

QST

devoted entirely to Amateur Radio

July 1977 \$1.50



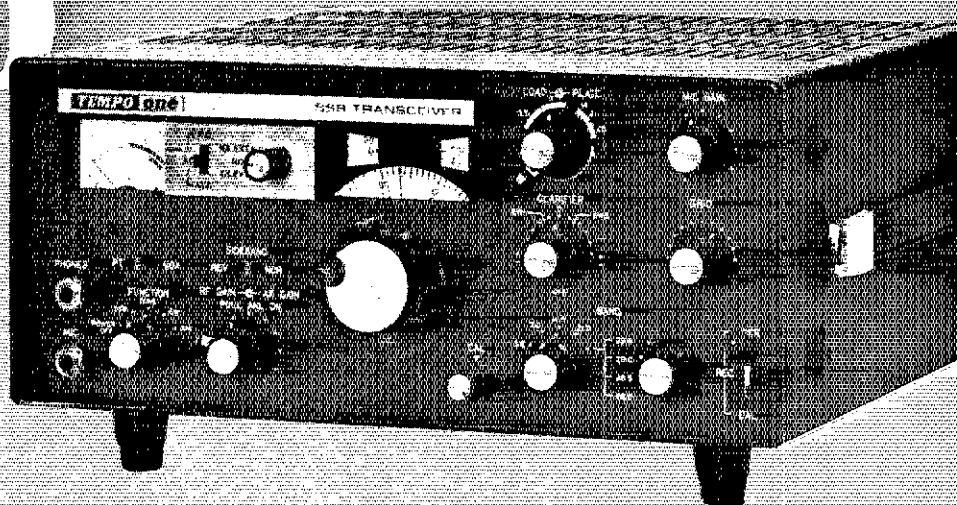
**Energy in short supply?
WØMCN finds the answer
blowin' in the wind.**



STILL UNDER \$500

**DO YOU KNOW
OF ANOTHER
FULL POWER, FULLY
ASSEMBLED,
HF TRANSCEIVER
STILL UNDER \$500?**

WE DON'T!



BUT DON'T LET THE LOW PRICE FOOL YOU. THE TEMPO ONE'S QUALITY AND RELIABILITY HAVE BEEN PROVEN BY THE TENS OF THOUSANDS IN USE BY GENERAL AND ADVANCED CLASS AMATEURS.

AND NOW UNDER THE NEW FCC REGULATIONS THE TEMPO ONE BECOMES THE PERFECT RIG FOR THE NOVICE AND TECHNICIAN CLASS.

Ask any of the thousands of owners about its dependability, look at its features and specifications...and the reasons for its unparalleled popularity will be obvious.

FREQUENCY RANGE: All amateur bands 80 through 10 meters,
MODES OF OPERATION: SSB upper and lower sideband, CW and AM.

SOLID STATE VFO: Very stable Colpitts circuit

RECEIVER OFFSET TUNING (CLARIFIER): Provides ± 5 kHz variation of receiver tuning when switched ON.

FREQUENCY STABILITY: Less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change.

INPUT POWER: 300 watts PEP, 240 watts CW

AF BANDWIDTH: 300-2700 cps

RECEIVER SENSITIVITY: $1/2 \mu\text{v}$ input S/N 10 dB

AGC: Fast attack slow decay for SSB and CW.

SELECTIVITY: 2.3 kHz (-6 dB), 4 kHz (-60 dB)

IMAGE REJECTION: More than 50 dB.

AUDIO OUTPUT: 1 watt at 10% distortion.

AUDIO OUTPUT IMPEDANCE: 8 ohms and 600 ohms

TUBES AND SEMICONDUCTORS: 16 tubes, 15 diodes, 7 transistors

ANTENNA IMPEDANCE: 50-75 ohms

CARRIER SUPPRESSION: -40 dB or better

SIDEBAND SUPPRESSION: -50 dB at 1000 CPS

THIRD ORDER INTERMODULATION PRODUCTS: -30 dB (PEP)

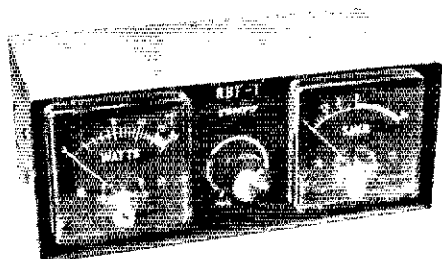
TEMPO "ONE" TRANSCEIVER \$399.00

AC/ONE POWER SUPPLY \$ 99.00

TEMPO VF/ONE External VFO \$109.00

CW FILTER KIT \$ 46.00

Prices subject to change without notice.



Tempo RBF-1 Wattmeter

An inexpensive, in-line Wattmeter and SWR bridge for use with any transceiver, transmitter, or amplifier from 1.9 to 150 MHz. Test and tune for maximum output or for monitoring on-the-air performance.

Allows selection of wattmeter scales of 0-200 watts or 0-2000 watts. Insures consistent, efficient transmitter operation.

As with all Tempo equipment, the RBF-1 delivers performance value far beyond its price. Only \$42.95



Tempo DM-20 Desk Mike

Features PTT and LOCK switches. Converts easily to high or low impedance (600 or 50k ohm). Only \$39.00

Henry Radio

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213/477-6701

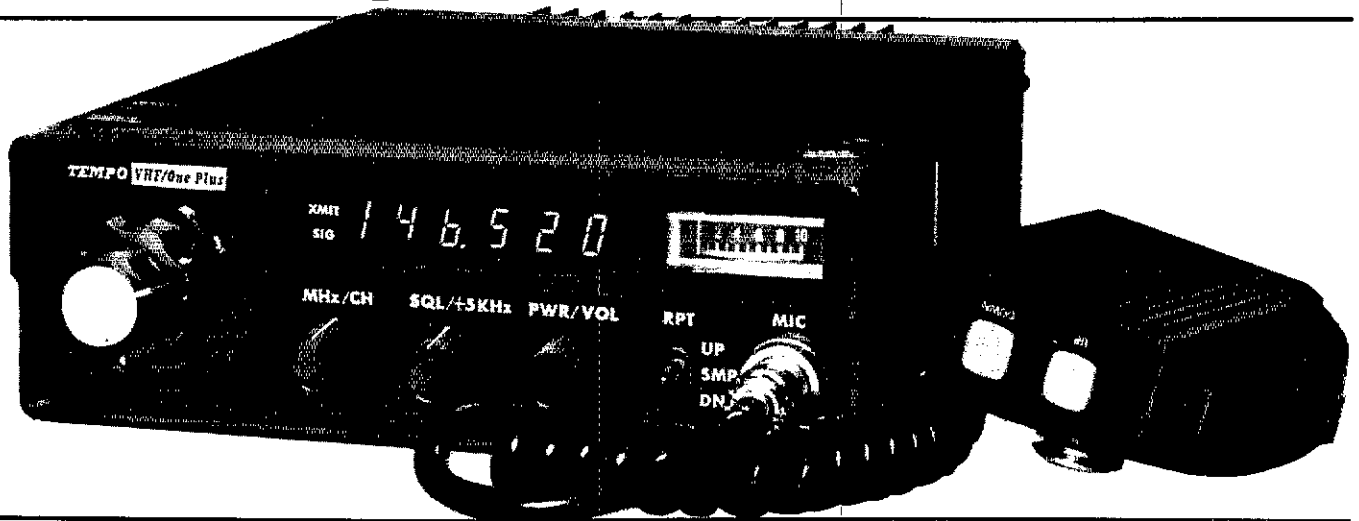
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TEMPO VHF / ONE PLUS



MORE POWER / 25 OR 5* WATTS OUTPUT SELECTABLE

REMOTE TUNING / ON MICROPHONE

NEW LOWER PRICE / NOW ONLY \$399.00

**SIDEBAND OPERATION WITH SSB/ONE ADAPTER / MARS
OPERATION CAPABILITY / 5 MHz NUMERICAL LED**

The Tempo VHF / One Plus is a VHF / FM transceiver for dependable communication on the 2 meter amateur band • Full 2 meter coverage, 144 to 148 MHz for both transmit and receive • Full phase lock synthesized (PLL) • Automatic repeater split—selectable up or down • Two built-in programmable channels • All solid state • 800 selectable receive frequencies with simplex and +600 KHz transmit frequencies for each receive channel.

*Adjustable internally 3 to 15 watts

TEMPO FMH-2, FMH-5 & FMH-42 (UHF)

6 channel capability • selectable 1 or 2 - 1 or 5 Watts output • Solid-state • Battery level meter • Earphone jack • Built-in charging terminals and separate charging jack for Ni-cad batteries • Flex antenna • Carrying case standard • Excellent frequency stability allows use with booster amplifier for high power output over 100 Watts • 8 AA batteries or 10 AA Ni-cads.*

*Not furnished...
FCC Type accepted models available.

TEMPO VHF & UHF AMPLIFIERS

VHF (135 to 175 MHz)			
Drive Power	Output	Model No.	Price
2W	130W	130A02	\$199
10W	130W	130A10	\$179
30W	130W	130A30	\$189
2W	80W	80A02	\$169
10W	80W	80A10	\$149
30W	80W	80A30	\$159

UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price
2W	70W	70D02	\$270
10W	70W	70D10	\$250
30W	70W	70D30	\$210
2W	40W	40D02	\$180
10W	40W	40D10	\$145
2W	10W	10D02	\$125

FCC Type accepted models available.

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 12 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 and dependable.



Sold at Tempo dealers throughout the U.S. and abroad. Please call or write for further information.

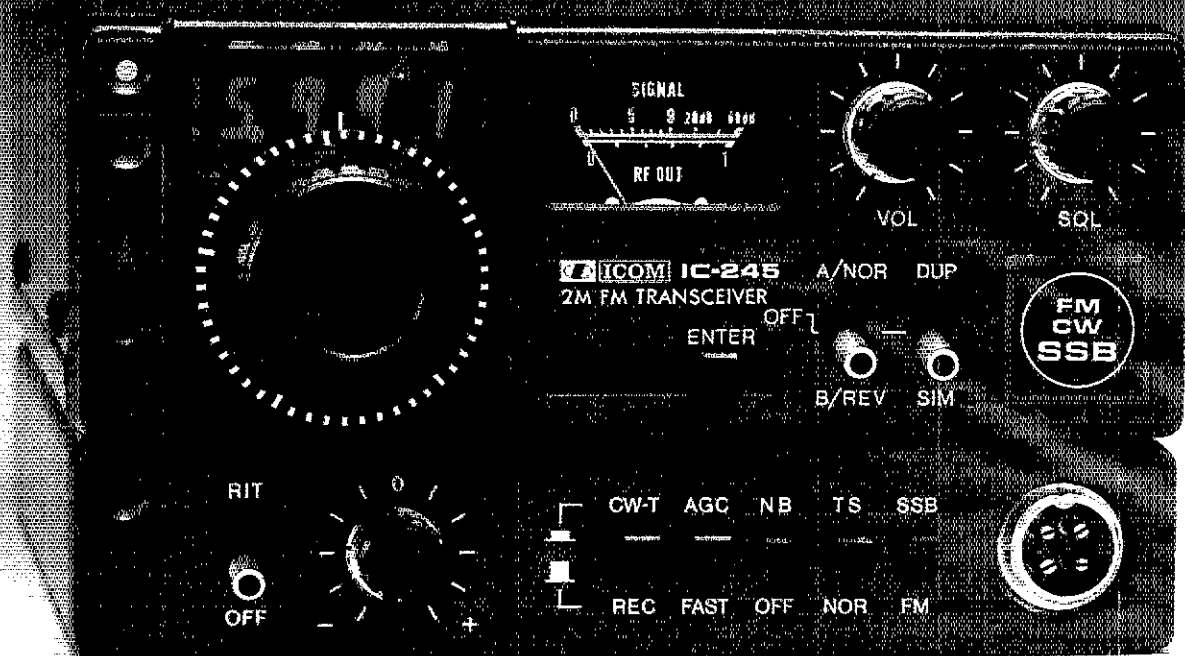
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931 N. Euclid, Anaheim, Calif. 92801
Butler, Missouri 64730

213/477-6701
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Henry Radio

July 1977



That's all, Folks!

All you need for All Mode Mobile, that is.

All Mode Mobile is now yours in a superior ICOM radio that is a generation ahead of all others. The new, fully synthesized **IC-245/SSB** puts you into FM, SSB and CW operation with a very compact dash-mounted transceiver like none you've ever seen.

- **Single knob frequency selection:** The **IC-245/SSB** is the only fully synthesized mobile unit with convenient single knob frequency selection over the entire band. No more fussing with two or more knobs just to check what is going on around the band. One easy spin of the 50-position detent knob does it all. This very important user oriented feature is exclusively ICOM.
- **Remote programming:** The **IC-245/SSB** LSI chip provides for the input of programming digits from a remote key pad which can be combined with Touch Tone* circuitry to provide simultaneous remote program and tone. Computer control from a PIA interface is also possible.
- **FM stability on SSB and CW:** The **IC-245/SSB** synthesis of 100 Hz steps makes mobile SSB as stable as FM. This extended range of operation is attracting many FM'ers who have been operating on the direct channels and have discovered SSB.

The **IC-245/SSB** is the very best and most versatile mobile radio made: that's all. For more information and your own hands-on demonstration see your ICOM dealer. When you mount your **IC-245/SSB** you'll have all you need for All Mode Mobile.

SPECIFICATIONS

GENERAL		Spurious Radiation	60 dB or less below carrier	Squelch Threshold	3 dB or less (FS)
Frequency Coverage	144.00 to 148.00 MHz	Maximum Frequency Deviation	±3 KHz	Spurious Response SYNTHESIZER	60 dB or better
Modes	1M (FS) *SSB (A3J), CW (A1) DC 13.8V ± 15%	Microphone Impedance	600 ohms	Frequency Range	144 MHz to 148 MHz 5 KHz for FM
Supply Voltage	90H x 155W x 235D	RECEIVER		Step Size	*100 Hz or 5 KHz for SSB
Size (mm)	2.7	Sensitivity	*A3J, A1 0.3 microvolt input over 10 dB S-N F3 0.3 microvolt or less for 20 dB quieting N-N ±0.1 N of 1 microvolt input, 30 dB	Stability	per % in the range of 10 to -60 C. 0.000145%
Weight (kg)					* Valid with SSB only
TRANSMITTER					
TX Output	F3 10W *A3J 10W (PEP), A1 10W				
Carrier Suppression	40 dB or better				

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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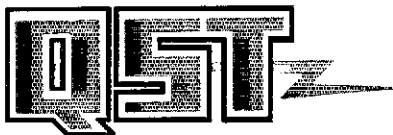


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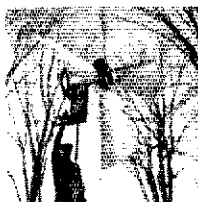
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THE COVER
Carl Heinen and his homebrew wind generator. He tells all, beginning on page 15; an author's profile begins on page 19.



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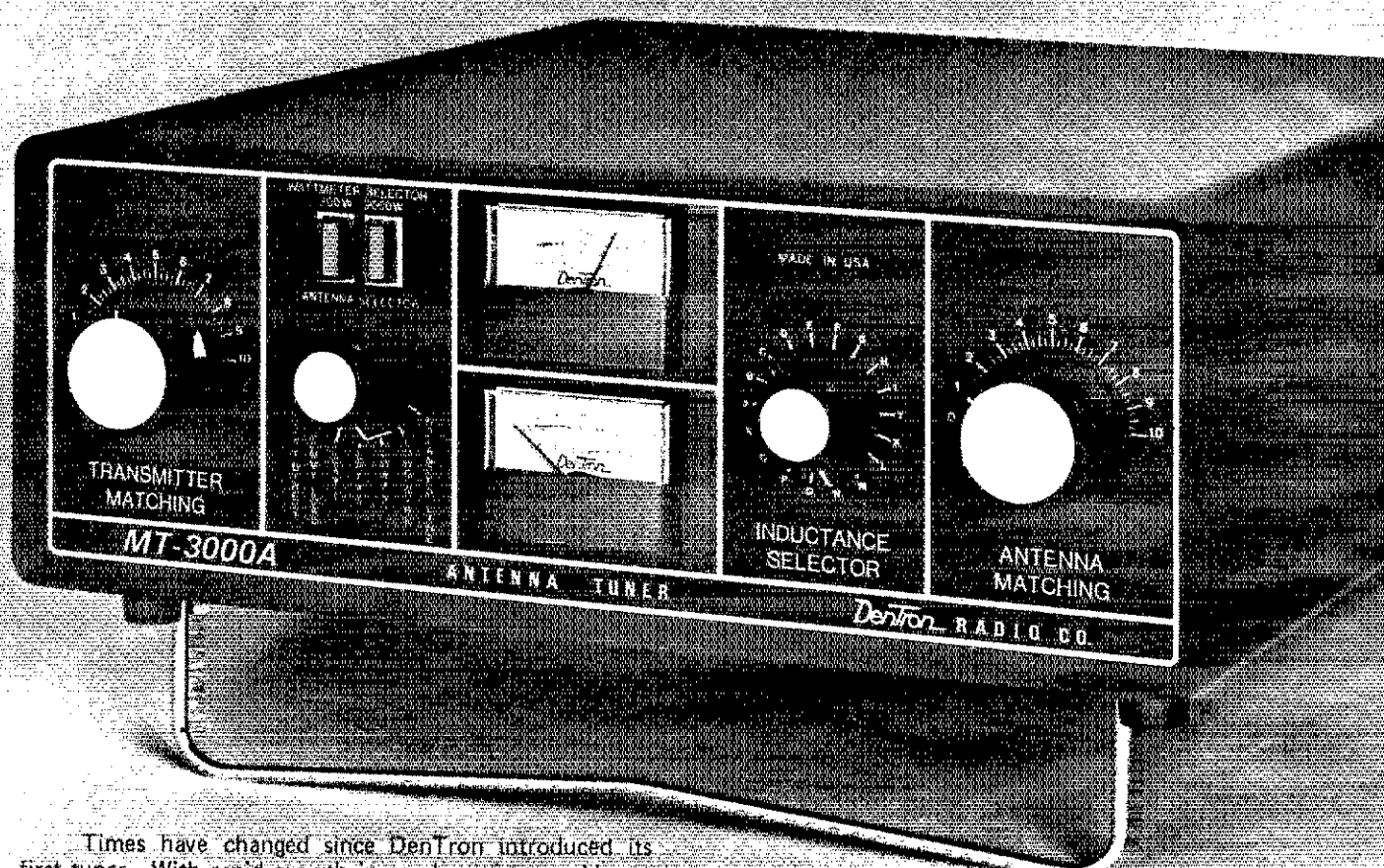
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Look closely at the new MT-3000A. You've never seen anything like it.



Times have changed since DenTron introduced its first tuner. With rapid growth in condominiums and housing developments, we have new problems that require new solutions.

DenTron decided to rethink the tuner and what its total capabilities should be.

The MT-3000A is a capsulized solution to many problems. It incorporates 4 unique features to give you the most versatile antenna tuner ever built.

First, as a rugged antenna tuner the MT-3000A easily handles a full 3KW pep. It is continuous tuning 1.8-30mc. It matches everything between 160 and 10 meters.

Second, the MT-3000A has built-in dual watt meters.

Third, it has a built-in 50 ohm dummy load for proper exciter adjustment.

Fourth, the antenna selector switch; (a) enables you to by-pass the tuner direct; (b) select the dummy load or 5 other antenna systems, including random wire or balanced feed.

The compact size alone of the MT-3000A (5½" x 14" x 14") makes it revolutionary. Combine that with its four built-in accessories and we're sure you'll agree that the MT-3000A is one of the most innovative and exciting instruments offered for amateur use.

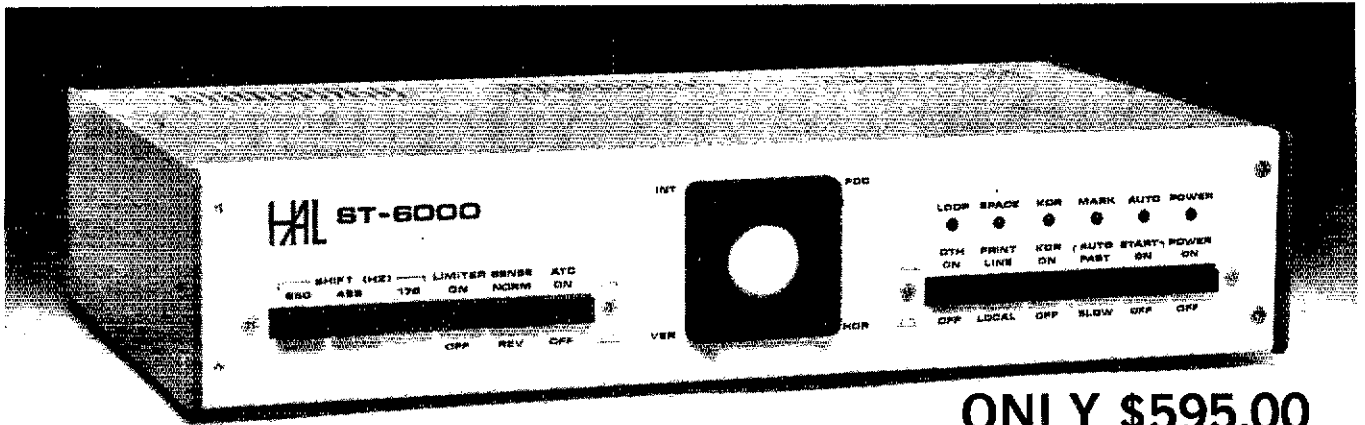
At \$349.50 the MT-3000A is not inexpensive. But it is less than you'd expect to pay for each of these accessories separately.

As unique as this tuner is, there are many things it shares with all DenTron products. It is built with the same meticulous attention to detail and American craftsmanship that is synonymous with DenTron.

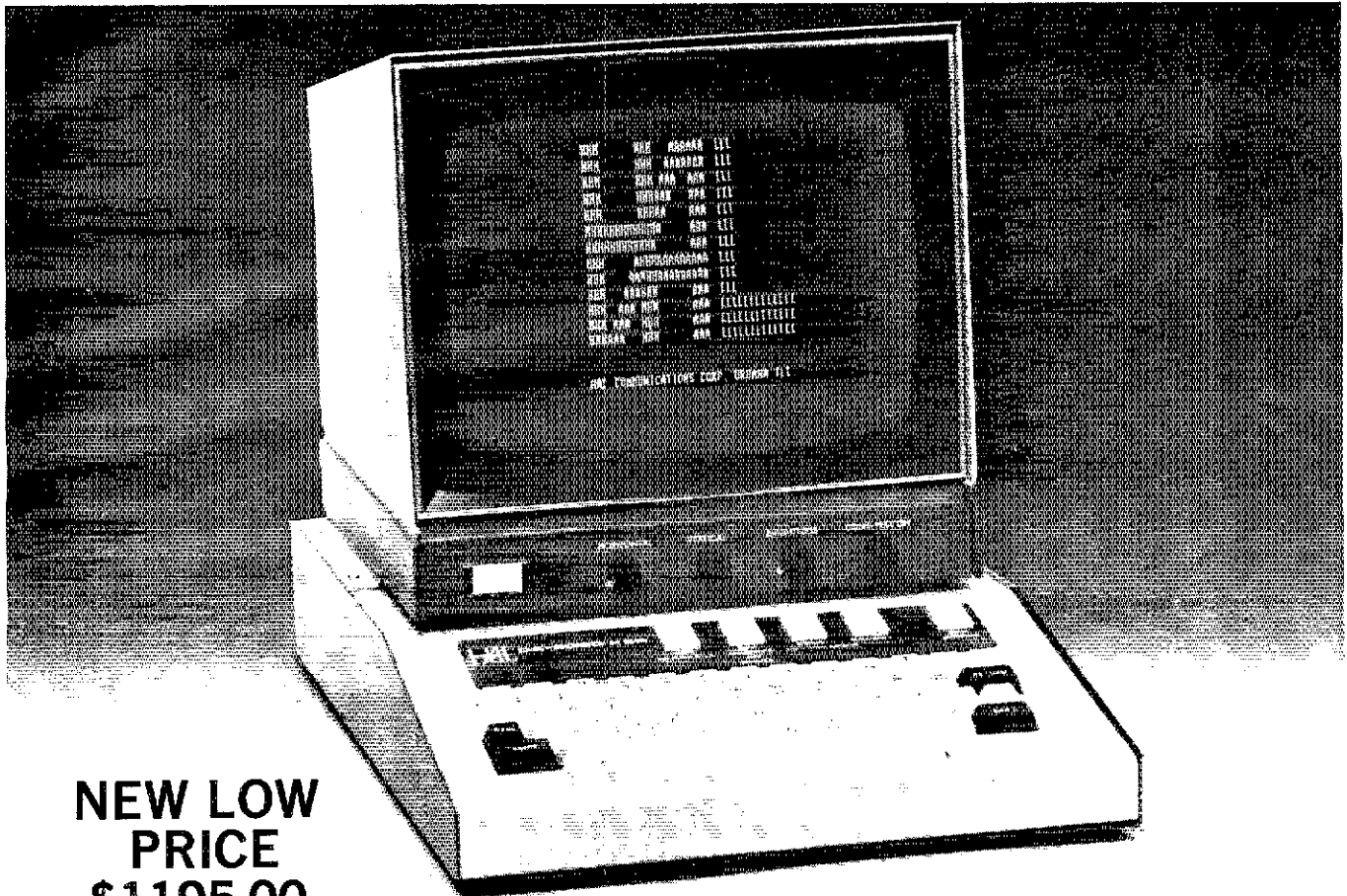
After seeing the outstanding MT-3000A, wouldn't you rather have your problems solved by DenTron?

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

Stay tuned for future programs.



ONLY \$595.00



**NEW LOW
PRICE
\$1195.00**

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 estab-

lishing 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
Urbana, Illinois 61801 • Telephone: (217) 367-7373

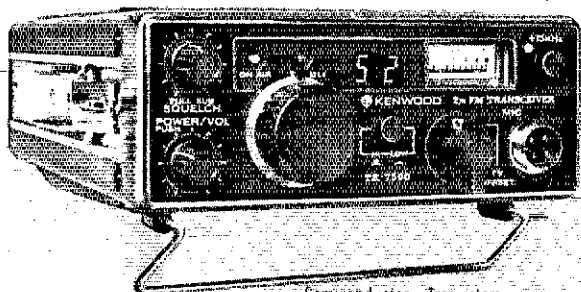
TR-7500



There are a number of good 2 meter FM transceivers on the market. You may already own one. But, even if you do, we suggest that you put your radio to this test. And, if you're thinking of buying one, this test should be a helpful guide.

	NO	YES
Is it PLL synthesized?	<input type="checkbox"/>	<input type="checkbox"/>
Does it have 100 channels (88 pre-programmed)?	<input type="checkbox"/>	<input type="checkbox"/>
Does it have 12 extra diode programmable channels?	<input type="checkbox"/>	<input type="checkbox"/>
Does it have single knob channel selection?	<input type="checkbox"/>	<input type="checkbox"/>
Does it have a LED digital frequency display?	<input type="checkbox"/>	<input type="checkbox"/>
Does it have a powered tone pad connection?	<input type="checkbox"/>	<input type="checkbox"/>
Does the receiver have helical resonators?	<input type="checkbox"/>	<input type="checkbox"/>

If your answer is NO to any of these, the TR-7500 is the radio that you should own. And, in addition to these important features, you get proven Kenwood quality, value and service.



Specifications

Semiconductors: Transistors	41
FETs	8
ICs	7
Diodes	35
Frequency Range: 146.01 to 147.99 MHz	
Mode: FM	
No. of Channels: 100	
Operating Temperature: -20 to +50 degrees C	
Power Voltage: 11.5 to 16.0V DC (13.8V DC nominal)	

Grounding Polarity: Negative ground
 Antenna Impedance: 50 Ohms
 Current drain: Less than 0.5A in receive with no input signal
 Less than 3A in transmit (HI) Less than 1.5A in transmit (LOW) (at 13.8V DC)

Dimensions: 172 mm (6-3/4") wide
 290 mm (9-7/8") deep
 75 mm (2-15/16") high

Weight: Approximately 2.2 kg (4.8 lbs.)

