory crystals. • Power requirements: 13.0 Volts dc ± 15% external supply OR internal battery supply. • Current Drain (Batteries): Squelched receive: 30 mA; transmit: 400 mA. External supply: above plus 45 mA for channel switch indicator lamp. • Antenna: 50 ohm external antenna through SO-239 connector OR screw-on telescoping whip antenna supplied, may be replaced with rubber helix antenna. • Dimensions: 5.45" (138mm) x 2.78" (58mm) x 8.5" (216mm). • Weight: 4.4 lbs (2kg).

RECEIVER

• Sensitivity: less than .5 uV for 20 dB noise quieting. • Selectivity: ± 30 kHz adjacent channel rejection greater than 75 dB. • Modulation acceptance: at least ± 7 kHz. • Inter modulation Rejection: 70 dB referenced to sensitivity level. • First i-f: 10.7 MHz with monolithic crystal filter. • Second i-f: 455 kHz with ceramic filter. • Audio Output: nominal 1 watt at less than 10% distortion into 8 ohm built-in speaker or external speaker.

TRANSMITTER

• Rf Output Power: 1.5 watts nominal with 13.0 volts dc supply. • Frequency Deviation: Direct frequency modulation adjustable to at least ± 7 kHz deviation, factory set at ± 5 kHz. • Separate microphone gain and deviation adjustments.

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W@VYX 8, W@DMY 6, W@OOX 6, WA@GHZ 4, WA@LOY 3, W@ZNI 3, W@DJU 2, W@YFR 2, WA@ECI 1, WB@FYB 1, WA@RJA 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1DGL. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

Net — Freq.	Time/Days	Sess.	QNI	QTC
CN — 3640	1900/2200 Dy	62	491	365
CPN — 3965	1800 M-S	32	588	188
	1000 Su			
VHF-2 — 28/88	2130 Dy	31	338	112

High QNI: CN — W1CTI W1EFW and WA1RUR. CPN — W1NQO WA1RUR WA1WYL and W1EJI. SEC W1DGL wants copy of Club Publicity Re: EC work — Competitive Broadcasters (CB) are not equal but get lots of Publicity. Director W1HHR pleased to see many Conn. Section members at Boston Convention, will be in Hartford next year. All CT Nets appreciate your check-ins. K1EIC has CPN reps on DIRN; K1EIR notes high QNI/QTC on CN; WA1ELA offers full local and thru coverage via VHF-2 members. CTN active on 3640 at 21:30. Southington ARA W1GVZ Net offers info on any subject. Stamford ARA exchanges guest speakers with CB Clubs. Shoreline ARC had ATV Program and some members building Fast Scan units. Tri-City Net on 21.4 at 9 PM. All above clubs have provided Novice classes. W1ZJJ active on W4MMK and skeds with W1BDI. Congratulations to: WA1UOT & WA1UOU for Advanced Class; WA1VOB Tech. Class; WA1RUR High QNI CN & CPN Aug.; W1HFB winner VP-9 Phone Contest and WA1BER first OO Class 5 CT Section! Clubs should be aware of the wealth of information available to ARRL members — programs, publicity, slides, movies, etc. can enhance the value of every meeting. Its Thanksgiving again, time to appreciate our blessings and share our good fortune. Let's give CB a boost, help them to become Amateurs! Traffic: W1EFW 415, WA1GFH 275, WA1RUR 206, WA1WEM 135, WA1WYL 124, W1AW 116, WA1UAX 113, WA1URA 103, WA1UHN 74, K1EIC 54, W1CTI 51, W1GVT 41, AA1UDB 32, W1BDN 23, W1DGL 22, WA1IKN 20, W1BDI 14, WA1VTO 12, WA1UOT 11, WA1TZK 10, WA1UWR 9, W1EJI 8, W1KV/1 6, W1QV 4, W1CUH 3, W1WEE 2, AI@BC/1 1.

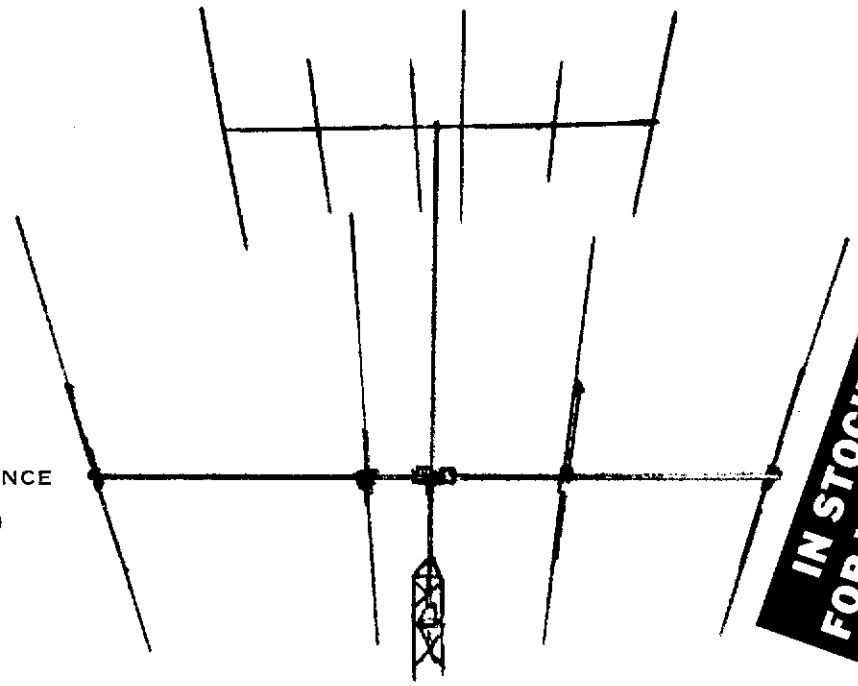
EASTERN MASSACHUSETTS: SCM: Frank Baker, W1ALP — SEC W1AOG received reports from ECs: WA1s: RTR TJG; K1s: PAD DZG NFW; W1s: BAR BHD FJI UJF PEX III EQH. NEEPN had 87 QNIs, 16 QTC. EMRIPN 838 QNIs, 305 QTC. Ashland RC has call WA1YVG. W1CUY in & out of hospital. WA1YOO is XYL of WA1PJJ. WA1SPI passed Advanced exam. W4MSS is ex-W1CMU. W1YN ex-W1PIV. W1ALP had an operation. WN1YPT is W1DW's daughter. W1YZ is ex-K1OUO. WA1YTQ's WA1VOK's wife. WN1ZEE new in Weymouth. W1RND on 75. WA1QQF in Plymouth on 2 fm, as is W1GQN. W1QVN moving to CT. T9 Club met at W1ISX QTH. WA5NQN will be at Ft. Devens. K1DZG was up in VO1-Land. WN1YML on 80, 40, 15. W4CEH, ex-W1BNU gone back to FL. W1DMH handled traffic for WA3ATQ of Women Marines Assn. Convention in Boston. WA1FNM in EMRIPN. All AREC & CD groups were active during hurricane Belle. WA1QAM has Extra. W1PL had visitors DJ1VC DJ8MX K4MOF YU and 1PFC. WA1BYM is communication officer in Westport CD. W1LE reports a joint Red Cross/Amateur Radio Exhibit in No. Dartmouth mall. K1IFV on 450 fm, will be on 2 & 6. WA1RTQ at Cornell Univ. WA1SXU & XYL have new daugher. WA1QAA/QAR vacationed in W7-Land. WA1ZGI on 2 with IC22A. Sharon ARA holding an Auction. W1EQH new OBS, WA1WGS new OPS. K1IFV endorsed as OVS, WA1QKD as ORS/OPS. Pilgrim ARC now ARRL affiliate. WN1YHX interested in cw nets. The members of W1KBN did a swell job the night of the hurricane Belle lining up stations for the Red Cross (K1UFT). WA1TCQ, vice-pres. of Club. WA1PGY is mgr. of First Region Daytime Net and WA1FCM asst. mgr, they meet at 4 PM on 3950 kHz daily, other nets please take note. K1FSU gave a talk on "Financial Affairs" at The Massasoit ARA, nine new members joined. WA1DFL, trustee, WA1IFE, vice-pres. of Mass. Chapter NAHC, Whitman ARC 6-meter net on 50.3 MHz on Wed. at 8 P.M. To those who hold the various appointments they are now for two years, but monthly reports are still a must. Officers of Middlesex ARC: WA1VBS, pres.; WA1GXN, vice-pres.; WA1RVZ, secy.; W1LJO, treas.; QRZ editor, WA1JWQ. W1THV No. 1 area (W1) winner in the Bermuda Amateur Contest, cw, also has Advanced. Officers of Sharon ARA: WA1SNR, pres.; WA1SZY, vice-pres.; WA1YBX, secy.; WA1PGY, treas. K1JNQ, Sharon ARA handled traffic at Country Fair. W1NFP's transformer blew out in his B&W L100-A. W1KKP W1FH on 2 fm, with Cleggs. EM2MN had 46 QNI, 33 QTC. W1UX has IC20. WA1QJJ will be operating from W1YK. EMRI had 393 QNI, 229 QTC. WA1VEI is mgr. of EASN. WA1UGJ has Advanced. Silent Keys: W1LUE WA1KFM W1EXR W1JHI K1VGZ W1HZR. Traffic: WA1MSK 388, W1DMH 306, W1PEX 286, WA1VEI 264, WA1TBY 250, W1UX 223, K1PAD 208, WA1UGJ 206, W1FIH 146, WA1RVZ 134, W1EMG 93, W1DMS 75, WA1FNM 34, WA1QWQ 29, WA1EYY 25, WA1PGY 20, W1AOG 13, WA1IFE 13, WA1PAZ 11, WA1IDA 9, WA1OAM 8, W1PL 8, W1FJI 7, W1LE 4.

MAINE: SCM, Ed Bristow, WA1MUX — RM: W1RWG. PAM: K1GUP. Nets: PTN QNI 203, QTC 142; NE Barnyard QNI 914, QTC 32; Hosstrader's starts 1st Sun, Oct. 4 PM, 3940 kHz. PSHR: W1BRW W1RWG WA1FCM. Bath Jr. HS RC WA1VZF now active, K1GDI trustee. Musical Hamfest at W1OLQ's huge success. 202 registered & abt 400 total at WA1GRA's in Abbot. WA1YUZ(KH6IAC) almost set up in Winterharbor. Need more Reps for FRN (4 PM 3950 kHz). 4 month av. 71%, high Apr. 87% low July 47%. Ask K1GUP for appt. W1s CBV HDC LQ QEN VF QXR; WA1s NIR NMW (NCS), WUY K1DTX, AHD/WA1VNG handled communications for Bangor Marathon. Augusta CD crystaling up for immediate access to WR1ADS. York Beach Animal Forest Park had message booth manned by K1BCS & AB2ASD/1 during their vacation. 34 hams operated "52 direct" in York Beach area this mo. W1WAS & W1CEV out of hospital. Traffic: WA1FCM 293, W1RWG 119, WA1RDX 61, W1ERW 52, WA1MUX 28, K1GDI 18, W1GU 14, WA2HSP/1 6, WA1NKE/1 4, WA1UCP 4.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX — SEC: K1RSC. RM: WA1GCE. Welcome to new hams WN1YFF WA1YHG WA1YIQ WN1YIO WN1YIV WN1YIY WN1YJM WN1YNX WN1YNJ WN1YMN. NHEPN report from W1EHT shows 50 check-ins, 3 traffic in 5 sessions. K1LMS has the first

WILSON AMATEUR ANTENNAS

MODEL 204 MONOBANDER PLUS DB33



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WILSON AMATEUR ANTENNA SPECIFICATIONS

	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M520	40	5	36'4"	27'0"	5.0	125	90	96	$269.00
M204	26	4	36'4"	22'6"	3.9	100	46	49	139.00
M155	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	40	5	36'4"	27'0"	7.9	198	105	119	299.00
(15)		4	24'3"						
DB43(15)	26	4	24'3"	15'8"	4.3	108	36	38	119.00
(10)		3	18'0"						
DB33(15)	17	3	24'3"	12'2"	3.8	95	31	33	89.00
(10)		3	18'0"						

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2-letter call heard K1NH. WA1UAV has a new bug. Officers of the Lebanon Twin State RC, K1IZL, pres.; W1RFP, vice-pres.; G3HWU, secy-treas.; WA1UJA, act. mgr. The NHVTN had 26 sessions, 108 traffic & 113 check-ins. AD1ACL's new keyer worked 50 states and 101 DX in the Bicentennial celebration. K1PQV is peeling long spruce poles for his vacation spot in Maine. QSPN reports 452 check-ins, 269 traffic. WB2ASD WB0IXE K1BCS WA2ASC WA1WXR WA1NXS WA1CMQ WA1PEL and WA1SBU held a night before the wedding party for WA1RMN. WA6HXR/1 moved to Litchfield. WA2DHI is at Dartmouth for his masters in EE. My best wishes to fellow SCM W1ALP for a speedy recovery. K1MFQ vacationed in ME. WN1TVB won for NH in the Novice Roundup. Traffic: (Aug.) K1BCS 417, WA1PVN 103, W1JB 82, W1GUN 67, K1LMS 60, K1PQV 54, WA1UAV 53, AC1TYX 40, AD1ACL 25, W1EHT 7, W1SWX 3, W1BYS 1. (July) K1BCS 286, WA1PVN 38, AD1ACL 28, K1PQV 24, K1LMS 19, W1EHT 9, W1SWX 7. (June) K1BCS 187, WA1PVN 46.

RHODE ISLAND: SCM, Ron Simonton, K1GMW — July late rpt. W1JFF reports excellent participation in Newport County during recent hurricane Belle alert, Red Cross, RACES and AREC units all active. Statewide, RACES and Red Cross units were in operation. SEC K1YDA still looking for operators interested in participating in AREC activities, especially young, single ops, who are willing to set up in shelters as they are established. EBAWA-WA1YPN group planning code and theory classes for Novices beginning this fall, check with WA1POJ for info. Traffic: (July) WA1POJ 191, K1GMW 52, WA1YPN 40.

VERMONT: SCM, J. Breakstone, WA1PSK — SEC: W1VSA. July late rpt. Nets: VT SSB, Mgr. WA1UQY, 3.909, 2300 M-S, 1330 Sun.; Green Mt., Mgr. W1JLZ, 3.932, 2230 M-S. Vt RFD, Mgr. K1BQB, 3.909, 2300 Sun., Tfc. 16, QNI 71; VT Fone, Mgr. W1KKM, 3.932, 1500 Sun.; Carrier, Mgr. W2DSK, 3.935 M-Su, 1430. Best wishes to newly married WA1FCY, W1YYU WA1OHB K1BQB and K1BCS teamed up with VT RFD Net and Granite State Phone Net with WR1ABU repeater (Concord, N.H.) to locate missing boy from Mt. Holly, VT. Congrats to WA1UQY on his election as VT SSB Net Mgr. W1LMO passed Extra exam; W1DQO W1BZD and WA1DKW upgraded to Advanced at Int'l Field Day in Charlotte. WA1TZV/1 successfully QSOd OSCAR 7 mode B from Charlotte. Traffic: (July) K1BQB 101.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BVR — W1ZPB back from year in Hawaii. He now is director of the Freshman program at Mt. Hermon. Ex-WN1RSY now AK1YXL. An ARRL meeting was held at the NOBARC Hamfest in Cummington on Aug. 21 with 27 hams plus CBers. PAM WA1MJE reports WMPN held 22 esssions, QNI 231, QTC 46, 15 different stations. CW RM W1DVW reports WMN 31 sessions, QNI 211, QTC 158, 17 different stations. SEC WA1DNB reports WMEN 5 Sun. sessions, QNI 166 (77 of whom were thru liaison with 2 mtr. repeaters), Tri. Co. VHF/UHF PAM WA1PLS reports WM AREC 22 sessions, QNI 80, 14 different stations. SEC WA1DNB submits excellent report of the West. MA activities during Aug. hurricane (report will be found in the Public Service section of QST.) WM Section Nets: WMPN 3935 Mon. - Fri. 4:30 P.M, WMN 3562 Daily 7:30 P.M. WMEN 3935 Sun. 8:30 A.M. Traffic: WITM 231, WA1MJE 117, W1BVR 111, W1UD 86, W1DVW 65, W1ZPB 59, W1KK 47, AK1YXL 12, W1DOY 9, W1BBI 8, WA1PLS 3.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — Active repeaters are Anchorage 34/94 and 16/76; Kodiak 28/88; Kenai 28/88; Fairbanks 34/94. Please note the SCM is frequency coordinator for the AK section. If anyone is planning a repeater on any frequency please contact the SCM ASAP. KL7HMU is coordinating activities for 6-meter operations in AK, contact him for your capabilities and plans. KL7HOV reports the ASN had 656 check-ins for the month with many PP and other traffic. KL7HDX will be out of the state for ten weeks so will not be able to meet the RN7 nets. KL7HMH and KL7HMJ asst. ECs for Anchorage stood by for possible assistance to local police in search for an 8 year old girl. KL7HMH new membership chmn for the Anchorage Club reports 54 members who are ARRL members. She also reports that she had 15 service type messages this month. KL7JDO busy moving his shop. I will be visiting all clubs in this section during Oct. Traffic: KL7HMH 30, KL7JDO 26, KL7HDX 8.

IDAHO: SCM, Dale A. Brock, WA7EWV

Net — Freq.	Time/Days	QNI	QTC	Manager
FARM — 3.935	0200 Dy.	1056	32	WA7RQI
IMN — 3.635	0300 M-F	163	76	W7GHT
RACES — 3.99	1415 M-F	471	12	WA7WXI

WA7CTS and XYL are mobiling through western OR through Sept. W7GHT and XYL just completed a circle through south ID, plenty of counties for the County Hunters I'm sure. I'm short on news as PARC and IMN news letters are late this month, more next month. Don't forget Seattle in 1977. Traffic: WA0KKR/7 291, W7GBO 12.

MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7PZO. My last report as your SCM — may I wish you all good DX and such. It has been a pleasure to work with you, thanks all of you for sending in news and letting me know what was happening in your area. Special thanks also to all appointees. W7OTJ hosted a pot luck picnic at his ranch with about 50 hams and families. Helena has revamped their repeater and now is working well. W7DXQ was in the hospital now recuperating. Capital City RC had a picnic on McDonald Pass, was well attended. A note from new SCM W7LR: As new SCM I'd like to help MT hams. Send your ideas on hamming. The WIMU hamfest was held in early Aug. MT hams are to put this on next year, with K7LTV Chmn. Sorry to hear W7MD is a Silent Key. IMN: 21 sessions, QNI 163, QTC 76. Traffic: W7LR 4, WA7OBH 1.

OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: Daniel O'Connell, WA7TDZ. SEC: WA7UHC. RM: K7OUF. PAM: K7RQZ.

Net — Freq.	Time(Z)	QNI	QTC	Sess.
Manager				
BSN — 3908	0330	208	18	16
WA7MHP				
NSN — 3701	0200	457	197	31
WA7UJO				

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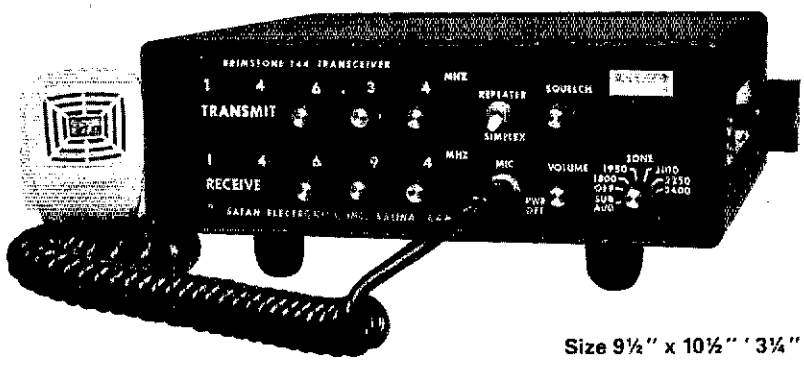

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- No crystals to buy.
- Complete band average 143 to 149.99 MHZ, 142 MHZ optional.
- Independent transmit/receive frequency control, yet simplex with the flip of a switch.
- Autopatch, tone burst and sub-audible tone capability by simply plugging in the desired module.
- Very low transmitter spurious output. Some manufacturers have demonstrated their inability to eliminate unwanted spurious outputs. The Brimstone has demonstrated that non-harmonic spurious output at least — 70Dd below the rated power output is possible when the radio is properly designed and constructed.
- The Brimstone 144 is designed for an unprecedented degree of component accessibility and plug-in modularity.
- The only amateur 2 meter FM transceiver with a TWO YEAR WARRANTY.

We have changed our company name to TEC-KAN, Inc. and at this time we are offering a special Fall Sale Price on the Brimstone 144. Check with your dealer on the Fall Special and ask for the 6 page full color brochure.

REPEATER AND AUTOPATCH CONTROL MODULE RPT CM-4

If you are planning a repeater and need a control circuit, we have just what you need! Complete control of repeater as well as the autopatch. Local or remote control. If you are using telephone line control for your repeater the RPT CM is ideal because it uses an opti-coupler for complete line isolation and low voltage, low current control.

If you are using the TKI SCAP-3D, you can call your autopatch line number and the RPT CM will automatically answer and connect you allowing you to send tones over the phone to turn the repeater on or off, or access the autopatch and communicate through the repeater over the autopatch phone line.

When calling the repeater on the autopatch line, you have 20 seconds to either access the autopatch or turn the repeater off or on. If the proper codes are not sent within 20 seconds the RPT CM automatically disconnects.

If you call the autopatch number, hang up, wait 30 seconds and call the number again, the repeater transmitter will be keyed and a tone sent each time the phone rings, thus signaling a mobile operator to access the autopatch. If there is no one available to access the patch, it will automatically disconnect after 30 seconds of ringing.

It also features a COR "Hold" circuit, which is adjustable from 1 to 5 seconds, and automatic "time out" timer, that resets each time the receiver COR drops. No need to wait for the repeater to drop out to reset the timer.

If you are planning a repeater, all you need is a good transmitter and receiver and the TKI RPT CM Control Module.

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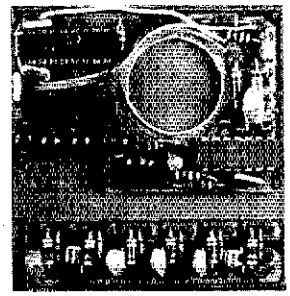
HANDI-TALKIE SCANNER KIT SK1402



Six Channel Cmos Scanner Kit has provisions to include Mostek Touch-Tone Encoder Chip. Features dwell and normal operation. "Dwell" mode monitors each channel that has a signal on it for 8 seconds. "Normal" monitors in conventional manner. Manual operation locks out the scanner.

Includes LED channel indicators, schematic and installation instructions. Designed for Wilson 1402SM Talkie.

Scanner Kit Model SK1402	$49.95
Includes Touch-Tone Encoder Chip Model SK1402TE	$58.95
Digi-Tran Pad, when ordered with Scanner Kit	$7.50

Size 9 5/16 x 4 9/16

AUTOPATCH SCAP-3D FEATURES

- 3 Digit access, single digit disconnect.
- 4 sec. time limit on access.
- Anti-falsing tone decoders.
- AGC with 30 Db dynamic range on all inputs and outputs.
- 3 digit on-off control of repeater or other devices.
- Remote inhibit or disconnect of autopatch as well as remote "off" function.
- Monitor amplifier allows monitoring all signals going into and out of the repeater.
- Adjustable level controls on all inputs and outputs.
- Jumpers on circuit board and frequency control pots on tone decoders allow field programming of access codes.
- Adjustable time out function. Patch will automatically disconnect in 30 to 90 seconds after it is accessed if no carrier is received.
- 90 days warranty.
- High quality tantalum and polyester capacitors used in tone decoder circuits to provide reliable low drift performance.
- Rugged G10 glass epoxy circuit board.
- High output level allows transmitter to be modulated through a dedicated phone line.
- Provisions for connecting LEDS for status indication at the local control point.
- Reverse polarity protection on supply line.
- Easily connected and adjusted.

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OSN — 3585 K7IWD	0145	271	137		31
JC AREC — 147.06/06 WA7TAE	0215	78	4		8
PDX AREC — 146.64-147.33 K7WWR	0330				
AREC — 3993.5 WA7NEQ	0200	426	13		31

Code & Theory Classes, using the new ARRL study guide looks like progress is being made. Hood River Co. has a new EC, W7EQI. K7AH reports some unusual long distance 2-mtr fm being heard at his QTH. WA7TZW 2 mtr ssb worked Boise, ID and several CA stations. W7PGY, NW Dir. W4KFC ARRL 1st VP seemed a little surprised at the number of YL-XYLs who turned out for the meeting. The RVARC 1st mtg in Sept. had 53 attending! W7LT has had his call 50 yrs, FB! WA7WOW W7VSE WA6GHH mobiled to ID for NW County Hunter's Convention, attendance 67. WA7OFK moving to Grants Pass. K7ZQU/7 reports he is getting his firewood in now for the winter ski season (has cabin there). WA7SSO putting out a good signal on BSN. W7EMF, Silent Key, Sept. 5. Traffic: (Aug.) W7VSE 278, K7IWD 173, K7OUF 158, K7NTS 127, K7IFG 97, W7IWN 97, WA7UJO 81, W7DAN 76, K7QFG 74, WA7TXV 48, AA7YEU 43, WA7MHP 26, W7LT 14, WA7QDC 12, WA7QDC 9, WA7RKN 5. (July) K7QFG 94, K7IFG 38, W7DAN 4.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — New appointees are K7VAS, with school completed, is the new WA SEC and WA7VLT Yakima Co. EC replacing K7VAS. WA7YKV and XYL WN7NAW have moved from Aberdeen to Seattle area. K7GGD has upgraded to Extra Class. With regret we record the passing of the XYL of W7GRM and K7QUV, our condolences. Mike and Keith ARC members were busy answering telephones at Jerry Lewis Muscular Dystrophy Telethon. Where was your group? This is where the PR is gang! Amateurs attending at Hamfest and Picnic this summer were double or more in attendance. Reports from individuals was very low this month possibly everyone is trying to find summer. Additional committees for 1977 ARRL NW Division Convention are being formed and we are now only 8 months from the big date in July. Your help would be appreciated. Do you have your advanced registration? You or your club may obtain the new Novice License course and Training Aid from ARRL direct. If you have an amateur license class please send information either to W7QGP or engineer in charge FCC in Seattle. This information is needed for referral in your area. See you in Seattle ARRL NW Division Convention July 77.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCMs: W6ZF, VE2AQV/W6. SEC: W6IIH, Asst. SEC: WB6DSI. It was truly a loss to all when W6LGW became a Silent Key. His call now lives on as the "W6LGW Memorial Station" located at the Red Cross building in Concord. WA6GBB WB6KNV and WA6JUD all have received their General Class licenses. WN6KGI has passed his Advanced. WA6JUD holds most of the Pacific Division, VHF records. Now with a new General look for WA6JUD setting new hf records. Members of the Lake County AR Society had a fine picnic at the QTH of the pres. W6JXK. W6CBF home after a fine trip to Canada. WA6CAZ has his old call back and is now known as K6TPB. New members of the Mt. Diablo ARC are K6TL WN6MXA WN6OCZ WA6USY WN6OCC WA6SXZ W6AMH and WB6MPN. W6ZF transmitting the West Coast Bulletins on 3540 kHz at 9 P.M. PDT (0400UTC) on the 1st and 3rd Mon. of the month. The Intruder Watch is very active once again. All those interested should contact League Hq. for full information. Traffic: K6JZR 485, K6HW 458, W6TYM 399, W6JXK 151, WB6JIX 119, K6PMG 8, K6TPB 6, W6ZF 2.

PACIFIC: SCM, Pat Corrigan, KH6GQW — Congrats to all who helped in Guam disaster and received Public Service Awards. See p. 49, Sept. QST for details. KH6BZF sporting new 2M radio & still plugging away at VHF/UHF. SAROC-Hawaii was again a success this year. Over 225 registered with about 300 total. Our best wishes to KH6IOP/KH6INE on their new QTH at Guam. Remember new City Hall Repeater in Hono, on 146.37/.97. EARC is updating much of its equip/ants at many sites, as it continues to serve the ever-growing group of repeater subscribers. Saipan activity seems to have dropped off. KH6IRT put up new 60-ft. crank-up mast to poke sig out of Aini Haina. Pac. Div. Convention very good this year, had good wrap-up of Guam Emerg. as part of Emerg. Comm. Workshop which had Amer. Nat. Red Cross reps present, including some that were at Guam. Also, KG6JDX attended and was recognized at banquet. KH6ZD and son walked off with big prize. Traffic: (Aug.) KH6IQU 120, KH6GQW 5. (July) KH6CKJ 76.

SACRAMENTO VALLEY: SCM, Norman Wilson, AA6JVD — SEC: AC6SMU. Congratulations to the El Dorado Co. ARC for doubling their membership to over 30 in less than a year. The Pacific Division Convention in San Jose was well represented by SV members. W6AJY served as Master of Ceremonies at the banquet and W6GO conducted the repeater forum. K6SG and WB6FAA have further burdened their shack wiring with 30S1 amplifiers. Congratulations to K6QM on the completion of 5BDXCC. WN6NIK a new Novice in Davis. WN6HBI has managed to pass his General while constructing his maritime mobile hamshack. The Golden Empire ARS of Chico held their annual Steakbake on Sat. 11. The Grant Union School District and McClellan MARS have undertaken another novice/general/commercial radio classes at the air base. W6DEF is running a 2 student class in Auburn. Traffic: W6RSP 36, W6DEF 9.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT — SF Section historian W6NUT notes our Section was established 50 years ago, Aug. '26 and consisted of SF, Marin, Sonoma, & Mendocino Ctys. 6EX was our 1st SCM. K6TP & WB6MOV are now on 2 m; W6EAJ will be there too when he gets up his beam. GL to WB6MBB (JA3USA) who abandons SF for homeland Japan. WB6ITN new ORS. WR6AQG the new 146.28/.88 repeater of the RERA (Ukiah). HARC & FWRA (Eureka area) provided communications support for the March of Dimes Bike-a-Thon. WN6POB & WN6OYJ are a new SF father-son team. AA6HPF got a crack as op at W1AW during his visit to ARRL Hq. W6GGR building a new freq. counter; AA6HPF has a new Galaxy linear. Traffic: (Aug.) K6TP 205, W6RNL 184, W6IPL 116, W6NL 78,

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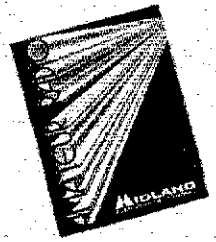

Write for Midland's Amateur Catalog: Dept. Q, Box 1903, Kansas City, MO 64141

WB6ITN 32, WB6UPV 14, W6GGR 3. (July) AA6HPF 10, WB6ITN 6.

SAN JOAQUIN VALLEY: SCM, Ralph Saroyan, W6JPU — After 22 years of being your SCM in the San Joaquin Valley, I am resigning my position, and turning the SCM duties to my assistant who will be appointed SCM. He is Charles McConnell, W6DPD, 1658 W. Mesa Ave., Fresno. It has been my pleasure to have served all of you. The new EC for Kings Co. is WB6TTP. W6ZLU heard on 2 meters fm. JA2AHQ was a guest of K6QPE. K6SYB YL of K6QPE has her call back. WA6KMW a new ORS station. At the Pacific Division Convention in San Jose, Sept 3-4-5, 1976 the following hams were present: WB6BKO K6RAU W6DPD W6WME K6SNA WB6CFI W6MMH K6QPE WB6HIN W6SYP WN6PAK WA6IPE WB6SVY W6DCP K6PSJ WB6DYG WB6DSK WA6DLA WA6LMZ W6YEP W6JPU WB6KSV WA6ONZ. WA6YAK got his Advanced license, has a TH6DXX beam. WN6BXI has 12 countries confirmed. AC6YKS worked WAS on 50 MHz. WA6IPE has FT221. WA6WXP a 625-1. WB6JDG a pair of sixteen-element beams on 2 m. I wish every one of you a happy thanksgiving. Traffic: K6PSJ 6.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — SEC: WA6RXB, W6RFF and W6AUC made PSHR. Nearly 700 showed for the Pacific Division Convention at San Jose in early Sept., including FCC Amateur and Citizen's Chief K3BNS, ARRL Prexy W2TUK, and Hq. staffers K1ZND and W1ICP. Hats off to the Assoc. RCs of San Jose and general chmn. WA6RXB for a convention job well done! Congrats to WA6TUF on working Europe via Oscar 7, without a sked, no less! Your SCM has swapped calls, now sporting W6CF (see above) in honor of his old and comfortable W6CUF. WB6KQU tearing up the low edge after acquiring new Extra Class ticket. WA6NMA and WA6PQU have new TS-700s down King City way, as does W6QNB in Palo Alto. This marks QNB's first venture to 2M in over 20 years. The Santa Clara Valley VHF Soc., has been around since 1965, and is still as vigorous — or more so — than in the beginning. K6GZK has membership info for the asking. Welcome to SCCARA's WN6MZE and WN6QSF, now QNV with new Novice tickets. King City EC WB6IZF worked 5 continents with 5W PEP plus a dipole on 20 ssb — while signing 9V1QF and YB9 AAP/YB7 earlier this year. The Palo Alto ARA gang at K6YT/6 and WN6DLH/6 walked away with the CCRC FD plaque for 1976, barely nosing out the Foothill group at K6YA/6. WA6GBQ in charge of Novice training for SCCARA, contact him for info on San Jose area licensing classes. Regional EC K6ITL has designated emergency coordinating frequencies for No. CA on a trial basis. They are 3630, 7130 cw, 3930, 7230, 28630 kHz ssb, and 146.52 fm. These frequencies should be monitored upon onset of an emergency situation in the area. Interested in hearing more scoop SCV activities? Your SCM, W6CF, SEC, WA6RXB, and REC, K6ITL, are QRV for club talks. Give us a call! Traffic: (Aug.) W6YBV 300, W6RFF 195, W6NW 71, W6AUC 67, W6KZJ 29, WB6HBT 12, WA6HAD 10, W6QNB 8, W6RNU 7. (July) W6QNB 10, W6ZRJ 8.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFO. VHF PAM: K4GHR. RM: K4MC. EC of the Month is W4DSU of Cabarrus Co. so give a call if you reside in this area. Alamance Rptr. Assn. held their first Swapfest and a good time had by all. The Shelby ARC is congratulated on their 20th Hamfest which ticketed over 2500 and attendance was estimated at 4500 for the two days. FCC gave exams at Shelby with 130 passing out of 199 tested. SCM WXZ visited the Raleigh ARs. Model Emergency Plans, authored by Guilford Co. EC K4CJZ, were sent to each EC in the Section so help your local EC fill in the blanks. Thanks to new EC from Elizabeth City WA4MUW for copying the model plans. WB4OXT reports results from his last class with WN4s SES SET & TLY with more to come. Congratulations to Alamance AREC & Alamance Repeater WR4AKY for a fine effort during the large telephone outage at Mebane NC. This outage covered 280 sq. miles with approx. 7500 telephones out after fire destroyed the local facility. The Alamance bunch set up 12 checkpoints which were advertised locally and citizens could use the checkpoints to communicate. Assistance was given from many different locations locally with over 150 operators taking parts, so watch QST for detailed reports. K4FXA reports class by WB4FWR yielded WN4s SIE, SIF, SNA & SNP for the Warsaw NC area and a club is forming. It is with deep regret that I record the passing of W4AA. His key started sending in about 1919 and throughout the years he became a steady supporter of both commercial and amateur radio and also collecting antique sets and showing them to others. A final 73 to a grand Gentleman now a Silent Key. Traffic: (Aug.) K4FTB 119, W4OFO 115, WB4PZU 68, WB4OXT 60, K4EZH 53, WB4MXG 52, W4WWR 40, WA4KSO/4 38, WA9NEW/4 38, W4ACY 28, W4WXZ 28, WA4MUW 16, WA4TCR/4 16, WB4FFX 8, WA4QJL 8, K4AIH 6, WN4PSL 6, W4EHF 2, K4FBG 2. (July) WB4PZU 72, W4WWR 53, K4EZH 38, WN4FKY 18, WB4FFX 8, K4GHR 6, K4AIH 3.

SOUTH CAROLINA: SCM, Tom Lufkin, WA4DAX — Asst. SCM: Gary M. Barnette, WA4MDP. SEC: WB4TNS. PAMs: W4MTK WA4DZG. RMs: WB4OBZ WA4UKU. New ECs: WA4QOT WA4NIE WA4DEI WB4GOK W4NAT WA4LCZ and WA4VTA. WA4NIE RACES Officer of Berkeley Co. WA4UKU upgraded to General, appointed RM of CNN. WA4AZT appointed Asst. Dir. Roanoke Division. Congrats to WB4ARJ on making BPL. CNN has 5 YL OPS (2 NCS). WB4NBK searching for hams interested in 6-meter net in section. Looking forward to visiting many clubs in future. (Sumter ARC, Nov. Piedmont TEC ARC, Dec. Congrats to WA4JBG on winning SMIRK contest in June. We are trying to get together a list of Clubs, have your secy. send me info on your Club (Officers, No. of members affiliated, etc.) Many active with Novice classes. New Novices: WNs: SIX TNN VDT VDW VDU UDZ and UDY. Net reports SC SSB QNI 1091, QTC 202; CNN QNI 271, QTC 62; PXE QNI 201, QTC 90; PXL QNI 90, QTC 10; CNE QNI 300, QTC 215; CNL QNI 246, QTC 104; BLUE RIDGE 2MTR QNI 1209, QTC 59. Traffic: (Aug.) WB4ARJ 551, WB4OBZ 328, W4NTO 99, W4MTK 87, W4ANK 53, K4FRX 42, WB4UDK 40, WA4KXZ 37, WA4DAX 36, W4FMZ 30, WB4MOT 30, WB4CAK 26, WA4ECJ 24, WA4UKU 24, W4BDT 19, WA4DZG 17, WA4NIE 13, WB4NBK 9, W4DRF 8, WA4MDP 7, WA4BDG 6, K5GQG 2, WB4HNQ 2, WA4QWJ 2. (July) WB4CAK 38, K4GQG 21.

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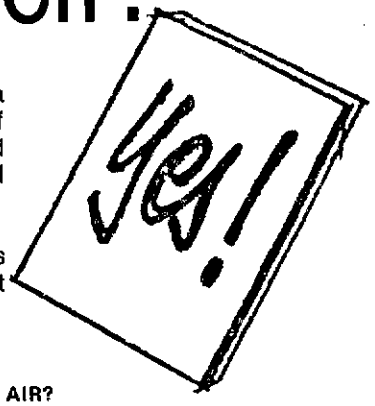

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VIRGINIA: SCM, Robert L. Follmar, W4QDY — SEC: WB4DTG. PAM VSBN: K4VWK. Asst. PAM: WA4YIU. RMs: VN K4IAF, VSN WA4EPJ, 4RN W4SHJ. New appointments: ECs: WB4AZY, K4IXL, W4KXE, WA4QQI, W4TMN, WB4UUY. ORS: W4OOL. All credit for new ECs to SEC WB4DTG! Nice to hear WB4PNY back on nets. OO W4HU had a bang-up rpt with 55 violators, WA4PRP submits 10 rpts of stations causing harmful interference in the 40-mtr band. WB4OXD removed five-element Yagi at 100 ft. due to Hurricane Belle which by-passed Norfolk, ant back up again! K4BKX re-learning code, this time with mil, HI. EAN stalwart W4UO back on air after long vacation. The Portsmouth ARC is now a Charter Member of ARRL and your SCM is invited to the "Charter Party," congrats. Judging by our reporting the summer doldrums are over, FB! Some of our appointees rpt that they are not receiving the CD Bulletins, have you moved lately and not informed the SCM or Hq.? (seems so). WB4ZNB now has 2 mtrs. with beam. WA4YIU beginning to assemble WR4AWS repeater into cabinet & hopes to have it up in Sept, FB! Many rpts still being recd from hams seen at the Roanoke Div. Conv. and all enjoyed the affair which was a big success! W4KM's Old Tyme Spark was an outstanding presentation and well received. K4KA is awaiting QSLs for Bicentennial WAS. First VP W4KFC attended Roanoke Div. Conv.; Central States VHF Soc. Conference; W1MU Hamfest (Yellowstone) & visited several clubs in NW busy folia! WB4DRB/4 rpts new rptr in Charlottesville No 28/88 to become 01/61 in short time. W4KX still alive & kicking. WB4DRC transmits bulletins on 19/79 Fairfax. W4JUJ says that county hunting so poor that he is back chasing XYLs (on the air that is!) and has 642 confirmed. K8PIV/4 continues to be occupied with preparations for Med Cruise Oct. 4 to Apr. 21. Will be operating MM from Region 1. FB rpt on VFN recd from W4TMN Asst. Net Mgr. It will appear in the VA Ham. K4VWK VSBN rpts 1167 check-ins; 54 sessions & 231 msgs handled. WB4NTV VHF stn rpts good 6-mtr opening on Aug. 11 to 1, 5, 8, 9 and VE1-Land, FB. Traffic: (Aug.) K4KNP 346, K4BKX 289, WA4EPJ 187, K4MLC 125, W4QDY 109, W4UQ 94, WB4PNY 67, K4VWK 62, WB4DBK 56, WA4FOM 56, W4SHJ 54, K4GR 50, W4SUS 44, K4JM 42, WB4ZNB 42, WB4TDG 38, W4LXB 35, WA4YIU 32, WB4KIT 22, WA4CLK 20, WB4DQZ 20, K4JM 17, WB3EKY/4 15, W4TMN 15, W4ZM 14, K4KA 11, W4KFC 8, WB4DRB/4 4, WB4SGV 4, W4DM 2, WA4GPS 2, W4KX 2, W4PVA 1. (July) W4HIR 9, WA4KKP 6, WB4SGV 4. (June) W4UQ 140, WB4SGV 8.

WEST VIRGINIA: SCM, Kay Anderson, W8DUV — Asst. SCM: Donald B. Morris, W8JM. SEC: WA8NDY. PAM: WB8DQX. RMs: W8HZA W8JWX. Net Mgrs.: CW WB8IIL, Fone WB8DQX, Novice WB8TDA. Monongalia (WR8ABM) repeater group had excellent PR in Morgantown's local news. Amateurs identified in article were: WB8RAE K8LGS W8JOF WA3ANO and W8IXG. Stonewall Jackson (Clarksburg) Club busy with transmitter hunts, tri-county SET exercise and a CB-to-Amateur program. Using the new ARRL novice training program, this club will begin new classes in Oct. Welcome to new licensees in WV: WD8BKR WD8CDQ WN8APZ WN8AOQ, also WD8BPP WD8BPQ WD8BTY (jr. ops of WB8CPU/WB8DQX). Can anyone top five hams in same family? Net activity: WVNN 159, WFN 190, WVN 57, Midday 66. Traffic: WB8IIL 108, WB8TDA 100, WB8DQX 56, W8HZA 39, W8CKX 26, WN8TJQ 24, WB8TSE 22, WN9OWA/8 22, W8EUE 21, WB8SAW 21, WB8TEE 19, WN8WVY 19, WA8POS 13, K8ZDV 13, WA8RUZ 12, W8CUL 10, W8DUV 6, K8QEW 6, K8ZDY 5, WA8LFW 4, WN8ZMX 2, WA8KCJ 1.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WAØHLQ — SEC: KØFLQ. RM: WBØHCK. PAMs: KØCNV WAØYGQ. WBØQOT began his service as CWN Manager on Sept. 1, and extends an invitation to everyone, regardless of code proficiency, to check into the net on 3.715 MHz at 0030Z, daily. WRØALE went on the air on Sunlight Peak on Aug. 17. WBØJGT is enjoying his many contacts with his new Kenwood TS rig. It is with deep regret that we add the call WØRA to the list of Silent Keys from the Colorado Section. He will be sorely missed by all. Net Tfc. for Aug.: HI-Noon QNI 918, QTC 28, Informals 106, 29 sessions, 1022 min. Traffic: (Aug.) WØWYX 2424, WBØQOT 774, KØYFK 572, WBØTAQ 146, WØOWP 112, WBØQHV 89, WBØNHA 54, WBØMCL 48, WØACH 41, KØOTU 39, WBØELD 35, WØCXW 32, WØGW 32, WBØPVT 26, WBØIZO 21, KØLCZ 18, WBØBAL 14, WØPT 12, WØRE 8, WAØHLQ 1. (July) WØLQ 125, WØKLE 91, WØETT 70, WBØJGT 31, WØIQZ 28, WBØDME 18, WØPT 6.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. RMs: K5KPS W5VDH. PAMs: W5PNY W5DMG. NMRRN meets at 6:00 PM local time daily on 3940 kHz this month reported 890 QNI with tfc 46. SWN meets at 7:15 PM local time on 3585 kHz, QNI 237, handled 180 msgs. WA5RCP has acquired a 4 wheel drive field ambulance which the Los Alamos club is converting to a mobile Search and Rescue command post. WB5KSS received his 35 wpm code proficiency certificate. WA5YTX has moved his antenna to new 60-ft. masts. W5DMT, a local State Policeman, is again active on many nets after a long absence from ham ranks. WB5OLA operated from the Totah ARC station K5WXI set up at four corners. He reports approx. 250 contacts from that station on phone and cw. Traffic: W5JOV 294, K5MAT 213, WB5KSS 195, K5KPS 151, W5UH 119, W5ENI 117, W5VDH 90, WA5YTX 79, W5RE 66, W5DMT 12, W5YQ 11, WA5MIY 9, W5QNR 4, WB5OLA 3.