TRANSMIT SECTION
 RF Output Power: High: 10 Watts
 Low: 1 Watt (approximately)

Modulation: Variable reactance frequency shift

Frequency Deviation: ±5 KHz

Spurious Radiation: Better than -60dB

Tone Pad Input
 Impedance: 600 Ohms
 Microphone: Dynamic microphone with PTT switch, 500 Ohms

RECEIVE SECTION
 Receive System: Double conversion superheterodyne
 Intermediate Frequency: 1st IF: 10.7 MHz
 2nd IF: 455 kHz

Sensitivity: Better than 0.4 uV for 20dB quieting Better than 1 uV for 30dB S/N

Squelch Sensitivity: Better than 0.25 uV
 Selectivity: 12kHz at -6dB down
 40 kHz at -70dB down

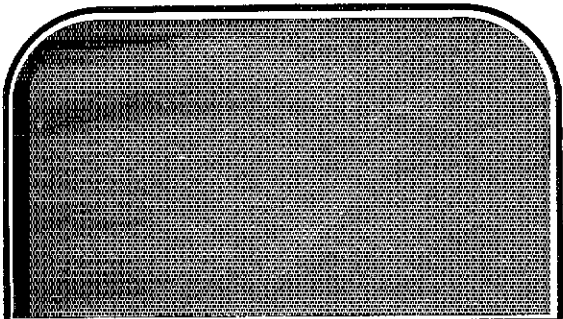
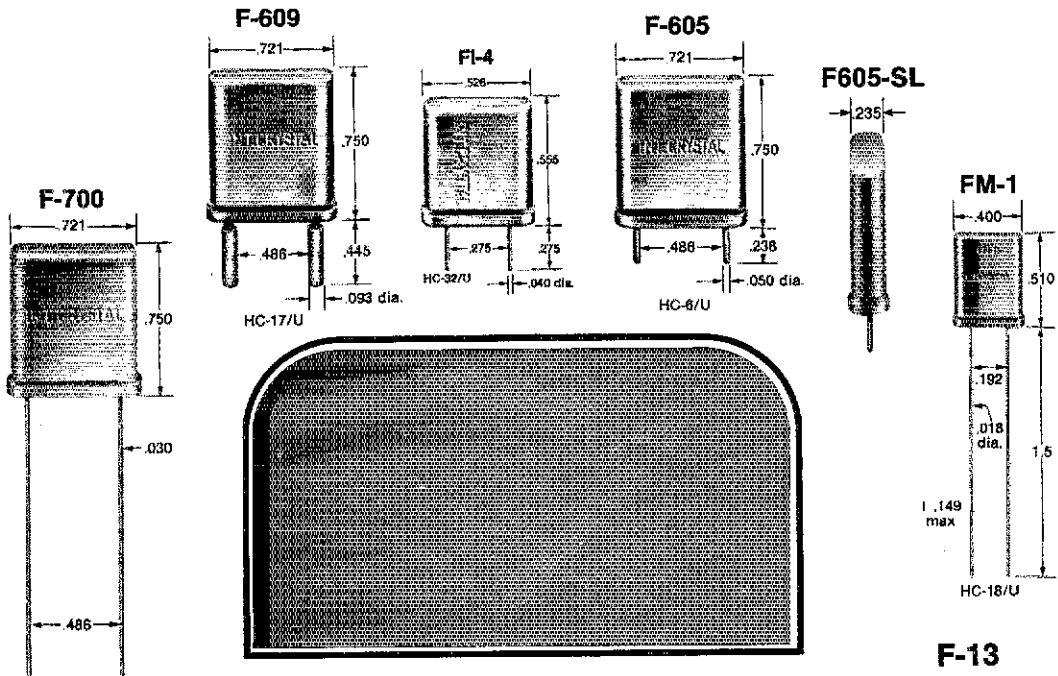
Image Rejection: Better than -70dB
 Spurious Interference: Better than -60dB

Audio Output: More than 1.5 watts across 8 Ohms load 10% distortion
 Intermodulation: Better than 66dB

WHERE RELIABILITY & ACCURACY COUNT

INTERNATIONAL CRYSTALS 70 KHz to 160 MHz

HOLDER TYPES

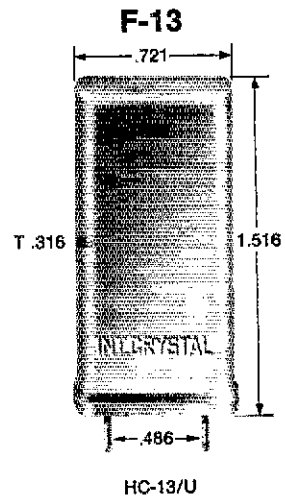
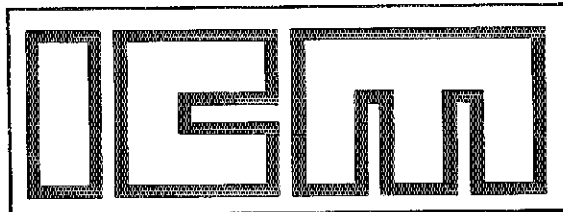
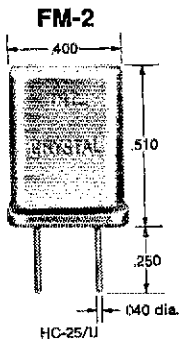


CRYSTAL TYPES

- (GP) for "General Purpose" applications
- (CS) for "Commercial" equipment
- (HA) for "High Accuracy" close temperature tolerance requirements

International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders.

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Reports invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The sixteen divisions of the League are further arranged into 74 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating An Amateur Radio Station*, free to members.

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Ontario

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Steven Fink, VE4FQ, 14 Grandcrest St., Winnipeg, MB R2V 2X2
Aaron D. Solomon, VE10C, 8 Clifton Park Road, Dartmouth, NS B3A 2N8
L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew ON K7V 3W1
Lawrence P. Dobby, VE2YU, 157 Sedgfield Ave., Pointe Claire, PQ H9R 1N8
Percy A. Crosthwaite, VE6RP, RR 3, Saskatoon, SK S7K 3L6

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Karl R. Medrow, W3FA, 718 W. Central Avenue, Davidsonville 21035
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Mark J. Worcester, WA0WLP, 1523 N. 20th St., Bismarck 58501
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The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible 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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WARC-79 — Those Who Are Helping

Elsewhere in this issue you will find a report about the Fifth Notice of Inquiry in Docket 20271, which relates to U.S. preparation for the World Administrative Radio Conference which will take place in Geneva in 1979.

It is not our purpose on this page this month to tell you what you ought to do in response to the Fifth Notice — that's covered more than adequately elsewhere in this issue. Nor is it our purpose on this page this month to question the ancestry of those who sit on the sidelines and make ill-advised comments about what the rest of amateur radio is doing while making absolutely no, repeat no, contribution themselves to the conference preparation.

Instead, it is our pleasure this month to give public recognition to a number of groups and individuals who have contributed positively to the WARC preparations, but with the full realization that some deserving of recognition may be inadvertently omitted, and that some who have been outstanding contributors may not receive the full recognition which is due them.

The Commission has identified the respondents to the 3rd NOI, and that FCC list is reproduced here so that everyone who reads *QST* will have an opportunity to see this "honor roll" of participants in the WARC preparatory work by the Amateur Radio Service.

Amateur Radio Advisory Committee; American Radio Relay League; Arbogast, Burl T.; Argonne Amateur Radio Club; Bayalis, John; Beacon Radio Amateurs; Berberich, Frank; Bidstrup, Scott C.; Big Island Amateur Radio Club (Hawaii); Bowen, Chuck; Bowles, William G. Jr., (W0FNL); Cambridge, Ohio Amateur Radio Club; Carlen, Ed; Carlson, C. R. (K6TXA); Choisser, Bill and Kenney, Lawrence; Citrus Center Amateur Radio Club; Clark, Rev. Benjamin (WB4OBZ); Cooke, Willis R. (K5EWJ); Davis, Marshall B. (W0ATU); Duck, Edward E.; East Bay Radio Club; Edgewood Amateur Radio Society, Inc.; Emergency Amateur Radio Club; Enid Amateur Radio Club, Inc.; Erk, Peter (WA9TCR); Evans, James J.; Eye, Louis D. II (WB4MFW); Fisher, James W. (W8JF); Fisher, Walter; Fountain City Amateur Radio Club; Fulton County Amateur Radio Club; Fort Belvoir Amateur Radio Club; Fulcher, William, N.; Gainesville Amateur Radio Society (FL); Great

Smoky Mountain Chapter of 10-X; Greater Fairfield Amateur Radio Association (CT); Grew, William; Guenther, John; Groenhof, Henry; Gulino, Chick; Gundry, James A. (W4JM); Heimberger, Raymond E.; Henselman, Ronald; Hodges, Louis A.; Hauck, Ray N.; Houston, Al; Knirko, Lee (W9MOL); Larkin, Clarence J., Jr.; Leopold, Hank; Letovrneau, Wayne; Lievsay, Claude, Jr. (WB6OZJ); Long Island Mobile Amateur Radio Club; Magro, Daniel, Jr.; May, Robert M. II (K4SE/WA4DBG); Mitchell, W. M. (W1AR); Moss, James; National Capitol DX Association; Pagliarini, John A., Jr. (W1YR); Paruolo, Emil; Pentagon Amateur Radio Club; Praig, G. Franklin; Preston, James C. (WA6UFY); Quarter Century Wireless Association Inc. (Long Island Chapter); Radio Amateur Club of Knoxville; Radio Amateur Megacycle Society; Radio Amateur Satellite Corporation; Reiter, Verlin E. (WA0KRL); Reynolds, Howard W. (WA3EOQ); Rock Creek Amateur Radio Association; Rudd, F. A. (W0MW); Ruh, Henry B. (WB8HEE); Scheurer, J. R. (WB6WIW); Schlotz, William; Shreve, R. B. (W8GRG); McClaren, Donald (W8URX); Hinds, George (WB8JYR); Carson, Willard (WB8TSM); Hollis, Dave (WA8MAA); Spearman, Frank; Springer, Alfred E.; Stitzer, Steven N. (WA3ZWC); Texas VHF-FM Society Inc.; Thompson, Andrew F.; Thornton, Douglas; Tiffany, W. D. (W6GNX); Troster, John G. (W6ISQ); Southern California Repeater and Remote Base Association; Tucson Repeater Association; West, Bryan F.; Winona Amateur Radio Club (MN); Wolf, John.

We regret that, for clubs and groups, we are unable to identify each individual who participated in the group filing, although the principal participants in the hardworking ACAR were identified in a note on page 23 of *QST* for January, 1977.

But, to the best of our ability at the moment, we — and that means all of us in amateur radio — hereby pay tribute to those who are participating in a constructive way to a strong U.S. amateur position for WARC-79. And it almost goes without saying that when the Sixth Notice of Inquiry is published sometime later this year, we hope to publish an even longer "honor roll" of contributors to the future of amateur radio. — *W1RU*

League Lines...

Elsewhere in this issue we treat the Fifth Notice of Inquiry in Docket 20271 (WARC preparation) extensively. The Fourth Notice of Inquiry in the same proceeding was released on May 17 and deals largely with small antenna earth stations and some technical regulations. The small antenna earth stations are of little concern to the amateur service, but Appendix 4, entitled "Table of Tolerances for the Levels of Spurious Emissions," would require any spurious signal from a transmitter operating below 30 MHz to be 40 dB below the mean power of the fundamental without exceeding the power of 50 milliwatts (previously 200 mw), while transmitters operating above 30 MHz with a power exceeding 25 watts would have to limit spurious radiations to a value of 60 dB below the mean power of the fundamental without exceeding 1 milliwatt, and transmitters operating above 30 MHz with a power of 25 watts or less would be required to suppress spurious radiations 40 dB below the mean power of the fundamental without exceeding 25 microwatts and without the necessity for reducing this value below 10 microwatts. These are the same standards proposed in Docket 20777 -- for a discussion see QST p. 63 May and p. 76 June. If you feel moved to comment, and we hope you do, that comment deadline is July 11, with July 26 the deadline for reply comments.

The FCC has modified its First Report and Order in Docket 20777 concerning the purity of emissions in the amateur service. The earlier rules became effective April 15 and required, among other things, that the mean power of spurious emissions below 30 MHz from an amateur transmitter or external amplifier be attenuated at least 40 dB below the mean power of the fundamental without exceeding 50 mW, and that spurious emissions between 30 and 235 MHz be attenuated at least 60 dB below the mean power of the fundamental. Full details appeared in May 1977 QST. Under the new modified rules existing transmitters and transceivers now owned by amateurs are exempt from the above standards of spurious attenuation. The exemption does not apply to external amplifiers. In addition, transmitters and transceivers manufactured prior to April 15, 1977 and currently in the hands of transporters or dealers or other middlemen may continue to be sold until January 1, 1978. However, after January 1, 1978, all commercially manufactured amateur equipment must meet the above standards before sale.

Due to problems encountered with the Delta launch vehicle, the newest OSCAR will probably not fly this year. AMSAT-OSCAR D was scheduled to be launched late this year, but it now looks good for sometime early in 1978. A-O D will ride piggyback with the LANDSAT-C Earth Resources Technology Satellite.

Worldradio News will be available for the visually handicapped on cassettes starting about September 1977 or so. Interested persons may contact either Tom Carten at Moreau Seminary, Notre Dame, IN 46556 (braille letters OK) or Worldradio News, 2120 28th St., Sacramento, CA 95816.

A third party agreement was signed May 16 by the governments of Jamaica and the United States, effective June 12, 1977.

In an FCC rule change that became effective on June 13, 1977, volunteer amateur license examiners need now only be 18 years of age instead of the former 21. All other examiner requirements still apply.

The Columbian Independence Day DX Contest is on for the weekend of July 16-17. For full details, see "Operating Events" in the June '77 QST. CQ HK!!

The new WIAW antenna/tower installation (see this issue) was made possible through a bequest from Ralph P. ("Tate") Thetreau, W8FX, former Michigan SCM and long-time ARRL member, and is respectfully dedicated to his memory.

Two deadlines to keep in mind: VHF QSO Party logs should be in the mail before July 20 and FD entries no later than August 1. Use the ARRL forms to make your job (and ours!) easier -- but you won't be penalized if all the info is there on your homebrew entry (still time to get those forms, however).

A Domestic Crisis Looms

With money scarce, the FCC is facing cutbacks that will bring headaches to the Amateur Radio Service for years to come.

By R. L. Baldwin,* W1RU

In *QST's* April editorial we discussed a dilemma facing the Federal Communications Commission. That dilemma has now become a crisis, and unless some solution is found, amateur radio is going to be severely penalized — penalized, in effect, by the very regulatory agency that would seemingly want to encourage it.

*General Manager, ARRL

The crisis is one of money and, therefore, people. The Commission is simply unable to cope with the explosion of interest that has taken place in CB and amateur radio. The Commission has the will, presumably, but has not found the way. The result may be a drastic curtailment in the handling of amateur applications.

This crisis comes at a most unfortunate time. We are on the verge of a great growth in the amateur service. January,

1977, brought a massive increase in the number of amateur license applications. Three factors contributed: the suspension of all fees for licenses, the major influx of 1 × 2 call-sign requests from eligible Extra Class licensees, and the graduation of students from the ARRL training courses throughout the country. Amateur applications averaged 12,000 per month during 1976, up 50 percent from 1974. In the first four months of 1977, amateur applications

SEVEN VISITORS SPEAK OUT

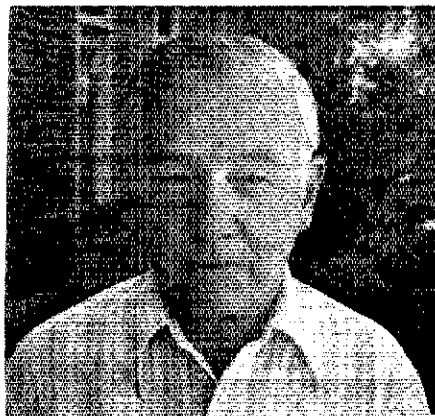
In general, amateur radio's problems are addressed by the administrative agencies of the federal government. Independent agencies such as the FCC derive their power and obtain their operating funds from Congress; but once Congress creates the agency and establishes broad policy guidelines, the agency is regarded as the "expert" in the field and Congress normally does not formally intervene in its day-to-day operations.

A nonprofit association such as the League may work with the administrative agencies without unusual or unreasonable limitations. However, it's a different story when it comes to influencing legislation before Congress (lobbying). While there is not a flat prohibition on lobbying, a nonprofit association may not devote a substantial amount of its operating budget to influencing legislation, or to encouraging others to do so. Unfortunately, the actual limit of the law on lobbying activities is extremely indefinite, adding a further complication.

The FCC funding crisis is so severe that it may require the League to seek a solution at the Congressional level. Thus, for the first time in many years, a concerted lobbying effort by the League may be required. In order to sample the feelings of the amateur community toward this situation, several visitors to ARRL hq. were asked for their reaction. Here's what they said.

Donald Duval, WA1WXS, Springfield, MA. Advanced.

The FCC does an adequate job, but of course they could do better if they had more staff. They should charge for licenses again, with the money going right to amateur radio. Getting rid of the Novice license would cut back the number of people getting licenses. I say the more hams, the better. It's a good springboard for polishing one's radio skills. You bet your life we should lobby. Absolutely!



George Bose, W2CJJ, Wantagh, NY. Advanced

I don't believe the FCC is serving the amateur community adequately. But things are getting a little better as the FCC is finally giving amateurs more recognition. It would be desirable to keep those employees at Gettysburg [who may be laid off], but I'm always yelling about taxes, so I can't really complain too much. The Novice license serves a useful purpose, and I'm very much in favor of lobbying by the League.



averaged 22,000 per month, including more than 25,000 in April alone! At the same time, CB applications, handled by the same office, soared to nearly one million in January, and now average more than half a million per month. More CB applications were received in February, 1977, than in all of 1974.

In 1975 the Personal Radio Division asked for and received 31 temporary employees to cope primarily with the massive increase in license requests. These temporary positions have been renewed at intervals since that time. By the time you read this, however, it is likely that these positions will have been canceled, as the Civil Service does not consider a problem extending over several years to be "temporary." Because permanent positions have not been authorized, FCC's Gettysburg office stands to lose those 31 employees, or some 40 percent of the workforce. Many of those temporary employees work on amateur licensing.

And that's only the immediate problem. It's going to get worse. Beginning early in 1978 the number of Novice radio classes is expected to exceed 2,000, which could mean as many as 40,000 applications for the Novice license in the space of a few months. In addition, many of the previously licensed Novices will be completing upgrading courses to Technician or General at about the same time, further overburdening a government licensing facility which is already in dire straits.

The Outlook for a Solution Is Bleak

A number of solutions have been suggested, but all have major drawbacks.

Stop licensing CB. This has been suggested at all levels from the Commissioners on down, but so far has been rejected. The enforcement group within the Commission needs a data base of license information in order to carry out its task. Furthermore, since some of those temporary employees hired to work on the CB problem were actually used on amateur licensing, their departure from the scene would only compound the problem.

Streamline CB licensing. The Personal Radio Division has already streamlined CB licensing to the point where it takes only 26 seconds overall to issue a CB license, with the cost being 38 cents (of which 13 cents is postage). Thus, this does not appear to be a very fertile field for further improvement.

Ask for additional funds. In February, 1976, the FCC submitted a supplementary budget request to the Office of Management and Budget for three and a half million dollars to upgrade the CB licensing facility, including making the temporary employees permanent. The OMB forwarded the request to Congress without comment. The House Appropriations Committee deleted this request, while the Senate passed it. The request failed to survive the House-Senate Conference, and the money was not forthcoming.

Volunteer Assistance. Federal regulations and the complexity of the licensing procedure seem to preclude the use of volunteer help at Gettysburg. The League's proposal to reduce the Commission's workload through a certification program ran into difficulty with opposition from a commercial publisher, and so is on the back burner. A greater role in licensing on the part of the League would undoubtedly be received even more poorly by the commercial sector (which cannot accept the fact that the League is a nonprofit membership association). In fact, the League's attempts to alleviate the Commission's workload through the certification program and the reaction of the commercial sector has contributed to a breakdown in communication between the League and the Commission, in an effort by FCC to avoid any appearance of collusion. This in turn contributed to the demise of the bulk mailing of Novice examinations, a potential time-saver for the Commission.

Reinstitute fees. The Field Operations Bureau and the Gettysburg office feel that the suspension of license fees has greatly increased the number of frivolous applications for large numbers of secondary stations and has increased the number of totally unprepared applicants for examinations at the field offices. This should at most be a temporary phenomenon, and the failure rate since the beginning of the year does not seem to indicate any great influx of

Fred Pritchard, W1BBC, Naugatuck, MA. Extra

The FCC is doing as well as it can, considering the budget it has. If there are fewer people at FCC the CB bands will get pretty wild, but it won't affect amateur radio much. I'm not too upset about the [proposed] elimination of the Novice license; I don't want us to relax our standards. Lobbying is a necessary evil. We have to do it if everyone else does.



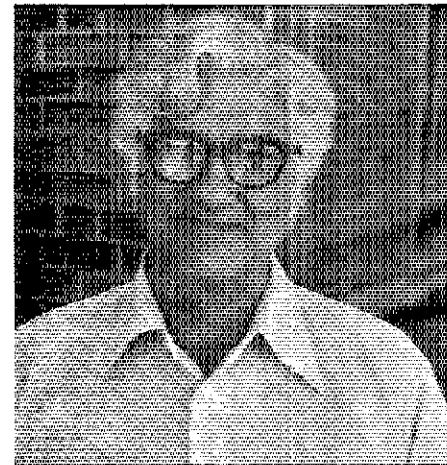
Leland Mott, K8UMN, Troy, OH. Advanced

I'd like to see the fee schedule reinstated. Then the FCC would have some money to work with. Amateur radio will deteriorate with a staff reduction at Gettysburg; there'll be bootleggers all over the place. I'd sure hate to see the Novice license eliminated. Sure the League should lobby, regardless of what Jack Anderson says.



Ken Bishop, W1EWD, Middletown, CT. Extra

The FCC is doing a fairly good job, but more monitoring of the ham bands would help. A reduction in FCC personnel would slow down new applications, especially with the influx of ex-CBers. The Novice license is the logical way to break into amateur radio, and that class shouldn't be dumped. The League should lobby to maintain the privileges we have now.



unprepared applicants. Moreover, the bulk of examinations is for the Novice license, where there has never been a fee.

The Real Problem

It appears that there may be no real commitment to the amateur service on the part of any of the people involved in the decision-making process. Once outside of the Safety and Special Services Bureau, and except for Chairman Wiley (who may soon be leaving), whom can we find with a real dedication to and understanding of the Amateur Radio Service? We have an especially difficult unawareness of the amateur service within the Office of Management and Budget and on Capitol Hill. Those people are pretty hard-nosed about additional budget requests from anyone. For instance, the request for additional funds for CB licensing failed, both at OMB and at Congressional levels, even though there are millions of CBers involved.

What Is Going to Happen to the Amateur Service?

If more money is not forthcoming, the amateur service is going to be emasculated. Already the Commission has, in Docket 21135, proposed the discontinuance of all additional station licenses, including separate licensing for repeaters, RACES, military and club stations, and the end of the 1 X 2 call-sign program for the Extra Class

licensee. In addition, there have been heavy hints that the Novice program would be discontinued. And there is every sign that the Commission would continue to search for ways to reduce the cost of administering the amateur service, most of which would, in our opinion, be derogatory to the long-term growth and vitality of amateur radio. As we said earlier on this page, it's a bleak prospect, especially because it comes at a time when there is every sign that we are on the threshold of a renaissance in amateur radio. New growth, increased activity, new technical breakthroughs.

We Must Not Let This Happen!

This writer happens to believe that no problem is without a solution. Solutions are not always immediately apparent, and oftentimes a certain amount of endurance is an essential ingredient to eventual success.

Probably most of us are pretty well convinced that a larger budget for the Commission is the eventual answer. What we must now do is find a way to assist the Commission in obtaining that budget. A number of approaches have been suggested — and we're probably going to need your individual help. More on this at a later date.

In the meantime, keep in mind that we have a major domestic problem on our hands, and if we don't solve it fairly soon, the amateur radio that we have enjoyed these many years is about to suffer irreparable damage.

Strays

I would like to get in touch with . . .

□ anyone who would like to play chess by way of traffic. Also anyone anywhere in the world who would like to be a pen pal. James L. McMurry, WB9YXN, 9412 S. 550 W., LaFayette, IN 47905.

□ radio amateurs in the U.S. to become pen friends and later to exchange visits. Hans Schloemmer, OE6HCG, A-8962 Groebning 463, Austria.

□ hams in the following cities who would be interested in a monthly phone-patch sked: Mt. Clemens, MI; Sandusky, MI; Elkhart, IN; Kenosha, WI, Dallas, TX, Holiday, FL; Culver City, CA; Bellevue, WA. Would be happy to reciprocate. Larry Stanton, WA8AAD, 500 Ferndale N.W., Grand Rapids, MI 49504.

□ any member of the "Old Radio Gang" attached to the *USS Oklahoma* in 1922-23. Also any member of the group attached to her on Dec. 7, 1941. Otis L. Eunice, WB9BCQ, 510 Johnston St., Galesburg, IL 61401.

□ amateurs who are members of the Church of God, which is headquartered in Cleveland, TN, to form a net. Tim Anderson, WBØJUA, 1111 St. James, Rapid City, SD 57701.

□ anyone knowing the present or past whereabouts of "Ted" J. Wang who was an engineer at WJJD in Mooseheart, IL, back in the '20s and who attended U. of Illinois in the late '20s or early '30s. O. W. Gibbs, W9BLT, 2146 Middlefield Dr., Aurora, IL 60506.

□ other amateurs who would like to form a book-club net. Suggested area: history. Three ground rules: come prepared, stick to the subject and good-willed openness. Dr. Peter Fribley, W9DKV/Ø, 391 4th Ave. S., St. Cloud, MN 56301.

□ someone who worked for Applied Electronics (APELCO) in California during the middle or late fifties. Stanley F. Wade, W7PD, 10433 Salem Dr., Sun City, AZ 85351.

□ IBM GSD employees interested in an IBM net. Send suggestions, photo of shack and biographical data. Photo may be in *GSD News*. C. Woodcock, WA2KWW, RD 1, Box 101-H, Audrey Ave., Lakehurst, NJ 08733.

□ nets, clubs or individuals using Esperanto on the air (or even off the air). Erik Hansen, 957 East Ave., Rochester, NY 14607.