UTAH: SCM, Ervin Greene, W7EU — A very successful meeting was held in Ogden for active members of UCN. Those in attendance were WA7MEL WA7QAR WA7JRC WB7BTB W7KHE W7FVQ W7TEH WA7JJU and W7EU. With cooler weather, ending of vacations, net activity should pick up. UARC autopatch working with access from Provo and Salt Lake exchanges. Much activity noted on the .16-.76 repeater. UARC planning Novice class in Oct. and possibly again later in the year. Discussions with WA7GTU and W7MUG productive and informative. The .22-.82 repeater on Utah Hill has very good coverage, is interlinked to the .34-.94 repeater on Frisco Peak, extending coverage from Las Vegas and Kingman AZ up into the Salt Lake Area. W7NFT has the .04-.64 repeater at a good site in the Richfield area. A visit was had with Russ while passing through the area. He sends his best to all. Traffic: WA7JRC 80, WA7MEL 71, WA7KHE 40, WA7TEH 32, W7OCX 22, W7BE 19, W7DKB 17.

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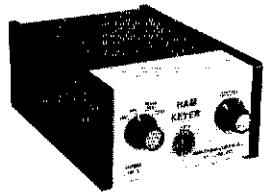

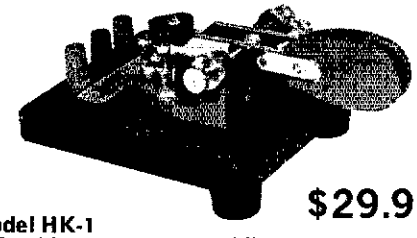

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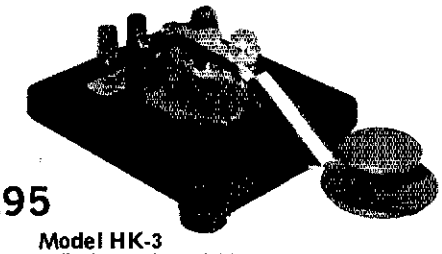

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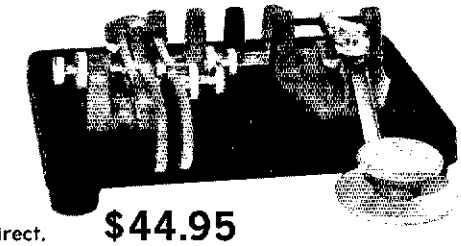

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WYOMING: SCM, Joe Ernst, W7VB — The WY Weather Net meets at 6:30 AM to 7:15 AM MST on 3920 kHz Mon.-Sat. The WY Cowboy Net at 6:45 PM on 3950 kHz Mon.-Fri. Your participation is invited. W7SSZ, Rocks Springs passed away the latter part of Aug. of a heart attack, while at work. K7SAR of Worland has a new call, WB7NJA. WB7AHL took off Sept. 7 for a two-week vacation. W7KHH in Mexico for a while in Aug. W7VTB busy with his Scouts and fishing at Boysen as he would up vacation Labor Day. W7PT with a linear on two, now makes the Northwestern Repeaters easily with his beam. W7NK worked TV transmitter relief for three weeks till a new transmitter engineer was procured. Kept the two meter repeater busy. Welcome to the AREC, WN7EIN. W7VEW continually busy on the phone setting up schedules for Moonbounce and Oscar 6-7 operation. W7SDA reports the WY Cowboy Net with 22 sessions, 545 QNIs and 12 QTCs. Traffic: W7TZK 376, K6VWA 311.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — It is with deep regret that I report K4VJL a Silent Key. She was an Honorary member of the Huntsville ARC and first Editor of the club paper, the "VOX." K4UMD has new TS-820. The Sand Mtn Repeater Assn. provided communications for the 37th national Dixie Cup Regatta. Participating were K4VZU K4VZN K4IXT K4IMQ K4CWD WA4BFN WA4QIZ WA4QKC WA4GOQ WA4BFG WA4RHD WA4SNQ WB4BFQ WB4BFH WB4BFJ and WB4BMA. The Montgomery ARC repeater and autopatch operating now on 146.40/00. The Twin Base ARC repeater WR4AUT waiting on duplexers. The Twin Base ARC, with WB4KEA as Training Chmn. has produced about 60 new Novices over the past 4 to 6 months. The Mobile ARC planning their annual Bel Air Mall exhibit for Nov. 11-12. New/changed calls: WA4ZWF to W4AJZ, a call he originally held in 1929; WB4FAR to W4NOL and W4SVM to W4ZS. Code practice on Tue. and Thur. nights on Cheaha repeater, 146.69/.09, 2030 CDT. Appointed W4MHO as OBS and Class V OO; the Class V OO is the first of that appointment for our Section. Traffic: (Aug.) WB4EKJ 319, W4RQS 202, WA4JDH 193, K4OAZ 161, WA4EUD 107, WN4RND 50, WA4JGG 25, K4UMD 18, WN4JGG 15, K4CUU 12, WA4TMG 9, WA4CYF 8, WA4ZDW 6, W2TPV/4 5, WA4MLK 2, WB4SVH 2. (July) WA4TMG 21, WB4CXD 3.

CANAL ZONE: SCM, Roderick J. Isler, KZ5PI — The CZARA has arranged and coordinated for all CZ amateurs to obtain their Panama calls (HP1) without much difficulty. Each CZ amateur has received an application form in the mail with easy instructions enclosed. The application along with some additional information will get an HP1 call in just one trip into Panama. Look for HP1Z calls in the future. KZ5VV conducting Novice classes twice weekly. It is with deep regret to report KZ5PW a Silent Key. KZ5JI recently hospitalized and heard for almost a month on 2 meters from his bedside has recently been released. 2-meter Simplex is getting more and more activity as well as the repeater. At the Dec. meeting election of new club officers for the new year.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. PAM: K4JNL. RM: K4FLR. Net, Freq., Time(Z), and when are as follows: GSN, 3.595, 2300/0200 daily; GTN, 3.718, 2330 daily; GSBN, 3.975, 2330 daily; NEGEN, 147.75/15, 0130 Mon.; AREC, 3.955, 2245 Wed.; CVEN 1, 3.950, 1730 Sun.; CVEN No. 2, 146.34/94, 0130 daily; Albany, 146.22/82, 1800 Sun.; Atlanta RC Emerg., 146.22/82, 0100 Thur.; GARS, 147.75/15, 0100 Tue.; GCWA, 3.830, 1300 Sun.; Warner Robins, 146.25/85, 0030 Wed. Congrats to K4FLR making PSHR; to WB4SQF who joins our ranks as a new ham; to K4ZYK for passing Extra; to W4BJT for passing Advanced; to WA4CBT WN4FNO WN4HHX and WN4NCA passing General. Condolences to WA4EPK W4DPZ and K4WC on having their rigs stolen; to W4MWT on his tower problems. Columbus ARC and BICity ARC has now merged. W4IMQ sporting a brand new shack in the backyard. W4JM married off his daughter and plans to be more active as his funds recover. WN4FNO helping WN4HHX make GTN go. W4FDN WA4RAV and W4WXA deserve plaudits for GSN work. WA4VWV leaving for north of Smith & Wesson line. GSN QTC 217, QNI 398 — great! Traffic: W4FOE 164, K4FLR 130, WB4WQL 65, K4NM 38, WA4LLI 34, AC4HON 26, W4IMQ 18, W4AAY 10, AD4BAI 10, W4JM 6, K4WC 4.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: WA4FBI. PAM: WB4VDM/75, WB4BSZ/VHF.

Net — Freq.	Time(Z)/Days	QNI	QTC	Manager
NFPN — 3950	2230/0300 Dy	1052	139	WB4VDM
QFN — 3651	2300/0200 Dy			W4MEE
QFNS — 3715	0100 Dy	177	77	WB4GHU

New appts.: WB4GHU as EC of Volusia Co., WA4OGB EC of Marion Co. W4FKH now W4RH. SEC WA4WBM on the go this summer visiting clubs and recruiting ECs. If your county doesn't have an EC, or you don't know him, contact WBM or myself. DRN5, 7290 kHz, at 2030Z, needs more N. FL reps. Mobile, AL, FCC office closed Sept. 1; it may become a quarterly exam point. Pensacola had a good crowd at the Mini-Hamfest. WN4QBB writes a Novice column for "W4UC News." Other new Novices are WN4s PMU QBC RAY RQH & RXG. QBB QNI's MS & LA CW nets, as well as QFNS. Flor-Ala chapter, QCWA, held recent luncheon in Pensacola; contact W4LRC or WA4MVM for more info. WA4UFP now General Class. WA4BAX passed Extra Class exam; received WAC and WAS certificates. WA4HHY moved to Tallahassee from Jax. WA4QIM working a while in Milton & Pensacola before returning to Jax. WA4LYY is the public defender in Columbia Co. WA4TNC's XYL now WN4TXA. Jax Beach EC WB4MMH conducts drills on 29.0 and 146.85 MHz. NOFARS proxy WB4DAD moving to MT. W4IZ racked up over 6,000 points in FD. WA4IMR WA4QCX and K4GLJ upgraded to Advanced Class. W8VYC/4, instructor at F.C.I. at Cross City, hopes to initiate classes for would-be hams. K4IPL's QTH was hit by lightning. Traffic: (Aug.) WA4FBI 243, W4LDM 121, WA4EYW 85, WB4FHT 78, WB4VDM 76, AB4DXN 72, W4JL 63, W4KIX 43, W4RH 36, WB4NJI 34, WB4FJT 33, K4BSS/4 31, WA4NID 27, K4OER 22, WA4EYU 21, WA4CRI 15, WB4ADL 12, K4IEX 12, WN4QBB 11, WB4GZV 10, WA4TNC 8, WA4HHC 7, K4RNS 7, W4IA 5, WB4YRL 4. (July) WB4SKI 136, K4RZM 23.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH. Asst. SEC: W4WYR. RMs: K4EBE W4MEE. PAMs: WA4NBE W4OGX. K4JPF

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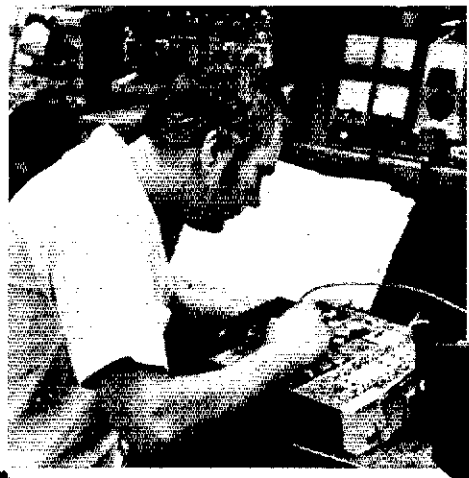

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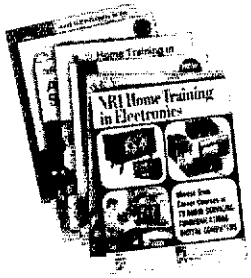

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received new 2-letter call K4TF. Art Monsees received his Bachelor of Science degree in Management and a new 2-letter call W4BK the same day, swapping in K4QG. W4DVO is getting back on traffic nets after two months lay up due to an operation. AA4ZLW graduated from college, got a new job and new TS700. He is working Oscar with indoor two-element quad as well as some DX on 2-meter SSB. Our congratulations to WB4ALH on promulgation of his new Section Emergency Plan. We hope all ECs will quickly follow suit and issue their own local plans. At this writing we are preparing for a fine Hamfest at Melbourne. By the time you read this we will be ready for a gala big convention at Sheraton Sand Key, Clearwater, FL November 6 and 7. Hope to see you there. Traffic: (Aug.) W4MEE 395, K4SJH 270, K4SCL 232, WA4SCK 209, K4TH 209, WB4AID 206, W4EH 191, WA4NBE 156, W4JHF 124, WA4JPV 107, W4NFK 102, W4IRA 76, WB4WYG 72, K4BLM 56, K4EUK 52, K4CFV 49, W4DVO 35, W4QM 28, WA4EIC 18, WA4KNX 12, W4WYR 11, W4NTE 9, K4DRH 5, W4SMK 5, K4IF 5, W4LK 2. (July) K4NE 60, W4DVO 29, W4GDK 19. (June) W4DVO 61.

WEST INDIES: SCM, David Novoa, KP4BDL — Appointments: KP4FZ KP4EGF OBSs; KP4BJM ORS. Recent up-grade to Advanced: KP4s BRL, BPJ and EJE; to General KP4s DQN AHQ and DRK. KP4WL received 25 wpm CP Certificate. He's now in the QRP gang. KP4EKI DXing from Levittown. KP4CV returned from trip to Europe. KP4EGO new Dir. of the Radio Club de Puerto Rico after KP4QM's resignation. KP4DMZ (ex-KH6IDI) new QSL Mgr. for the KP4-Land. QTH is still P.O. Box 1061, San Juan, PR 00902. KP4DGT has a Kenwood TS-520. KP4EGO now has a DXer Rig. KP4EBQ again active with his FT-101B. KP4DMZ has a four-element quad at 100 feet and a two-element 40-meter Yagi at 90-ft. Traffic: KP4EHF 72, KP4BSQ 54, KP4AZA 16, KP4BBN 6, KG4WW 3, KP4SV 1.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — RM: K7NHL. PAMs: WA7KQE W7UQQ. W7HFR has prepared a thorough set of instructions for smooth operating procedure for Cactus Net members. Contact him or net mgr. W7UQQ for details. A series of programs with the theme "A Season of SSB — Putting Amateurism Back into Amateur Radio" are planned by the Scottsdale ARC. K7CC has a 34/94 repeater with autopatch (WR7AIM) in operation in Tucson. He also reports receiving the AMSAT Oscar 50 award. W7VZL of Patagonia is reported as a Silent Key. W7YS reports new WN7 calls in Flagstaff are FCE FBB FCR FCT FCS FBN and FBP. He says WA7YYG and WB7BRB are running a novice course at the high school. WB7BVK submitted his QVS reports from Ecuador where he spent the summer on business, and operated 2FM on 52 and 16/76. Nets: Cactus Net QNI 1,162, QTC 353; ATEN QNI 525, QTC 49; certificates to W7RQ K7NMQ K7GLA K7EMN WA7QMA W7CAF; SWN QNI 237, QTC 180. Traffic: (Aug.) K7NHL 378, K7UXB 52, WB7CAG 49, WA7YKM 27, WA7KQE 24, K7NTG 24, W7CAF 16, W7DQS 11, K7NMQ 8, W7RQ 6, WA7WEB 6, WB7BGC 4, K7CC 4, K7GLA 4, K7EMN 3, WA7JCK 2. (July) WA7WEB 16.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Berasley, WB6OYN. RMs: WB6PKA WB6ZVC. Acting SEC: W6SPK. WB6TCR and W6RXD reported on the recent support provided by the South Bay RACES and AREC members to the Redondo Beach Police Department on the Fourth of July at the King Harbor area. The group put together a five station network located at key points in and around the harbor area. We're glad to say no unusual events were reported in spite of the large crowd. The TRW executive committee recently met at the home of Veep W6RLN for a board meeting and were greeted with a Pizza Dinner complete with wine and all the trimmings. Congrats to WA6CUM on his appointment as OPS covering the San Fernando Valley. The Southern CA Repeater Assn. recently hosted John Johnston, Chief, Amateur and Citizens Div., of the FCC. John is an excellent speaker and answered many questions for the membership. The JPL RC W6VIO now has a new set of feed lines to their antennas which is hoped to help reduce the loss of long feedlines. Recent bull from the TELCO RC indicates many new club activities in future planning including a constructor's meeting. WA6CUM, has been active on 7 MHz bringing up his cw speed in preparation to taking his Extra Class exam. He plans to be active on the Mission Trails Net. SGVRC are preparing for their yearly auction. WB6QFE will be the official auctioneer. The League now has come out with study guides for those wanting to teach Novice classes. Send a large envelope with approx 39 cents in stamps for your copy. We are in need of good operators to take sked spots on RN6 (Region Six) net, I am sure there are some good operators who would like to take a spot or two on either SCN or RN6 per week. The Pacific Net seems to have slowed down recently with the moving of KH6IQU back to the mainland. The recent MWRA newsletter is a beauty, with lots of pictures of the hard working men behind the Mount Wilson repeater, also some pictures of Burt. This has to be one of the best Bulls in a long time. W6WIS is assisting in RACES at new Lomita Sheriff's Station. It is with much regret that we lost WA6TCH who is moving back to New England, Rich has been very helpful on SCN for several years. WB6JFD very active and now has new beam CL-33 up at 30-ft. and going up more. K6EA away on vacation will be looking for local SCN members on 14 MHz. W6DEO recuperating after short stay in hospital. W6DQX off the air, temporarily, had to take his antenna down while removing a tree. K6ASK vacationed through 16 states and 6 Canadian provinces, used 2 meters mostly. Traffic: WB6PKA 309. W6INH 272, W6HUJ 176, WA6TLV 102, W6OEO 70, WB6EPS 26, WB6AIT 19, W6NKE 19, W6BRO 17, W6USV 16, WA6FWH 12, K6CL 5, WB6VID 4, WA6ZKI 4.