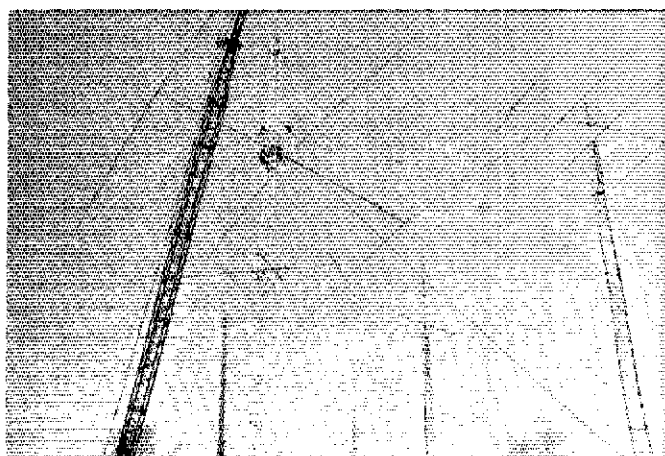
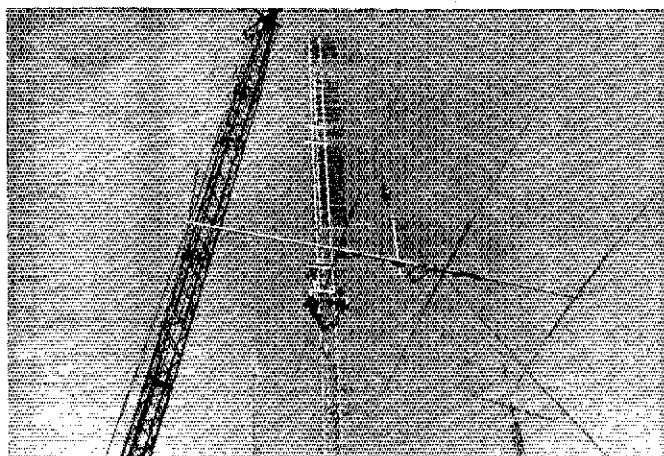
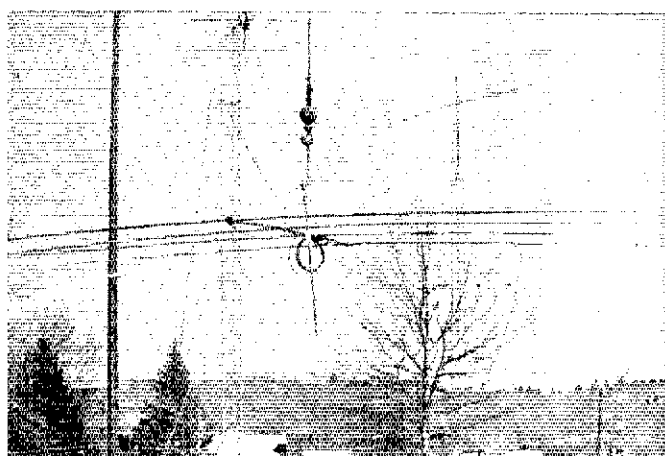
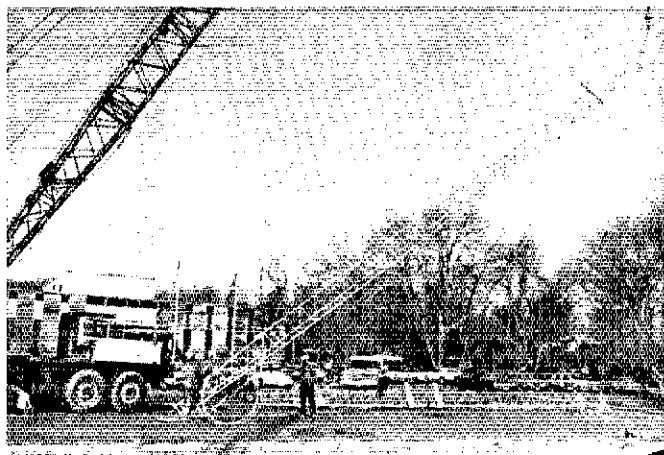
Robert Hempy, WØKOW, St. Paul, MN, Extra
The FCC could be doing better. They need to enforce rules that are in existence now. Their office in St. Paul seems to have only two engineers and two office personnel on duty. If they cut back their workforce a lot of CBers will be operating in the ham bands without licenses. Instant upgrading was a real improvement. Yes, the ARRL should lobby.

Dennis Matura, WBØQDV, Aplington, IA, General

I don't think the FCC is acting in the best interests of the amateur community. They're trying too hard to please the citizens band manufacturers. I'm not in favor of eliminating the Novice license, but I do think the League should lobby in Washington.



Strays



The new W1AW antenna system: stacked Telrex four-element beams at 120 and 60 feet plus three elements on 40 at 90 feet, supported by a 120-foot Rohn no. 65 tower. Now that's why we're louder out west! Above is what some of the hams at Headquarters were doing on April 14, 1977. The project was handled by W1XT, WA1LNQ and K1TN, assisted by WA1AH1, W1CW, K1FHN, W1GNC, W1NJM, WA1PAT, WA1SQB, W1WPR, W1YL, W1YNC, W1XZ, K1ZZ, WA0VC and Dave DeMaw. (W1YL photos)

Watts from the Wind

Don Quixote tilted with windmills and dreamed the impossible dream. Well, WØMCN tilts with windmills and makes the impossible dream come true — free energy!

By Carl J. Heinen,* WØMCN

From age four to well over 40, I enjoyed kite flying as a secondary hobby. This caused me to experiment with kite-supported antennas and cameras. From kites it was an easy transition to sports more becoming for the middle-aged: sailing and iceboating. Somehow, in all these years of wind-powered activities, I had no interest in windmills until the 1973 energy crisis.

The abundance of alternative energy articles in the news media, plus the feeling that most of us had about energy scarcity, caused a lot of discussion among my technically minded cohorts at work. It was mostly talk, but there was some action. One of the fellows built a small solar collector and collected extensive data of its performance by means of thermocouples and a chart recorder. Another person explored solar possibilities with a large curved mirror, which he discovered would eventually boil a cup of water. A more "chemically minded" experimenter tried to generate methane gas in a pop bottle while using food scraps and septic-tank activator. He was dismayed when the balloon he placed on the bottle to collect the gas, instead of expanding, tried to suck itself into the bottle!

Me? I started fooling with windmills!

You Never Run Out of Ideas

The first thing I learned about windmills was that you never run out of ideas. The photographs shown here give you some idea of the number of projects I tried in seeking the best type of wind generator. I used all kinds of materials — tin cans, roller-skate wheels for bearings, pinwheels made from scrap linoleum and all kinds of assorted junk.

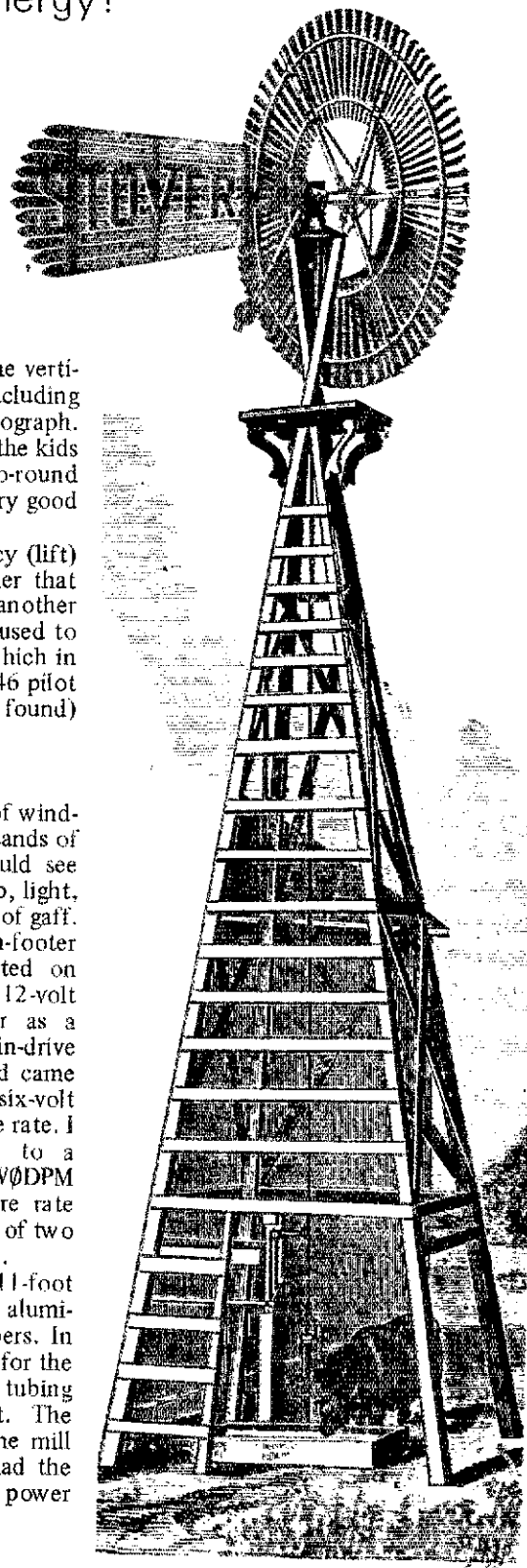
Many Savonius rotors of the vertical-shaft variety were tried, including the monster shown in the photograph. They were fun to watch — and the kids liked to use them for a merry-go-round — but they didn't prove to be very good generators, at least not for me.

I also tried two high-efficiency (lift) type propellers,¹ one seven-footer that blew apart in a high wind and another five-footer. The five-footer was used to drive a bicycle-light generator which in turn managed to light up a no. 46 pilot light. The final answer (that I found) was a sail-type windmill.

Sail-Type Windmill Experiments

People have used sail types of windmills for hundreds, maybe thousands of years. After building one I could see why. They are noncritical, cheap, light, easy to make big and stand lots of gaff. My first major effort was a seven-footer consisting of four sails supported on two bowed sticks. It powered a 12-volt permanent-magnet (P-M) motor as a generator through a 14:1 chain-drive speed-up system. When the wind came from the north it charged a six-volt tractor battery up to a six-ampere rate. I moved the whole contraption to a windy location owned by WØDPM where it attained the six-ampere rate two or three days a week instead of two days a month as it did in my yard.

The next model was an 11-foot bowed type that used one-inch aluminum tubing for the cross-members. In order to obtain a sufficient angle for the sails, it was necessary to bow the tubing almost to the snapping point. The tubing *did* break shortly after the mill was in operation. However, I had the dubious pleasure of seeing wind power



*2185 South Shore Blvd., White Bear Lake, MN 55110

¹ Footnotes appear on page 19.

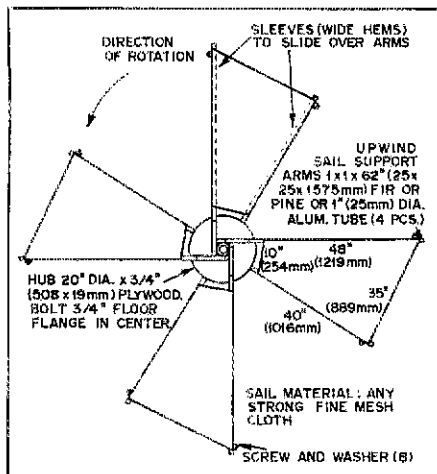


Fig. 1 - The sail assembly from the windward side.

burn out an automobile headlight. Attempts at repairing the cracked tubing with pieces of dowel and pipe resulted in a loss of proper sail angle and eventually led to the nine-foot design described here.

Construction of the Sail Assembly

A 20-inch diameter disk of 3/4-inch plywood forms the hub for the sail support arms. Fir or pine 1x1s or one-inch diameter aluminum tubing make satisfactory support arms. The arms on the windward side are screwed to the hub about three inches to the side of center (to provide more strength), rather than coming out radially. The arms on the downwind side are screwed to brackets made from 1/16-inch aluminum. These brackets set the angle of attack of the sails. They are positioned and then screwed to the hub after the sail material is in place on the arms. The objective is to have a small amount of slack in the sails so they will take on an airfoil curvature when pulling a load.

When viewed from the windward side, each support arm on the downwind side of the hub is positioned clockwise in respect to its mate on the upwind side. This provides the sails with the proper angle to drive the assembly counterclockwise, see Figs. 1 and 2. A 3/4-inch floor flange bolted to the center of the hub couples the sail assembly to the drive shaft.

Any strong, fine-mesh cloth should be suitable for the sails. Mine are made out of bags that epoxy powder came in. The bags appeared to be Dacron. Also, the material was porous. To close up the pores I painted the finished sails with latex house paint. This was very effective but probably unnecessary. I've enjoyed plenty of good sailing on a boat equipped with cotton sails that were porous.

My wife had better things to do than

make windmill sails so I sat down at the sewing machine and did my best. I ended up with crooked, uneven stitches and three colors of thread but luckily, the wind didn't care. If wood is used for the support arms, the sails can be attached with a staple gun but a preferable method is to sew sleeves (wide hems) along the edges of the material. The sails can then be slid over the arms and held in place by a sheet metal screw and washer at each outer end.

This windmill has no tail. The sails operate downwind of the vertical pivot point and act as a tail to head themselves into the wind.

The dimensions given in the plans are what I ended up with and may not be best. Possibly, narrower sails might give more speed and efficiency. Perhaps six sails would be better than four (four

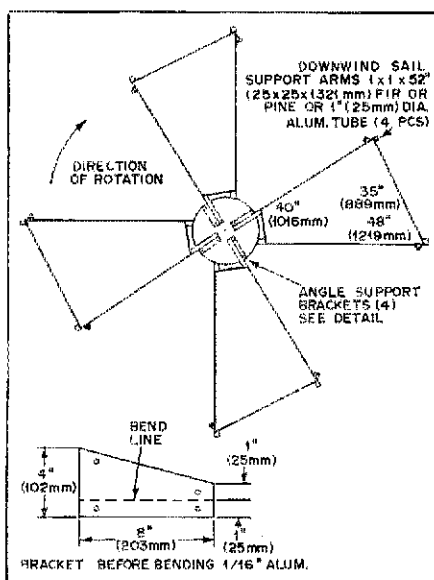


Fig. 2 - The assembly from the downwind side.

sails outperform two). The angle between the upwind and downwind arms is about 15 degrees with the bracket dimensions given. Again, this may be far from optimum.

Bearing and Alternator Mount

Sandwiched between the ends of two 11 x 26-inch pieces of 3/8-inch plywood are two 22-inch pieces of 2 x 4. The upper 2 x 4 extends beyond the plywood plates in a downwind direction and serves as the base for the driveshaft bearing blocks and the vertical swivel-point bearing. The bearing blocks are 3-1/2-inch pieces of 2 x 4 to which are screwed 3-1/2 x 3-1/2-inch pieces of 3/4-inch plywood. The 2 x 4 pieces are bored out to clear 3/4-inch water pipe (slightly over 1 inch). The plywood pieces are bored or sawed out to accom-

modate the ball-bearing races. For most of my experiments I've been able to buy reasonably good bearings from a surplus-machinery dealer. In this case the bearings should have an inside diameter slightly larger than 3/4-inch pipe, 1-1/4 inch typically. The two pipe-to-bearing adapters will have to be turned out on a lathe. They are made of 1-1/2-inch lengths of 2-inch diameter cold-rolled steel. Try for a hole through the center that's a slip fit over 3/4-inch pipe and a shoulder that's a snug fit to the bearing race selected. The thickness of the bearing, of course, determines the length of the shoulder. Drilled and tapped holes in the 2-inch diameter portion of the adapters accommodate 1/4 x 28 bolts which act as set screws to hold the adapters in place on the pipe. A bearing block is bolted at each end and on top of the upper 2 x 4 with 3/8-inch threaded stock. It is best to mount the blocks with the grain of the wood vertical. Underneath the upper 2 x 4 and centered 5 inches from the upwind end is a 1-inch floor flange which has been narrowed slightly (with a hacksaw) to fit the 2 x 4. The flange and an 18-inch piece of pipe screwed into it form the pivot bearing and shaft that allow the assembly to turn into the wind. The 1-inch pipe slips into a 13-foot piece of 1-1/4-inch pipe used for a mast.

The lower 2 x 4 extends beyond the plywood side plates in an upwind direction. It has a 2-inch diameter hole in line with the pivot shaft to allow the 1-1/4-inch pipe mast to go through. Two L brackets screwed to the 2 x 4 support a 5/16-inch bolt that goes

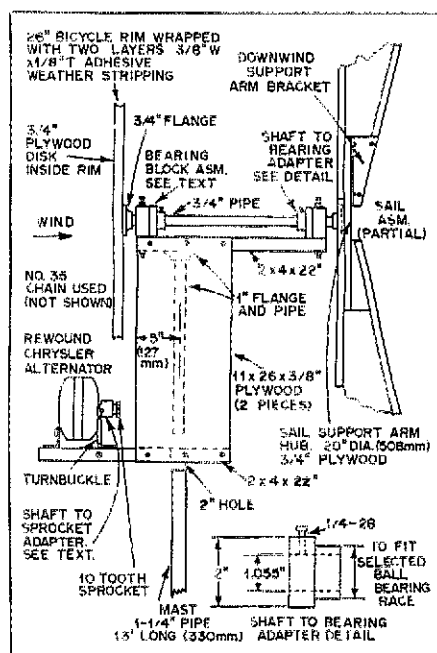


Fig. 3 - Details on the drive assembly.

through the mounting ears of the alternator. One end of a turnbuckle is bolted to the hole in the alternator that normally engages the slotted section in an automobile installation. The other end is screwed to the side of the 2 X 4 in a spot that will allow up and down adjustment of the alternator.

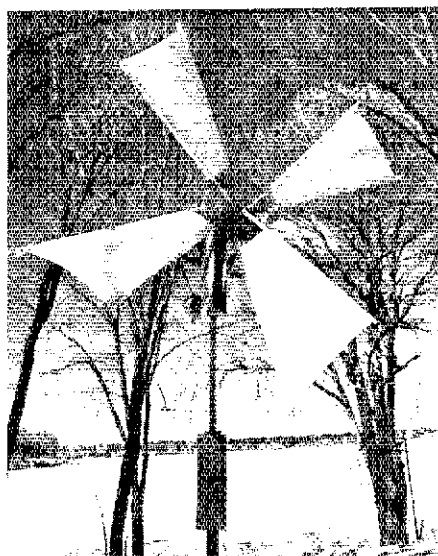
The Chain-Drive Method

Coupling energy out of a windmill was a difficult problem for me. I experimented with belt-, gear- and friction-drive methods a long time before tackling the chain-drive approach. The big problem was the lack of high-ratio sprockets. I finally managed to make a 160-tooth sprocket that more or less matched some small-size chain and an 11-tooth sprocket obtained at a surplus outlet. This arrangement was used on the seven-foot sail model and gave much better low-wind performance than a V-belt system on the same windmill. The old-time bicycle engineers were smart!

A former go-kart enthusiast gave me an assortment of sprockets and no. 35 chain. This was the basis for the present system. The big drive wheel is a 26-inch bike rim nailed onto a 3/4-inch plywood disk. The breakthrough came when I discovered that foam rubber would grab the chain sufficiently well for the purpose — no teeth needed. Two layers of 3/8-inch wide x 1/8-inch thick adhesive-back weatherstripping wrapped around the rim do the job. Unfortunately, the top layer requires replacement every month or so.

In order for the chain drive to work smoothly, extreme care must be taken to cut the plywood disk precisely round. The floor flange that couples to the drive shaft should be mounted precisely in the center. Another problem is finding a floor flange whose base is a true 90 degrees with respect to a pipe threaded into it. I ended up threading a flange on a piece of pipe and facing it off square in a lathe. The chain drive won't tolerate much wobble.

Using a wheel puller and a propane torch, it was a difficult job to pull the pulley off the alternator. Making a shaft-to-sprocket adapter was another lathe job. It would be easier to leave the pulley on, drill holes through it and bolt on a metal plate with appropriate spacers; then bolt the sprocket to the plate. The 10-tooth sprocket I used

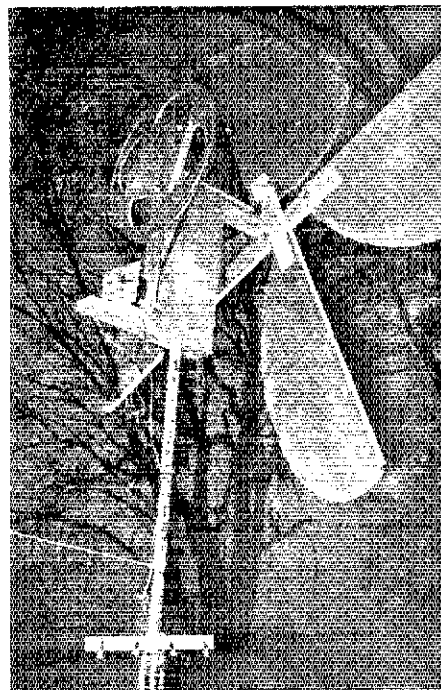


Even though it is down in the trees, close to ground level, this nine-foot sail model produces useful power.

resulted in a 21:1 increase in speed. The no. 35 chain is an overkill; bicycle chain would be adequate.

P-M Motors, Generators and Alternators

For low-power wind-generator applications a permanent-magnet motor is a splendid performer. If it turns at all it puts out power, plus there's no field to absorb precious amperes. However, these motors seem to be scarce items and at most windmill speeds will not develop their rated motor voltage. The one I used for the six-volt system had a motor rating of 12 V at 3 A. It charged the six-volt battery at up to a 6-A rate. The one used in the 12-volt system was quite a bit larger, with a motor rating of 24 V at 4.5 A. It charged a 12-volt battery at an 8-A rate.



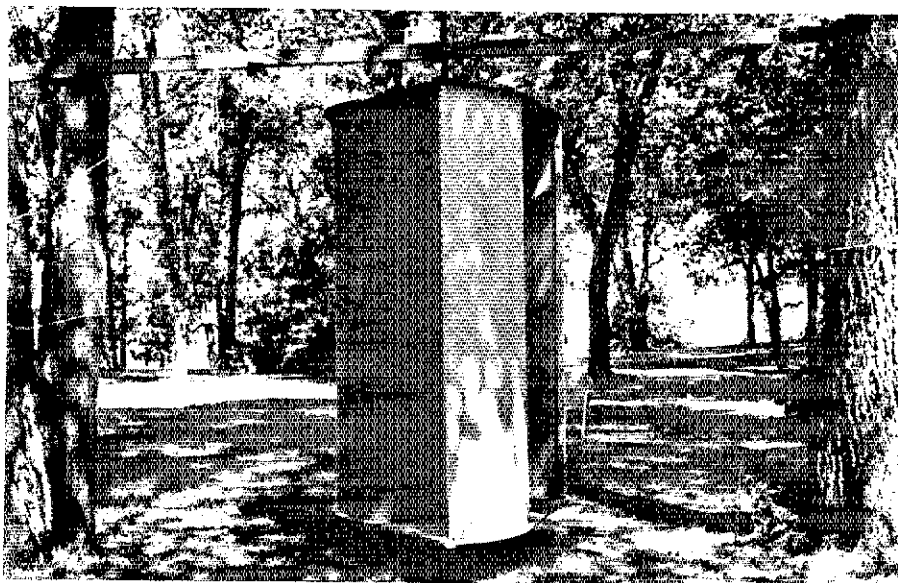
This is the nine-foot plywood paddle model that gave the same output as the nine-foot sail but, heavy and fragile, it soon broke.

When I told the fellow at the auto junkyard I wanted a couple of generators and alternators for wind-power experiments, he sold me five of each at a very reasonable price. I used a 1/3-HP motor equipped with a step pulley for testing purposes. A couple of old publications^{1,3} indicated that generators of the 30s started charging at 600 to 800 RPM. My generators of the 50s had to be driven to almost 2,000 RPM before they would energize their fields. They could be activated at 1,500 RPM by placing permanent magnets on their housings. I tried sloshing mineral spirits on the commutator of a generator while driving it at 1,350 RPM. Almost instantly it started charging a battery at a 6-A rate. This cleaning method worked on three other generators.

One of the alternators was a Chrysler product with a burned-out stator. I rewound it as suggested by K6TPS.⁴ The original 16-turns-per-loop winding is replaced with 26 turns of no. 20 per loop. For the rewinding operation a tongue depressor and a couple of handles from artist brushes were useful tools for contouring the turns and packing them into place. The rewound alternator has an admirable feature that makes it the recommended choice for this wind generator. It's self energizing, eliminating the need for an external field supply. For the amount of power likely to be developed, a field current of 1-1/4 amperes is sufficient. The brake-light filament of a no. 1034 lamp makes



An early experiment, this giant pinwheel was made out of a four-foot scrap of linoleum.



Yes, we know what it looks like — but it ain't! This is a Savonius model. You could climb inside and get a wind-powered ride!

a good current limiter. A reverse-current diode should be included to prevent the field circuit from discharging the battery.

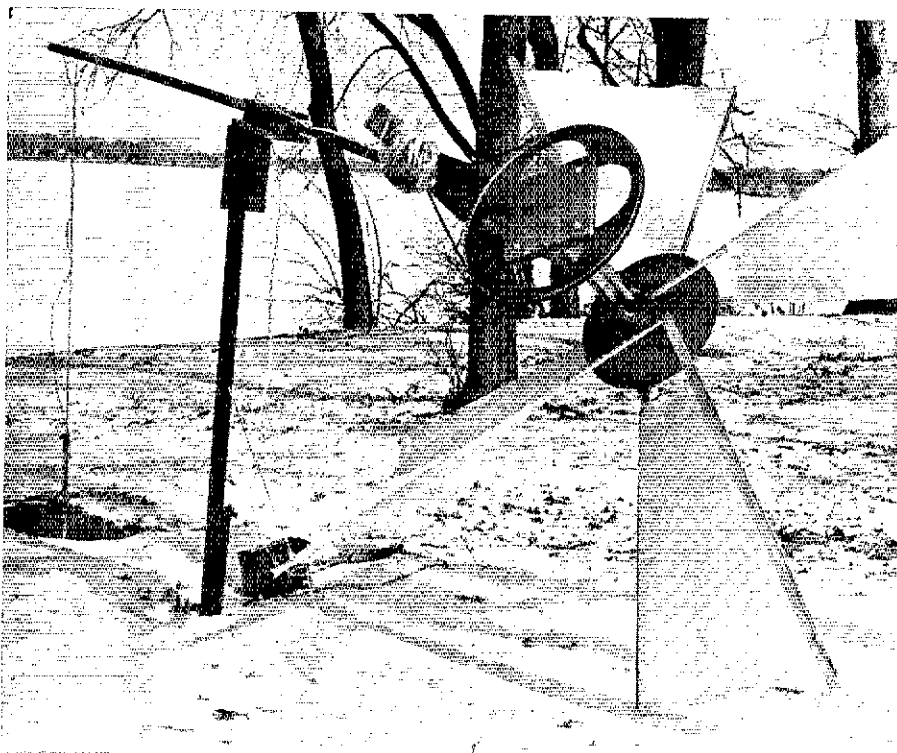
Performance

The capriciousness of the wind made data taking a tough job. Also, my wind gauge, a type that has a small ball pulled up a tube by the wind blowing over it, was prone to hang up from moisture

condensation and static electricity. The low and high ranges didn't exactly agree. Nevertheless, I believe these figures will be acceptably close. With the P-M motor as a generator, a barely indicated charge occurred at 7 to 8 mi/h wind speed. Ten mi/h gave 1 ampere, 12 mi/h gave 2 amperes, and the highest I measured was 8 amperes at 18 mi/h. Voltage directly at the generator was 18 volts and at the battery,



This is the seven foot bowed windmill that was set up in W&DPM's field, a much better location for winds than my QTH.



Ordinary gate hinges are used so that the mast can be tilted over and the unit can be worked on. This is a pretty good shot of the pulley arrangement.

slightly under 15 volts. Three volts were lost in the no. 18 lamp cord and reverse-current diode. Since then I've changed to no. 12 Romex for the power cable.

The rewind alternator starts charging at 10 to 11 mi/h. It gives 1 ampere at about 12 mi/h, 2 amperes at about 13 and the highest measured, 8 A at 20 mi/h. The sails start to turn at 4 mi/h with either generating unit. As a comparison, the maximum I could charge a battery with the 1/3-hp motor driving my best alternator was 11 amperes. For another comparison — with the drive section clamped to a low bench for convenience, I was bushed after maintaining a 3-A charge rate for two minutes by turning a crank mounted on the big drive wheel (using the P-M motor as a generator). I could only jerk the crank to a 5-ampere surge. When I tried cranking the alternator, I couldn't even maintain a 1-ampere charge!

This design has no provision for high-wind shutdown or protection. The seven footer in WØDPM's field withstood 45-mi/h gusts. The nine footer has been subjected to 35-mi/h gusts from the north. These figures were according to the weather bureau and not actually measured by me. When a strong gust hits the sails, I believe there is some flexing of the support arms, causing the sails to spill some of the wind. Anyway, they stand lots of gaff.