ORANGE: SCM, William L. Weise, W6CPB — Asst. SCM: Dick Birbeck, K6CID. SEC: WA6TVA. RM/PAM: WB6AKR. DRN6 check-ins remain very high even with poor band conditions. WA6YWS has been very busy with traffic from the Eastern CA Museum at Independence. Bill even made BPL. Congrats! If you haven't requested your Instructors Guide for training and teaching Novice classes better get your order in with the Training Department at Headquarters. The SCM/SEC meeting held on Aug. 21 at Corona-Riverside was very informative. Your new SCM and SEC are planning excellent events for the future. Please give them your full support. Since this is my last column for QST I want to thank all who have

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T-4X Transmitter 339
TR-72 2 Meter FM 225
AC-4 AC Supply 95
TR-4-C Transceiver 449
CC-1 Console
CPS-1 Supply
SC-2 Conv
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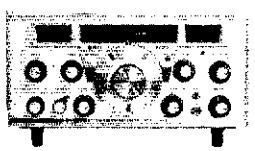

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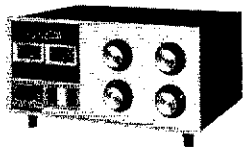

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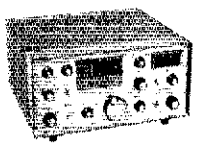

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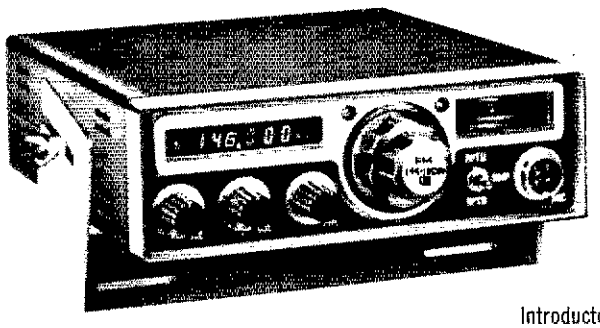

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supported me during the past four years. It has been a very rewarding experience. I hope to see many of you at the coming ARRL Conventions. W6BUK reports he has been inactive due to an operation and will be on vacation for sometime. Good motoring and health Graham. The Orange Section League Officials meeting on the First Sun. of each month will continue with WB6AKR as your Net Control. This net meets on or about 3965 kHz at 1D AM. Congrats to WA6YWS and WB6EIG on making BPL for Aug. Traffic: WB6EIG 512, WA6YWS 312, WA6TVA 107, WA6IKH 71, W6AQB 12, W6WRJ 56, W6CPB 39, W6QBD 19.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — ECs: W6PZU Northern, WB6JQI Southern, WA6UFY Eastern, W6INI Central, K6VRS Imperial Districts. AREC Nets: Novice/Tech, Sun. 0830, 3725 kHz, K6SCY Net Mgr.; FM, Sun. 1900, on 146.52 MHz, WA6HJJ Net Mgr. Apologies to WB6GVR for reporting his call incorrectly in Sept. QST. WA6PDE helped San Diego celebrate America's Finest City week with commemorative call NB6AFC. WB6IBM upgraded to Adv. W6DEY went home with an ATLAS 210X from annual Palomar RC picnic. Last year his XYL, W6PJU, won the major prize. W6OVP working on innovative plan to demonstrate all amateur radio modes to the public with non-polluting-energy sources of power. ARC of El Cajon Aug. program featured an earthquake slide-talk by OES staffer Jack Duncan. New AREC members WB6CBG WA6MJZ WN6ODE WA1TSS and WB2WBM. S. D. County repeater service will be greatly improved with S. D. Rptr. Assn's plans for up-dating equipment. Most stolen amateur equipment does not contain identifying serial numbers. Police recommend engraving your CA driver's license number on all items. Traffic: (Aug.) WB6FTY 271, W6BGF 132, W6PZU 39, W6DEY 31, KG6JES 21, WB6CFT 19, WA6UFY 14, WA6EJL 11. (July) W6PZU 58, W6DEY 31, WA6IIK 6.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI — SEC: WB6HJW. RM: K6QPH. PAMs: (VHF) W6KPS, (HF) K6YX. This fall the Mike and Key Club sponsoring classes in Camarillo, K6VFE in Ventura & WB6LMX teaching in Ojai. WB6DPL working to form a YL Club in Ventura Co. More repeaters on with WR6AQX on with a 450 machine, WR6AFI a 220, and WR6ANW now "on site" on 146.19/146.79. Ventura Co. AREC provided communications for a Bike-A-Thon Labor Day weekend. Santa Barbara ARC issued a Memorial call, K6TZ. 1st annual Bar-B-Que of the SB ARC a huge success, Division Dir. in attendance. 2-meter RTTY activity increasing with 146.58 simplex channel being used in addition to the LA repeater. WA6DEI enjoying trip to Japan. WB6LLT moving to PA, W6GKR purchased 80-ft. tower from WB6LND who is moving to Camarillo. WB6FLI returned from assignment in Washington, DC. W6PNM spoke at Poinsettia ARC on RTTY. WB5KPL while moving from TX to CA summoned help for a traffic accident via the Kingman, AZ 16/67 repeater. He and his wife both MD's rescued the victims. PSHR: WA6VBS 28. Traffic: (Aug.) WB6CWE 157, WA6MBZ 114, WA6VBS 99, WB5KPL/6 8. (July) WA6MBZ 151, WA6VBS 46.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L. E. Harrison, W5LR — This is it. Thanks to each of you. Our association has been "FB," thanks millions. "Ted" writes your article next time. Eq Sheet FTW sez excellent FD Ops. RACES held July 4 Heritage Pk. Primary job coordination of entertainment on stages passing data on 85 lost children. Excellent results. Waxahachie Rptr 31/91 causing QRM with Denton, W5DGN Denton very much involved Tel No. 387-3023. Your SCM just mailed 150 letters to League Appointees NoTX announcing chg of, SCM office plus endorsements for ORS, OPS, EC, OO, OVS, RM and SEC etc. Many were past due. Approx. 40% answers were received. Some came from WA5UNK WA5KHE W5GSN W5IZU WbJHA W5BVC W5TGA and many others. Intruder Watch Bulletin No. 3-76 shows 3 W5s inc W5QPX W5GEL & W5QYK. WA1QMI head honcho at Hq. Richardson WK rpts membership 100 plus & Glenn Zook has idea we can re-arrange ARRL Divisions plus arithmetic to o reevaluate our Sections vs population. W5LGY comes forth with some FB comments on Ham Radio. This proves someone's reading our mail. Arlington ARC Bar-B-Que Randall-Mill Pk 7:30 PM Aug. 20 rpts good supply Novices. Mtg held at Fred Benefial Electronic Store. Temple ARC rcvd National Weather Services PubSvc Award for its assistance in relaying info to Waco WC Bureau during recent bad weather per Geo. P. Cressman, Dir. WX Svc. Club rpts 200 residents evacuated ahead rising flood waters on Nolan Creek earlier this year. Club in constant assistance to Bureau during May 26 Tornado on Lake Belton. K5SOR installed 1900 watt emergency generator. W5TBW spent $2b & now is K5DK. His W5TBW cancelled OO appt. Same on WB5EEE ORS. K5ABV moved OO appt. cancelled. New OVS WB5GII 2 mtrs & 3970 so K5IBI take note. WB5LWB ex "CB" now pres. Dallas ARC reported keying 48 elements on two. Better jumber ur "$2" meters boys & gals. By the way Dallas Ham Club reports 400 applicants from "CBs" to next School held at Braniff Training Center. Sir I dunno what you guys think but 'ppears to me that this is "close on them duck" t-wards a record. Traffic: W5YK 12, W5LR 8, WB5DXB 5.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — PAMs: WB5AZS WB5KGP WA5OUV. RMs: WB5NKD W5RB. WA5MDN new OBS for Ponca City area. AA5MLT latest Bicentennial WAS. WN5RXZ WB5NKC recent upgrades. Excellent Newsletter from OAN, Okla. City planning 6 simultaneous License classes this fall. TRO provided communications for the Great Ratt Race at Tulsa on Labor Day. Enid has new solid-state repeater link. WB5AOH new at Muskogee. WB5JYF, new EC for Choctaw Co. Traffic counts holding up well. Some of the Nets could use some more help in the way of outlets and Net Controls. The WX Net can always use more WX reports. This is a good way to get your community on the map. See your local WX observer and make arrangements. The Weather Service uses this info. Also TV picks them up when they are exceptional. Many of our younger Ops are back in school and not as active, will be glad to have them back as their time permits. Traffic: WB5NKD 458, W5REC 308, WB5NKC 194, WB5KGP 191, W5RB 122, WA5UJF 92, W5FW 57, WB5RLR 57, WB5AZS 41, W5SUG 28, WB5ELG 25, WB5OYU 22, WA5FSN 14, WN5UCM 14, W5FFW 4, WA5OUV 4, WA5FLV 2, W5JJ 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — SEC: W5TQP. PAM: WB5AMN. RM: W5UGE. WB5AMN also appointed asst. SCM for this section.

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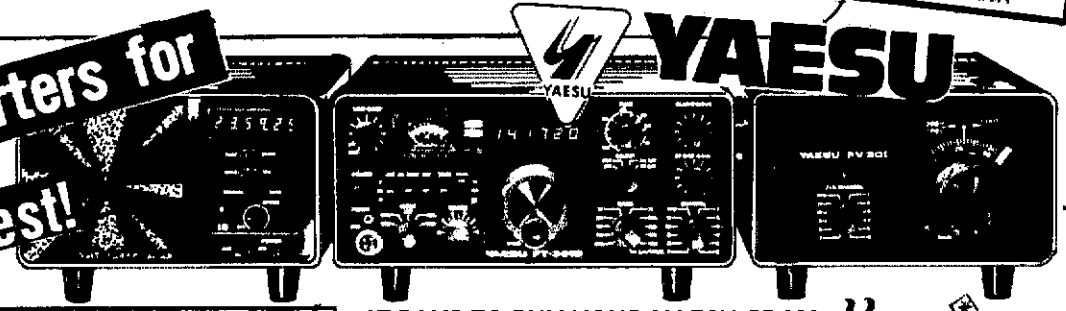

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OVS/OO WB5CIT and others set up two mobile repeaters to assist with communications for San Antonio Sports Car Assn. rally; used 6-mtrs and 2-mtrs. WB5KPL just finished stint in San Pedro Sula, Honduras, with Amigos de las Americas; worked with WA5GNT YV1VT W4RFA and others. OPS WB5LTW reports WN5URV is new ham; WB5M5Z has changed his call to W5VDM. OPS K5RVF will be calling from OE-Land for a while. RM-ORS W5UGE really enjoying 2-mtrs with new TS-700A; he also reports WR5ANT, 146.04/.64 is new rptr with NASA's Johnson Space Center ARC. ORS/EC W5UJJ enjoyed vacation in O-Land. OPS WA5VBM made BPL for third time. ORS WA5YEA elected mgr. of TTN. Tidelands ARC "Hamtides" reports WR5AMX, 147.75/.15, will operate from North County Court house EOC. Coastal Bend AR Digest (Corpus Christi ARC) reports WR5APA in test stage, equipment to go atop Nueces County Court house; WR5AMA is new 146.28/88 machine to be on air soon. Houston ARC's HARC News reports K5HXR recruiting amateurs for operating in Latin America from June 15 to Aug. 15, 1977; contact him for further information. Traffic: (Aug.) WA5VBM 430, W5KLV 395, K5HZR 320, W5IJJ 157, WA5YEA 145, WA5RKU 98, K5ZSI 91, WB5NUM 80, W5BHO 16, WB5IZN 11, WB5GVQ 8, WB5AMN 6, WB5FMA 6, K5RVF 6, WA5YXS 5. (July) W5UGE 236, WA5RKU 210, WA5YEA 158, WB5KPL 155, WB5NUM 61, K5ZSI 34, WB5IZN 29, WB5LTW 17, W5BHO 14.

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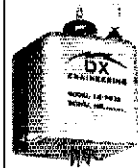

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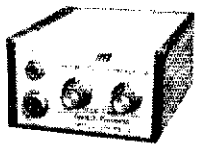

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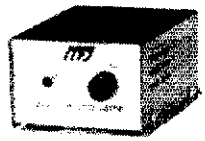

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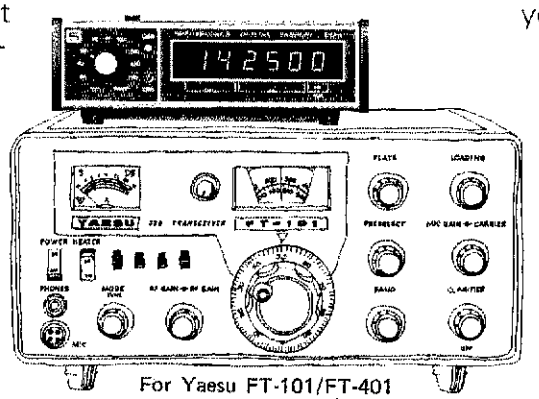

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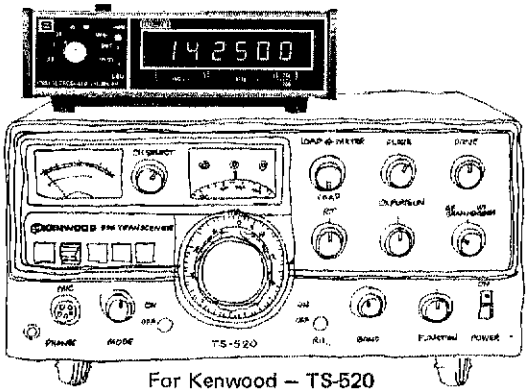

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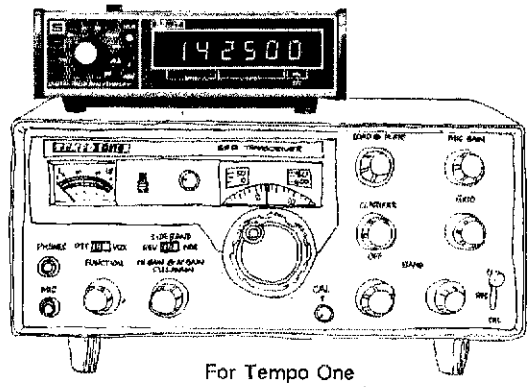

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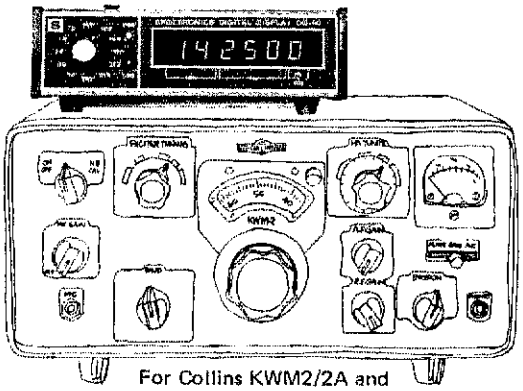

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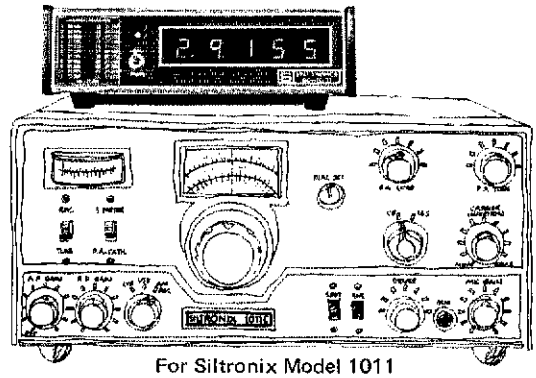

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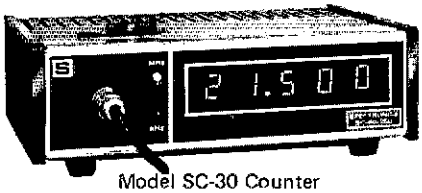

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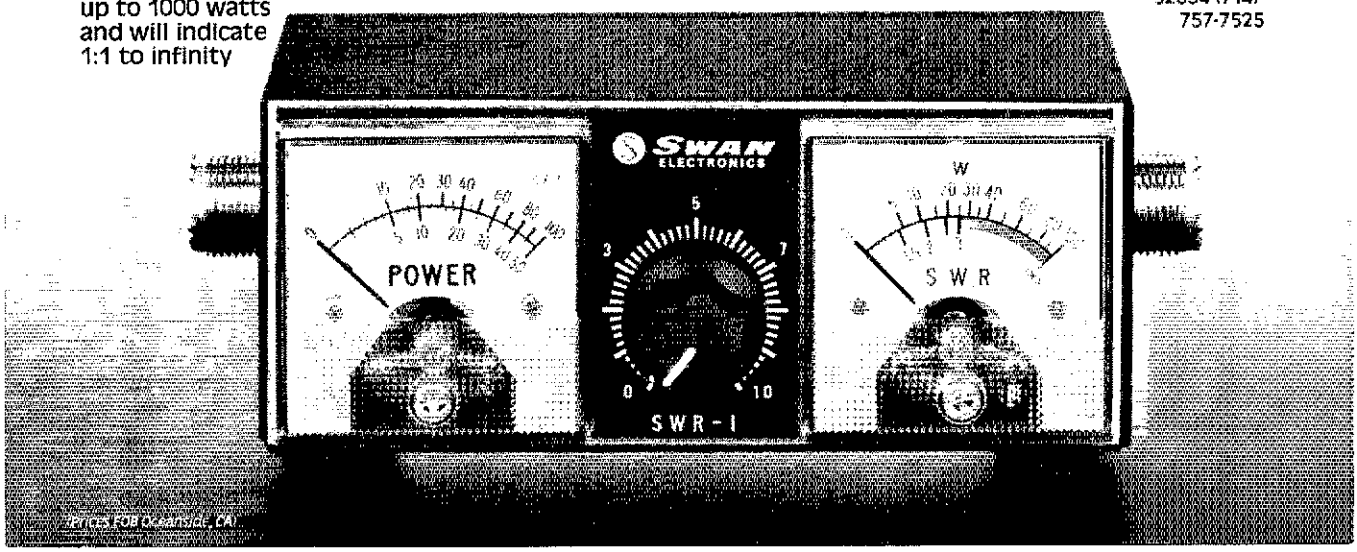

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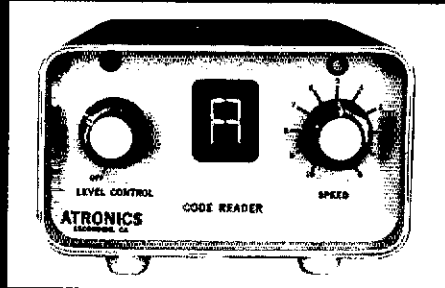

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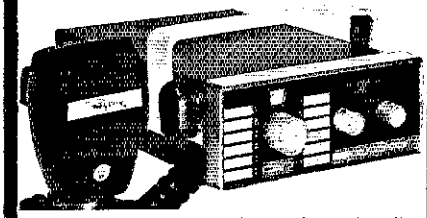

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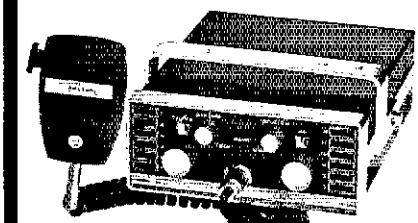

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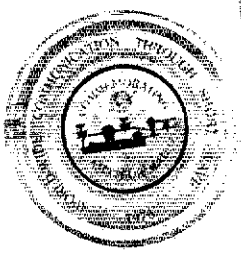


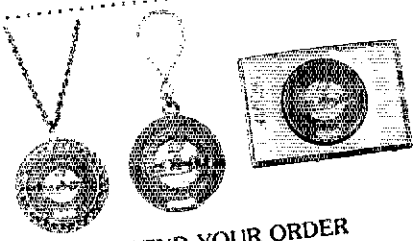

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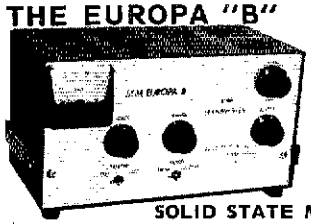

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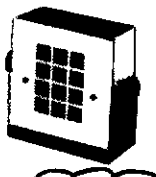

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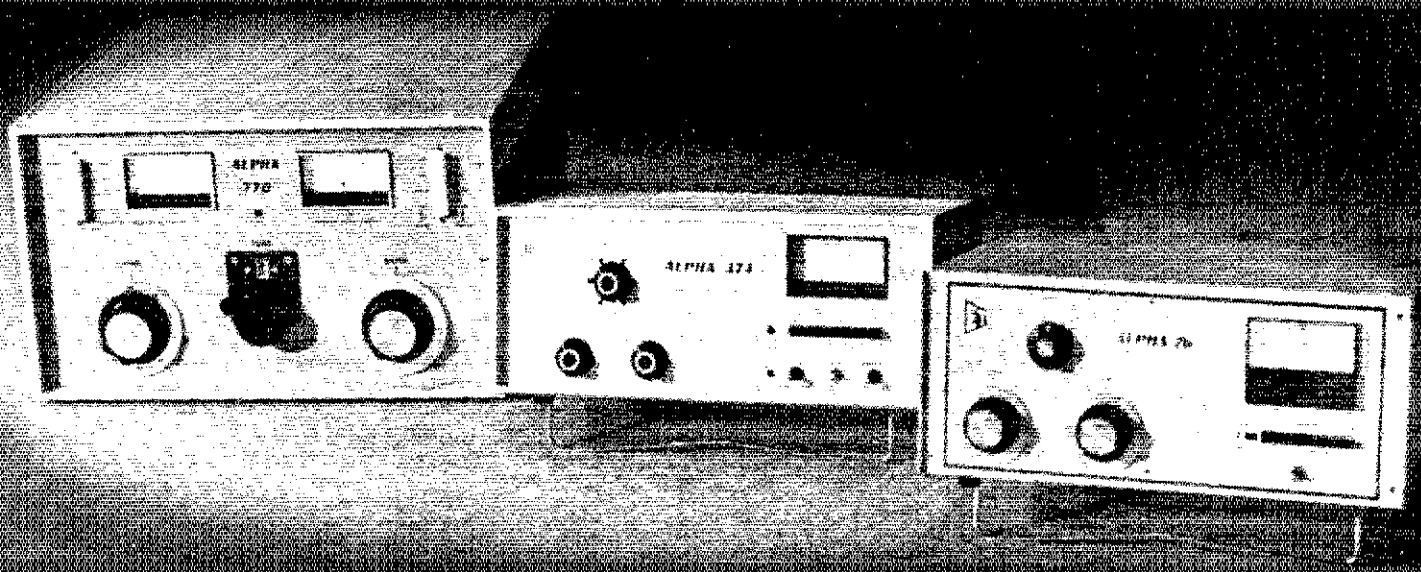

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- Full vacuum relay QSK (CW break-in) standard.
- Basic design proven in toughest commercial and amateur service since 1970.
- 1/3 the size of any amplifier of comparable power; easy to handle & ship.

ALPHA 77D is the standard of excellence around the world.
$2995 U.S., built on order. Contact ETO for schedule.

ALPHA 374 IS SUPER CONVENIENT

- The smallest and lightest of all true [NTL] kilowatts at only 0.9 cubic ft. and 52 pounds.
- No-tune-up operation 10-80 meters, thanks to factory-pretuned bandpass filters, yet built-in controls allow manual antenna matching and amplifier "tweaking" when necessary for maximum efficiency and power output.
- Thoroughly proven performance and durability through more than two years' worldwide contest, DX, FSK, SSTV, and general use. $1395 U.S.; prompt delivery from factory stock.

ALPHA 76 SETS THE VALUE STANDARD

- An honest, rock-crusher [NTL] kilowatt in all modes, like the **ALPHA 374**. You can lock the key at a full d-c kilowatt and leave town . . . if you have a very husky dummy load!
- Full coverage 10-160 meters - no other [NTL] kilowatt linear (except a **'77D**) covers 160.
- Standard 45 pound plug-in transformer (1.5 KVA CCS) itself outweighs some so-called "kilowatt" amplifiers. (The only way we know to make any true [NTL] kilowatt lighter than the '76 is to use special tape-wound Hipersil® transformers like those standard in the **ALPHA 77D** and **'374**, and optional in the '76.)
$895 U.S.; factory stock.

Every **ALPHA** HF Linear Amplifier has a combination of quality and convenience features that's available in no other true kilowatt d-c, 2+ KW PEP linear amplifier: • modern, rugged ceramic grounded-grid triode tubes; • silver-plated copper tubing main tank coils; • a 1.5 KVA CCS (or larger) plug-in transformer; • full-cabinet, ducted air cooling; • self-contained desk-top convenience; and a full year of free factory service for any defect. NEW! Expert **factory** demonstration, advice, **sales**, and service is conveniently available in the Midwest and in Southern California. Write or phone ETO direct for full information, illustrated brochure, and personal service.