Application

I use two old car batteries. While one is being charged by the wind generator, the other is connected to my fm transmitter which draws a couple of amperes in transmit. I use the rig a great deal and so far I haven't had a battery go below 3/4 charge because by then, the one on the generator is fully charged. If the wind generator were located where it received strong winds from all directions

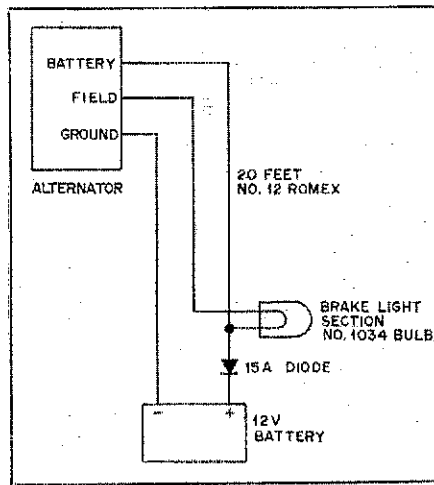


Fig. 4 — Charging circuit.

and was connected to four car batteries, I'm sure it would keep a 100-watt rig powered for average nightly use — I

don't know about for Sweepstakes!

Those interested in more power should refer to articles by K6TPS⁴ and Haven Noble⁵. I got a good look at Haven's wind generator: It's smooth, efficient and powerful.

No, a wind generator that most of us are likely to build won't reduce the light bill appreciably, and it will probably never pay for itself. But there is something wonderfully satisfying about using a little bit of Mother Nature's real-time energy instead of the stuff that took her 100-million years to make. QST

References

- ¹ Lynch, "A More Efficient Impeller for Wind Driven Generators," *QST* for April, 1935.
- ² McColly-Buck, "Homemade Six-Volt Wind Electric Plants," Special Circular, Jan. 1939, North Dakota Agricultural College.
- ³ Autopower, by Autopower Inc., St. Louis, MO (Revised Edition 1943).
- ⁴ Sencenbaugh, "Energy Crisis," *QST* for Feb. 1974.
- ⁵ Noble, "The Noble Windgenerator," *Alternate Sources of Energy* No. 24, Feb. 1977.

Profile of a Hard-Core Experimenter

Lots of people talk about the energy crisis, but few generate the enthusiasm to do anything about it. A talented self-trained electronics tinkerer, Carl Heinen is convinced that others can do what he did.

By Joel P. Kleinman,* WA1ZUY

What kind of guy would put his energies into building a wind generator in this age of freeze-dried foods and factory-built ham gear? A very determined one!

Carl Heinen is a self-taught technician, often the best kind. A list of electronics projects he's scraped together in his basement workshop could fill a small notebook. Some he's given away; some he's still using, years later. But each has served its purpose, and served it well. Likewise, his windmill is obviously homebrew, but functional just the same.

When I first called him, he modestly protested his unsuitability for a QST interview. After we had chatted a while,

he got more and more used to the idea, and a portrait of a multi-talented man emerged.

You won't find a tower on Carl Heinen's property. In fact, his antenna farm consists of a maze-like series of wire strung in his basement. It's typical of his homespun attitude toward ham radio. As the self-acknowledged build-it-yourself experimenter will tell you, he "just doesn't seem to get much pleasure out of things I buy already made. Enjoyment, yes; satisfaction, no."

His wind generator, honed from spare and scrap parts — and looking like it — is the culmination of more than 40 years of designing and building radio

gear and accessories. At age 13 he put together a crystal set, and was hooked on a hobby that has turned into a career as well.

No Interest in WAS, DX

The 1935 *The Radio Amateur's Handbook* provided the stimulus for his first tuned rf project, a two-tube receiver (see photo). After five or six years of assembling a station, piece by piece, Carl broke down and got himself an amateur radio license.

"I was always interested in seeing what I could do with what I had," he remembers. "I just liked working guys: I had no interest in Worked All States or DX."

And it's a good thing, since the first homebrew equipment he built as a

*Editorial Assistant, *QST*

licensed ham was a 30 Hartley QRP transmitter, boasting all of one-third of a watt input. "I worked four states with it, though," he says, laughing.

Many projects later, in 1956, he designed one of the first ham-bands transistorized receivers, earning him a *QST* cover article that year. "Unfortunately," he recalls now, "there was a mistake on a diagram. A fellow from Brooklyn asked me about it and I set him straight. He was so pleased to have it finally working that he sent me a leather camera case full of tubes in appreciation. I still use it, 20 years later."

Employed as a research technician at Honeywell, the 56-year-old ham/builder found his job and hobby through a natural affinity for designing and building electronics projects. Another impetus was his college major, Spanish, which in turn was cultivated out of a deep-seated enjoyment of Latin music. What better way to listen than to track down South American broadcast stations — with a homebrew receiver, of course.

Amateur Radio Helped Out

It took only a few months of practice teaching to convince him that he preferred electronics to small children, and he found a job at a Honeywell plant near his alma mater, the University of Minnesota. He's been there for 30 years, gradually progressing to his present position. His total lack of technical training, save for a stint as a radio operator in the Army, hasn't handicapped him a bit. "Amateur radio sure helped out there," he says.

Not surprisingly, his talents are well used at work, where he builds and designs experimental circuits with applications as varied as three-dimensional

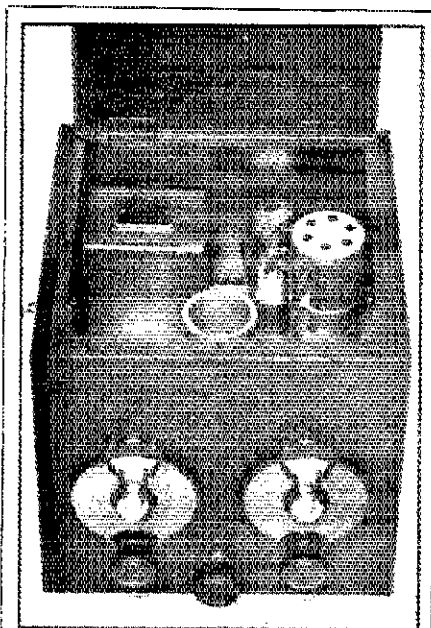


FIG. 512—THIS TWO-TUBE RECEIVER HAS A CONTINUOUS FREQUENCY RANGE OF 1450 TO 41,000 KILOCYCLES AND GIVES COMPLETE BAND-SPREAD ON FIVE AMATEUR BANDS

It can be used with either 1.5- or 6.3-volt tubes without change in the wiring. The right-hand dial gives general coverage and that at the left gives band-spread around any frequency for which the general-coverage dial may be set.

The photograph and caption of the two-tube ham-bands receiver taken from *The Radio Amateur's Handbook*, 1935 edition.

television and welder's helmets.

Carl Heinen lives with his wife in White Bear Lake, MN, about 10 miles from the Twin Cities. Their spacious, tree-studded backyard that ends at the lakeshore seems more suited for another of Carl's hobbies, boat building, than generating electricity from the wind. But there the windmill stands, a crude but functional symbol of our past as

well as our energy-tight future. Its builder is quick to point out that his attempt to harness the wind bears little resemblance to a cost-efficient energy producer. Having been raised in Iowa, he recalled that windmills commonly supplied electricity for farms before the REA brought it through wires in the 1930s. If 3 kW can be generated in a 25-mph wind with a 15-foot diameter windmill, he figured one of his design could supply enough power to fully charge a car battery, which in turn would power his amateur radio station.

A Working Wind Generator

After the painstaking trial-and-error that afflicts all creative people, Carl Heinen had himself a working wind generator. He readily admits that it won't win any beauty prizes ("When you're experimenting, things stay crude," he says), but it surely does what it is supposed to do: supply enough power to fully charge a half-charged car battery during a windy night. "It's not really going to save much electricity," he admits; but it may very well do something more significant.

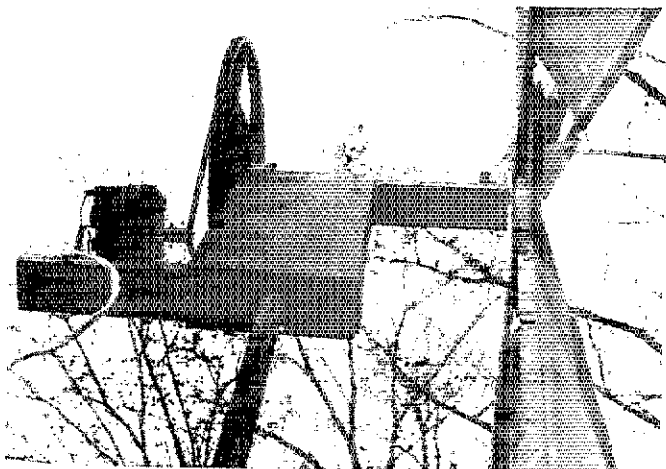
In the back of his mind is the hope that others will expand upon his modest venture and probe the ancient art of wind generating for themselves. "I'm kinda hopin' guys will take an interest and say, 'Gee, I've got more ability than that guy; I can build a better one.' But there's always that hesitancy to take the plunge."

With the exception of one neighbor who "really enjoys it," the response from friends and co-workers to his wooden contraption has been somewhat less than enthusiastic. But Carl Heinen foresees an upsurge of interest as the amateur community comes to recognize the utility of wind-powered machines as

With his windmill in its "cranked down" position, its builder inspects the inner workings. His homebrew catamaran (left) and Savonius rotor (right) can be seen in the foreground.



The mechanism that produces power from the winds blowing off White Bear Lake is readily apparent in this view.



alternate energy sources.

Not easily satisfied with the status quo, he is already thinking of ways to preempt others who will try to improve on his design.

"I'd like to change the angle; try six

sails," he says as he examines his creation, adding, with a smile, "I'd almost like to try carving a high-efficiency propeller and use a permanent magnet motor instead of an alternator."

Once the wheels begin churning full-

speed ahead, there's little doubt that the next windmill to sprout on Carl Heinen's backyard will do a great deal more than the first.

But it probably won't look any better than its predecessor. QST

Strays



45 YEARS OF HAMMING ATOP MT. WASHINGTON

"Despite the seventy-mile wind, we managed to repair the antenna so that Mac could carry out his sked with Claremont. However, later in the afternoon the far end of the eighty-meter antenna pulled loose and the lead-in brace gave way. A few minutes later the forty-meter antenna also failed. The adverse conditions imposed on our antennas during such a storm are impossible to exaggerate. Heavy thick ice exceeding two inches in diameter encircles the wire, which is also subject to the strain imposed by a seventy-mile wind."

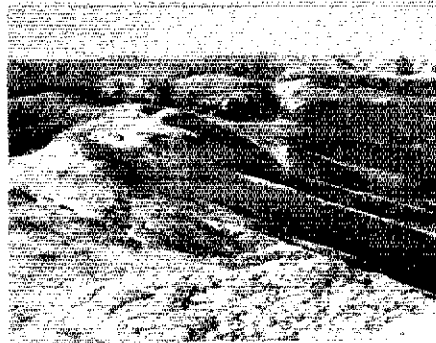
□ Taken from *Mount Washington Re-occupied*,¹ by Bob Monahan, this description gives some idea of conditions at the summit of the 6,288-foot-high peak, the Northeast's highest. The hardy group of hams who braved that winter of 1932-33 were monitoring and relaying weather information during the Second International Polar Year. Their experiments helped show that uhf waves are subject to deviation from the line-of-sight path, a vital contribution to propagation theory.

Amateur Radio was vitally important both to the volunteers who manned the hastily winterized Stage Office on the summit and to the success of the entire mission. Weather data and time signals would not wait for someone to hike up or down the mountain. There was little chance that a telephone line to the valley below would survive the long, harsh winter and even less chance that anyone trying to mend a break would be successful. Prime power at the Stage Office was of small capacity and most of its output was needed to supply the heated anemometer. Extreme icing made it impossible to keep antennas for the low frequencies up in the air.

Henry S. Shaw, W1FGA (later W1JK), of Exeter, NH, chairman of the Board of Directors of General Radio Co., provided the first 5-meter equipment. A second set was constructed by

Alex McKenzie, W1BPI/W1ECV, of that first winter's crew, for use at the foot of the mountain. Weather information was relayed via this "uhf link" to Joe Dodge, W1UN/W1OB, who was manager of the Appalachian Mountain Club's nearby camp at Pinkham Notch. Joe in turn relayed the data on lower frequencies to Al Sise, W1ASF/W1CSF, in Brookline, MA.

That winter's experiments with uhf transmissions from Mount Washington led to the conclusion that deviations in the propagation path were caused, at least in part, from inversions in the normal temperature gradient. Prior to



The view from the kitchen window, our backyard in winter. On a good day you can see 130 miles, but most of the time it's less than 130 feet. (Photo courtesy of Mt. Washington Observatory)

that time, frequencies of 60 MHz and higher were known as "quasi-optical frequencies" because of the general belief that they could provide only line-of-sight transmissions. A low-power contact between the Mount Washington Observatory and W1CSP at the Blue Hill Observatory, 142.5 miles away, made it clear that these frequencies would be usable over distances that far exceeded the line-of-sight.

Following the pioneering work on this subject by Greenleaf Whittier Pickard, W1FUR/W1XZ and Al Sise, along with Harvard's Dr. Charles F. Brooks, the late Ross Hull, *QST* associate editor, contributed a brilliant addi-

tion to propagation studies resulting in his classic *QST* article (June, 1935), "Air Mass Conditions and the Bending of Ultra-High Frequency Waves."

Since those times of pioneering scientific work, many amateur operators have lived, worked and hammed on the top of the "Rock Pile." Included were some who did it at the TV/fm station next door: Mack Beal, W1PNR; Arthur Bent, W1COO (SK); John Dick, W1KAZ; Bill Durland, W1LRZ; John Edgerton; Ted Everett, W1TNO; Lafayette Gosselin, W1AP; Joe Caron, K1KWU*; Willie Harris, W1HQZ/K1CCN*; Wendell Lees, W1FMG; Al Oxtan, K1OIQ*; Gordon Pugh, W1JTB; Pete Steady, W1OST; Ken Thompson, W1PS (now K4RO); Norm Turner; Pat Harney, W1NIU (now W2IEN).

Today the Observatory is home to WR1AAL (146.07/67) and the primary location of K1OIQ. Including amateur equipment, there are 55 to 60 (the number varies from day to day) transmitters located on the summit: amateur, commercial, state and federal. Sometimes it seems they are all going at once!

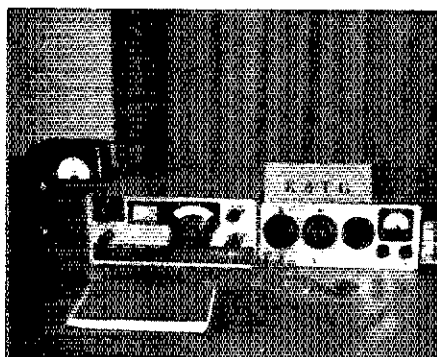
This year marks the 45th anniversary of the re-occupation, in October 1932, of Mount Washington by a scientific party. The Mount Washington Observatory was founded four years later. To celebrate the amateurs' part in these past 45 years of research, education and public service from the top of New England, we will operate a multiband amateur radio station at the Observatory for a 24-hour period from 1200 EST Saturday, July 23 to 1200 EST Sunday, July 24, 1977. We expect to be on 80 meters (Novice cw); 20 meters (SSB); 15 meters; 6 meters (a-m); 2 meters (fm and perhaps SSB); and 70 cm (fm). During this celebration we will use the call W1BPI, assigned to Alex McKenzie, of the first crew, who will be with us on the mountain. We expect to re-enact on 2 meters some of the early 5-meter point-to-point experiments. A special QSL card will be sent to all who send their card with reception report and include an s.a.s.e. to: 07-67, Mount Washington Observatory, Gorham, NH 03581. — Al Oxtan, K1OIQ

¹ Brattleboro, VT: Daye Publishing Co., 1933. The record wind measured at the summit of Mount Washington, located in New Hampshire's White Mountains, is 231 mph. *Present residents

Full Break-in and RIT for the HW-8 QRP Transceiver

Make your HW-8 transceiver really versatile by adding QSK and RIT to an already neat little package. The modifications are inexpensive and simple, but what an improvement in operating characteristics!

By Ben Saylor,* K6TG



RIT control in upper left corner of HW-8 panel is set for normal operation at a frequency below the received signal. A field-strength meter is at the left. The Ultimate Transmatch is behind the key, and the HWA-7-1 power supply is on the extreme right.

The slow system of changing from transmit to receive on the HW-8 can be annoying. For this reason, almost immediately after getting my HW-8 operational, I sought a way to improve the changeover system.

My first observation disclosed that the antenna relay has a tiny, lightweight armature which moves slightly between closely spaced send-and-receive contacts. Noting that this relay has a winding and a keying circuit that exert a powerful pull on this armature, it became apparent that the relay should follow high-speed keying; therefore, the basic requirement for a fast break-in system was already in the HW-8.

I wondered what would happen if the hold circuit of the relay would be disabled intentionally. Disengaging that part of the circuit proved that the relay followed the keying perfectly. However, there was no full QSK because the audio silencing circuit was just as slow as before. Only after the silencing circuit was disconnected could the HW-8 be

operated with full break-in, but another disconcerting situation needed to be resolved. The key thumps coming through the headset seemed as though they would knock my head off. Existence of key clicks was verified by the use of another hf receiver and a hand-held bc set. Beyond that, the signal sounded great with faultless keying.

One might reason that the clicks from keying a little 3-watt rig would scarcely be worth worrying about. Who would hear them anyhow? But, any performance fault should be corrected. The cure resulted from installing a previously removed capacitor at a different point in the circuit (plus the addition of another capacitor). Even the bc set displayed no interference unless it was less than one foot from the open HW-8.

While the key clicks were no longer evident on the air, the headset still reproduced very loud thumps, the last stumbling block to obtaining trouble-free full break-in for the HW-8. With more work, a few tricks, and a pair of diodes, this problem was overcome. Only with the volume control set at a high level could some weak clicks be heard. Success had been realized and my HW-8 was ready for fast action.

Starting the Modification

The HW-8 has plenty of room between the shell and the bottom side of the big circuit board for adding small parts. Most of the work is done on the bottom side of the main circuit board (where the new parts are to be mounted). In making the required changes reference should be made to the circuit-board X-ray views on pages 78 and 79 of the manual for the HW-8, as well as the large separate schematic diagram that accompanies the manual. Tables 1 and 2 list the parts required for the modifications to convert the HW-8 to RIT (receiver incremental tuning) with



The modified HW-8 is shown in this photograph with Dick Simpson, W6JTH at the key in Mariposa County during the California QSO Party.

full break-in. The parts may be obtained at Radio Shack stores, or equivalent components can be purchased from other suppliers.

The two diodes, previously mentioned, are to be placed across the output of the audio filter for use as limiters. Many types of diodes were tried, but only the specified type would do the job of reducing the thumps in the earphones. These are ordinary silicon black-bullet one-ampere diodes. It is wise to test diodes with a VOM for shorts, opens, polarity, low forward resistance and high reverse resistance.

These diodes (Fig. 1) are to be connected between the ground foil and the L-shaped foil as indicated on the upper left-hand corner of the circuit-board diagram. The cathode of one diode and the anode of the other are attached to C38 and hole EE.

A tie point is now to be made using a defective diode. Cut the lead from the pointed end (if it is pointed) and file the end flush. With a sharp awl, make a tiny hole through the circuit board at the tie point indicated in Fig. 1. Push the remaining lead of the defective diode

*Box 2314, Modesto, CA 95351

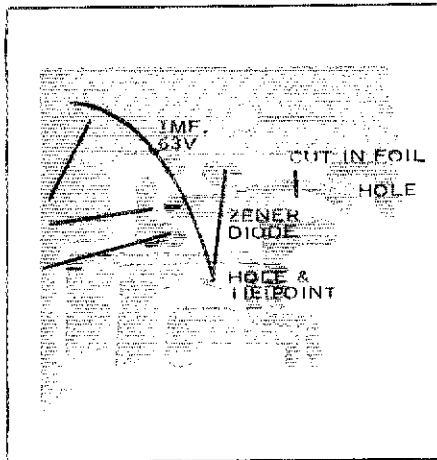


Fig. 1 — Modifications of the main circuit board for full break-in. See page 79 of the HW-8 manual. The area shown is a portion of the upper right-hand corner of the layout drawing.

through the new hole from the inside. Pull it tight, make a tiny loop against the bottom of the circuit board, and cut off the excess lead. This becomes the tie point.

Mount the 1- μ F capacitor as illustrated in Fig. 1. Place it tightly together with the two diodes. Yoke the capacitor down by means of a piece of bare hookup wire which is soldered with the negative capacitor lead to the ground foil. Slip a length of spaghetti insulation over the positive capacitor lead, leaving enough of the wire exposed to solder it to the tie point. At this time give the rig a quick test to be sure it operates as before, being positive first that there are no solder bridges under the new parts.

Next, remove C92, which is located behind the Trimpot control situated near the relay. This 10- μ F capacitor is part of the delay circuit. Replace C92 with a 1- μ F capacitor of the same type. By turning the delay control fully counterclockwise and then advancing it clockwise to 1/3 of the range, radiation of key clicks on the "break" should be prevented.

Mount the removed 10-pF capacitor as shown in Fig. 2, using a yoke of bare wire. This is connected from the base of the keying transistor Q11 to ground and will prevent the emission of key clicks on the "make." The transmitter will still key properly.

Refer again to Fig. 1. By using a knife blade or awl cut the foil as indicated so that "C" of the mute transistor Q14 is disconnected from the input of the audio preamplifier. Full break-in is now possible but the thumps will still be heard in the headset. With the aid of Fig. 1, use the awl or a small drill to puncture another tiny hole through the circuit board at the edge of the foil near Q14.

Remove the mounting screw from the af amplifier circuit board and pull the amplifier away from the side wall to expose the foil side. With the aid of the drawing on page 78 of the HW-8 manual remove solder from the bottom left-hand corner foil until you can force the awl or drill through the mounting hole of C201. Enlarge this hole to accommodate the lead from C201 and a piece of hookup wire. Remove 1/4 inch of insulation from each end of a 3-1/2 inch length of the hookup wire. After inserting one end of this wire in the enlarged hole, solder it to C201. Remount the audio amplifier. Insert the other end of the 3-1/2 inch wire through the new hole in the big board and solder it to the foil along with "C" of Q14. This connects the muting circuit to the input of the final audio stage.

Cut the foil as shown in Fig. 2. Install a one-ampere silicon diode across the cut in the foil with the cathode soldered to point J along with the 47-k Ω , 1/2-W resistor. Mount the resistor so there is no chance of it making contact with the nearby relay stud. These changes reduce the thumps in the earphones.

Install the Zener diode as indicated in Fig. 1 with the banded (cathode) end being connected to the tie point. The cathode lead *must* be insulated. The circuit performed better after this component was installed.

After adjusting the sidetone volume control (R77) to your liking and readjusting the delay control, R68, the full break-in modification is complete.

Receiver Incremental Tuning

RIT is almost essential for fast cw operation when using a transceiver. But, adding a capacitor and a varactor diode to a transceiver VFO can upset the dial calibration. Numerous problems may arise while trying to add RIT to any previously constructed set, especially

when the new RIT must work with a full break-in system. Not so with the HW-8.

Once it was decided to use C47 in the VFO for the RIT capacitor, the Yaesu FT-101 RIT circuit,¹ and the electron-IC switch described in Grebenkemp's article "RIT for the HW-7,"² no problem was encountered other than juggling a few resistors.

Fortunately, it is not necessary to drill the panel of the HW-8 because Heath has provided a hole at an ideal location for the RIT control and filled it with a rather superfluous selectivity switch. This switch was used only during the first week of my operation following assembly of the HW-8. I then left it permanently in the "narrow" position.

More than enough RIT swing is obtainable with this system: No change results in the transmitted frequency when the RIT knob is tuned throughout the full range. The main dial calibration is not degraded, and there is no adjustment problem. This RIT is 100-percent compatible with the full break-in system. The new circuits use less battery power than does the removed offset circuit containing D11 and R36. A subminiature switch on the rear panel gives an instant comparison of RIT zero with the transmitter frequency.

Select a control knob of reasonable size with a good "feel" as well as a clear index mark at the base. This knob will be used constantly. The panel "zero" mark may be anything from a pencil mark to a neat dial plate. A piece of thin opaque material, 1-3/4 \times 1-3/8 inches, may be extended from the top of the panel to cover the letters associated with the selectivity switch. The latter will be replaced by the new RIT control potentiometer. A dot of white paint in a 1/16-inch hole drilled at the precise top center point above the dial will make a fine zero indicator. Old

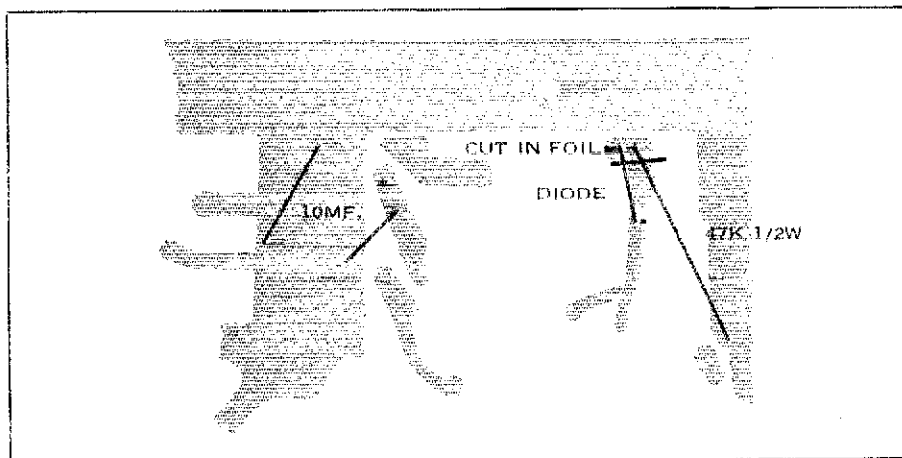


Fig. 2 — Main circuit-board changes for full break-in. The area shown is from the lower right corner of the layout diagram on page 79 of the HW-8 manual.

Table 1

Parts required for full break-in modification of HW-8. Components are available at Radio Shack stores. Radio Shack part numbers are shown.

- 3 — 1-ampere, silicon, black bullet diodes, no. 276-582.
- 1 — Defective diode for tie point (not to be used electronically).
- 2 — 1- μ F, 63-V dc tubular capacitor, no. QV1-11.
- 1 — 47-k Ω , 1/2-W carbon resistor, no. 271-042.
- 1 — Zener diode, 6.8 volt, 1 watt, no. QRT-238 or Zener diode, 6.2 volt, 1 watt, no. QRT-237.

plaques from surplus gear have good back sides. The outer black lamina may be drilled to expose the white interior. Cutting a line in the proper place with a thin saw blade is difficult. I recommend drilling, just barely into the white layer. One mark is all that is needed.

For the 10-k Ω RIT control, TRW and CTS Snaptrol potentiometers with replaceable bushings in various lengths are suitable. The control chosen should be small enough to fit into the available space. The threaded bushing must be long enough to go through both the front panels and any dial plate.

The two nails (N1 and N2) are 1-inch long, brass plated and 18 gauge. They serve as escutcheon pins. However, 3/4-inch copper plated 17-gauge weatherstrip nails can serve as good substitutes. Both are stocked by some hardware stores, hobby shops, home-improvement centers and lumber yards. You may ask why the can of food and the cup appear on the parts list: They serve as special tools. The can is used merely as a weight, but the polystyrene

cup is needed for holding the tiny varactor diode in place during soldering.