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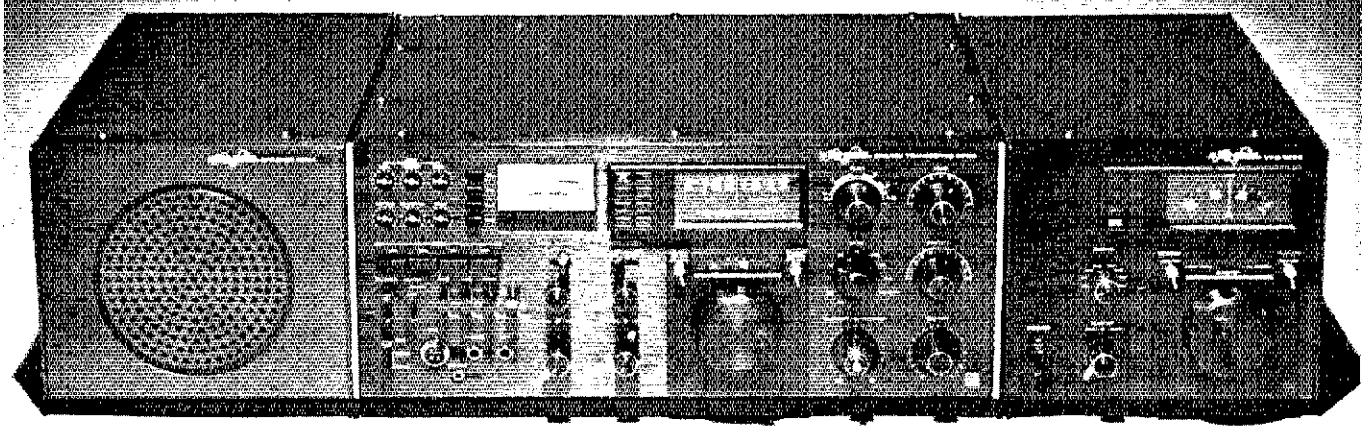

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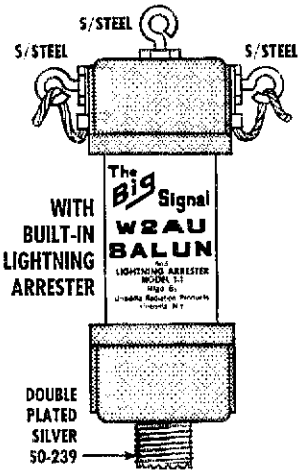

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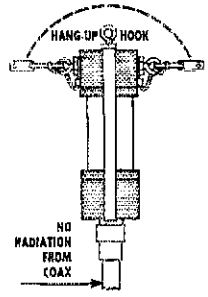

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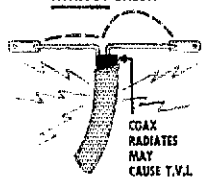

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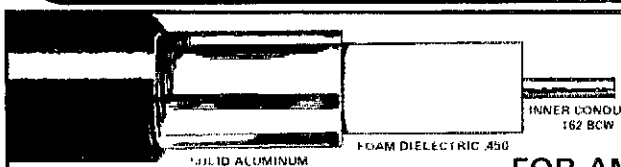

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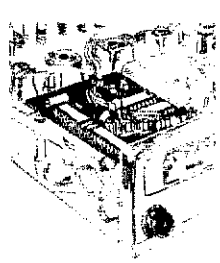

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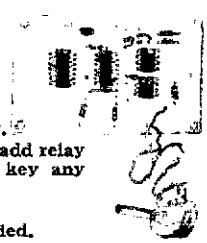

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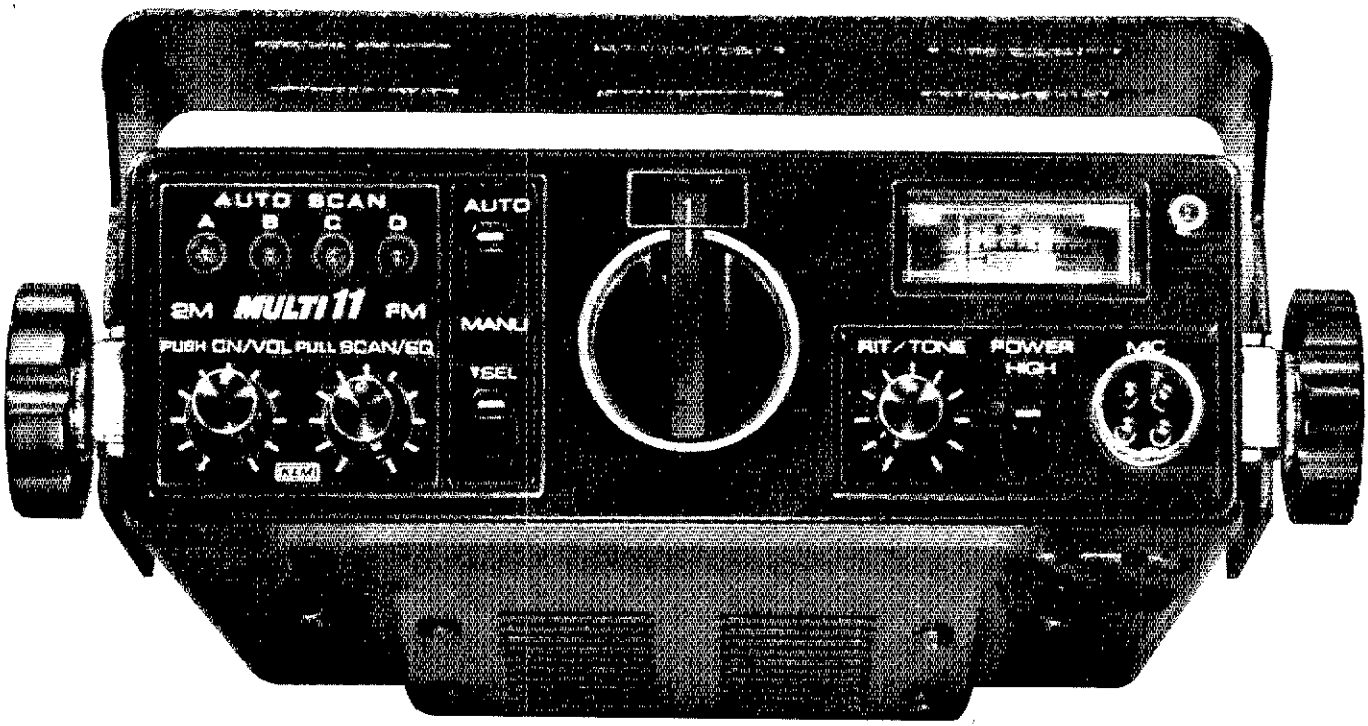

continuously scan and/or transmit on any four of your favorite VHF channels

Here's a VHF transceiver that will greatly increase the scope and enjoyment of your mobile operations. Safer too because your eyes can be on the road... not on the rig!

KLM's exclusive "scan plus" feature adds four additional channels to the basic, band-switched 23 channels provided, electronically scans both transmitter and receiver continuously at a 4 channels/second rate. Any channel can be "held" whenever you want to break in. Or you can continue scanning on a manual basis. In each instance, channel being scanned is identified by panel LED. Be set for 2-way contacts by selecting quartz crystals for the scanner transmitter section which correspond in frequency to "splits" in use on the receive channels selected. **All new KLM Multi-11models are now supplied with five sets of quartz crystals without any increase in price!** Sets are: 22-82, 28-88, 16-76, 34-94, and 52-52. These same crystal pairs are also available to owners of older model Multi-11's for **17.50.**

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plus 23 additional switchable channels.

- All solid state.
- Two RF stages w/dual gate MOS FET.
- Multi-conversion receiver.
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- RIT ±5 kHz.
- Sensitive squelch w/0.5 μV threshold.
- Auto or manual scan (four channels). **plus** 23 manually switched channels.
- 144-148 Megahertz.
- Freq. Control: Quartz crystals.
- NBFM (switchable to WBFM).
- 10 watts output (switchable to approx. 1W). Available KLM solid state amplifiers can boost power output to 70-160 watts.
- Protective circuit for output transistor.
- Speaker tilts forward for better copy.
- Tone oscillator w/switch. For test, control, etc.
- Multi-function metering: Power out, "S" units. Also switchable to FM centering.
- Operating voltage: 13.5VDC at 2.5A (Hi). Usable voltage range 11-15V. Negative ground.
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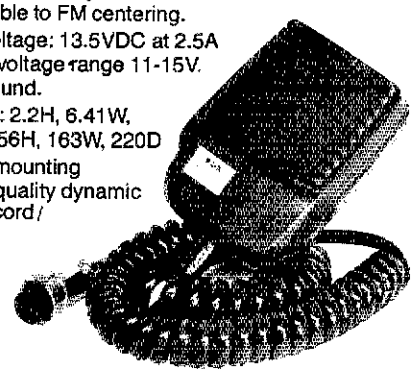
- Supplied w/mounting bracket and quality dynamic mic. w/coil cord/4 cond. plug.



This is the quality of SSTV picture you get with the new Robot Model 400 Scan Converter.

The picture shown above is from an unretouched photo taken from a monitor of a picture transmitted with the new Robot Model 400 Scan Converter. It is much sharper and clearer than was previously possible with existing SSTV equipment.

But the new solid state design and random access memory (RAM) of the Model 400 now gives you the ability to send and receive picture images just as sharp and clear as the above picture.

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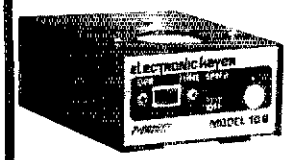
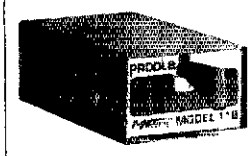


ELECTRONIC KEYER
MODEL 10B

Reed relay output (1 amp, 250V, 20VA). 10-30 WPM @ 6V-DC supply, 12 MA drain. 15-45 WPM @ 9V-DC supply, 15 MA drain. 3 MA idle current drain. Fixed spacing. Dots 1:1, Dash 1:3. Self-completing Dot/Dash. Manual dash in tune position. (Batteries not included.) Use the Model 10B Keyer with your paddle or our Model 11B matching paddle.

MODEL 10BWA KEYER with Sidetone assembled	**$39.95**
MODEL 10BW assembled	**$29.95**
MODEL 10BK (Kit)	**$23.95**
200-2K PC BOARD KIT	**$14.95**
200-3K SIDETONE KIT	**$ 5.95**
Ship. Wt. 1 Lb., add	**$ 1.00**

(PA RES. ADD 6% SALES TAX)



PADDLE
MODEL 11B

Dit/Dah travel adjustment. No mechanical switches. No bearings to fail. Paddle assembly weight is 1.5 pounds. Reversible Dit and Dah connections. Rubber feet. Damping on paddle operator lever. Feather glide paddle movement.

MODEL 11BW assembled	**$11.95**
MODEL 11BK (Kit)	**$ 8.95**
Ship. Wt. 2 Lb., add	**$ 1.35**

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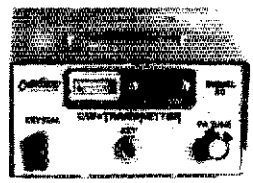

CW TRANSMITTER
MODEL 50

15 watts input. Full break-in keying. All solid state. Crystal control. 160, 80 or 40M plug-in coil. Zener regulated chirpless keying. Has built-in 120 Vac power supply. OPTIONS: Built-in keyer and/or sidetone. Paddle Model 11B is compatible with built-in keyer option.

MODEL 50K (Kit)	**$49.95**
MODEL 50W (Wired)	**$69.95**
Add-on options:	
SIDETONE 200-21 Kit	**$ 5.95**
200-21 Wired	**$ 8.95**
KEYER 200-22 Kit	**$13.95**
200-22 Wired	**$18.95**
Ship. Wt. 4 Lb., add	**$ 2.10**

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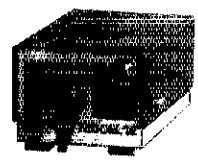
(All units come with 40M plug-in coil unless otherwise specified. (Additional coil kits $3.95 each postpaid.)



ELECTRONIC KEYER WITH PADDLE

MORSE-1835
MODEL 12

C-MOS circuitry. Solid state output switch. (250V, 1 AMP MAX.) 8-45 WPM. Fixed spacing. Dot 1:1, Dash 1:3. Self-completing Dot/Dash. No on/off switch required. Sidetone has 2-inch speaker. Paddle travel adjustment. Rubber feet. 4 penlight batteries (not included).

MODEL 12 assembled	**$49.95**
Ship. Wt. 2 Lb., add	**$ 1.35**

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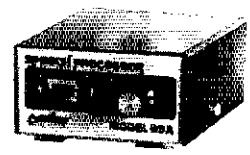

SPEECH PROCESSOR
MODEL 60A

200K/500 OHM inputs. PTT on connector. Instantaneous attack and release. 2, 9V-DC batteries (not included). 1.5 MA drain. Frequency is ±-1/2 db., 300-3000 Hz. Process gain control has an in/out switch. The process threshold is: 1.5 MV-RMS (HI-Z). 400 micro V-RMS (LO-Z). Output voltage 100 MV-RMS nom.

MODEL 60AW assembled	**$29.95**
MODEL 60AK (Kit)	**$23.95**
Ship. Wt. 1 Lb., add	**$ 1.00**

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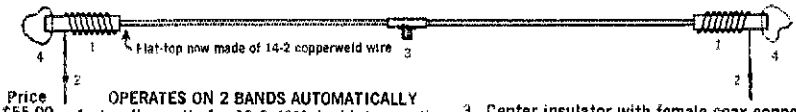

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- ★ Transmatch QRP, L1-4 — Handbook, p. 350 ..... $ 6.00
- ★ Preselector 80 To 10M L1-20 — Handbook, p. 265 ..... $15.00
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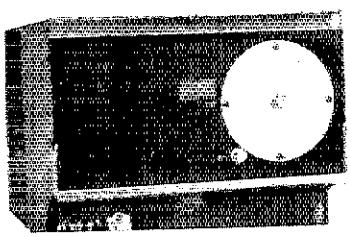
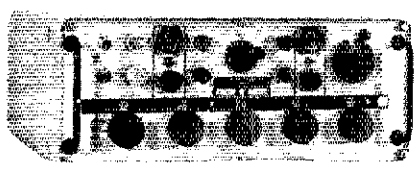
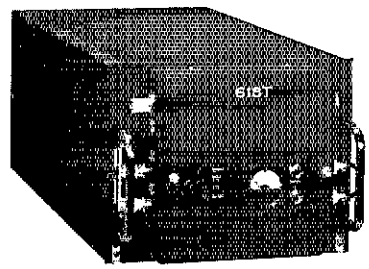


490-T Ant. Tuning Unit
(Also known as CU1658 and CU1669)



R1051 or T827



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RX144C W/T.	same as above – factory wired and tested	114.95
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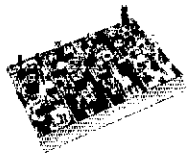

RF28 Kit	10 meter RF front end 10.7 MHz output	12.50
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FM455 Kit	455 KHz IF stage plus FM detector	17.50
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TX144B Kit	transmitter exciter – 1 watt – 2 meters	$ 29.95
TX144B W/T.	same as above – factory wired and tested	49.95
TX220B Kit	transmitter exciter – 1 watt – 220 MHz	29.95
TX220B W/T.	same as above – factory wired and tested	49.95

TX432B Kit.	transmitter exciter 432 MHz	39.95
TX432B W/T	same as above - factory wired and tested	59.95
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PA2501H W/T.	same as above – factory wired and tested	74.95
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PA4010H W/T.	same as above – factory wired and tested	74.95
PA144/15 Kit.	2 meter power amp – 1w in – 15w out – less case, connectors and switching	39.95

PA144/25 Kit.	similar to PA144/15 kit except 25w out	49.95
PA220/15 Kit.	similar to PA144/15 for 220 MHz	39.95
PA432/10 Kit.	power amp – similar to PA144/15 except 10w and 432 MHz	49.95
PA140/10	10w in – 140w out – 2 meter amp – factory wired and tested	179.95
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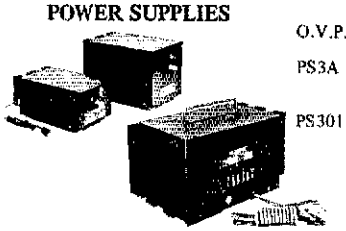
POWER SUPPLIES

PS15C Kit	15 amp – 12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	79.95
PS15C W/T	same as above – factory wired and tested	94.95
PS25C Kit	25 amp – 12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	129.95
PS25C W/T	same as above – factory wired and tested	149.95



O.V.P.	adds over voltage protection to your power supplies, 15 VDC max	9.95
PS3A Kit	12 volt – power supply regulator card with fold back current limiting	8.95
PS3012	new commercial duty 30 amp 12 VDC regulated power supply w/case, w/foldback current limiting and over voltage protection, wired and tested	239.95

REPEATERS

RPT28 Kit	repeater – 10 meter	TBA
RPT28	repeater – 10 meter, wired & tested	TBA
RPT50 Kit	repeater – 6 meter	TBA
RPT50	repeater – 6 meter, wired & tested	TBA
RPT144 Kit	repeater – 2 meter – 15w – complete (less crystals)	465.95
RPT220 Kit	repeater – 220 MHz – 15w – complete (less crystals)	465.95
RPT432 Kit	repeater – 10 watt – 432 MHz (less crystals)	515.95

RPT144	repeater – 15 watt – 2 meter – factory wired and tested	695.95
RPT220	repeater – 15 watt – 220 MHz – factory wired and tested	695.95
RPT432	repeater – 10 watt – 432 MHz – factory wired and tested	749.95
DPLX144	2 meter, 600 KHz spaced duplexer, wired and tuned to frequency	399.95
DPLX220	220 MHz duplexer, wired and tuned to frequency	399.95

TRANSCEIVERS

TRX 144 Kit	case and all components to build 15 watt 10 channel scanning 2 meter transceiver (less mike and crystals)	219.95
TRX 220 Kit	same as above except for 220 MHz	219.95
TRX 432 Kit	same as above except 10 watt and 432MHz	254.95

SYNTHESIZERS

SYN II Kit	2 meter synthesizer, transmit offsets programmable from 100 KHz - 10 MHz, (Mars offsets with optional adapters)	169.95
SYN II	same as above, wired and tested	239.95

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HT 144B Kit.	2 meter, 2w, 4 channel, hand held receiver with crystals for 146.52 simplex	129.95
NICAD	battery pack, 12 VDC, ½ amp	29.95
NICAD	battery charger	5.95
Rubber Duck	2 meter, with male BNC connector	8.95

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CD2 Kit	10 channel xmit deck w/switch and trimmers	14.95
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COR2 Kit	complete COR with 3 second and 3 minute timers	19.95
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Crystals	we stock most repeater and simplex pairs from 146.0-147.0 (each)	5.00
CWID Kit	159 bit, field programmable, code identifier with built-in squelch tail and ID timers	39.95
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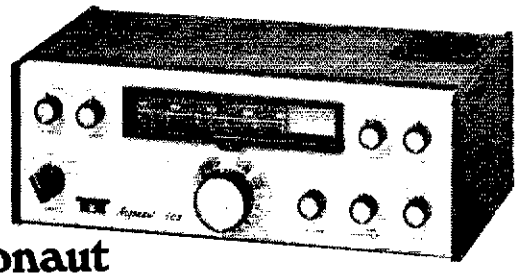

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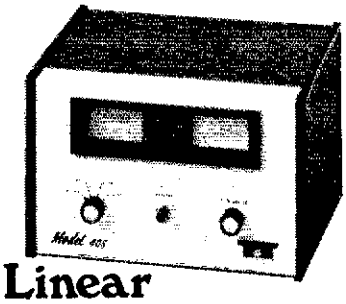

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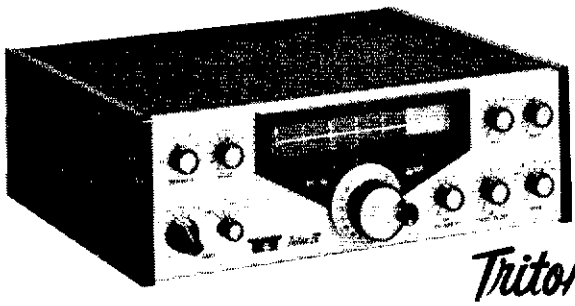

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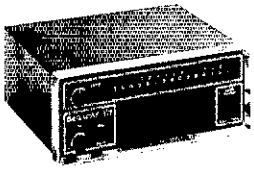

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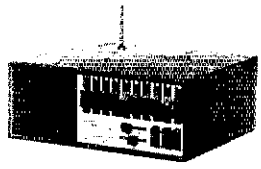

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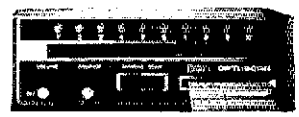

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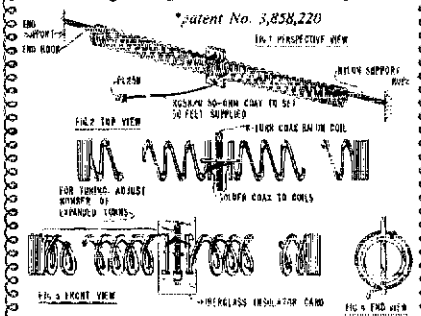

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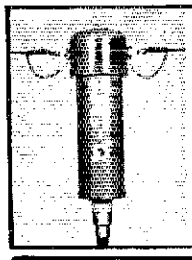

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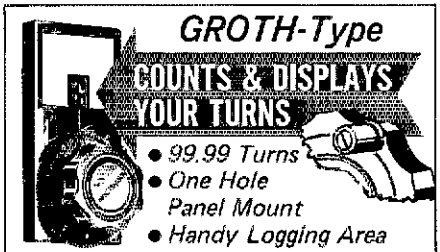

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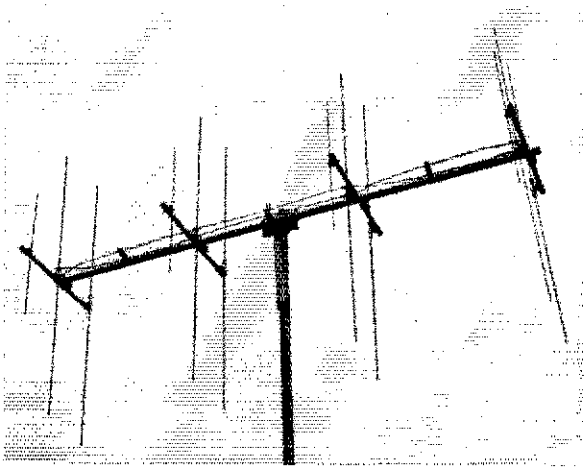
VHF DX



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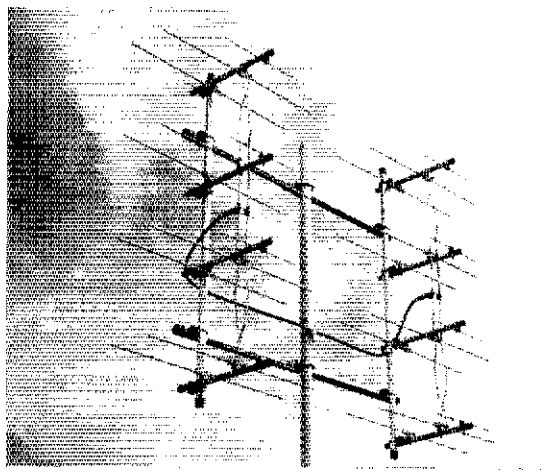
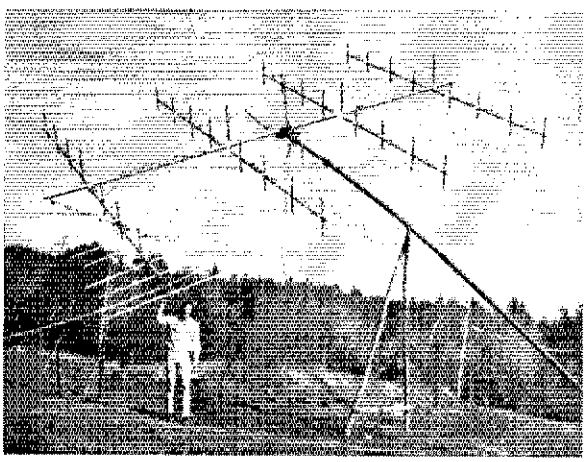
Discover reliability in long-haul communications with VHF SSB and CW. The Cush Craft DX-Array also gives low angle, high gain performance for many exotic propagation modes — tropo, aurora, sporadic-E, and meteor scatter, Horizontally polarized DX-Arrays may be used singly or combined in pairs (twice Effective Radiated Power) or quads (4 x ERP). Each DXK stacking kit is complete with stacking frame and phasing harness (vertical mast not supplied). This year has seen some spectacular VHF band openings — Don't miss the next one!





Dave Olean, K1WHS, with his 160 Element DX-Array and Polar Mount EME System

EME —

Many VHF experimenters have found excitement in conquering the formidable Earth-Moon-Earth (EME) path. 2-meter moonbouncers have achieved outstanding success using eight stacked DX-Arrays. Impedance and gain characteristics of this antenna permit stacking without the critical detuning problems inherent in large arrays of Yagis. Enlarging system size will yield a more uniform gain increase with DX-Arrays than with many other large antennas. The physical configuration alleviates mounting and phasing/tuning problems. EME enthusiasts are setting new records — So can you!

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20 Element DX-Array	DX-120	$39.50	DX-220	$32.50	DX-420	$29.50
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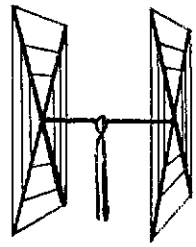

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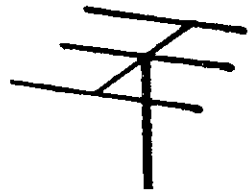

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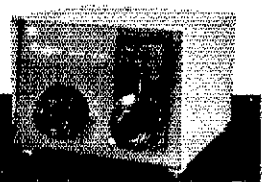

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SPECIFICATIONS:

GENERAL:

Front Panel Size: 6½" × 2½"
Over-all Dimensions: 10½" deep × 6½" wide × 2½" high
Components: 13 Transistors, 10 Diodes, 6 FETS, 4 ICs
Frequency Range: 144 to 148 mHz
Number of Channels: 20 plus 2
Weight: Approximately 6 lbs.
Power Supply: 13.75v DC system, negative ground

RECEIVER:

Sensitivity:
12 db SINAD: .25 Microvolt
Selectivity: ±7.5 KHz, @ 6 db or less
Squelch Threshold: 0.1 Microvolt
Modulation Acceptance: More than 5 KHz
Adjacent Channel Rejection: More than 85 db (±30KHz)
Intermod response: More than 70 db
Image Responses: More than 70 db
Spurious Response: More than 70 db
Audio Output Power: 4 Watts at less than 15% distortion (5 Watts Max)
Frequency Stability: ±.001%
Circuit Type: Double conversion, Superheterodyne, Crystal Controlled. 8 Pole Crystal Filter
Intermediate Frequencies: 10.7 mHz 1st IF; 455 KHz 2nd IF
Current Drain: (Squelched) .2 Amps.
FCC Certified: Part 15, subpart C

TRANSMITTER:

Power Output: Hi: 30 Watts nom., 25 Watts min., @ 14v DC input
Lo: 1 Watt @ 14v DC input
Output Impedance: Matches standard 50 Ohm amateur antennas
Frequency Stability: ±.001%
Audio Modulation Deviation: Adjustable to 10 KHz max. (Factory set to ±5 KHz)
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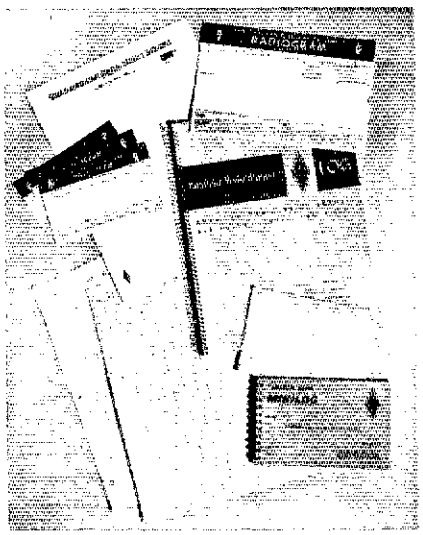

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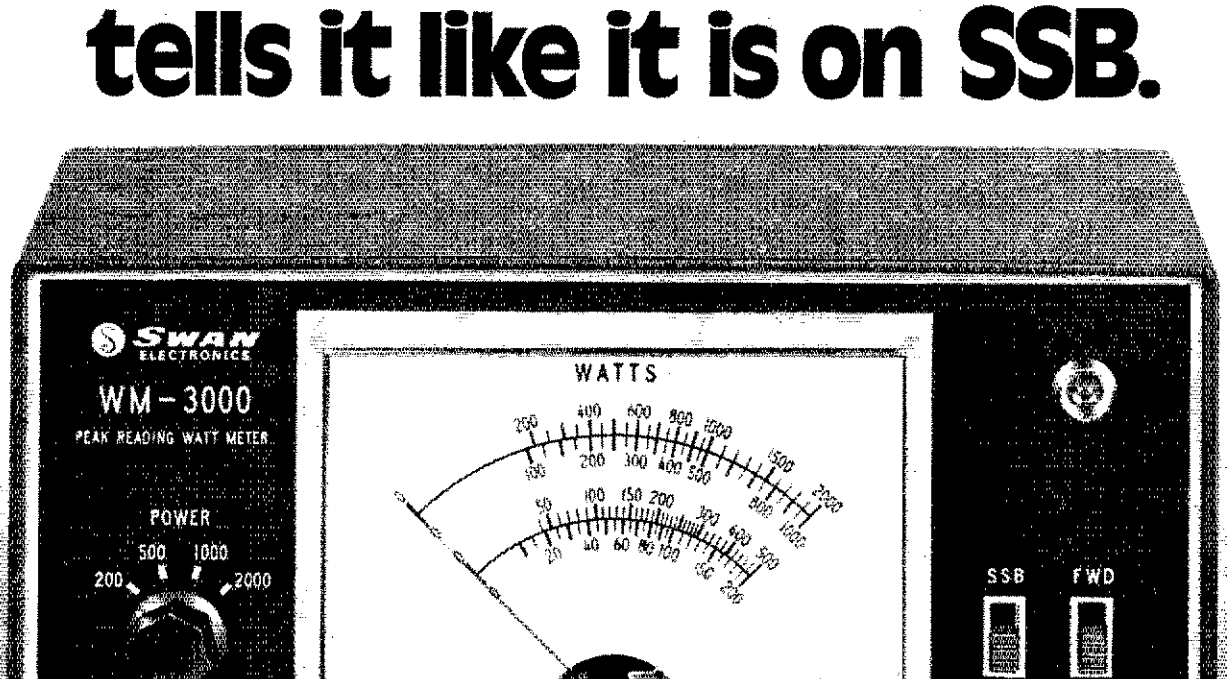

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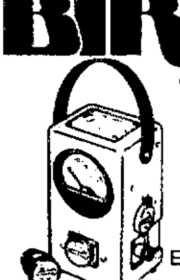

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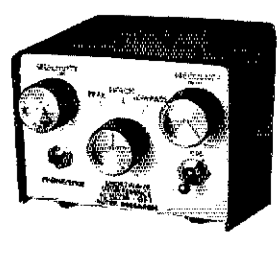

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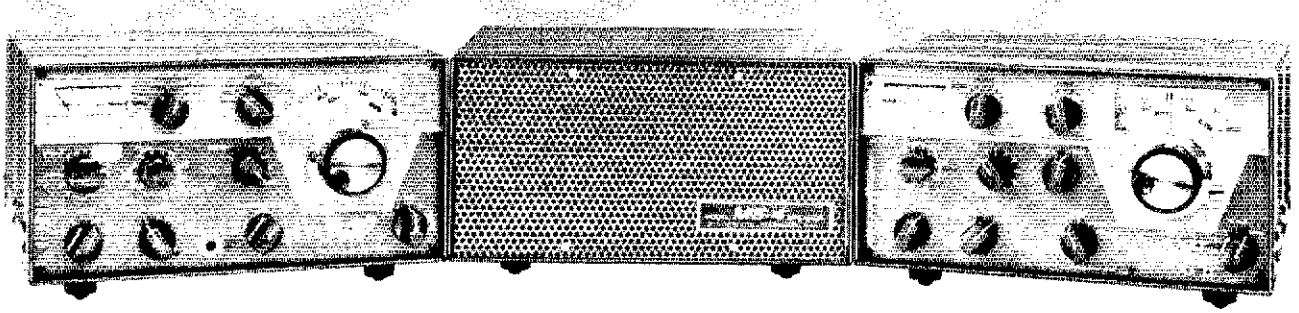

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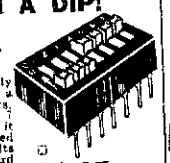

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☐ SN7407	.46	.47
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☐ SN7409	.52	.53
☐ SN7410	.22	.23
☐ SN7411	.27	.28
☐ SN7417	.62	.63
☐ SN7420	.22	.23
☐ SN7421	.55	.56
☐ SN7423	.47	.48
☐ SN7425	.37	.38
☐ SN7430	.22	.23
☐ SN7432	.36	.37
☐ SN7440	.22	.23
☐ SN7442	.97	.98
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☐ SN7446	1.10	1.11
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Type	Sale	2 for
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☐ SN7495	.86	.87
☐ SN7496	.86	.87
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☐ SN74126	1.29	1.30
☐ SN74132	1.95	1.96
☐ SN74141	1.12	1.13
☐ SN74145	1.69	1.70
☐ SN74148	3.25	3.26
☐ SN74150	1.12	1.13
☐ SN74153	1.10	1.11
☐ SN74154	1.53	1.54
☐ SN74157	1.09	1.10
☐ SN74158	1.55	1.56
☐ SN74160	1.59	1.60
☐ SN74163	1.50	1.51
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☐ SN74165	1.79	1.80
☐ SN74173	1.69	1.70
☐ SN74174	1.42	1.43
☐ SN74175	1.45	1.46
☐ SN74177	1.59	1.60
☐ SN74181	3.75	3.76
☐ SN74184	2.19	2.20
☐ SN74190	2.75	2.76
☐ SN74191	2.75	2.76
☐ SN74193	1.29	1.30
☐ SN74195	.89	.90
☐ SN74196	2.19	2.20
☐ SN74198	2.25	2.26
☐ SN74199	2.25	2.26

TTLs

SALE

ORDER BY CAT. NO. 11M1983 & TYPE NO. AT LEFT

ECONOMIZE WITH Solar Energy Chips

- 10 Times more potent than cad cells in 10 times less space!
- From space projects to hobby!
- Fraction of original cost!
- Rectangular shapes save space!

A "sold out" is now back! POLY PAKS is in the SOLAR ENERGY business. We were first in many fields and once again we have "SHONE" them all! These blue energy chips were used by the National Aeronautical Space Agency (NASA) for SPACE & TELEPHONIC COMMUNICATION SATELLITES! Forced to unload due to the economy pinch; factory & POLY PAKS now give you these nifty chips to stimulate all energy-economy-thinking hobbyists. **Converts Solar to Electrical Energy!**

We are stocking 4 sizes: measured in centimeters 1 x 2, 2 x 2, 2 x 4, 1 x 2 linked together. Silicon "thin plate" forms the basis of the cell. It's a **Space Saver!** Each cell (chip) generates 0.6 volts, but at different current capabilities. Solder edges for easy "multiple chip building". Each cell has blue-reflective-coated-surface and with transparent protection.

Cat. No.	Type	Size	MA	MW	Sale	3 for
11M3229	N220CG	2 x 1	50	21	$1.49	$3.99
11M3230	N220CG	2 x 2	100	42	1.95	5.00
11M3232	N120S	2 x 2	100	†	2.49	5.50
11M3231A	N240CG*	2 x 4	200	‡‡	3.50	8.00
11M3231B	N420CG*	4 x 2	200	‡‡	3.50	8.00

† Two 1 x 2's shingled together; equals 1 volt
* State 1st and 2nd grid choices. 1 oz

LARGEST CLOCK PANEL!

- 1.2" HIGH, 4-DIGIT, 7-SEGMENT
- Orange, gas discharge!
- AM-PM indicators!
- Pulsating seconds!
- 12 hour!

Interfaces directly to MM5316 chip which we are offering FREE! Cat.No.11M3248

Panel 'N Chip **$13.95** ☐

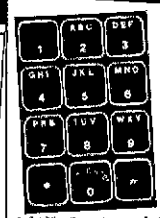
FREE! FREE! Each Clock panel purchase we give MM5316 chip—no charge.

We have never seen a digital clock panel with characters so high, orange color so bright. It's by far the finest panel we've sold. The substrate is "sandwiched" between ¼" thick panels of glass. Each of the printed circuit pins is lettered or numbered to correspond pin-for-pin interfacing with the famous MM5316 clock chip, which WE GIVE FREE! Power requirements 170 volts for anode, 1½ mils per segment. Includes colon too! Size 4¾ x 1-9/16", Makes a nifty looking digital clock for home, office, ham or radio station, lab, etc. Wt. 8 oz.

CHOOSE ANY BARREL KIT *LISTED IN THIS MAGAZINE* **FREE WITH $25 ORDERS**

"BLASTAWAY" ON 1N4000 RECTIFIER PRICES

Type	PIV	Sale
☐ 1N4001	50	10 for 45c
☐ 1N4002	100	10 for 55c
☐ 1N4003	200	10 for 65c
☐ 1N4004	400	10 for 75c
☐ 1N4005	600	10 for 85c
☐ 1N4006	800	10 for 99c
☐ 1N4007	1000	10 for 1.25



REPEATER
• Hams take note!
HOME
OFFICE
FACTORY
SHOP

IT'S REVOLUTIONARY!

TOUCH TONE ENCODER KIT*

18.88 ☐

1.25M, 2-meter and 6-meter amateur radio operators, if your rig is mobile, convert it easily to a mobile telephone station and contact your home, shop, school. factory TTE-100 touch tone encoder kit. Kit includes: Chomerics touch tone pad, Motorola MC14410 chip, trimpot, resistors, zener, digigram, and G-10 pc board. Electrical specs, 12-16 volts, 6 mils (max), 4 volts PP output. * Less 1-MC crystal. **Cat. No. 11M3385**

Cat. No.	Description	Sale
11M3149	Touch Tone Pad	$4.50
11M3382	MC14410 Chip	10.50

BUY 'EM SEPARATELY

11M3383 P.C. Board 2.95

These small magnetic proximity reed switches are ideal for all types of burglar alarms. One case contains an Alnico magnet, which actuates a Normally Open reed switch in the other case within a distance of ½". Mount on windows & doors, on back of valuable equipment, etc. Protect your home, car, and shop. **Cat.No.11M3183**

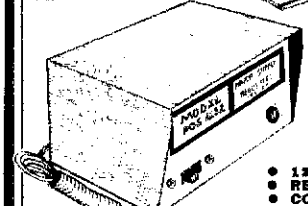
PROXIMITY REED SWITCHES FOR BURGLAR ALARMS

$1.50 pair ☐

FULL EPOXY SILICON BRIDGE RECTIFIERS

WAVE PIV	2 Amp	6 Amp	10 AMP
50 ☐	$ .69 ☐	$ .85 ☐	$1.49 ☐
100 ☐	.79 ☐	.99 ☐	1.69 ☐
200 ☐	.95 ☐	1.25 ☐	1.89 ☐
400 ☐	1.19 ☐	1.50 ☐	2.09 ☐
600 ☐	1.38 ☐	1.75 ☐	
800 ☐	1.59 ☐	1.95 ☐	Case: 2 amp TO-5 case
1000 ☐	1.79 ☐	2.25 ☐	

6 Amp 1/2 x 1/2 x 3/16 sq.



22.50 ☐ 3 for $60.

CITIZENS BAND POWER SUPPLY

- 12 VDC @ 3 AMPS
- REGULATED, CONTINUOUS DUTY
- CONVERTS CB, HAM RIGS TO HOME
- COMPLETELY WIRED

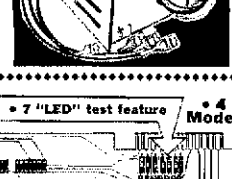
CB'ers ATTENTION! For your CB or Ham rigs . . . 115V to 12VDC converter! Built-in automatic RESET circuit breaker. Powerful 3 amps (6 amps peak) makes it ideal for SSB rigs, too! Attractive walnut like metal modern-design cabinet (6x 4½ x 2¼"). Big U.S. maker design. Built-in circuit breaker. Front panel has OFF-ON switch and LED light. For 115 VAC 60 cycle. Saves you many $$$ too! Wt. 5 lbs. **Cat. No. 11M3452**

ECC INDUSTRIAL SPEED CONTROL

3 for $14

$4.95 ☐

Repeat of a sellout! A $30 item, made by ECC famous for semiconductors, designed and built this speed control for XEROX. Controls home, shop and industrial lighting too. Rated at 1200 watts. A very elaborate circuit for controlling many electrical and electronic devices. Easily controls speeds of electric drills, brush type motors, etc. Built with heavy duty aluminum framing. Complete with external 50K pot, for variable speed control, and series resistor. Heavy duty colored wires for 115VAC 60 cycles, and item to be controlled. 10/32 mounting stud. Outperforms our previous sell-out. With hookup diagram. Use as temperature controller too. Wt. 2 lbs. **Cat.No.11M3392**



DIGITAL CLOCK

Never before offered (as far as we know!) the latest in Digital clock circuitry . . . 4-digit, 0.8" height, LED, built-in red filter, with a MM5885 multi-function alarm chip, mounted on a 3 x 1¾ x ¾" module. Has all necessary discrete components mounted on module by factory, to require only 6 function switches, brightness and voltage divider control, 12-16 volt filament transformer, AC line cord and case. Makes easy-built-in alarm and radio output; switch functions: Seconds, Sleep timer up to 1 hour, fast set, Snooze alarm display (tells you when snooze alarm triggers), Alarm display (tells you when alarm triggers), Alarm ON/OFF. Instruction and hookup diagrams. Shpg. wt. 7 ozs.

Cat. No. 11M3411

MODULE WITH BUILT-IN "CHIP"

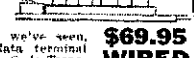
$14.95 ☐

KEYBOARD & ENCODER KIT

- Uses Encoder MOS ROM
- 7 "LED" test feature
- 4 Modes
- 63-Key keyboard

- Double sided PC board

Outputs — standard ASCII 7 bits plus strobe



$69.95 WIRED ☐

$59.95 ☐ KIT

Lowest price Keyboard and Encoder kit we've seen. General purpose ASCII keyboard for data terminal applications. Could be used for TV, RTTY, Code Transmission, Altair and other Mini Computers, etc. Utilizes 2-key rollover MOS memory allowing encoded outputs to be strobed out as each key is depressed. Uses double side pc board. Electronic shift lock, not mechanical on keyboard. Keyswitches, one integral assembly not individual keys. Keyboard: 63 keys (49 encoded keys), 4 modes: normal, shift and control, 3 internal function keys: shift leach side of board, shift lock and control, 3 functions: Key Break, Here is, Repeat, 7 additional functions (can be assigned by user).

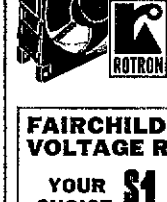
Electrical specs: voltage requirements plus 6 volts and minus 12 volts, 200mw, negative or positive logic output, jumper selectable. Output connector. On the PC board we have 4 NEW KEYBOARD TEST FEATURE . . . LEDS! These LEDs display visually the ASCII code for the depressed key. TTL compatible. Kit includes: 63 key keyboard, pc board, ROM, 7 LEDs, resistors, capacitors, TTL IC's and SOCKETS. We include diagram and wiring instructions, ROM code. Wt. 7 lbs. Size overall: 13 x 5½ x 2".