Preparing the HW-8 for RIT

Remove the leads from the selectivity switch. Insulate the black lead with spaghetti sleeving. Solder the red and white leads together and insulate them with sleeving. Fold back and tape these leads to their cable. Place the cable between the terminal strip and the meter, lashing it to the terminal strip bracket with a piece of carpet thread. Next, remove both the panel and the selectivity switch. Mount a pair of 16-k Ω , 1/2-W resistors on the terminals of the 10-k Ω RIT potentiometer as indicated in Fig. 4. Install the potentiometer and provide for the zero mark prior to replacing the panel.

Drill two 1/16-inch holes through the side wall near the potentiometer, 1-1/4 inches from the corner and 1/4 and 3/8 inches respectively from the top. Drill two similar holes in the same wall, 1/4 inch from the rear corner. These are for holding the RIT potentiometer cable in place. Drill a 1/4-inch mounting hole for the toggle switch in the rear panel near the chassis connector, 2-1/8 inches from the end of the panel and 1-1/8 inches from the top. Make two 1/8-inch mounting holes near the toggle-switch hole for the dual inline IC socket. Both should be 7/8 inch from the top, with one 2-7/8 inches and the other 4-1/8 inches from the end of the panel. On the inside, scrape the paint away from these holes. From the outside insert two 4-40 X 1/2-inch round-head machine screws in the holes using a soldering lug and then two nuts on each for fastening. Face the lugs toward each other and tighten all nuts. Be sure that the IC socket fits properly. Then mount the toggle switch so that the handle will

Table 2

Components needed for RIT modification. All electronic parts are identified by Radio Shack part numbers. The nails (escutcheon) may be obtained at hardware stores or hobby shops. Packaged quantity shown in parentheses.

- 1 — Knob with index, no. 274-416 (four).
- 1 — Panel zero mark.
- 1 — 10-k Ω linear pot, of good quality.
- 2 — Nails.
- 1 — Can of food (for weight).
- 1 — Foam cup (polystyrene cup).
- 1 — Silicon varactor diode, no. QRT-262.
- 1 — 0.01- μ F 100-volt disk capacitor, no. QC1-141.
- 1 — Dual inline IC socket, no. 276-024 (pair).
- 2 — 4-40 X 1/2 in. roundhead machine screws, no. KF-470 (box).
- 6 — 4-40 X 1/4 in. hex nuts, no. KF-557 (box).
- 2 — Size 4 soldering lugs, no. KT-196 (box).
- 1 — Subminiature dpdt toggle switch, no. 275-614.
- 1 — 1000- Ω Trimpot, no. 271-227.
- 3 — Silicon npn amp. transistor, no. QRT-102 or similar.
- 1 — 10-k Ω , 1/4-W carbon film resistor, no. QR4-A10K (four).
- 1 — 1200- Ω , 1/2-W carbon film resistor, no. 271-024 (pair) or no. QR4-B1K2 (four).
- 2 — 47-k Ω , 1/2-W carbon film resistor, no. 271-042 (pair) or no. QR4-B47K (four).
- 4 — 16-k Ω , 1/2-W carbon film resistor or 15-k Ω resistor, no. 271-036 (pair) or no. QR4-B15K (four) or 18-k Ω resistor, no. QR4-B18K (four).

Resistors are 10-percent tolerance.

move vertically from the outside of the rear panel.

Next, remove C55 and R36 from the front center of the main circuit board. This eliminates the fixed offset that will be replaced by the variable offset of the RIT. Refer to Fig. 3A and page 79 of the manual. Reorient, if necessary, the leads of C44, C45 and C46 in order to clear the corner of the foil where the

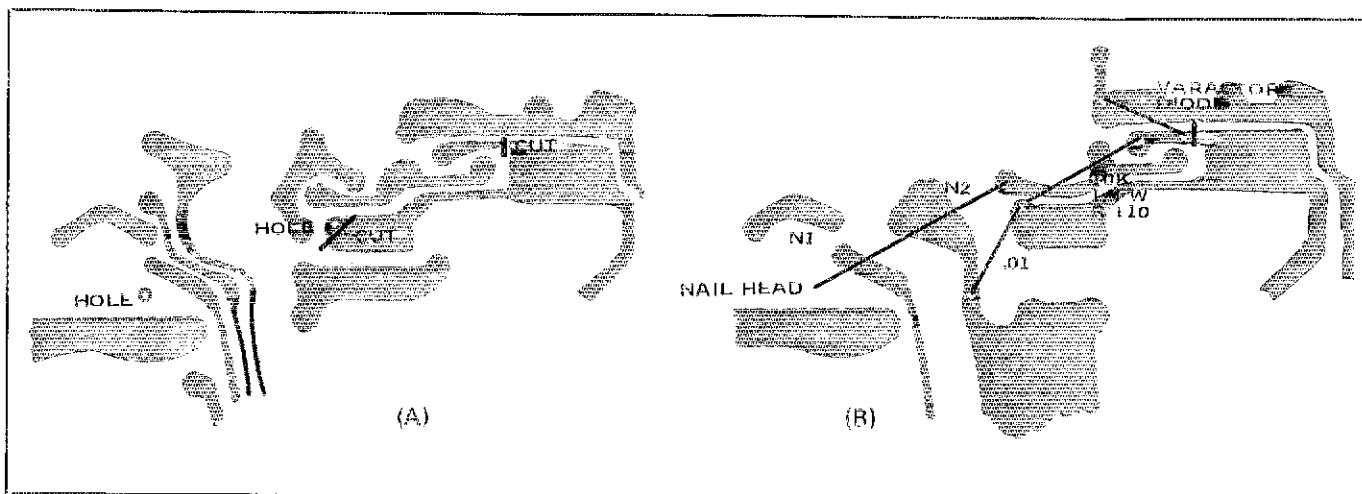


Fig. 3 — At A, modifications of the main circuit board for adapting the HW-8 to RIT. This section is from the left center section of the layout drawing shown on page 79 of the HW-8 manual. At B, the locations of component changes for modifying the HW-8 for RIT. The illustrated portion is from the lower left section of page 79 of the HW-8 manual.

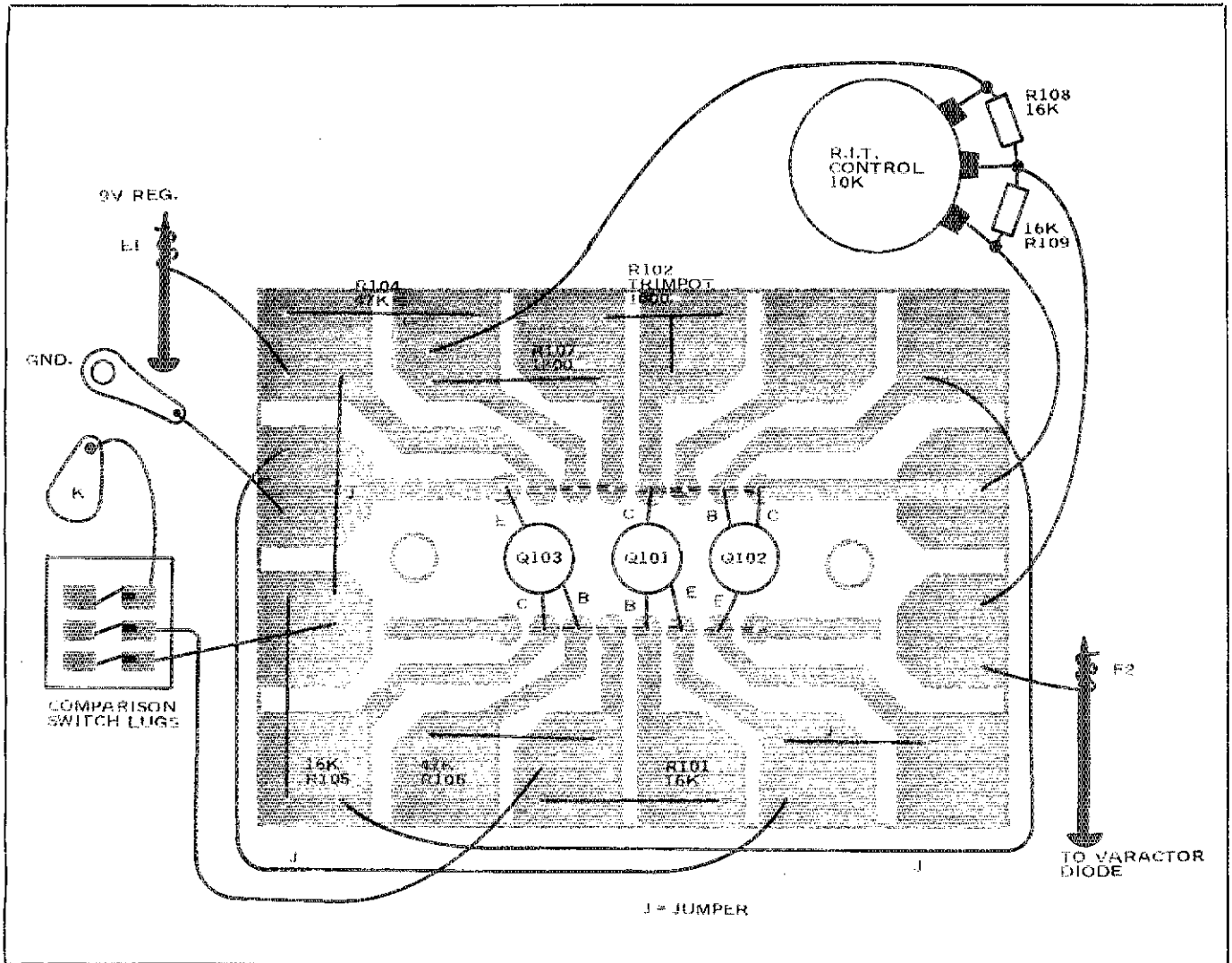


Fig. 4 - The electronic switch with all connections is shown as viewed from the foil side. All parts and wires are mounted on the opposite side.

hole and cut are to be made. With a drill smaller than the diameter of the nails, drill two holes as indicated by Fig. 3A. One hole is drilled on the corner of the foil. With a razor blade and the awl, cut the foil as indicated and remove the small triangle of foil. Enlarge the two holes with the awl so the nails will fit snugly. Place the nails in the holes with the heads standing 1/8 inch above the foil side. Carefully remove more foil, if necessary, so that the nail is isolated.

Turn the rig upright, and with a toothpick place a small amount of epoxy glue around the two holes. Allow this to harden overnight. Make the other foil cut as indicated (Fig. 3A) to free C47 for new duty as the RIT capacitor. It will perform as originally intended, but the path to ground will be through the varactor diode instead of through C44, C45 and C46.

With Fig. 3B and page 79 of the manual at hand, solder the jumper to the foil which is connected to the banded end of ZD1. Insulate this jump-

er with sleeving. Wrap one turn of the free end around the nail. Then bend the jumper across the head of the nail and solder the jumper to the head. Do not attempt to solder under the head.

Cut and form one lead of the 10-k Ω , 1/4-W resistor for connection to the foil and C47. Now, wrap the other resistor lead once around another nail, then bend the lead across the nail head and solder it to the top of the head. A toothpick placed under the lead may help while soldering. The leads should next be bent so that the resistor will lie in such a fashion that the unsoldered end may now be soldered to the foil and C47. Examine your work and test the circuit with a VOM for shorts to adjacent foils.

Prepare the varactor diode for installation by cutting and forming the leads as indicated. The banded end (cathode) is connected to the foil attached to C47. Arrange the diode to lie in place with leads resting on the foil. Invert the foam cup and place the rim on the body of

the varactor diode. Put the can of food on top of the cup. One lead of the diode will be exposed. Solder this lead quickly, then cool it by blowing air. Do the same with the other lead. Do not reheat the soldered connections. If necessary, whittle excess solder away in thin slices by using a razor blade. Recheck the cut in the foil and clear any unwanted bridges with the awl. Again test for shorts with a VOM. Appearance of any high-resistance readings will be normal, but a dead short indicates a solder bridge.

The cup and toothpick will be useful next while installing the 0.01- μ F capacitor. After the capacitor is connected use the VOM again to test your work. Unsolder the yellow wire from point K (hole K) located inside the cabinet near the relay. Fold this wire back along the cable.

Construction and Installation

The electronic switch that applies and removes the RIT is built on the IC

socket. Work with Fig. 4, which shows the foil side at a scale of 4 to 1. With a razor blade trim and alter three of the four lands near the two mounting holes, as shown. This is done to avoid unwanted grounds caused by the nuts.

Drill holes at the indicated points for resistors, jumpers and wires. Drill three larger holes to fit and mount the Trimpot. All parts and wires are mounted on the other side. Mount and solder the five 1/2-W resistors and the Trimpot as well as the two short jumpers. Mount and solder the three transistors, placing them 1/2 inch above the board in order to provide easy access to the mounting holes. Install the two long insulated jumpers. Route them to avoid interfering with the mounting holes.

Connect the eight external wires as indicated in Fig. 4. Make these sufficiently long to reach the designated areas. Cut the ground wire to a length of 4 inches and solder it to both soldering lugs. Place the electronic switch on the mounting screws with the foil side toward the panel and with the Trimpot on top. Install and tighten the last two nuts. Four nuts were previously tightened on the bolts.

After placing one wire behind the electronic switch, twist together the three wires for the RIT control and extend them across the top of the rear panel and along the left side to the control. Lash them in place at each pair

of mounting holes by means of carpet thread. Solder these leads to the lugs of the control potentiometer. The wire shown on the center lug (potentiometer arm) must be connected in this manner. The other two wires are interchangeable.

Leaving plenty of slack, solder the two wires to the two bottom pairs of lugs on the microminiature switch as shown in Fig. 4. Do not interchange them. Attach the wires to the nails, wrapping three turns around the end of each nail, then solder the joints (see Fig. 4). Note that these two wires do not cross.

Solder a piece of wire to the empty top pair of switch lugs. Extend it behind the electronic switch, over the nuts, and down to point K near the relay where it is soldered. This is the keying lead to the electronic switch. You may now replace the bottom cabinet shell.

Adjustment and Final Steps

Install the knob so that it will turn the same arc each side of the zero mark. Some change may be necessary later to allow the same frequency shift each side of zero.

Place the knob on zero and the microminiature comparison switch in the DOWN position. Tune a strong signal to zerobeat. Put the comparison switch in the UP position and adjust the Trimpot for zeroheat. Set the main dial

for a low beat note and slightly readjust the Trimpot to the point where there is no change in the note when the comparison switch is flipped up or down. The Trimpot has changed the transmit frequency to coincide with the receive frequency when the RIT knob is on zero.

Adjust the Trimpot in the UP position. Operate the HW-8 in the DOWN position. The UP position allows listening on the transmit frequency while only the electronic switch is keyed.

Substitution of resistors and variations in components selected for use could put the above adjustment out of the Trimpot range. Change the value of R107 (if necessary) to bring the circuit into adjustment. Other resistor configurations may be used in the electronic switch. The one shown with this article was used to reduce the RIT action to 5 kHz on each side of zerobeat. Interchanging the outer leads on the potentiometer will reverse the knob action.

Turn next to page 62 of the manual and perform the alignment of the VFO with the RIT knob set at zero. This realignment will be slight. Replace the top cabinet shell. The RIT modification is now complete.

Operation

See Grebenkemper's article² for a good method of using RIT. Another approach is to leave the knob offset from zero and adjusted to the loudest beat-note point (about 3/16 inch on my dial plate). But in so doing, you must tune the main dial to the correct side of the signal. Your RIT must be adjusted to a frequency lower than your own transmitter frequency if you are listening on a frequency lower than the received signal. This may be checked by flipping the knob to an equal position on the other side of the zero mark. The signal should then reappear at the same beat note. Many times QRM can be completely dodged by this flip. Practice is needed to get the most out of your RIT.

Remember, the transmitter frequency is always at the zero mark. Only the receiver frequency is changed by the RIT knob. The main dial changes both frequencies. But, now you can copy with the pencil in one hand and keep the signal tuned in, yet dodge QRM by means of the RIT knob. Furthermore, you can listen up and down the band while you call CQ. It's a whole new game for your HW-8. If you like fast break-in, the QSK feature should appeal to you.

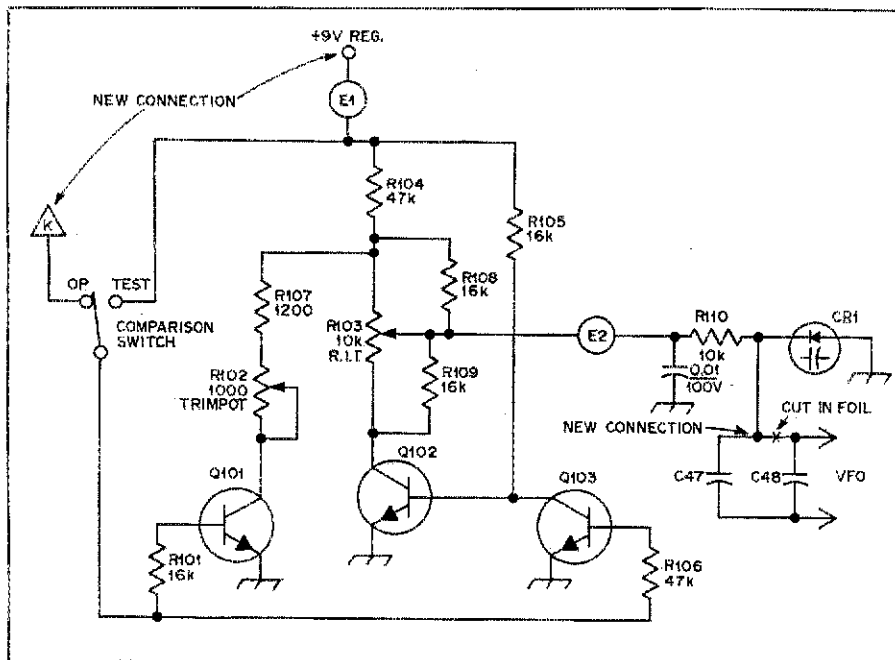


Fig. 5 — This diagram shows the complete RIT circuit. The three points marked as "new connections" are the points where the new circuit is connected to the HW-8 foils.

C47 and C48 — Original parts of HW-8

CR1 — Varactor diode, Radio Shack part no. QRT-262 or equivalent.

N1 and N2 are feedthrough points for the nails.

Q101-Q103 — Radio Shack part no. QRT-102 or type 2N3565 transistor.

R103 — 10k ohm RIT control potentiometer (linear-taper). Resistors are 1/2 watt, 10 percent composition except R110 which is 1/4 watt. Point K is on the main circuit board.

The 0.01- μ F capacitor is a disk ceramic type.

Footnotes

¹ Yaesu FT-101 Instruction Manual, p. 37.

² Grebenkemper, "RIT for the HW-7," QST for July, 1975.

Build This Solid-State Titan

Part 2: Last month we learned how to assemble the solid-state 180-watt Titan amplifier. Now it's time to learn some dos and don'ts about the design procedure.†

By Helge Granberg,* K7ES/OH2ZE

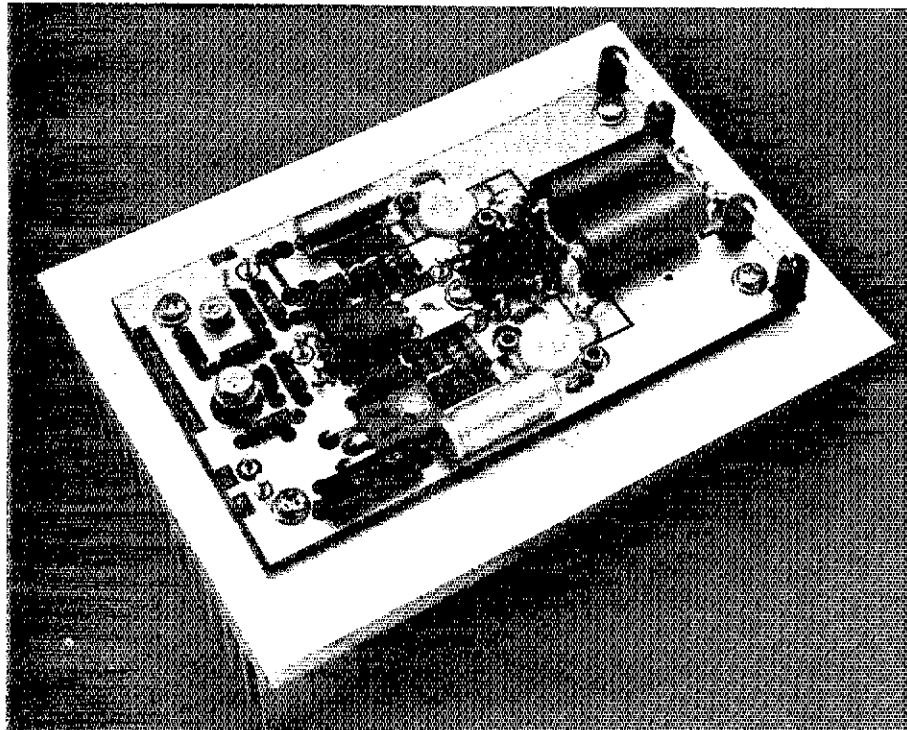
Smooth predictable solid-state amplifier performance does not always come as easy as it did with vacuum tubes, and we will learn something about this as we get into the meat of Part 2 — the concluding installment of this paper. Some useful performance curves are included in this section for those who are interested in the parameters from an academic point of view.

General Design Considerations

Since the primary and secondary of T3 are electrically isolated (Fig. 1, Part 1), the collector dc blocking capacitors, which may also function as low-frequency compensation elements, have been omitted. This decreases the loss in rf voltage between the collectors and the transformer primary, where every 100 mV amounts to approximately 2 W in output power at the 180-W level. The rf currents at the collectors operating into a 2-ohm load are extremely high

$$I_{rf} = \sqrt{\frac{180}{2.0}} = 9.5 \text{ A, or peak } \frac{9.5}{.707} = 13.45 \text{ A} \quad (\text{Eq. 1})$$

Similarly, the resistive losses in the collector dc-voltage path should be minimized. From the layout diagram of the lower side of the circuit board (Fig. 3, Part 1), we can see that the V_{CC} is brought through two 1/4-inch wide runs, one on each side of the board. In case of the standard 1-ounce laminate, the copper thickness is 1.4 thousandths of an inch, and their combined cross-sectional area would be equivalent to



View of the assembled solid-state Titan amplifier.

no. 20 wire. This is hardly adequate to carry the dc collector current which, under worst-case conditions, can be over 25 A. Thus, for the high-power version of this design especially, 2-ounce or heavier copper laminate is recommended, or these runs should be reinforced with parallel wires of sufficient gauge.

The thermal design (determining the size and type of a heat sink required) can be done with information in the device data sheet, and by means of the formulas presented in references 7 and 8. As an example, with the 180-W unit

which uses MRF421s, the junction to ambient temperature (R_{ja}) is calculated first as

$$R_{ja} = \frac{T_j - T_a}{P}$$

where

T_j = maximum allowed junction temperature (150°C),

T_a = ambient temperature (40°C),

P = dissipated power $(\frac{180}{\eta}) \times (100 - \eta)$

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†Part 1 appeared in QST for June, 1977.

and
 η = collector efficiency (percent).

If the worst-case efficiency at 180 W cw is 55 percent, then $P = 148$ W, and

$$R_{ja} = \frac{150 - 40}{\frac{148}{2}} = 1.49^\circ\text{C/W}$$

(for one device).

The heat sink to ambient thermal resistance, $R_{sa} = R_{ja} - (R_{jc} + R_{cs})$ where R_{jc} = device junction-to-case thermal resistance, 0.60°C/W (from data sheet).*

R_{cs} = thermal resistance, case to heat sink, 0.1°C/W (from table in reference 7).

Then

$$R_{sa} = \frac{1.49 - (0.60 + 0.1)}{2} = 0.395^\circ\text{C/W}$$

This number can be used to select a suitable heat sink for the amplifier. The information is given by most manufacturers for their standard heat sinks, or specific lengths of extruded material. E.g., a 9.1-inch length of thermalloy

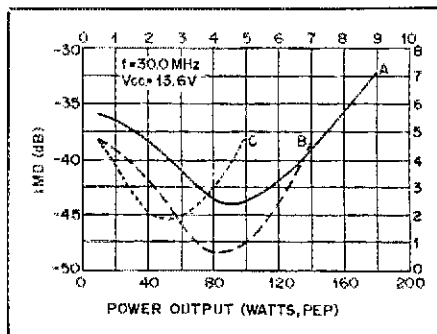


Fig. 4 — Representation of power output respective to IMD for the three amplifiers.

6153 or a 7.6-inch length of Aavid Engineering 60140 extrusion would be required for a 100-percent duty cycle, unless the air velocity is increased by means of a fan or other circulator system.

Performance and Measurements

The performance of each amplifier was measured with equipment similar to that which is described in reference 2. The dotted lines in Figs. 4, 5, 6 and 7 represent the 100-W module, the dashed lines represent the 140-W unit, and the solid lines refer to the 180-W version. The presented data are typical, and

* [Editor's Note: The θ_{jc} figure of 0.875°C/W given for the MRF421 is in error. This will be corrected in future prints of the data sheet.]

References can be found at the end of Part 1, June QST.

spreads in the transistor h_{FE} s will result in slight variations in rf power gain (Fig. 4).

The performance data are also affected by the purity of the driving source. There should be at least 5 to 6 dB of IMD margin to the expected

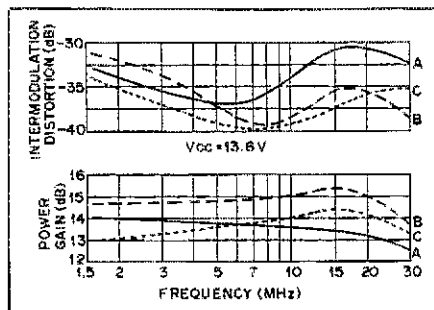


Fig. 5 — Curves illustrating IMD and power gain versus frequency.

power-amplifier specification, and a harmonic suppression of 50 dB minimum below the fundamental is recommended.⁹

The IMD measurements were done in accordance to the E.I.A. proposed standard, commonly employed in ham radio and other commercial equipment design. The distortion products are referenced to the peak power, and adjusting the tone peaks 6 dB below the 0-dB line on the spectrum-analyzer screen (Fig. 8) provides a direct reading on the scale.

The collector efficiency under two-tone test conditions is normally 15 to 20 percent lower than at cw. The load line has been optimized for the peak power (as well as possible in a broadband system with transformer impedance ratios of 4:1, 9:1, 16:1, 25:1, etc. available), which at ssb represents a smaller duty cycle, and the power output varies between zero and maximum. Typical figures are 40 to 45 percent, and 55 to 65 percent, respectively.

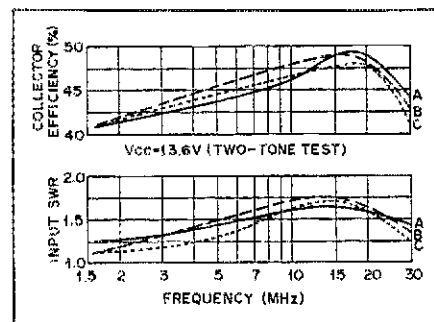


Fig. 6 — Input SWR and collector efficiency versus frequency are shown by these curves.

The stability and load-mismatch susceptibility were tested at 15 and 30 MHz employing an LC network² to simulate high and low reactive loads at different phase angles. The maximum degree of load mismatch was controlled by placing high-power 50-ohm attenuators between the amplifier output and variable LC network. A 2-dB attenuator limits the output SWR to 4.5:1, 3 dB to 3.0:1, 6 dB to 1.8:1 and similar, assuming that the simulator is capable of infinite SWR at some phase angle. The attenuators for -1.0 dB or less were constructed from a length of RG-58/A coaxial cable, which at 30 MHz has an attenuation of 3 dB/100 feet, and at 15 MHz 2 dB/100 feet. Combinations of the cable and the resistive attenuators can be used to give various degrees of total attenuation.

The tests indicated the 100-W and 140-W amplifiers to be stable up to a 5:1 output SWR at all phase angles, and the 180-W unit was stable up to 9:1. All units passed a load-mismatch test at full rated cw power at an output load mismatch of 30:1, which they were subjected to, until the heat-sink tem-

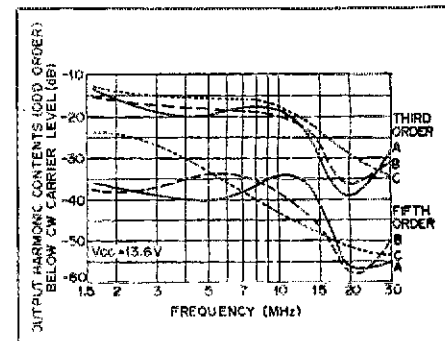


Fig. 7 — Odd-order harmonic characteristics respective to frequency in MHz.

perature reached 60°C . For this, the simulator was motor-driven with a 2-second cycle period.

Output Filtering

Depending on the application, harmonic suppression of -40 dB to -60 dB may be required. This is best accomplished with low-pass filters, which (to cover the entire range) should have cutoff frequencies of 35 MHz, 25 MHz, 15 MHz, 10 MHz, 5.5 MHz and 2.5 MHz, respectively. The theoretical aspect of low-pass filter design is well covered in the literature.¹⁰

A simple Chebyshev type of constant K, 2-pole filter (Fig. 9) is sufficient for 40 to 45 dB of output harmonic suppression.

The filter is actually a dual pi network, each pole introducing a -90° phase shift at the cutoff frequency,

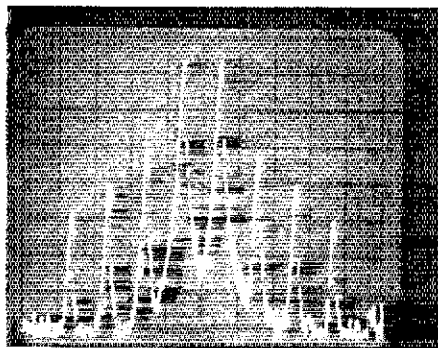


Fig. 8 — Spectral display of the distortion products referenced to peak power (see text).

where L1, L2, C1 and C3 should have a reactance of 50 ohms, and C2 should be 25 ohms. If C2 is shorted, the resonances of L1C1 and L2C3 can be checked with a grid-dip meter to find their resonant frequencies.

The calculated attenuation for this filter is 6 dB per element/octave, or -45

dB for the 3rd harmonic. In practice, only -35 to -40 dB were measured, but this was because of the low Qs of the inductors (approximately 50). Air-core inductors give excellent results, but toroids of magnetic materials, such as Micrometals grade 6, are also suitable at frequencies below 10 MHz. Dipped mica capacitors can be used throughout.

If the filters are designed correctly, and the component tolerances are 5 percent or better, the power loss will be less than 1 dB.

This basic circuit layout has been successfully adopted by several equipment manufacturers. Minor modifications may be necessary depending upon the availability of specific components. For instance, the ceramic chip capacitors may vary in physical size between various brands, and recent experiments show that at least values above 0.001 μ F can be substituted with unencapsulated polycarbonate stacked-foil capacitors, which are available from Siemens Corporation (type B32540) and other

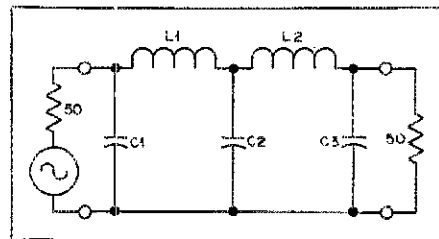
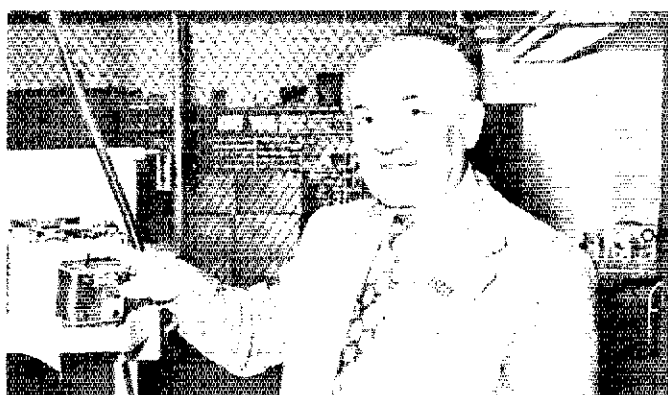
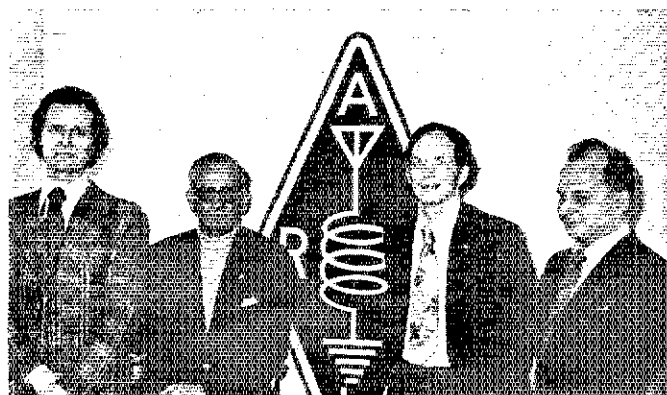


Fig. 9 — Schematic illustration of a half-wave harmonic filter. These amplifiers should not be connected to an antenna unless filtering of this type is employed.

sources. Also T1 and T2 can be constructed from stacks of ferrite toroids with similar material characteristics. Toroids are normally stock items with most ferrite suppliers.

The above is intended primarily to give an example of the device performance in nonlaboratory conditions, eliminating the adjustments from unit to unit. **QST**

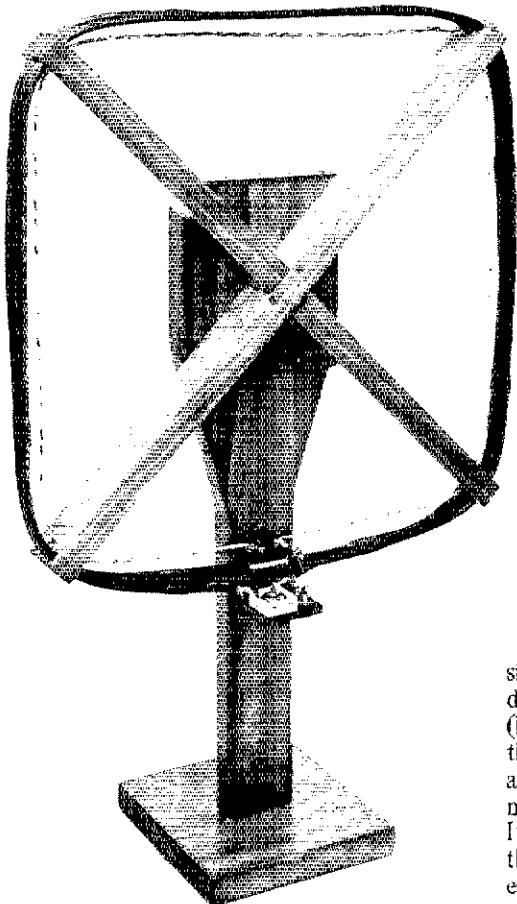
Strays



Four foreign dignitaries in the amateur world paid visits to Hq. in April, in time to see work progressing on the new addition to the building and to admire W1AW's new antenna system. Clockwise from upper left: David Kaplan, CX9AAK, station engineer for 4U1ITU in Geneva looks on during WARC discussions; Joseph Malboise, F6CCI, IARU liaison officer for the REF, French national amateur society, chats with QST Managing Editor Bill Dunkerley, WA2INB; fascinated with the technical department's "CB Slider," M. Malboise poses with it in the Lab; League Assistant General Manager Dave Sumner, K1ZZ, stands with, from left, REF President Jean Coussi, F9FF, M. Kaplan and Reino Janhunen, OH2HK, editor of the Finnish amateur journal, *Radioamatori*.

Beat the Noise with a "Scoop Loop"

By Doug DeMaw,* W1FB



The silhouette is of an indoor version of the four-turn shielded loop described in this article. A wooden framework is used to support the main loop winding and the one-turn pickup link. The resonating capacitor is mounted on an aluminum L bracket along with a phono jack and an 860-pF disk capacitor. The latter is used between the output link and the phono jack instead of a trimmer capacitor. The framework was built by Technical Secretary Marian Anderson's OM, Bob. It has been stained and coated with clear lacquer.

If you've been tempted to massage your receiver with a 10-pound hammer because you can't copy some of the weak signals being heard by your colleagues, you may need a receiving loop! A high ambient noise level on 160 meters has stifled my DX work for several years, and more than once I was ready to capitulate in favor of the man-made and atmospheric noises that my 75-foot shunt-fed vertical responded to. "Grrrr," I would snarl to myself as I listened to stations with Beverage antennas: They were handing out RST 579 signal reports to DX stations, and I couldn't find the DX signals in the noise, let alone copy them.

Something had to be done. It was a matter of giving up on my 1.8-MHz efforts toward DXCC, or putting forth a zealous attempt toward an improved

signal-to-noise ratio. Some effective outdoor receiving antennas were erected (half-wavelength open loop — parallel to the ground, and a 200-foot end-fed wire a few feet off the ground), but they did not always respond well to DX signals: It depended on band conditions. Also, there was the danger of receiver front-end damage caused by unwanted excitation of the large receiving antennas (resonant) during the transmit period. They were in close proximity to the vertical antenna, which I used for transmitting purposes. Lethargy prevented me from installing a protective circuit at the receiver front end, and as a consequence I "blew" a JFET preamp and two protective diodes in the front end of my FT-301D transceiver.

Revisiting the Past

For many years I have experimented with small receiving loops for 40, 80 and 160 meters, but the efforts were casual. The best of the loops was an outdoor one of the shielded variety, five feet on a side, and fashioned from RG-59/U coaxial cable.¹ However, it was necessary to go out-of-doors each time I wanted to rotate it, and I wasn't enthusiastic about investing in a rotator to use with the loop.

Recently, it seemed that some work could be done with indoor types of receiving loops. After all, loops of that kind have been around since radio was invented, and plenty of amateurs are using them effectively. I scanned my available literature (Terman, Kraus, Jasik and Keen),² then set about the task of building a framework for the design of my choice. This time a multi-turn loop would be tested (Fig. 1).

Construction

The photograph shows the general structure of the loop. In Fig. 2 are the

dimensions of the wooden frame used to contain the antenna wires. There is nothing magic about the size of the antenna: I used two pieces of wood that were stored in the workshop, each being 48 inches (1.3 m) long, 1-1/2 inches (37 mm) wide and 3/8 inch (9 mm) thick.

Arbitrarily, I decided to make L1 of Fig. 1 a five-turn winding. Holes were drilled (5) in each end of the cross-frame to accommodate the loop turns and hold them in place. Actually, there should be six holes at the bottom point of the frame to permit the final end of L1 to be secured during the threading-through process.

Five additional holes were drilled (Fig. 2) 3/4 inch (19 mm) below the holes for L1. These are used to contain L2, the one-turn output link of the antenna. L2 requires two holes at the bottom member of the frame — again to provide an anchor point for the ends of L2. Alternatively, V-shaped notches can be filed on the ends of the cross-frame. The wire for L1 can be laid in the grooves rather than threaded through the holes shown in Fig. 2. L2 should, however, be wound inside L1, through the five holes shown in the drawing.

A mounting base for the assembled antenna can be made to the builder's specifications. I used a piece of 3/4-inch plywood which has dimensions of 30 X 12 inches (0.8 m X 300 mm). A one-inch diameter hole (25 mm) was drilled in the center of the board to accept an 18-inch (450 mm) length of 1-inch diameter dowel rod. The latter is lashed to the framework of the loop to enable the operator to rotate the loop as desired. Although this is a "kluge" type of assembly, it serves its purpose adequately. A carpenter should be able to conceive a more practical base and support system for the antenna!

I used no. 22 insulated hookup wire for the loop turns. There is nothing critical about the wire size, but it is best

*Senior Technical Editor, QST

¹ Footnotes appear on page 34.

to use the larger gauges. This will make the loop more rugged.

Performance

A variety of feed systems were tried before I settled for the method illustrated in Fig. 1. Direct connection to the terminals of L1 required careful balancing to assure a uniform loop-response pattern. Unbalance causes pattern distortion, and if it's bad enough the maximum response can occur off the broad side of the loop rather than in the plane of the antenna.

Addition of a one-turn coupling loop, L2, proved to be the easiest method for assuring good balance. Bandwidth of the loop is dependent upon the Q . The latter can be controlled by the amount of capacitance used at C2: the lighter the coupling, the greater the loaded Q . Loop resonance is effected by means of C1. Since there is interaction between L1 and L2, it is necessary to readjust C1 each time C2 is tweaked. In this application it should be stressed that C2 is not used for the purpose of obtaining an SWR of 1. It is purely a coupling device. Hence, a 50-ohm condition does not necessarily exist at the loop output terminals.

During initial experiments the pickup loop, L2, was connected directly to the 50-ohm input port of a 40-dB broadband preamplifier which was designed by W7ZOI (Fig. 3). Without C2 in the circuit the coupling was excessive. This resulted in low Q , and the loop

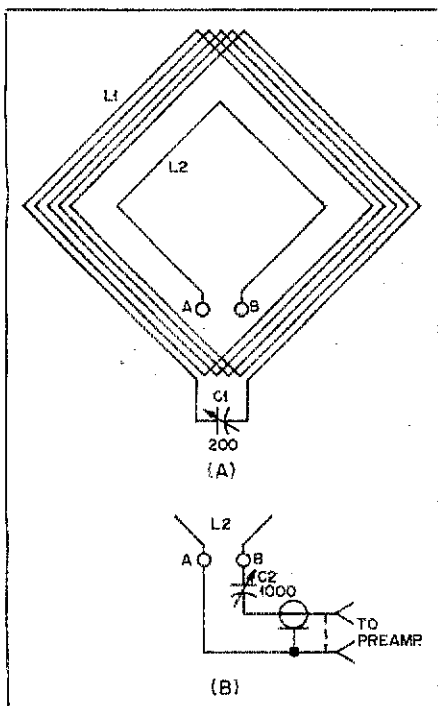
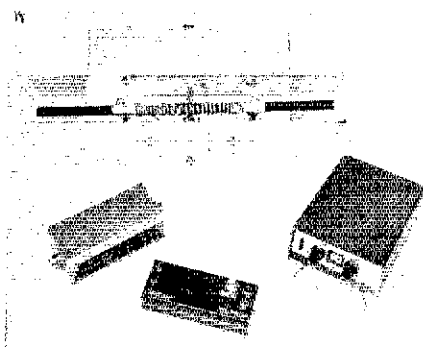


Fig. 1 - Schematic diagram of the receiving loop. C1 and C2 are mica compression trimmers. The illustration at A shows the 1-turn link inside the 5-turn one. At B is an expanded diagram of the feed point for L2.



View of the ferrite-rod loop and test setup accessories. In the foreground (left) is the Butterworth band-pass filter. Below it at the center is the broadband preamplifier, and a Tektronix 2701 step attenuator is seen at the far right.

bandwidth was approximately 150 kHz at the 3-dB points of the response curve. After C2 was added and adjusted to provide a bandwidth of 25 kHz, the loop gain increased 10 dB. Alternatively, one might make L2 smaller and locate it closer to the center of the loop frame in order to lighten the coupling between the two windings. This could be a somewhat tedious mechanical procedure: My inherent lassitude favored the addition of C2 for the purpose!

Performance Characteristics

A test range was set up for checking the null properties and relative gain of the loop. The equipment was arranged in an outdoor location, well away from power wiring and other station antennas. A crystal-controlled weak-signal source (2N2222A oscillator and 9-volt battery) was placed some 100 feet (33 m) from the test loop. It contained a 36-inch (0.9 m) whip antenna (vertically mounted) for radiation of the test signal. The 75-foot (25 m) transmitting vertical was shorted out at the feed point to prevent it from being resonant and affecting the loop antenna during the test period.

A 50-ohm Tektronix step attenuator was placed in the coaxial line between the loop and the receiver. The attenuator was used to measure accurately the changes in S-meter reading on the FT-301D transceiver which was used as a detector during the measurements.

A null depth of -21 dB was obtained with the loop. An extremely sharp null was noted. As the broad side of the loop was moved toward the signal source, the null began slowly, then fell deeply to -21 dB over the final 10 degrees of rotation. No evidence of pattern distortion was observed. The null was dead off the broad side of the antenna, and maximum response was directly off the thin side of the loop.

A comparison between the 75-foot

transmitting vertical (shunt-fed tower, top loaded and with buried radials) and the wire loop indicated that on ground-wave signals the loop (without preamp in line) was -18 dB respective to the vertical. This suggested that in a practical installation a single JFET or dual-gate MOSFET preamp would provide unity gain with the transmitting vertical.

Using the Loop Indoors

My home has aluminum siding, and as is the case with all modern homes there is a network of water pipes, phone wires, TV lead-in conductors and house wiring. I wondered how well the loop would perform within all of these unwanted signal obstacles, some of which form loops by themselves! The ham shack is at ground level inside my family room, and the loop was placed on a stand at floor level. The clutter of unwanted conductors disturbed the directivity of the loop somewhat, but the signal-pickup ability of the antenna was not impaired.

A step attenuator was inserted between the W7ZOI preamplifier and the station receiver so that unity gain could be established between the loop and the 160-meter vertical (22 dB of gain had to be gotten rid of). An antenna switch was added to the system to permit rapid comparisons between the antennas.

Extensive tests proved that the loop outperforms the vertical by a substantial margin when it comes to digging weak signals out of the noise (man-made and atmospheric). I have copied PAØHIP, PYØZAE, G3MYI, W6RW, W6BLZ, W5AB and others perfectly Q5 on the loop (indoors) when they couldn't be found, or were unreadable on the vertical. It is only fair to say that on some occasions the vertical was the better antenna for receiving. Propagation conditions and ambient noise levels at a

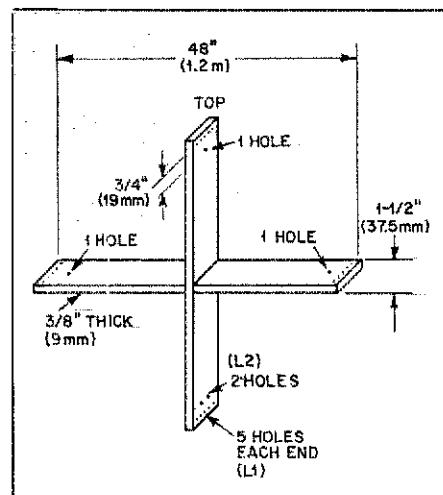


Fig. 2 - Dimensional drawing of the wooden frame which contains the Scoop Loop. Further information concerning the structure is given in the text.

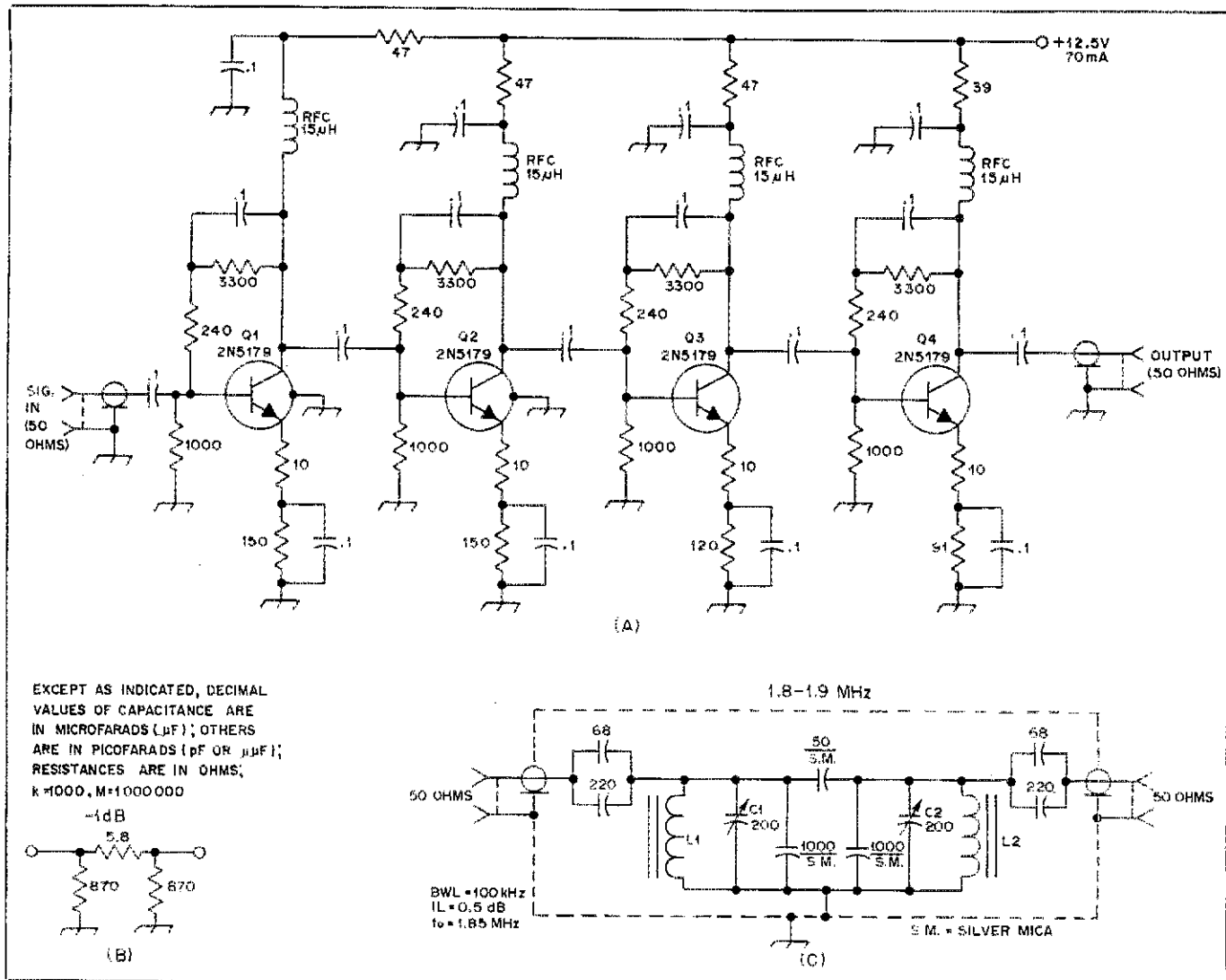


Fig. 3 — The W7ZOI broadband 40-dB preamplifier is shown at A. Capacitors are disk ceramic or chip types. Resistors are 1/4-W composition. The upper 3-dB point of the amplifier is at 65 MHz. Heavy feedback is used to stabilize gain and provide a 50-ohm characteristic. At B is a 1-dB attenuator pad which can be used between an antenna of unknown impedance and the filter at C to provide a proper load for the filter. The Butterworth band-pass filter at C is suitable for use with the preamp at A. It will help reject out-of-band signals to

improve the IMD characteristics of the preamp. When the preamp is used with nonresonant receiving antennas, it will be necessary to employ the filter to protect the preamp from signals across its response range (bc band through vhf). The preamp and filter would be fine for use with Beverage antennas. C1 and C2 are mica trimmers. L1 and L2 consist of 31 turns of no. 22 enameled wire on Amidon T68-6 toroid cores ($5.1 \mu\text{H}$).

given time will determine which antenna can provide the best reception. Typically, the ambient noise level from the WIFB vertical is S3 on a receiver that is calibrated to indicate S9 on a 50- μV signal. The same receiver shows no noise response when the loop is connected to it. However, static crashes (atmospheric noise peaks) are as loud with the loop as they are with the vertical when a storm is in the immediate area. Noise from distant storms can be discriminated against by turning the loop null toward the storm front. It appears that the major part of my ambient noise is man-made in nature. At times it peaks as high as S8.

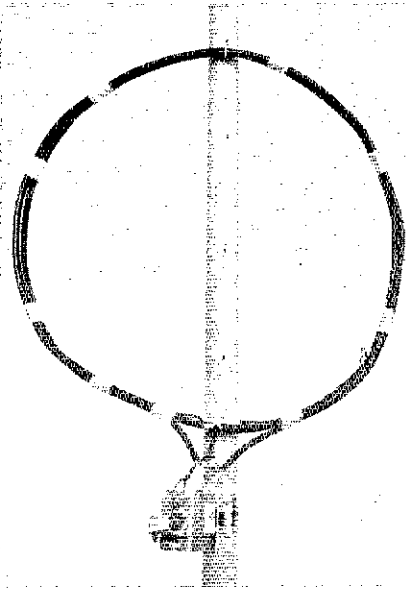
When the loop is used indoors it responds to unwanted 15.750-kHz TV spurs, and when appliances are actuated the transients kick the receiver S-meter

rather hard. This is because the loop is contained within loops formed by house wiring. This type of interference has not been observed while using the vertical antenna, even though it is affixed to the rear of my house. To prove that the house wiring was causing the problem with TV birdies and transients, the loop was located out-of-doors for two nights. The interference vanished!

Some Other Loop Experiments

Ferrite-rod loops have been used to advantage for many years (bc-band radios, direction-finder receivers for boats and aircraft, etc.), so it seemed worthwhile to investigate a model of that type of antenna before concluding my tests. Two versions were tried. The first consisted of a single $7 \times 5/8$ -inch ($175 \times 16 \text{ mm}$) Amidon Assoc. ferrite

rod on which was wound a 40-turn solenoidal coil of no. 22 insulated hook-up wire. The loop was tuned to resonance by means of a 100-pF per section split-stator variable. A four-turn output link was wound over the center of the primary winding. The latter occupied approximately 3 inches (75 mm) of the center portion of the rod. A small aluminum chassis served as the foundation for the antenna, and the rod was spaced some 3 inches above the chassis. Performance tests showed the antenna to be less efficient than the large 5-turn wire loop. As referenced to the 75-foot vertical, the ferrite loop was -38 dB . Furthermore, it was prone to the same induction effects which plagued the wire loop when both were used indoors. The rod-loop null was dismal — some 10 dB!



Photograph of the 4-turn coax loop with electrostatic shielding. The trimmers are visible on aluminum brackets below the loop.

An improved model of the loop was built by using epoxy cement to join together a pair of 7-inch ferrite rods, end to end. The sensitivity (μV per meter) increases with the length of the rod, but is dependent upon the length of the coil which is wound on the rod.⁵ A multilayer coil contained at the center of the rod should be considerably better than a solenoidal coil spread over the major portion of the rod: The shorter the coil, the higher the Q of the antenna.

I did not have Litz wire available, and was unable to build a multilayer coil, so a short solenoidal winding was placed on the center 5 inches (125 mm) of the $14 \times 5/8$ -inch rod. It consisted of 32 turns of no. 12 insulated wire, spaced one wire diameter between each turn. The ferrite rods are made of Q2 material ($\mu = 125$).

Fig. 4 shows the schematic diagram of the rod loop. A four-turn output link is wound over the center of L1. C1 is a mica compression trimmer which tunes the loop to resonance. C2 is used as a coupling capacitor to control the loop loading.

It seemed worthwhile to try shielding the loop, so a pair of aluminum L-brackets were bolted to the chassis as shown in the photograph. Each bracket is $16 \times 3-3/4$ inches (400×94 mm). The shields are spaced 1 inch (25 mm) either side of the loop.