Cat. No. 11M3208 Keyboard & Encoder Kit . . . **$59.95**
Cat. No. 11M3209 Keyboard & Encoder Wired **69.95**

Rotron Fans

$8.88 ☐

- 3-5-6 Bladers!
- 115 VAC!
- Compact!
- Lightweight!
- Only 4-11/16" sq. x 1½" deep!



Now anyone can afford these neat Muffin and Centaur fans by Rotron. Used extensively for hi-fi cept because of low-cost, dependable cooling, as well as flushing computers, power supplies, office equipment, light projectors, transmitters, receivers & more! Weighs only 1-lb. LOW NOISE LEVEL! Humidity & moisture resistant motor. REVERSIBLE AIR FLOW! Impedance protected. Suitable for −40° to +160° F. Both 115 VAC, 3200 rpm, 16 watts, 16 amps. Hi-impact, flame retardant polycarbonate propellers in a reinforced phenolic venturi block. **Blow away high prices with our Muffin and Centaur fans!** Removed from new equipment. Money back guarantee.

Cat. No.		Shpg. wt.
11M3108	"Muffin" 3-blade . . .	1½ lbs.
11M3109	"Centaur 2" 5-blade	
11M3110	"Centaur" 6-blade . . .	

FAIRCHILD, NATIONAL VOLTAGE REGULATOR PANIC

YOUR CHOICE **$1** ☐

- 1-AMP RATING
- TO-220 or TO-3 CASES
- POSITIVE OR NEGATIVE

Volts: ☐ 5 ☐ 6 ☐ 8 ☐ 12 ☐ 15 ☐ 18 ☐ 24

2 for $2.75

Cat. No. 11M3449 Positive Voltage**
Cat. No. 11M3450 Negative Voltage**

** State voltage and case style when ordering.

Terms: Add postage Rated: net 30
Phone : Wakefield, Mass. (617) 245-3829
Retail: 16-18 Del Carmine St., Wakefield,
MINIMUM ORDER — $6 (Plus Postage)

SALE ☐ *Send for FREE Fall-Winter* **CATALOG**

POLY PAKS

P.O. BOX 942M LYNNFIELD, MASS. 01940

C.O.D.'s MAY BE PHONED

General

CANADIAN Surplus Catalog and flyers $1. Etcox Electronics, Box 741, Montreal Canada H3C 2V2.

CANADIANS – Collins 755-3, 32S-3, 30L-1, 312B-4, 516F-2, 8M-2 mint condition for sale. Best offer. Phil VE2AUT 66 Summit Crescent, Westmount, Montreal, Canada 514 482-0936.

WANTED: UG-970/U or UG-971/U adapter connector for R 390/URR. Karl Lickfeld, DL3FM, Rombecker Weg 71, D-4330 Muelheim, Federal Republic of Germany.

TOWER already in Israel: Tristao CZ 471-F5. Free standing 21'-71' height, electrically motorized. Winch tilt-over. 855 lbs. galvanized steel supports large beams (TH6, TA36). Used 3 months. $1250. Call evenings: USA 607-748-9397, Israel 03-950867, 03-751712, Karger.

WANTED: Manuals for ELCO 880A and 881M VLF receivers, Sulzer-Tracor 2.5C frequency standard, Tracor frequency difference meter 527A. Offers for 300 British Radio Magazines 1924-1935. Fletcher, 62, Moorbridge Lane, Stapleford, Nottingham England.

JAMAICAN Ham Villa, 4 BR, Pool, staff, antennas WB@HQI, 6418 Vernon Ave., Minneapolis MN 55436.

CASH paid for your unused tubes vacuum variables and quad ham and commercial equipment. Send list to Harry Electronics, 512 Broadway, NY NY 10012.

CALL toll-free (800) 327-7798. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex. Address: 112 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9561.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick WA 99336.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

NOVICES. Need help for General or Advance Ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License Instruction, PO Box 6015, Norfolk VA 23508.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 150 Miller Street – Elizabeth NJ 07207. (201) 354-2420.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

TELETYPEWRITER parts, manuals, supplies, equipment, Teroids. S.A.S.E. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Buy parts, late machines.

WANTED: An opportunity to quote your ham needs. 37 years a ham gear dealer. Collins, Drake, Ten-Tec, Swan, Kenwood, Tempo, Regency, Icom, Hy-Gain, etc. Trades, terms. Request catalog. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon MI 49441. 616-726-3196.

HAM Radio Repair. Expert repair and alignment in our new Lab. Prompt, reasonable. "Grid" Gridley, W4GJO, 3824 Malec Circle, Sarasota, Florida 33581.

SERVICE by W9YKA. Professional grade lab, FCC commercial license. Amateur and commercial SSB-FM equipment. Repairs, calibration, modifications, consultation. Low overhead, reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P.O. Box 1032, La Grange Park IL 60525 (312) 352-2333.

W2ONV Wants your tubes - Will pay highest prices - (201)-279-7528.

RUBBER stamps $2.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

WANTED: Radios, parts, books, magazines of the 1920s. W6ME, 4178 Chasin St., Oceanside, CA., 92054.

MOTOROLA HT220, HT200, Pageboy, etc. Service and modifications performed at reasonable rates. Hatfield, WA3FRV (804) 272-8403 evenings.

DESK console cabinet for your equipment. Build your own. Design drawings and photographs, $4.75. Bill Morris, WA5RSC, P.O. Box 411, Lubbock TX 79408.

RADIO Books catalogs prior 1930 list $1. Emporium, Box 19406 Dallas TX 75219.

TOROIDS – Five 88mHy for $3.50 P.P. M.L. Buchanan P. O. Box 74 Soquel CA 95073.

VERY interesting! Next 4 big issues $1. Ham Trader Yellow Sheets, Sycamore IL 60178.

W6ME still looking for R-390A parts. Bob Herbig, 4178 Chasin St., Oceanside CA 92054.

KEYBOARDS, for your microcomputer. I have a few of these new units left. See Advertisement in QST March 1976, Page 108. G. J. Layton, 680-2 Pond View Hgts, Rochester NY 14612.

WILL PAY $100. for any Atwater Kent "breadboard" radio for my private collection. Parsons, 22 Forest St., Branford CT 06405, Tel. 203-488-4267.

CALIBRATION & repair all receivers, transmitter, test equipments. DCS, 10 Schuyler Avenue No. Arlington NJ 07032 201-998-4256.

FOR SALE: Swan Cygnet 300A with SS-16B. Slinky dipole. Used only 40 hours. Best offer. Bob Tatarons 4½ Hawthorne Ave., Methuen MA 01844.

LOOKING for used gear?? Buyers & Sellers has the equipment you want at the right prices. Call our Ham Gear Hotline: 617-536-8777 weekdays 9-5. SASE brings weekly list. Box 73, Boston Mass. 02215 (mailed Friday).

WANTED: Yaesu FT101E or EE with fan and cw filter. Bill, 721 St. Francis, Klamath Falls OR 97601. 503-882-4795.

QST's complete from Dec. 1915-1952, each year bound separately in custom hard bound bindings. No photocopies, original editions in superb condition. Of the 25 or so known early sets, this is among the finest, binding alone cost over $600. Shipping arranged anywhere, FOB NJ, Best offer over $2,500., WA2VCP.

TEFLON Stock, s.a.s.e. W9TFY, Frank Wirt, Alpha IL 61413.

WANTED: Pre-1928 QST magazines. W6RVB, 529 Kevin Way, Placentia CA 92670.

WANTED: HO-13, W4GBB.

RUBBER Stamp, Name/call/QTH $2.50 ppd. (CA residents add tax) LWM Press, Box 22161, San Diego, CA 92122.

STAINLESS and galvanized steel antenna guy wire our speciality. Wilcox Electronics, Box 1331, S.L.C., UT 84110.

WANTED Collins 51S1 and 2 kW Pep linear amplifier in good used condition. Send details to W5TPN, 3703 Washington Ave., Pascagoula MS 39567.

QUALITY Rubber Stamp with your call, name, address and zip, 4 lines only $2.00 Ppd. Fast Service! IPC-T4 WN7DGB, Box 1251, Ogden UT 84402.

CIRCUIT Boards — Undrilled. Morse converter Oct. Nov. Dec. QST. MORSE/ASCII $15, ASCII/TV $10 postpaid USA. Send stamp for details. Bert Kelley, 2307 S. Clark Ave., Tampa FL 33609.

ATLAS, Motorola FM and ssb Marine Radio. Motorola Pagers bought and sold. WB5BCO, Ralph Hicks, P. O. Box 15633 Tulsa OK 74112. 918-266-2525.

WB2HAN wants your Test Equipment. 609-654-7446.

YAESU Equipment owners — present or prospective — join the five-year-old 2000-member, 40-country, International Fox-Tango Club. Members receive valuable monthly Newsletter, money-saving purchasing service, technical committee consultation, free ads, FT, Net, more. Back issues of Newsletter available from 1972. To join, send $5. for calendar year (includes all 1976 issues of Newsletter) or $1. creditable towards dues, for complete information and sample Newsletter, Milton Lowens, WA2AOQ/4, 248 Lake Dora Drive, W. Palm Beach FL 33411.

RTTY NS-1A PLL TU (Ham Radio 8/76). Wired/tested $29.95 ppd. Board $4.75 ppd. S.a.s.e. for info. Nat Stinnette Electronics, Tavares, FL 32778.

MUST Sell: Swan 500C with both supplies. Super mint condition. Less than 25 hours total operation. WA5JUL, 8850 Chimney Rock Rd., No. 40, Houston TX 77096, 713-665-4134.

WANTED: Johnson VFO for Viking II, Johnson 250w Match-Box, ssb-xmtr adaptor, Ranger I, manual for Collins 75A-4 revr and Ranger. WA5JUL, 8850 Chimney Rock Rd., No. 40, Houston TX 77096, 713-665-4134.

SYNTHESIZER problems etc? RF getting in on dc, PTT lines & etc. Erie rf filters type 1202-052 100 MHz to 10 GHz. 2 for $3.95 plus s.a.s.e. PBI Co., Box "S", Azusa CA 91702.

SWAN; 1200X, Linear Amplifier, New in Sealed Carton, $250. Russell, 19680 Mountville Dr., Maple Hts OH 44137.

NEED: for Arctic use 2 HW-12 or HW-16 units, with 12 volt power. Must be top shape. Thompson, Box 186, Gorham NH.

WANTED- SB303, SB401, SB220, SB610, 2 HD1410's, Mike HDP2IA, Ham II. W2UGM, 415 Demarest, Closter NJ 07624. 201-767-0123.

WANTED: 70L-24 VFO for Collins 75A-4. State price and condition. T. G. Suomela 2652 North 5th St., Springfield OR 97477 Phone 503-746-2231.

HT-200, unmodified H23DEN-1110A, charger, case and Ni-cad Battery, all for $150. WB6FXJ, 714-256-9576 (nites).

WANT Early Grebe receivers, complete or not. Grebe cabinets and parts for all models, and C12-18 plug-in coils. Anything in any condition acceptable. C. Byrnes, 20975 Valley Green Dr., Apt. 290, Cupertino CA 95014.

COLLINS: 75S-1, 32S-1, 516F-2, 312B-4, 30L-1 also Johnson KW Match box/SWR model 250-30-3. Immaculate condition. Includes manuals and shipping. All for $1,250 or make offer on individual items. A. Meinhardt, 8406 NW 59 St., Tamarac FL 33321.

WANTED — Distributors for "3rd Hand" — Twin clips with 360° rotation; tighten any position — inquire on company stationary — ANCO P.O. Box 1082 Benton Harbor, MI 49022.

TELETYPE Equipment for beginners and experienced operators, RTTY machines, parts, supplies. Beginners special: Model 15 Printer and demodulator $139. Dozen black ribbon $6.50; Case 40 rolls 11/16 perf. tape $17.50 fob. Atlantic Surplus Sales 3730 Nautilus Ave. Brooklyn NY 11224 Tel: 212-372-0349.

QST, Ham Radio, 73, and CQ issues at 20c each, including USA shipping. Lockheed ARC, 2814 Empire, Burbank CA 91504.

WANTED: Car telephones and mobile telephone parts, heads, cables, etc. Greg Hyman, 87 Yonkers Ave., Yonkers, NY 10701. 914-476-4330.

TRANSMITTING Type Variable Capacitor Kit Self-Addressed Stamped Envelope for catalog Airway Products, Princeton MN 55371.

WHOLESALE Prices On Antenna Specialists, Mosley, Hy-Gain, Regency, Tempo products. S.a.s.e. brings quotation. TALED Electronics Pine Tree Hill Raod Newtown, Conn. 06470.

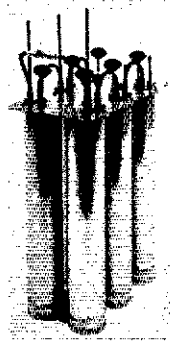
FOR SALE — New Ham II. Unopened carton. $125 + UPS O. M. Carter, Box 117, Lockport IL 60441.

WANT To Buy: 6C21 and 1000 TH Tubes, also 1934 Packard Car Radio with Motor Generator Power Supply. R. Shelar, 9471 Norquest Blvd., Youngstown OH 44515.

NORTH SHORE

RF TECHNOLOGY

DUPLEXER & CAVITY KITS...



Now available for you fully assembled and tuned!

- UPGRADE YOUR REPEATER WITH A RF TECHNOLOGY DUPLEXER.
- ALL DUPLEXERS AND CAVITIES ARE TEMPERATURE COMPENSATED WITH INVAR® AND MEET ALL COMMERCIAL STANDARDS
- ONLY TOP QUALITY MATERIALS GO INTO OUR PRODUCTS.
- BOTH KITS & ASSEMBLED DUPLEXERS AND CAVITIES ARE AVAILABLE TO YOU AT A SAVINGS TO YOU.

Mod. 62-3...6 cav., 2 mtr., insertion loss 0.6 db with isolation 100 db typical; pwr. 350 w. Kit $349 ea.-Assembled $439.

Mod. 4220-3...4 cav. 220 MHz insertion loss 0.6 db with 80 db isolation typical; pwr. 350 w. Kit $249 ea. - Assembled $329.

Mod. 4440-3...4 cav. 440 MHz, insertion loss 0.6 db with 80 db isolation typical; pwr. 350 w. Kits $249 ea. - Assembled $329.

Mod. 30 Cavity Kits: 2 mtr. $65 ea., 220 MHz $65 ea., 440 MHz $65 ea.,; 6 mtr. $115 ea. Add $15 for Assembled Kit.

Also available: 6 mtr., 4 cav. Kit $399-Assembled $499, 2 mtr. 4 cav. Kit $249-Assembled $329, 440 MHz TV Repeater Duplexer

Only hand tools are necessary to assemble Kits!

Send your order to: Distributor: **TUFTS RADIO**, 386 Main St., Medford, Mass. 02155. Phone (617) 395-8280.

(Prices F.O.B. Medford, Mass. All units can be shipped U.P.S.-C.O.D. orders require $50 deposit. —Mass. residents add 5% sales tax.)

ICOM, KLM, Swan, Larsen and CushCraft. Use your Master Charge or BankAmericard. W@NGS, Bob Smith Electronics, 1225 9th Ave North, Fort Dodge IA 50501. 515-576-3886.

SWAN 350-117XC supply Orig owner firm 360 Mint. Want 3251 or Drake T4B, with supply. Must be mint cond. K3ROW — 301-479-0935.

HAM Rubber Stamps. Huge call letters three line address $4.95. request sample impressions. Forwardco P.O. Box 76m Massillon OH 44646.

DESIGN electronic circuits with pictures. Electronic Circuit Analysis Without Mathematics $2.75 postpaid, New York residents add 17c tax.
DESIGN electronic circuits with pictures, Electronic Circuit Analysis Without Mathematics $2.75 postpaid, New York residents add 17c tax. Jamboree Acres, Box 415B, Jamestown NY 14701.

COLLINS 755-3B, 325-3, 312-4 516F-2 New XFMR, Excellent Condition $1,250. 755-1 Waters Rejection, cw filter $350. 516F-2 Round Emblem $135. Drake TR-3, AC/DC $350. Manuals. Write, Frank Harris, 1100 Woodland, Petersburg VA 23803.

SELLING entire station due to college. Send for price list. Gene Patterson 803-23rd Street, Beaver Falls PA 15010.

WANTED: Heath DX-60B, HW-16, HG-10B, HRA-10-1, HM-102. Beaver, Box B, Aliceville AL 35442.

QUALITY Rubberstamp with you; call, name, address and zip. 4-lines only $2.00 Ppd. Fast Service! IPC-T4 WN7DGB, Box 1251, Ogden, Utah 84402.

WANT pre-1925 Marconi, DeForest, Grebe and similar radio gear or parts. Spark gear, Loose couplers, crystal sets. Advise condition and price. Mike White, 118 Countryview Drive, Naperville IL 60540.

WANTED — distributors for "3rd hand" twin clips with 360° rotation; tighten any position — inquire on company stationary — ANCO P.O. Box 1082, Benton Harbor MI 39022.

SELL Collins 3253 wiac supply and 7553C. All Round Emblem, s.a.s.e. for prices. W6CY, Melcher, 921 N. West St., Anaheim CA 92801.

COLLECTORS: National SW3, manual, coils 160, 80, 40, 20 and blank coils, spare tubes, less power supply — $60. Pick up only. W2GDE, 4156 Harriet Rd., Bethpage LI NY. Tel. 516-PE1-6206.

FOR SALE: Drake receiver R4B — transmitter T4X13 power supply, speaker. Reasonable offer. Total contents of ham shack for sale. Operator deceased. Mrs. Larry S. Smith, 91 Mill Street, Rhmiluk NY 12572.

SELL: TH6DXX — $125; SB220 — $350; rationotor rotator — $40. U-pickup. K1IGQ, 203-669-2458.

FOR SALE: SB-102, 400 Hz filter, SB-600 speaker, ac power supply — $395; SB-220 — $375. Excellent condition with manuals, Gene Gildow, W1ELQ, Riverside RI 401-437-0212.

DX-160 Radio Shack general coverage receiver with manual in original carton — $95. WB2CMZ, 116 Bay Ave., Greenport NY 11944. 212-666-2933.

WANTED: Heath HG10B VFO — Heath HD-15 phone patch. WB5DBZ.

FOR SALE: HRO-50-T-1, w/manual, Nat. Spr., Nat. Select-o-ject, Nat. F-Fm adaptor and 14 plug-in-drawer/s 50 kc to 54 mc wooden-storage rack for drawer/s, set of dial inserts, in good working order and appearance. Johnson Viking, Valiant II w/manual, Collins TR-32V3 w/manual; Collins RX 75-2 (late prod.) w/manual, product detector, spk. housing w/speaker. All equip. in good working order, write for further detail/s. W5GYP/W5MVQ, P.O. Box 1041, San Juan TX 78589.

SELL: 80-m transceiver, HW-12A with ac power, microphone, speaker — $120, or best offer. You pay shipping. WA4OZA, R. R. Coleman, 2224 Eden Parkway, Lakeland FL 33803.

TOWER 14-foot triangular base, 67 feet high. Bolted angle iron, extremely strong. Location inaccessible to trucks, you take it down — $450. Fairfield CT. 203-938-3731. Guerlain.

TECH Manuals for Govt. surplus gear — $6.50 each: SP-600JX, URM-25D, OS-8A/U, PRC-8,9,10. Thousands more available. Send 50c (coin) for 22 page list. W3IHD, 7218 Roanne Drive, Washington DC 20021.

SELL: Drake SC-2, SC-6, CPS-1, SC-1, CC-1, all for $165; TC-6 $165. Includes cables and manuals. Cash or P.O. money order. George, K4IQC, 10009 Nottingham, Huntsville AL 35803. 205-883-1503.

B&K Test equipment, 15% discount, free shipping. Free catalog. Spacetron, Box 84K, Broadview IL 60153.

FOR SALE by original owner: Immaculate NCX-5 Mark II, ac supply, vfal calibrator, all in factory cartons with spare tubes, manuals, National bulletins. New tubes and expert calibration approx. 50 hours ago — $425. John A. Ellis, 11838 Monticeto Lane, Stafford TX 77477. 713-498-1644.

COLLECTOR needs QST issues from 1916: March, April, May, June, July, August, September, November, December. Ed Kalin, WA1JZC, 75 Tumblebrook Lane, West Hartford CT 06117. 203-233-9915.

FOR SALE: Collins KWM-2A with 516F2, P/S estate item, less than 50 hours. Serial no. 39704 — $1400. Will ship. W5FR, 713-488-0517.

TEMPO One, Ac one, Shure 444, all like new, used less than 25 hours, package sale only. First $350, takes it. FOB Portland. Can't use in my apartment. WA7ZVU, 4812 S.E. 28th No. 504, Portland OR 97202.

HEATHKIT SB-104, power supply and microphone in excellent condition. Trade for Hammerli Target pistols, Star reloading equipment or sell best cash offer. Bob Woodburn, KG6JAM/6, 280 St. Mary Street, Martinez CA 94553.

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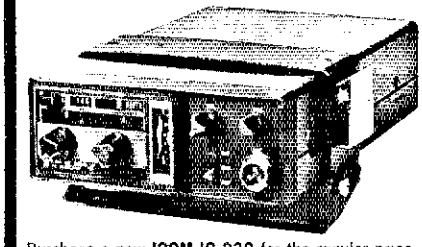

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TOUCH-Tone receiver — $65; Mot & GE — 6m, 2m & 3/4m. Stamp or s.a.s.e. for list, W. R. Blum, WA7OOO, 13905 87th Ave N.E., Kirkland WA 98033. 206-827-4403.

FOR SALE: Very clean Kenwood TS-511S with cw filter and matching power supply — $400, plus shipping. W3KET, 25 Holly Hill Road, Wilmington DE 19809.

ATLAS 210X with noise blanker — $525; mobile mount — $25; Swan model 45 — $75; antenna xfmr — $15. All for $600. W6BKY, Box 1633, Palo Alto CA 94302.

HW-7 with receiver, incremental tuning, perfect — $60. Shipped UPS. Carl Vall, W9FN, 2514 Birch Drive, Richmond IN 47374.