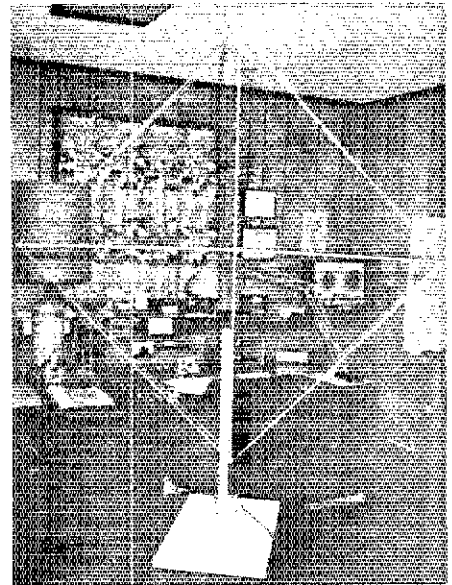
The top of the U-shaped channel must be left open to prevent the shield from acting as a shorted turn. Proof of the effect can be seen by shorting across the open end of the trough (over the center of the rod) with a screwdriver. The received signal will vanish! An electrostatic shield, when used with a

loop antenna, should minimize induced fields from nearby conductors and precipitation static, thereby making the system better for indoor use.

Rod-Loop Tests

The same outdoor test setup was employed for checking the performance of the rod loop. The nulls occur off the ends of the rod, and maximum response is found off the broad sides of the rod. A null of -23 dB was obtained with the loop, but efficiency was less than that obtained with the 5-turn wire loop. When compared to the 75-foot vertical a reading of -31 dB was obtained -13 dB inferior to the wire loop. The noise figure of the W7ZO1 broadband pre-amplifier was too high for use with the new antenna, so a common-gate JFET pre-pre-amplifier was added between the loop output and the input to the 'ZO1 unit. Ideally, a 30- or 35-dB preamplifier (two JFETs) should be used with the rod loop to assure a low noise figure and ample gain.

With the coupling set for maximum loop gain, the bandwidth (measured with an HP spectrum analyzer) is 10



Close-up view of the 160-meter indoor receiving loop at W1FB. The antenna is resting on a piano bench, and is situated near the operating position so that it can be hand-rotated as necessary.

kHz at the 3-dB points. The loop was measured independent of the shields and preamp for unloaded Q by means of an HP Q meter. A reading of 430 was obtained.

The electrostatic shield cured the unwanted pickup of TV spurs and appliance transients during indoor use. I'd like to mention that the wire and rod loops are affected to some extent by the presence of the 75-foot vertical. The latter is only 20 feet away from the operating position. It tends to reradiate noise and signals. Some of that energy is picked up by the loop antennas. If an indoor loop is to be used regularly, or if it is outdoors, but within 100 feet (33 m) or so of the vertical, the latter should be shorted out or detuned during the receive period. An spst relay could be slaved to the regular antenna change-over relay to accomplish this.

An improvement in performance for either type of loop could be had by adding a sense antenna and appropriate phasing circuit (Fig. 5). This would provide a cardioid pattern and result in a unidirectional response. Greater reduction of QRN and QRM would be effected through that technique. A weather-proof system of that type could be placed out-of-doors for year-round use. A TV type of rotator would be useful for changing the loop position, as desired.

The W1FB 4T-ES Loop

During a final investigation of loop types and performance characteristics, an attempt was made to devise a shielded loop small enough to be practical indoors. The primary objective was to develop a loop from ordinary materials

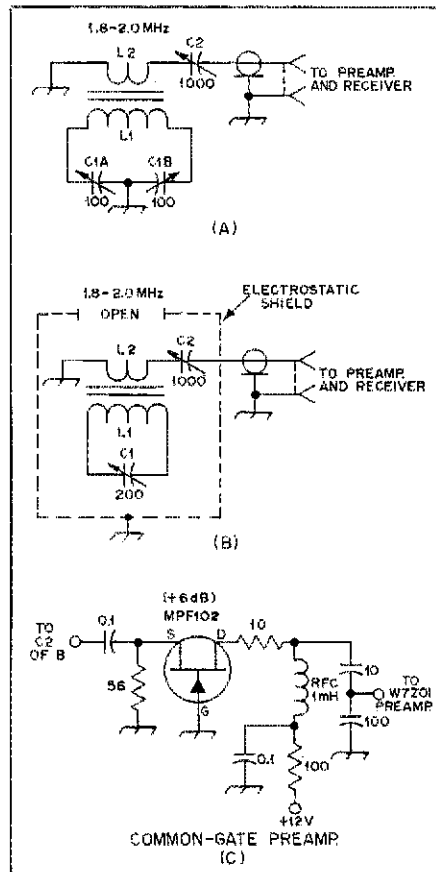


Fig. 4 — The drawing at A shows the circuit of a 7 X 5/8-inch ferrite-rod loop (see text). At B is the final version which employs an electrostatic shield. C1 and C2 are mica compression trimmers (see text for other details). The circuit at C was used ahead of the W7ZO1 preamplifier to improve the system noise figure.

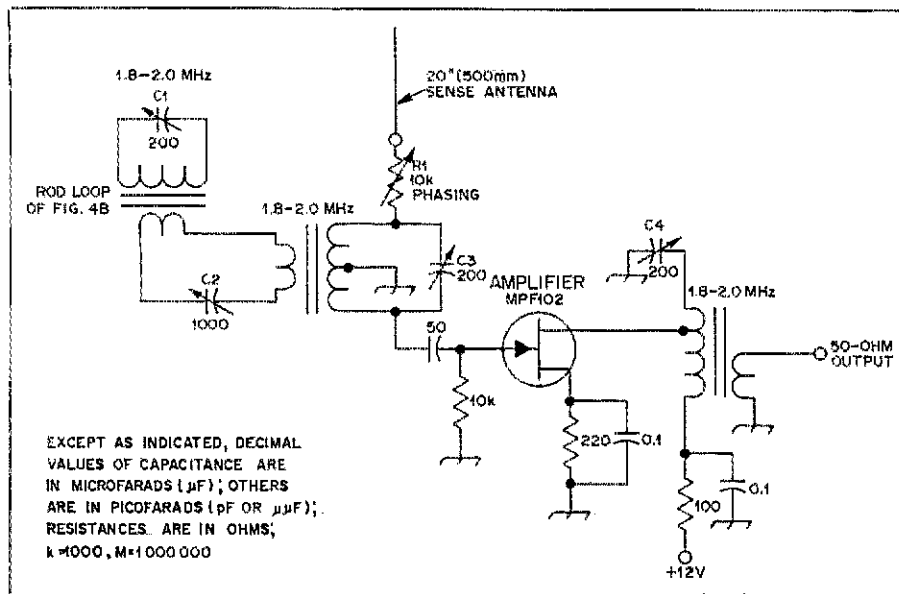


Fig. 5 — Suggested circuit for using a sense antenna with the rod loop. The sense antenna can be mounted 6 to 10 inches (150 to 250 mm) in front of the broadside of the rod loop (centered). C1, C2, C3 and R1 are adjusted alternately for the deepest null possible off the rejection side of the loop (side opposite the sense antenna). It may be necessary to experiment with the length of the sense antenna to obtain the best null in the cardioid response pattern. The tuned circuits for the JFET preamp can be wound on T-68-2 toroid cores.

— something that was inexpensive and easy to build. It should have efficiency comparable to that of the 5-turn wire loop described earlier in this report. A reasonable null depth and an undistorted pattern were sought also. From these criteria evolved the 4T-ES (four turn, electrostatic shield) loop shown in Fig. 6.

It consists of four turns of RG-58/U cable which are formed into a circular configuration to provide a diameter of 13-1/2 inches. There is nothing critical about the diameter, and RG-59/U coaxial cable could be used instead of the type specified. The turns are formed side by side, then taped at several points to maintain the loop form.

It is necessary to split the shield braid at the electrical midpoint of the loop. This prevents the shield from acting as a shorted turn. The principle is the same as that described for the ferrite-rod loop with its aluminum-channel shield. The braids are joined at the loop feed point and made common to one end of L2. The three grounded elements are then attached to the coaxial connector ground terminal on the loop support frame.

Loop performance was checked by using the test procedure discussed earlier. A null depth of 26 dB resulted. There was no discernible pattern warping, and the null occurred deeply over just a few degrees of rotation. The 4T-ES was 18 dB inferior to the 75-foot vertical antenna when checking distant signals. The unloaded Q was measured by means of the HP Q meter. A value of 85 was obtained. Because C2 was set for light loading of the loop, a bandwidth

(3-dB points) of 20 kHz was obtained when the preamplifier and receiver were connected to the antenna.

Numerous comparisons were made on DX signals from Europe and the Caribbean area during the ARRL DX Contest in March of 1977. In all instances the 4T-ES was as good as or

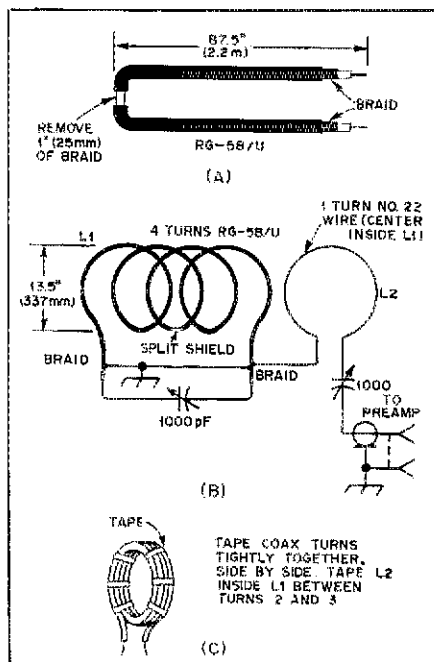


Fig. 6 — Structural details of the W1FB 4T-ES loop antenna. At A is an illustration of the total length of RG-58/U before the loop is formed. An expanded view of the loop turns and pickup link is given at B. Drawing C shows how the loop turns are taped together side by side as the antenna takes its final form.

better than the 75-foot vertical. Ambient noise was considerably lower in amplitude while using the loop, even though all tests were performed with the loop indoors at ground level. There was no reduction in atmospheric noise (which was high that weekend) because the maxima of the loop favored the NE and SW directions: The storm front was SW of Connecticut. However, rotation of the loop caused a drop of 26 dB in the static crashes when the loop nulls were SW and NE. Because of the electrostatic shielding there was minimum noise induction from the house wiring — a contrast to the performance characteristics of the unshielded 5-turn wire loop. The W7ZOI broadband preamplifier and an attenuator were used during the tests. There were some instances when the loop provided a stronger signal response than the vertical, even though the two systems were adjusted for unity gain.

The 4T-ES is suitable for use indoors, but it could be weatherproofed for outside installations. Epoxy cement could be used to seal the open ends of the coaxial cable of L1, and the trimmer capacitors would survive the natural elements if housed in a metal or plastic container.

In Summary

The loops that have been discussed here should be suitable for use on 40 or 80 meters if scaled accordingly. They may not show much directivity on sky-wave signals because of the "tumbling effect" at the higher frequencies. But QRM from nearby amateurs could be reduced greatly, and man-made noise sources could be rejected significantly by correct orientation of the loop.

I have attempted to discuss some of the characteristics of small loops which are not treated in most of the references contained in amateur journals. There is plenty of latitude remaining for experimentation, and the reader is encouraged to apply his or her skills in developing better loops for amateur use. Meanwhile, why not build a small loop and scoop those weak signals out of the noise? It could mean some new countries for you on "top band" or 80 meters. QST

References

- DeMaw, "A Receiving Loop for 160 Meters," *QST* for March, 1974.
- Terman, *Electronic & Radio Engineering*, McGraw-Hill. Kraus, *Antennas*, McGraw-Hill. Jasik, *Antenna Engineering Handbook*, McGraw-Hill. Keen, *Wireless Direction Finding*, Third Edition, Hiffe & Sons, Ltd.
- DeMaw, "His Eminence the Receiver," Parts 1 and 2, *QST* for June and July, 1976. Receiver used in combination with an Autek Research QF-1 RC active audio filter.
- DeMaw, "Build This Quickie Preamp," *QST* for April, 1977.
- Jasik, *Antenna Engineering Handbook*, pages 28-6 and 28-8.

A Simple Approach to Complex Circuits

Networks with resistance, capacitance and inductance in various series and parallel combinations are sometimes called "complex" circuits by engineers. Maybe that's because those engineers want to impress you with their knowledge, for complex in this case does not necessarily mean complicated.

By Jerry Hall,* K1TD

It was a bright, sunny weekend afternoon, and Gus was taking advantage of the nice weather by washing the family car. He had the 2-meter mobile rig turned on and was listening to the conversation going on through the local repeater as he sponged and hosed away. "Interesting," he mused to himself. "Most of those fellows on there are ones I got started in ham radio. I gave all but one or two of them their Novice tests. And now some of them even have two-letter calls." Suddenly his thoughts were interrupted as his wife shouted out the back door, "Gus! Telephone!"

Inside the house he learned it was Jack, the new Novice a few blocks away. Jack was studying diligently for his General test.

"I'm not sure I understand some of the questions in the study guide about parallel circuits. Can we get together sometime soon and go over them?"

"Sure, Jack, how about later this evening?"

"Fine! I'll see you after supper."

Jack arrived that evening with his study guide. He and Gus sat down at the dining-room table. Gus had a pad of paper and a collection of freshly sharpened pencils waiting in readiness.

"First," he said, "let's review what you know about circuits with just resistors. They're easier to understand than when you have inductors and capacitors too."

"Right," Jack agreed.

"What if you had two 500- Ω resistors in series? What would the equivalent value be?" As Gus asked the ques-

tion he drew out the circuit shown at the left in Fig. 1A.

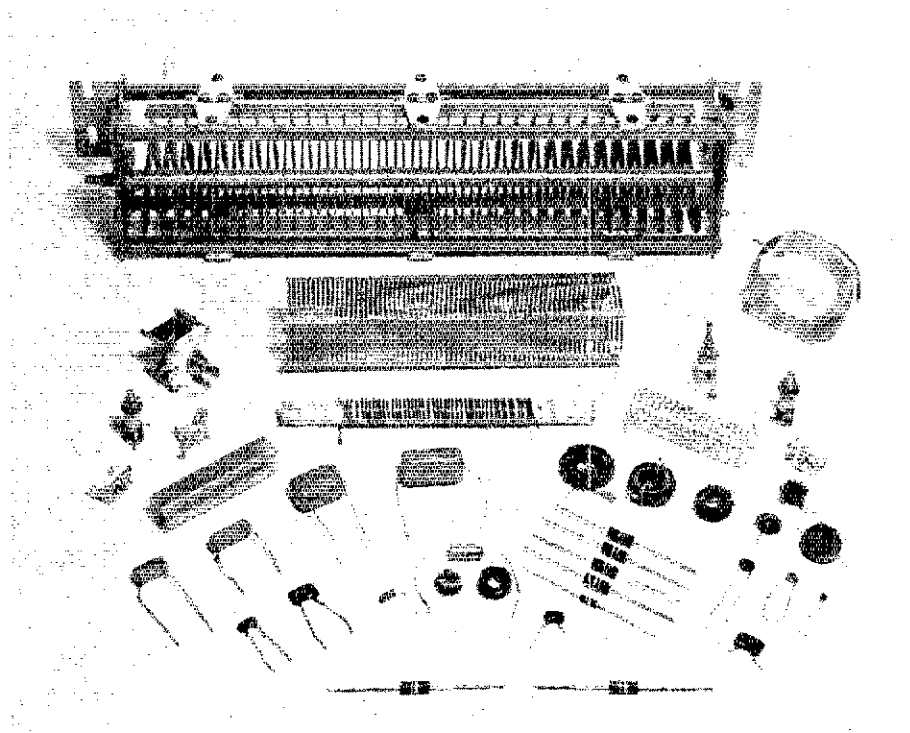
"That's easy, Gus. You'd have 1000 Ω ."

"Right. Now, what if you had three 500- Ω resistors in series?"

"That's easy too; 1500 Ω ."

"Okay, now let's try some practical values. What if you had three resistors in series? One is 2700 Ω , one is 5600, and one is 3900."

Jack reached for the pad of paper and a pencil and began adding up those three numbers, 2700, 5600 and 3900.



Resistors, capacitors and inductors come in all sorts of sizes and shapes. That big thing at the back in this photo is a variable capacitor, and just in front of it is a large inductor. These two components are typical of those

you'll find in a matching network for an amateur hf antenna where the legal power limit is being used. On parade in the foreground is an assortment of other "complex" circuit components.

*Associate Technical Editor, QST

"You'd have 12,200 Ω ."

"How'd you get that answer?" Gus asked, testing Jack.

"I just added up the three resistance values. That's right, isn't it?"

"Sure it is! I just wanted you to realize you're using a little mathematical equation. Are you telling me this is how you figure the equivalent total resistance when you have several resistors in series?" Gus asked as he wrote down the equation in Fig. 1A.

"Yep, that's what it says in the *Handbook*." He knew from Gus's smile that he was right.

"Okay, fine. Now how about resistors in parallel? What if you had two 600- Ω resistors in parallel? What's the equivalent value?" Gus drew out the circuit at the left in Fig. 1B as he asked this question.

Jack knew that one right away, too. "It'd be 300 Ω , half of 600."

"Why half?" Gus asked.

"Because there are two resistors," was Jack's reply.

"What if there were three 600- Ω resistors in parallel, like this?" and Gus drew the right-hand circuit in Fig. 1B.

"You'd have 200 Ω , a third of 600."

"One third because there are three resistors?" Gus asked.

"Yes, I think I read that somewhere," Jack said.

"That's right," Gus assured him.

"Any time you have resistors of equal value in parallel, you can figure the equivalent resistance by dividing the value of one resistor by the number of resistors," and with that he jotted down the equation shown in Fig. 1B. "But what if they're not equal? Let's take those values we used a moment ago and see what we'd have if they were in parallel. That was 2700, 5600, and 3900 Ω ," said Gus as he drew the circuit shown in the left of Fig. 1C.

Jack reached for the pad again and manipulated the pencil. After making a bunch of pencil marks, he scratched out what he's just done and started again. Later he scratched that out, too. Sheepishly he reached in his pocket and extracted a little 4-function electronic calculator. "You gotta use reciprocals to figure this one out," he explained, "and I'm not so good at doing them by hand."

"What's a reciprocal?" Gus asked, pretending he didn't know.

"That's when you divide a number into one," Jack said confidently. With his calculator he punched $1 \div 2700 =$ and the display showed 0.0003703. He jotted that down on paper. Similarly he divided 1 by 5600 and 1 by 3900 and jotted down those numbers, 0.0001785 and 0.0002564. Then with the calculator he added up the three numbers and jotted down the answer, 0.0008052. Next he divided 1 by that answer.

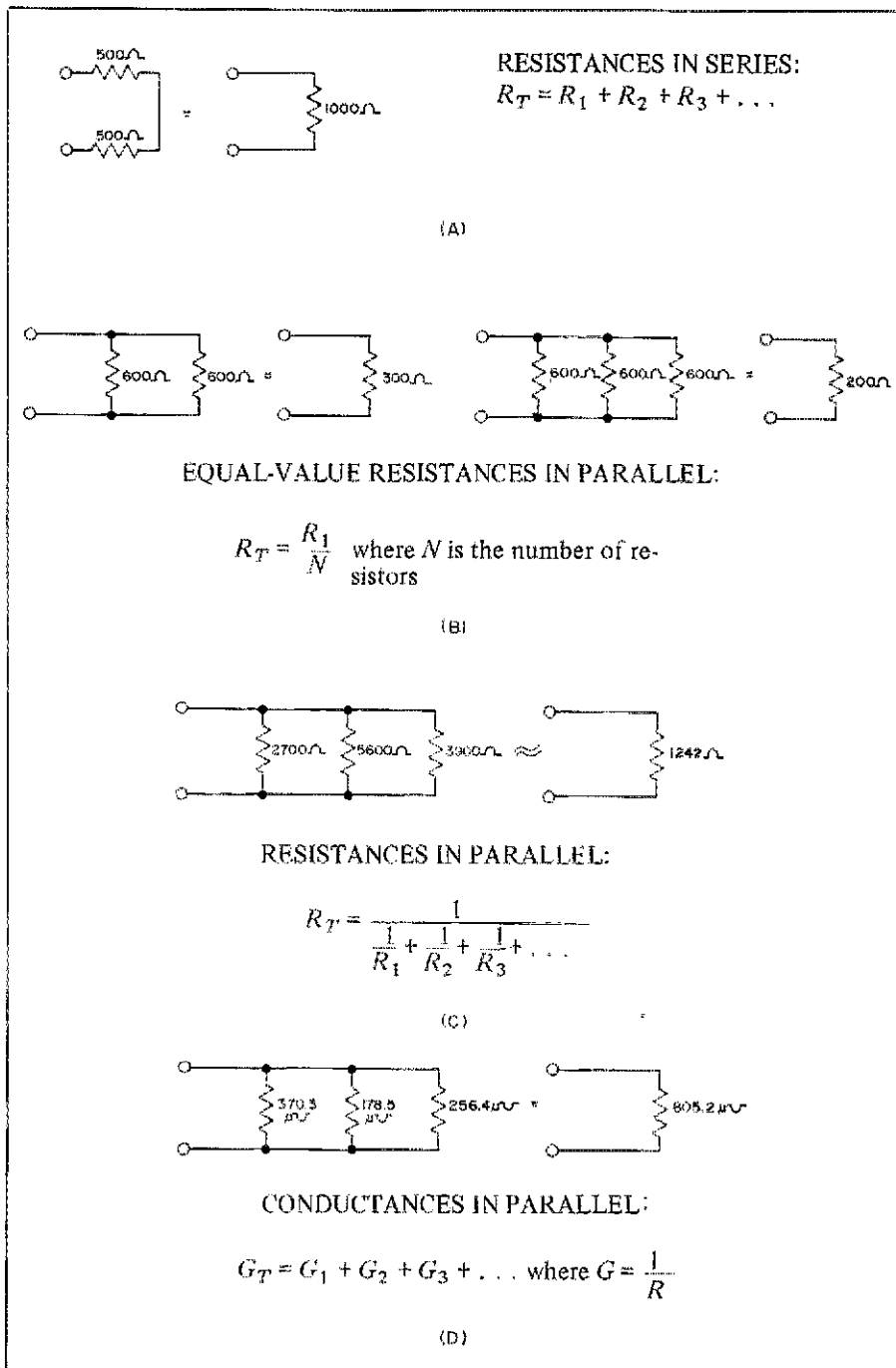


Fig. 1 — Circuits with resistance only. Equivalent resistance values (R_T) may be calculated for the type of circuit by using the appropriate equations. Parallel resistances can be handled easily if they're converted to conductances, as shown at D and as described in the text.

"You'd have just under 1242 Ω ," Jack exclaimed triumphantly.

"That's right!" Gus agreed as he came up with the same information on his more expensive calculator. Then Gus said to Jack, "Can you write down an equation for what you just did to get that value?" Jack correctly wrote the equation shown in Fig. 1C. "Good," Gus exclaimed.

And he added, "Here, Jack, let's try something with your calculator. If yours has a feature called an automatic constant, you won't have to punch in the 1

each time you take a reciprocal." On Jack's calculator he keyed in 2700, and then in sequence he keyed $\div =$. After the equal-sign key was pressed the first time, a 1 appeared on the display, but after the second time the display immediately showed 0.0003703.

"Wow!" Jack exclaimed. "How'd you do that?"

"You can save yourself a lot of work when you're doing reciprocals." Gus told Jack, handing back the calculator. "Anytime you have a number in the display that you want to take the

reciprocal of, just punch $\div = =$. It won't work on every calculator, but if yours doesn't have a reciprocal key it's worth a try to find out."

Conductance

"Now, Jack, can you tell me what those numbers are that you just jotted down on the paper?"

"Sure, those are the reciprocals of the resistor values."

"Yes, that's true, but there's another name for them. Those are conductance values."

"Conductance! What's that?" cried Jack.

"You just said it," Gus stated. "Conductance is the reciprocal of resistance. You know we use the letter R to represent resistance in a circuit or an equation, and we use the Greek letter Ω (omega) as the abbreviation for ohms. You probably wouldn't know it yet, but we use the letter G to represent conductance. And conductance is measured in mhos. Mho is ohm spelled backward. Jack, what symbol do you suppose we use for mhos?"

" $1/\Omega$?"

At this reply Gus chuckled. "Not quite, but you're certainly logical. We really use an upside-down omega, but usually on drawings only. Most typesetting systems don't have an upside-down omega, so you see the word *mho* spelled out in print, rather than abbreviated."

"Strictly speaking," Gus went on, "resistance and conductance are reciprocals of each other *only when you're talking about parallel circuits*. It doesn't work out quite the same way when you have series circuits. And the mho is a pretty big unit of measure, something you wouldn't run into unless you had parallel resistances of less than one ohm. Mostly you'll see millimhos (mmhos) and micromhos (μ mhos) whenever they're used. Now let's take a look at those numbers you just jotted down."

"Oh, I think I see," Jack interrupted. "This 0.0003703; that's really mhos?"

"Sure is. Most likely that value would be converted to 370.3 μ mhos, by moving the decimal point six places to the right."

"Oh! And these other two would be 178.5 and 256.4 μ mhos?"

"Right."

Jack thought for a moment and then frowned. "I understand what mhos are, but what *good* are they?"

"Well, look at it this way," explained Gus. "See how easy you figured out the equivalent resistance when you had several resistors in series. You just added up the individual resistance values and got the total resistance. Okay, when you have resistors in parallel, it's just as easy with conductance. You just add up

the individual conductance values to get the total conductance." In saying this, he drew out the circuit shown in Fig. 1D. "See, these three values add up to 805.2 μ mhos, which is just what you did with your calculator there."

"Oh, I get it," Jack exclaimed. "You're saying to use resistance when I'm working with series circuits and conductance when I'm working with parallel circuits."

"Right on! And the same idea applies when you have complex circuits. That's what circuits with resistors, inductors and capacitors are usually called, complex circuits. If you remember this little tip it'll simplify your calculations a lot . . . ohms for series circuits, mhos for parallel."

Reactance and Impedance

"Now let's talk about those so-called complex circuits. A complex circuit has a property we call *impedance*. Jack, can you tell me what impedance is?"

"Sure, that's what you get in a circuit with resistance and reactance."

"Correct," exclaimed Gus. "Now, what's reactance?"

"Uh . . . well — I sort of know, but I don't know how to explain it."

"Okay," said Gus with a smile. "I'll explain it for you. Reactance comes from circuit elements that do not absorb any power. Remember, Jack, only resistances can absorb power. Now, I'll bet you know what kinds of circuit elements I'm talking about."

"Inductors and capacitors?" Jack asked cautiously.

"Right! They used to be called coils and condensers, and sometimes you still hear those words. But the modern words are inductors and capacitors. You know that inductance is measured in henrys, and we use the letter H as the abbreviation for henrys."

"And we use the letter F for capacitance," chimed in Jack, "because capacitance is measured in farads."

"You *have* been reading the *Handbook*, haven't you Jack! Then of course you know that a farad is a very big unit, and the capacitors we use in ham radio are measured in microfarads, abbreviated μ F, or else picofarads, abbreviated pF. And inductors for audio and rf work are usually measured in millihenrys (mH) and microhenrys (μ H).

"At ac and rf," Gus went on, "inductors and capacitors have this property we call reactance. Like I said, reactances don't absorb any power, but in a circuit they can prevent some of the available power from being transferred to the resistance. And it doesn't have to be a circuit on a chassis or a circuit board, either. An antenna behaves like an electrical circuit."

"Oh! Like my antenna before you helped me cut it to the right length. My

SWR was high and you said the antenna had reactance."

"That's right," Gus said. "That reactance wasn't absorbing any power, but it did prevent some of the power from being 'absorbed' or transferred to the radiation resistance of the antenna. That unradiated power went back down your feed line and that's why your SWR was high — higher than your transmitter could handle."

"Reactance is measured in ohms, just like resistance," Gus continued. "It is important to remember that for any inductor or capacitor, its reactance depends on the *frequency* you apply to it. The letter X is used for reactance, and usually there's a subscript letter L or C , X_L for inductive reactance and X_C for capacitive reactance. There are a couple of equations that you should memorize for figuring out reactance, because you'll be using them so often." And Gus wrote them down on a sheet of paper as he explained, "In these equations X_L and X_C are in ohms, f is the applied frequency in hertz, L is the inductance in henrys, and C is the capacitance in farads.