HALLICRAFTERS FPM 300, solid state — $350. KP4DGT, Calle 15 SE 751, Caparra Ter PR 00921. Tel. 782-0318.

WANTED: Radio News magazines prior to 1930, old battery radios and crystal sets of the early 1920s. Need not be in working condition. State model name and number and your price. For sale, QST in binders from year 1946 to 1973. David McKenzie, KØSVJ, 1200 West Euclid, Indianola IA 50125.

WANTED: 3 to 15 watt ssb generator covering 2 or more ham bands. K4DAJ, Thomas Shockley, Rte. 4, Roccoa GA 30577.

FOR SALE: Whole station, 4 year old, HW-101, CDE-44 rotor, Hy-Gain TR-3 beam & tower, perfect for beginning ham, Vibroplex lug, code records, hamming books, etc — $750. Write WA7RTE, Sue Kagan, Star Route, Heron MT 59844. 406-847-5579.

TEMPO One ac supply, good condition — $350, or best offer. WA5ZBN, 6812 Langston, Austin TX 78723.

FOR SALE: Drake R4-B, beautiful condition, must sell — $280. Pick-up or will deliver reasonable distance. WB2DLE, 19 Logan Dr., Princeton NJ 08540. 609-452-1581.

DRAKE T4-XC, AC-4 MS-4 and R4-C with Noise blanker, 1.5, .5, .25 and 4 kc filters — like new — $1200. Brand new TR-4C — $495. K4KJC. 615-794-5380.

FOR SALE: Collins KWS-1 ser. 230, 75A4 ser. 1277 — $1000. Also 75A3 with 3kc and 500 cycle filters — $200. C. Richard Kennamer, Rt. 4 Box 434B, Arab AL 35016 or phone 205-586-6391. Reason for selling, getting out of amateur radios. All equipment in excellent condition.

NCX-5 MKII with MCXA wanted, mint condition, non-mobile history. State price. D. Brooks, 4105 Pepperton Dr., Raleigh NC 27606.

WILL trade new 10 bill for manual for Dummont Scope model 304H. B. H. Standley, W5FGQ, 17626 Lakeshore Drive, Channelview TX 77530.

WANTED: SX 100 or Hallicrafter general coverage receiver. Paul Wise, Rte 6, Rogers AR 72756.

FOR SALE: Drake 2-C rcvr — $135; Heath DX-60B xmtr — $55; SWR meter. Chris Costa, 109 Prospect Ave, Douglaston NY 11363. 212-428-2072.

DRAKE T-4XC and R-4C and MS 4 with all filters; built in DX engineering i-f clipper, MFJ compression processor, MN 2000 matching network, SB 200 Heathkit Linear and Shure 444 mike. Less than year old, like new, a steal at $1495. George H. Poirier III, 11243 130th Ave. North, Largo FL 33540. Phone, 813-586-2219.

FOR SALE: Touch Tone Pad, solid state, subminiature size, great for HTs — $33 shipped. Regency HR2A, excellent condition, unmodified — $150, shipped. Knight VOM KG-640, excellent condition — $20 shipped. WA9WDB/P5 John Teles, 10511 Tenneco Dr., Houston TX 77099.

SWAN-350C w/117XC p/S, 510X oscillator w/crystals, SWR meter, Turner 454C microphone w/many extras only $500. L. Berman, 627 Buxton Av., W. Hempstead NY. Tel. 516-489-8929.

TR4 — $300; NC300/6M conv. — $110. W9UDK.

HY-GAIN TH-3-MK3, Ham-II rotator, 1 year old — $175. WB2QJY, Mark Levy, 1570 E. 91 St. Bklyn NY 11236.

VHF Pocket Scanner, Realistic Pro-4A, 148-174 MHz — $60. WB2QJY, Mark Levy, 1570 E. 91 St., Bklyn NY 11236.

HELP: Want Motorola HT-200s and PT-series radios, parts, boards, accessories, manuals, etc. State condition and lowest price. Must have serials. WA3RSP, 469 Jayson, Pittsburgh PA 15228.

SELL: Swan 250, 117XC, VS-2 729SR — $265; also GE Pacer, GE TPL, GE Message Mate and Charger, Drake WV-4, Aerotron Tracer HT, Electro-Instruments 4010 DVM, TenTec PM-1, PRR-9 receiver, new Hustler resonators RB-20, RM-10, GE and Motorola strips. WA3RSP, 469 Jayson, Pittsburgh PA 15228. Sa.s.e. for condition and price.

WANT Hammarlund HQ-160 and following Heath gear. IM-1202, ID-101, IB-102, IG-28, IT-28, IT-12, IP-2718 and IP-2715. K9UKX, 51625 Chestnut Road, Granger IN 46530.

SWAN 500-C, VOX, 117XC, excellent — $360, prefer local. WA2IBE, Box 215, Ironia NJ 07845.

FOR SALE: Central Electronics 100V, excellent condition — $300, or best offer. Pickup only. Ed Ladd, W2IDZ, Five Points Road, Colts Neck NJ 07722. 201-462-8191.

432 MHz transmitting converter, built from QST Nov. 1973 article, 29.5 MHz input 10 watts pep ssb output, includes tubes and diagram $80. Heath Twoer with 12V. mobile power supply $25. Drake WV-4 wattmeter $60., WB8BKC 313-663-8921.

WANTED' Hallicrafters SX-88 or HT-32B in good condition. State price and condition first letter. Eugene Santilli 2415 Martha St., Aliquippa PA 15001.

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QUAD kits from $15 to $27. Send s.a.s.e. for information. WAC, 404 Sanders Rd. SW, Huntsville AL 35802.

HOOSIER Electronics — Your ham headquarters in the heart of the midwest. Factory-authorized dealers for Kenwood, Collins, Drake, ICOM, Ten-Tec, Regency, Atlas, Tempo, Swan, Alpha, Standard, Dentron, CDE, Hy-Gain, Mosley, Cushcraft, Antenna Specialists, and others. For the best deal around on ht or vht gear, see us first or see us last, but see us before you buy! Write or call today for our low quote and become one of our many happy and satisfied customers. Hoosier Electronics, P.O. Box 2001, Terre Haute IN 47807. 812-238-1456.

WANTED: Collins 51J/4/R388, R390A, 51S1, 65151; HRO500, R1051, Tektronix 545, 54b etc. Condition not important, to be used for experiment. Quote condition and price to ship. H. Kolesnik, WB0RVG, 10727 E. Dorado P., Englewood CO 80110.

FOR SALE: Triton IV, excellent with VOX power supply and cw filter — $625; Atlas 210X with 220CS power supply — $575; SB-610 monitor scope — $85. WB4ZCD, 606-441-9684 days.

FOR SALE: Heath IM-102 Digital voltmeter — $130; HP-21 calculator — $70; RCA WR-50B signal generator — $50. WB4ZCD, 606-441-9684 days.

DRAKE Line — TR-4C with N. Blanker, RV-4C VFO; AC 4 pwr supply; MS-4 spkr; 7075 mike — $700. Heathkit HW-16, HD-10E — $75. WN4BVC, 13 Windsor Circle, Brunswick GA 31520.

SELL: Hallicrafters HA-1 TO Keyer with Vibroplex key — $65. K2TSB, 39 Vivian Court, Howell NJ 07731.

WANT: Johnson Valiant II, unmodified and excellent or better condition. Describe and price. Hartzell, WA3YKO, Rt. 2, Mifflinburg PA 17844.

SALE: Heath SB500 2M xmtr — $125; Collins 75S-3/32S w/cw filter & Round Emblem p.s. — beautiful buy at — $1250. WB2HSL, Box 234 E. 19th St., Paterson NJ 07524, 201-345-4419.

WANTED: 51S1 or H.R.O. 500 with accessories. Fred Wiedenroth, Madison Lake MN 56063.

FOR SALE: Novice special Heath HR-10 receiver with HRA-10-1 xtal calibrator — $60; 500 series instructograph with 10 rolls tape — $60; all in A-1 condition — $100 for both, you pay ship. J. Willhoit, Box 116, Jasper AR 72641.

FOR SALE: SX25 with speaker, perfect condition, includes, service manual, battery power converter, 18 replacement tubes, best offer. J. S. Harvey, Box 941, Stamford CT 06904.

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COLOR Video Recorders, Television Cameras, ridiculous prices! Haas Enterprises, 6017 Majorca Ct., San Jose CA 95120. 408-997-0132.

HQ145X — $150; MM2 rf analyzer — $60; Vibroplex bug — $15; BC 221 freq. meter ac supply — $25. All like new with manuals. K6GG, 740 East Sycamore, Willows CA 95988.

GENERAL Radio LR-4 heterodyne frequency meter and crystal-controlled calibrator (secondary frequency standard). Range 160 — 30,000 kHz. Purchased new, excellent condition. Complete with 80-page manual. Best offer over $500, FOB Moraga. W6ITH, 2151 Camino Pablo, Moraga CA 94556. 415-376-2212.

APELCO Marine transceiver, six xtal frequencies xmit/receive mint, best offer. W9AYL, 2003 Newton, Parkridge IL 60068.

WANTED: Circuit diagram of Meissner signal shifter Modelex — and used Vibroplex key. W9NJZ, Clarence Grimm, 193 So. Mason, Bensenville IL 00106.

WANTED: Heathkit transmitter "Marauder" HX-10. WA4VFW, 804-826-0006.

VARIABLE capacitors, new split-stator, 180 pF per section, 2,000 volt spacing, Cardwell, MO-180-BD, 1/4-inch. dia. shaft, original box, the best quality — $8 each, including shipping, USA. Air-Dux, new, airwound coils for 80-10m, 250-watt pi or tuner, each turn accessible for tapping, 1-1/2 dia X 4-1/2 long, 82-turns, with 5-1/2 inch clear mounting plate — $250 ea.ii, including shipping, USA. J. M. Hotter, W1DL, 24 Cherry Road, Framingham MA 01701.

ICOM IC22-A, mint condx., 9 channels xtaled, shipping prepaid — $180. WB5HTG, 87 Litchfield Lane, Houston TX 77024. 713-461-7606.

WALKIE Talkie Heath HW2021, NiCads, charger, perfect — $170; Heath ten-watt amplifier HA201, new — $28. K4JK, 7801 Horseshoe Trail, Huntsville AL 35802.

HEATH solid-state VOM, model IM-15, manual, rf probe — $30. R. E. Ford, Rt. 1, Box 45, East Calais VT 05650.

MOTOROLA — HO38NC Pager — $40; B&W Roller Inductor — $18; Turn-Count Dial — $5; Electrovoice 664 w/stand — $40; EV RE-10 — $45; Accu-Keyer with paddles — $35. WA2BSX, 518-783-7492.

GENERAL Coverage Communication Receiver 540 kc — 54 MHz. Hammarlund SP600 — immaculate. Tyler, 1430 Spring Lane, Apt. 2, Clearwater FL 33515.

MINT HW-104 and all accessories. Factory checkout — $450. WN5VFY, 505-672-9362.

SELL: CIE first-class radiotelephone license course with corrected exams. Cost over $450 — asking $125. W2HPE, 201-939-2338.

DRAKE RV4C, new; Vibroplex, presentation model, new; Autek Audio filter, new w/ac; Realistic DX 150A comm. rcvr, excellent; Knight T-60 xmtr, excellent. Best offer, s.a.s.e. please. W4OXF, 8219 Luree Lane, Hermitage TN 37076.

HW-8 with ac supply, aligned by Heath, mint — $100. K8HJI, 4181 Tamarack Turn N.E., Grand Rapids MI 49505.

WANT to buy 2 kW amplifier, such as Alpha 77 or 374, BTI-LK-2000, Henry 2K-3A, York 5000, or sharp homebrew single, or pair 4-1000A, fully metered and power supply all in one cabinet. Or have to trade Tempo 2020 or Kenwood TS-820 unopened cartons. Richard Schark, 417 North Ferry, Ottumwa, IA 52501, Ph. 515-682-5741, between 8:00 A.M. and 3:00 P.M.

WANTED: 5th edition ARRL handbook; RADIO prior to 1936 or after 1943; Radio News prior 1948; 1967 RTTY Journal, Proc. IRE, prior 1928; 1945 issues CQ. Nagle, 12338 Lawyers, Herndon VA 22070.

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WANT to buy broken transceiver 914-294-9509. WB2BMH, Joel Levine, 508 Woodhill Drive, Goshen NY.

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HW-101, HP-23A, never used mobile, excellent condition — $285. Bob Simpson, 830 Pinar Dr., Orlando FL 32807, 305-277-6405.

TH3MK3 Hy-Gain Tri-Band beam. Used less than 1 year. Like new — $150. Bob Simpson, 830 Pinar Dr., Orlando FL 32807, 305-277-6405.

TR-4, AC-4, MS-4, mint; Galaxy dc supply needs transformer — $500; Elco 717 keyer — $25; Tymeter 24-hr clock — $7; "Champion" bug — $8, you ship. Scotty, WA2DFI/7, 527 W. Pebble Beach Dr., Tempe AZ 85282, 602-966-6774.

WANTED: Collins KWS-1. Write: Yamada, Box 272, FPO, Seattle 98761.

NEW Ten-Tec 509 Linear, new Heath HP1144 ac, ps — $225. Pickup. WA1AEZ.

HEATH SB-102 transceiver, SB-600 speaker, HP-34B supply, cw filter, manuals. All excellent — $375. Plus shipping from Phoenix. W7BER, 602-966-8116.

GONSET GSB-201 MK IV, 2 kW linear amplifier, excellent condition — $300. WA4OEJ, 205-881-5327.

FOR SALE: Heath SB102 with 400 cycle filter, ac, dc power supplies — $450; CE 100 V, completely rebuilt & updated by designer 2 yrs ago — $350. R. Smirnow, 7 Pulaski Rd., East Northport NY 516-261-1068.

WANTED: Good Drake TR4-C or TR4 transceiver, also selling good Kenwood TS520 transceiver — $465. Shipped, offers considered. George Konnick, Apt. C5, 1750 West Main Street, Riverhead NY 11901.

YAESU FT101 Digital Receiver. Absolutely new condition. 160 — 2 meters. Frequency electronically displayed to 100 Hz. Many extras. Asking $600. Larry Dighera, Box 947, Riverside CA 92502. 714-797-8039.

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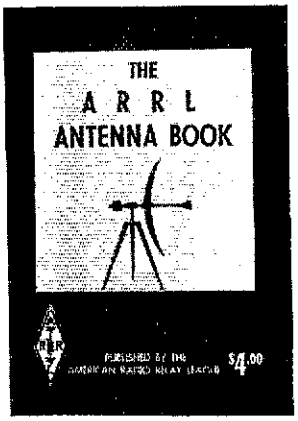
OSCILLOSCOPES. Tektronix model 315D, $225. Hewlett Packard model 150A, $225. W6BKY, Box 1633, Palo Alto CA 94302.



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SELL: Misc issues QST and CQ, 1934-1965, or trade for HR. S.a.s.e. for list. BACH, Rt. 2, Box 50A-1 Scottsville VA 24590.

MICRO computer System— Altair 8800A, 16K memory, R-M terminal/keyboard, PIO, 4PIO, VDM-1, AD/DA converter, RCA 12" TV monitor, Cassette interface for mass storage, Fisher RC-80B Dolby cassette — Professionally wired, runs beautifully, software included. $2500. — will consider cash-trade for Collins/S-line, KWM-2A or SSTV equipment. Also Swan-250 6 meter transceiver/AC-DC supplies, excellent condition — $250. or trade for SSTV monitor. ARP Odyssey II electronic music synthesizer new — best offer over $900. Sandy Meitzer 9014 Auburn Way, Tampa FL 33615 813-886-8574.

NEW Drake C line: R-4C/160M/10M with 250/1500/4000 Hz filters, $490. MS-4 $18. T-4XC/160M/10M $430. AC-4 $80. L-4B linear $675. MN-2000 $165. All new mint condition. Pick-up only. $1800. takes all. W1KYG, 603-669-6902.

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DRAKE 2C rcvr with Q-mult spk $190. SB101 xcvr with a/c supply SB600 spkr $335. Ameco preamp Nuvistor type $25. Bob Uhrlass WB2DXL 438 E. 239 St., Bronx NY 10470, 212-324-5463.

QST magazines dating from 1925-1955. All of 1930 to 1935. Other years a few are missing. Good condition will sell as lot. Best offer. Mrs William Howard, 2 Vannoy Ave., Pennington, NJ 08534.

NATIONAL 190 receiver $120. Utica 650 six meter transceiver, vfo and mike $100. Roger, 301-997-0995.

R4B/T4XB/AC4/MS4/ mint, $850. SB303/SB-401/SB-600 Mint $600. UPSs paid. WB@IQK 605-342-4190.

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DRAKE R4-B Receiver, Exceptional, $300. Johnson KW Matchbox with SWR, $200., Johnson 275 watt Matchbox with SWR, $125., both excellent, Heathkit HW-7 transceiver with AC supply, Mint, $60, Jerold Gunsolley, 1900 B St., So. Sioux City NE 68776, 402-494-4232.

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HEATH DX-60 — $35. Mosley MP-33, Beam $100. 516-822-7429. Larry WN2ASZ.

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SALE: Kenwood-Trio TR2200 (Drake TR22 w/o Drake emblem) 2M handheld transceiver, 150. WA4MCP, 654 Missimer Ln., Vinton VA 24179.

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T-106	135			1.06	1.50
T-80	55	45		.80	.80
T-68	57	47	21	.68	.65
T-50	51	40	18	.50	.55
T-25	34	27	12	.25	.40

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CORE SIZE	MIX Q1 μ = 125	MIX Q2 μ = 40	SIZE OD (in.)	PRICE USA $
F-240	1300	400	2.40	6.00
F-125	900	300	1.25	3.00
F-87	600	190	.87	2.05
F-50	500	190	.50	1.25
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F-23	190	60	.23	1.10

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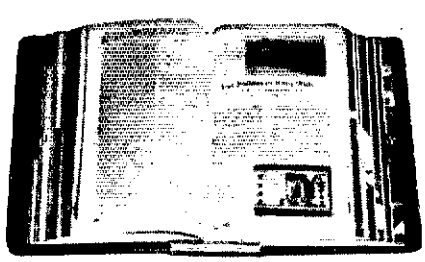

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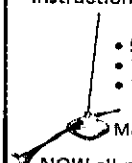

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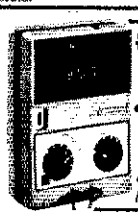

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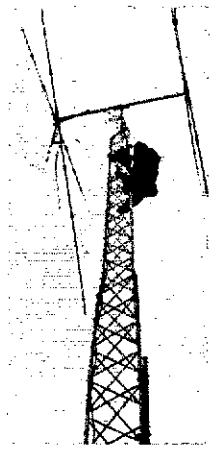

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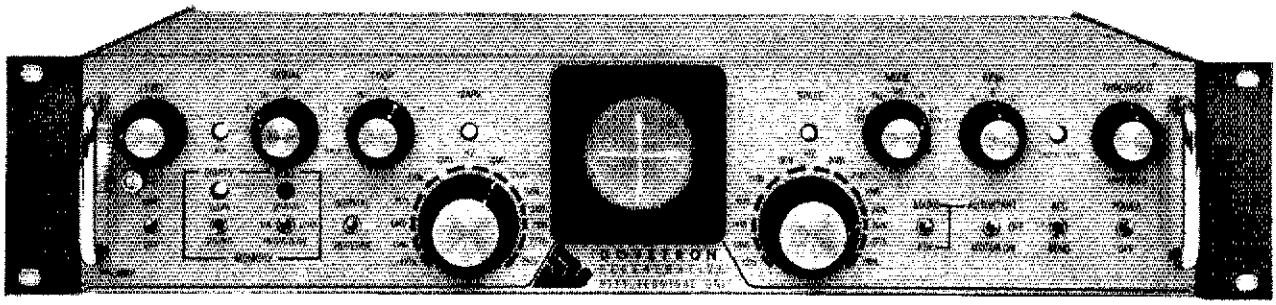

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There are TWO IMPORTANT FACTORS in any purchase of ham equipment — the PRODUCT and the DEALER — or, in other words, WHAT you buy and WHERE or from whom you buy it!

NOT ALL AMATEUR RADIO OPERATORS ARE ALIKE! Hence WHAT you buy should be determined on a basis of what's right for YOU — the radio that suits YOUR operating habits and also YOUR budget — not necessarily the same one that your buddy down the block is running, or the one that you heard about on the air.

NOT ALL AMATEUR RADIOS ARE ALIKE! Take the time to make a FAIR EVALUATION of the various makes & models on the market today. Compare PRICES, PERFORMANCE and FEATURES, and take a good look at QUALITY, RESALE VALUE and SERVICE-ABILITY. And, if time is of the essence (you'd like to have it "YESTERDAY") — you may also want to consider "AVAILABILITY" as well.
(NOTE: The recent upswing in amateur activity has created an almost overwhelming DEMAND for nearly all new models now in production and, consequently, a good share of these ARE NOT readily available for immediate delivery — some, in fact, may even be several months in coming!)

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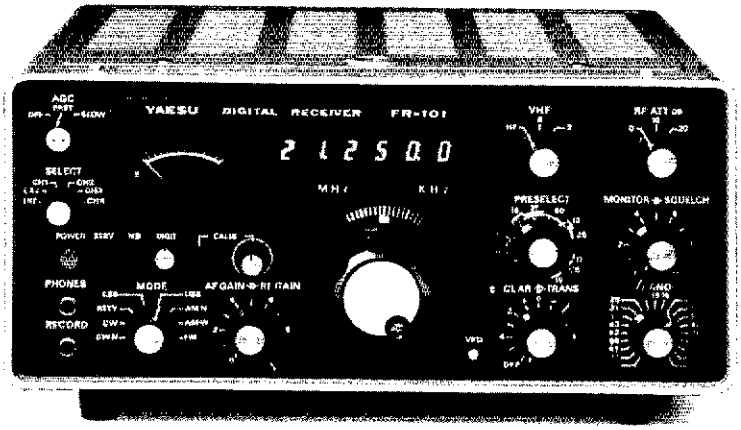

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