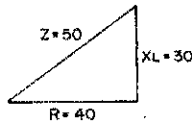
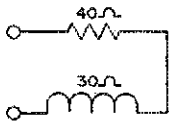
$$\text{Inductive reactance} = X_L = 2\pi fL \quad (\text{Eq. 1})$$

$$\text{Capacitive reactance} = X_C = \frac{1}{2\pi fC} \quad (\text{Eq. 2})$$

"Now, Jack, suppose we had a series circuit with a resistance and a reactance," and he drew out the circuit shown in Fig. 2A. "Do you know what the impedance of that circuit would be?" Jack scratched his head thoughtfully but said nothing. So Gus proceeded to draw out a little triangle, like that in Fig. 2A. "Here," he said, "this right triangle represents the circuit values. We'll let the base represent the value of R , 40 ohms, and the side represent the X , 30 ohms. Now the hypotenuse, this diagonal line, represents the overall impedance. We use the letter Z to represent impedance."

"I know," Jack exclaimed. "The impedance is the square root of R^2 plus X^2 ." He didn't even need his calculator to come up with 1600 plus $900 = 2500$, and he recognized in his head that the square root of 2500 was 50.

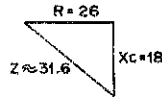
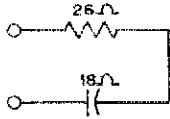
"Yep, 50 is right," said Gus as he wrote down the equation Jack had just worked out, shown in Fig. 2A. "There's another way you can write it, too," and he added $= R + jX_L$ at the end of the equation he had just completed. "This is a kind of shorthand way of writing it. That little j in there is an *operative* function. Don't let it shake you up. All it means is that you do *what's called* a vector addition, like in the right triangle, rather than straight addition. You



(A)

R AND X_L IN SERIES:

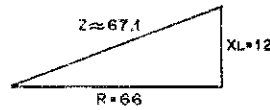
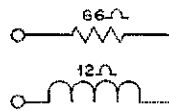
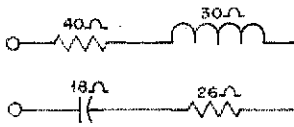
$$Z = \sqrt{R^2 + X_L^2} = R + jX_L$$



(B)

R AND X_C IN SERIES:

$$Z = \sqrt{R^2 + X_C^2} = R - jX_C$$



R , X_C AND X_L IN SERIES:

$$Z = \sqrt{(R_1 + R_2 + \dots)^2 + (X_{L1} + X_{L2} - X_{C1} - X_{C2} \dots)^2}$$

$$= R_1 + R_2 + \dots + j(X_{L1} + X_{L2} - X_{C1} - X_{C2} \dots)$$

(C)

Fig. 2 -- Series circuits using R , L and C . The overall impedance of the circuit, Z , can be found from the appropriate equations. The j in the equations is an operative function, a shorthand way of saying, "Don't add apples and oranges."

know that $40 + 30 = 70$, but like you just figured out, $40 + j30 = 50$. That's all the j means. It's telling you you can't add resistive ohms to reactive ohms directly, 'cause that'd be like adding apples and oranges. If you had a calculator like mine that worked trig functions, you could solve this kind of problem directly, but you can still do it with yours. Let's try another one," and Gus drew out the circuit shown in Fig. 2B.

With his little calculator, Jack squared the two numbers and added them; $26^2 + 18^2 = 676 + 324 = 1000$. Here he was stuck, for he didn't know the exact square root of 1000 and his little calculator wouldn't help him much unless he wanted to try several guesses and check each guess with the calculator. Hoping to satisfy Gus he stated proudly, "The impedance of that circuit is the square root of 1000."

Gus smiled and wrote down this little equation for Jack.

To solve for square roots, $\frac{A^2 + n}{2A} = B$ (Eq. 3)

"Here, use this to find out with your 4-function calculator what the square root of 1000 is. The n is the number

you want the square root of, 1000, and the A is your guess as to about what the square root might be. This will give you a value for B which will be closer than your guess of the square root. You can put this value back in the equation for A and come up with an even closer number. Usually a couple or three times through the equation will give you the value for the square root as near as you'd want it."

With this, Jack took 30 as his guess for A , knowing that 30^2 was 900, not far from 1000. Plugging 1000 into the equation for n and 30 for A , he came up with a value for B of 31.666666, which he jotted down. Squaring this number to see how close it was to 1000, he decided to work through the equation again, substituting the 31.666666 for A . He already had A^2 on the display of his calculator, since he had just squared the value to check its accuracy. From there he merely added 1000 and divided by $2A$ in chain fashion to get 31.622804. Squaring this, he found the result was very close to 1000, so he beamed broadly as he told Gus, "It's 31.6 ohms."

"A⁺ for you," said Gus, grinning.

While Jack had been figuring out the square root of 1000, Gus had drawn out another little triangle to represent this circuit, shown at B in Fig. 2. Again he used a horizontal line to represent R , but this time he drew the reactance line down instead of up from the end of the resistance line. "By convention we say that inductive reactance is positive, and capacitive reactance is negative. That way, if we're solving an equation for the value of a reactance, we know by the positive or negative answer whether it's inductive or capacitive. Let's see how that works out. What kind of impedance would we have if we put the two circuits we just talked about in series?" And here he drew out the circuit shown at the left in Fig. 2C.

"Do you still add up the values of the resistors to get the total equivalent resistance?"

"That's right."

And with that, Jack drew out the beginnings of an equivalent circuit, saying "40 + 26 = 66 Ω ." And after a moment of thought he said, "Can you add the reactances together directly?"

"Yes, you can, but don't forget to use plus and minus signs like I just told

you.”

“I get it!” Jack said excitedly. “There’s 30 Ω inductive; that’ll be positive. And 18 Ω capacitive; that’ll be negative. Let’s see, 30 plus a negative 18 is 30 minus 18. That’s 12, and it’s positive. Does that mean there’ll be 12 Ω of inductive reactance in the equivalent circuit?”

“Yes, that’s exactly what it means.”

Jack then completed the drawing he had started, shown in Fig. 2C. From there it was easy for him to draw out the little triangle Gus asked him to do, and with his calculator he computed the overall impedance to be approximately 67.1 ohms.

“Here are the equations for what you just did,” Gus said, writing down those in Fig. 2C. “They look more complicated than they really are, but

just because I’m showing that you can have more components that we did in our circuit. Do you have any questions about impedances?”

“No, I think I’ve got it pretty straight. Impedances are made up of resistances and reactances, and the reactances can be either positive (inductive), or else negative (capacitive).”

“Perfect! You’ve got it!”

Admittance = Conductance + Susceptance

“But we haven’t talked about parallel circuits with reactance yet, and that’s what I came over here for.”

“Okay, Jack. Let’s try this one. Suppose we took those two complex circuits we just had, 40 + j30 and 26 - j18, and connected them in parallel. That might be the kind of a situation

we’d have if we tied the feed lines of two antennas together with a T connector at the back of the transmitter. What kind of a load would the transmitter see? Here’s what the circuit would look like,” Gus said, drawing out the diagram of Fig. 3A.

Jack looked at the drawing at length. Finally he confessed, “Gosh, Gus, I don’t even know where to begin.”

“Remember what I said a bit ago? Ohms for series circuits and mhos for parallel circuits.”

“Yes, I remember, but here we’ve got two series circuits in parallel with each other. What do you do about that?”

“Well, you can handle it any of several ways. You can convert each series circuit to its parallel equivalent, and then convert the values to conduc-

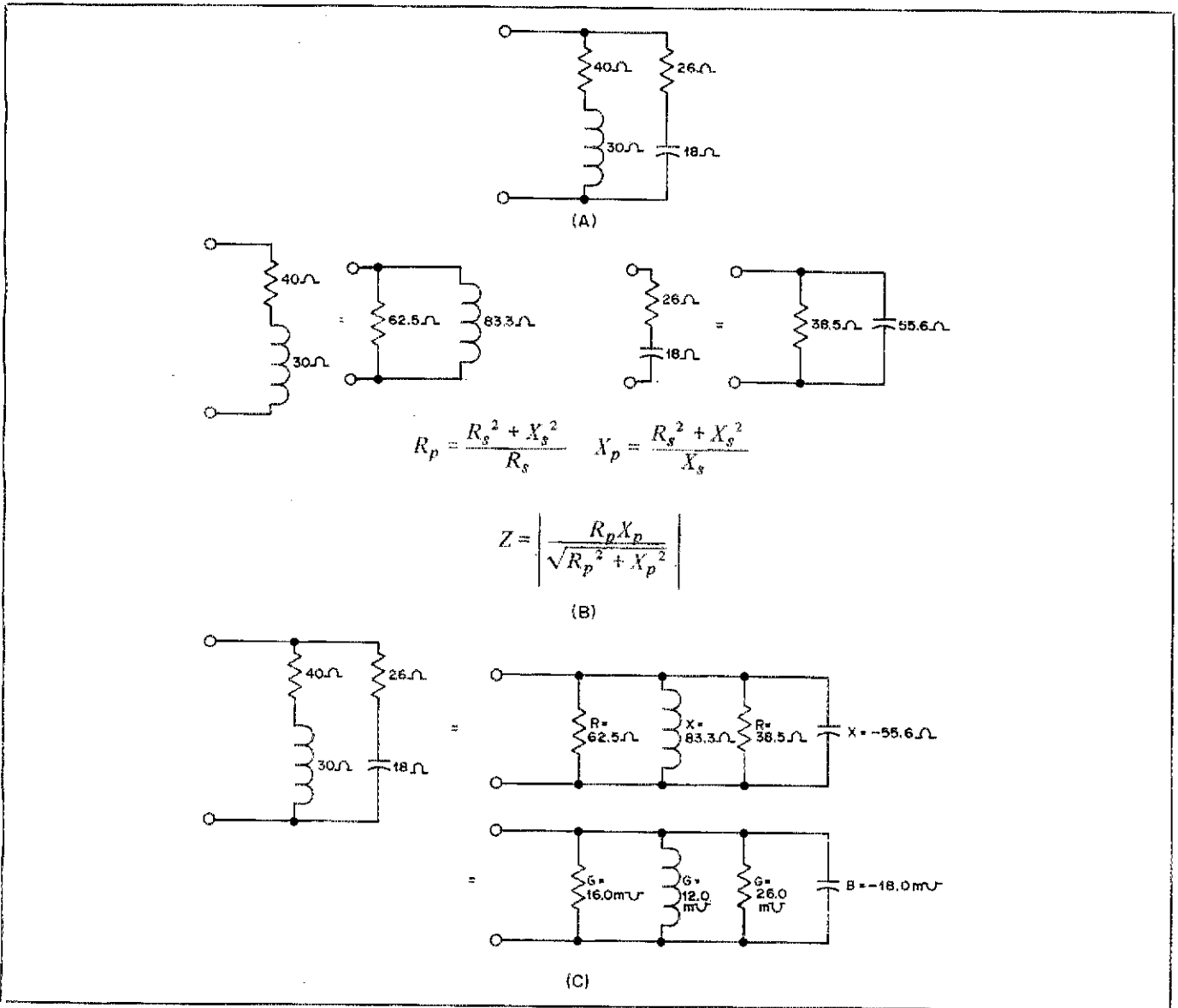


Fig. 3 — “Complex” circuits using values of R, L, and C in combinations of series and parallel circuits. Series circuits using several components may first be converted to a simple series equivalent, as shown in Fig. 2C, and the result may be converted to a parallel

equivalent, as shown here at B. (The subscript, *s*, indicates series-equivalent values, and *p* indicates parallel-equivalent values.) The circuit at A is equivalent to those shown to the right of the equal signs in C.

tance and susceptance to figure out the overall admittance, or you can . . ."

"Wait a minute Gus. You lost me on that one! You've explained conductance, but what are those other things you're talking about, susceptance and what?"

"Admittance. Admittance is the reciprocal of impedance, of $1/Z$. We use the letter Y to represent admittance. And you just told me that impedances were made up of two kinds of components, resistance and reactance. In the same way, admittances are made up of two kinds of components, conductance and susceptance. Power is consumed in the conductances, but the inductors and capacitors which make up the susceptances don't consume any power."

"And you said admittance is the reciprocal of impedance?"

"That's right."

"And earlier you said conductance was the reciprocal of resistance?"

"That's right, too, as long as you're talking about resistors in parallel with all other components."

"Then is it true to say that susceptance is the reciprocal of reactance?"

"Yes, it certainly is," Gus stated emphatically, "as long as you're talking about a circuit having all components in parallel. By convention, all engineers used to change the sign as well as take the reciprocal, so that inductive susceptance was taken as negative and capacitive susceptance was positive. But now they're getting away from that convention, and take inductive reactance *and* susceptance as positive, capacitive reactance *and* susceptance as negative. I'm going to use the new style in what I show you. Either is okay, as long as you know which you're using."

Jack nodded his head in agreement but had a very puzzled look on his face.

Gus took the cue and went into some further explanation. "I was just about to tell you that we use the letter B to represent susceptance. Let's write out some equations showing everything I've just told you about admittance."

$$\begin{aligned} \text{Admittance} = Y &= \frac{1}{Z} = \frac{1}{R + jX} \\ &= G + jB \end{aligned} \quad (\text{Eq. 4})$$

"And for components in parallel"

$$\text{Conductance} = G = \frac{1}{R} \quad (\text{Eq. 5})$$

$$\begin{aligned} \text{Inductive susceptance} &= B_L \\ &= \frac{1}{X_L} \quad (\text{positive}) \end{aligned} \quad (\text{Eq. 6})$$

$$\begin{aligned} \text{Capacitive susceptance} &= B_C \\ &= \frac{1}{X_C} \quad (\text{negative}) \end{aligned} \quad (\text{Eq. 7})$$

"I don't think I understand all this," Jack admitted.

"We'll come back to it. Let's return to this circuit we were going to figure out." (See Fig. 3A.) "You know that each series circuit has a parallel equivalent — a circuit with different parallel values that behaves exactly the same way as the series circuit. Let's take just this $40 + j30$ part of the circuit," he

said, drawing what is shown at the left in Fig. 3B. "For now we don't know what values to put on the right side of the equal sign, but with these equations we can figure them out." And he wrote out the first two equations shown in Fig. 3B. "The s subscripts indicate components in the series-equivalent circuit, and the p subscripts for the parallel-equivalent circuit."

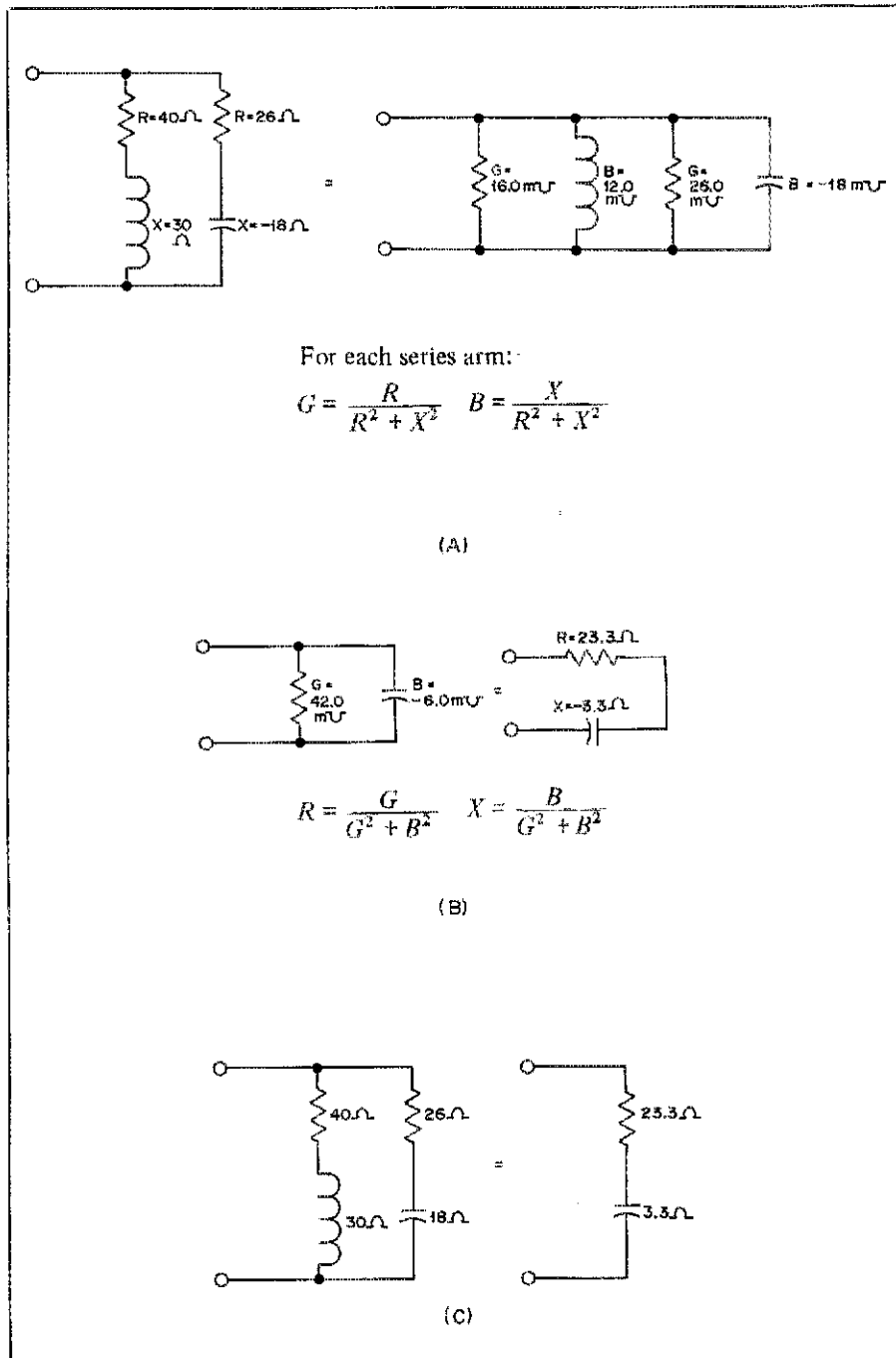


Fig. 4 — Series-equivalent circuits may be converted directly to circuits with conductance and susceptance, as shown at A, and the overall equivalent circuit converted back to a series circuit, as shown at B. If additional parallel arms consisting of a single R , a single L , or a single C each were included in the circuit at the left of the equal sign at A, their values could be converted to conductance or susceptance with Eqs. 5, 6 and 7 (see text). By using appropriate combinations of conversions from above and from Fig. 3, any complex circuit may be broken down into a simple series-equivalent circuit. The original and final equivalent circuits that Jack and Gus worked out are shown at C.

This was all the information Jack needed. Deftly he began punching keys on his calculator and soon he wrote in the values, 62.5 Ω for the parallel resistance value and 83.3 Ω for the inductive reactance. Gus confirmed those values with his own calculator. "Was that hard?" Gus asked.

"No, not after you told me what to do."

"Good, now do the same thing for that 26 - j18 part of the circuit." Jack drew the information shown in the right-hand part of Fig. 3B and calculated the values, 38.5 Ω for the parallel resistance and 55.6 Ω for capacitive reactance. Gus's calculations agreed, each of those parallel circuits on the right of the equal signs would perform identically to the series circuits at their left.

"Now," Gus exclaimed, "suppose you knew only the parallel values and wanted to figure the overall circuit impedance. Say we had this 62.5- Ω resistor and 83.3- Ω inductor and wanted to know the overall circuit impedance," he said, pointing to the parallel circuit in the left of Fig. 3B. "How would you figure that?"

"Well, you could convert it back to the series circuit and go from there."

"Yes, you could, but here's a simpler way," and with that Gus wrote down the third equation shown in Fig. 3B. "These vertical lines mean to take the absolute value. In other words, disregard the minus sign if you have capacitive reactance." Jack took the 62.5 and 83.3 values and tried them in the equation Gus had just written out. Finally he came out with the value of 49.99 plus a small fraction. "Pretty close to 50, isn't it? It's not exact because we rounded the values when we went to that parallel circuit. But you remember, 40 + j30 = 50. So you see, it checks.

"From here we can take the two parallel-equivalent circuits and put them in parallel with each other," Gus explained as he drew the top two circuits in Fig. 3C. "Now you can begin to see what kind of a load that transmitter would be looking into."

"Oh, yes. Now we can just add up the values for the resistors to get total resistance, and for the reactances to get the total reactance."

"Whoa! Wait a minute! Those are ohms there in that circuit. You can't add ohms to ohms and get the right answer unless you have a series circuit! And even then you've gotta keep resistive ohms and reactive ohms separate. Remember mhos for parallel circuits! Convert those values to mhos before you start adding."

"Can we just take the reciprocal of each value to do that?"

"Yep, that's how we do it," Gus confirmed, pointing back to Eqs. 5, 6 and 7. With that, Jack again went to work with his calculator and wrote in values for the circuit Gus drew, shown at the bottom in Fig. 3C.

A Simpler Way

"Before you go ahead and add up values, let me tell you about a little simpler way. I just showed you this because sometimes you need to make a conversion from series to parallel circuits using ohms. If you want to convert the other way, you can use these two equations."

$$R_s = \frac{R_p}{1 + \left(\frac{R_p}{X_p}\right)^2}$$

$$X_s = \frac{R_s R_p}{X_p}$$

"But here's how you can convert from a series R and X circuit directly to a parallel G and B circuit without the intermediate step." He then drew the circuits and wrote in the equations shown in Fig. 4A, but omitted the values on the parallel circuit at the right of the equal sign. He asked Jack to fill them in. Sure enough, the values came out the same as Jack had jotted down earlier (Fig. 3C).

"Alright!" Jack exclaimed. By this time he was anxious to know what kind of a load that transmitter would be

looking into, so he hurriedly combined the values and drew the circuit at the left in Fig. 4B. All the while he was watching Gus for a sign of any mistake he might be making. But Gus just sat there silently, grinning from ear to ear. "We add 16 and 26 to get 42 millimhos for the Gs. That's conductance. And 12 plus a negative 18, that's a negative 6 for B, so that's capacitive susceptance."

"Right you are. From here you can go either of two ways. Most of us aren't used to thinking in terms of millimhos, so you'll probably want to convert that circuit to ohms. You can either take the reciprocals of G and B directly and come up with the equivalent parallel circuit, or you can convert directly to the equivalent series circuit with these two equations." He wrote down the equations shown in Fig. 4B.

Jack opted to go for the equivalent series circuit. After punching a few keys and jotting down some numbers, he came up with 23.3 ohms for the resistance and 3.3 ohms for the capacitive reactance. "Is that right?"

"You bet it is. That's the load the transmitter would see at the T connector."

About that time Gus's wife brought in two cups of hot chocolate. While they were sipping that, Gus reviewed what he had explained to Jack. To wrap up the last part, he summarized their calculations by drawing the circuits shown in Fig. 4C, including the values. "Okay, here's the circuit we started with," he said, pointing to that at the left of the equal sign, "and here's the equivalent circuit," pointing to the right.

"Gosh, I didn't know I knew how to do that!"

"Well, you do now. I've showed you a lot more than you'll ever need to know for your General test, but I'll bet if you study these notes you won't have any problems at all with those questions on parallel circuits."

"You know, I bet you're right." Jack agreed, gathering up the notes and his materials. "Goodnight, Gus, and thanks a lot!"

GET

Strays

□ The "Father of Radio," Dr. Lee deForest, was recently inducted into the Inventors Hall of Fame at a ceremony held at the U.S. Patent Office, Washington, DC. According to his widow, Marie, WB6ZJR, the award will be displayed at the deForest Memorial Archives in Los Altos, CA, where many of his more than 300 inventions are to

be found. Among them are the three-element radio tube called the Audion and electronic sound-on-film. The latter invention earned deForest an Oscar from the Academy of Motion Picture Arts and Sciences in 1959, two years before his death at age 87.

□ Do you realize that if you were operating SSTV moonbounce on an old Hy Gain rig in the Military Affiliate Radio System it is possible to have the following: your signal would go from Venus (SSTV) through the Galaxy (rig) via MARS to the moon and back to

earth!! - Michael Berlin, WB2FIG

□ The Triangle Amateur Radio Club of East Liverpool, OH, has set up a plan to relay emergency information to the city hospital, through the club repeater which covers a 40-mile radius on 146.7 MHz. Rich Feldman, K8HGY, said the club is capable of sending two-man teams equipped with hand-held rigs to emergency sites. They then relay information to similar teams monitoring the repeater in control centers at the hospital.

A 60-Watt Solid-State UHF Linear Amplifier

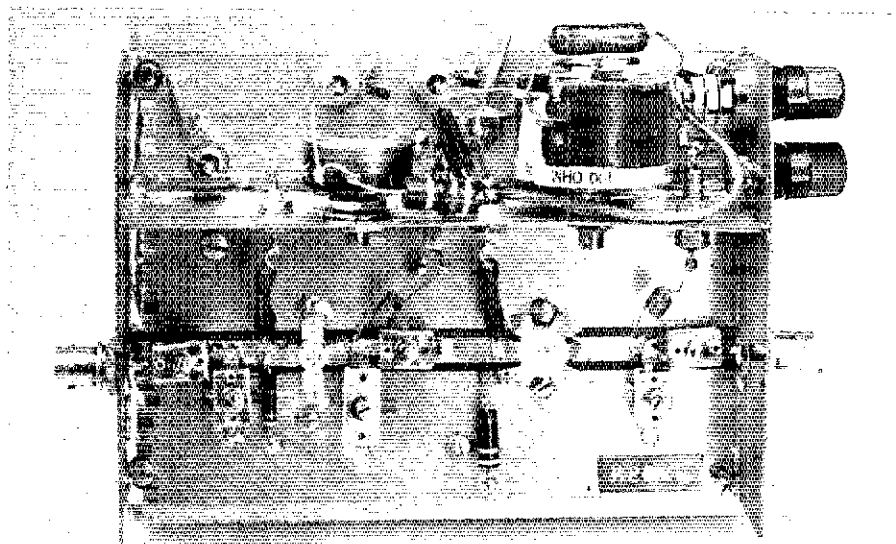
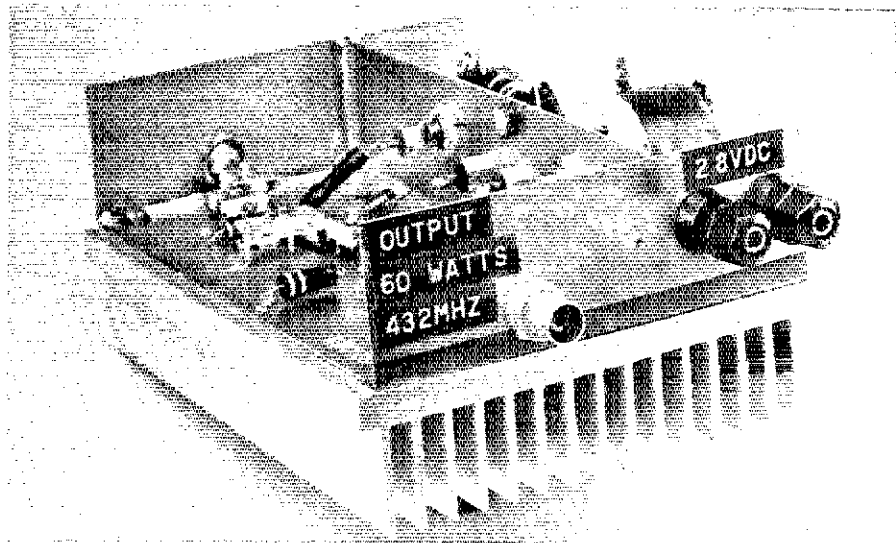
Add some punch to your OSCAR or tropo signal! The only thing small about this 432-MHz brick is the size.

By Jay Buscemi,* K2OVS

Although relatively low-power transmitting equipment has been extremely successful on 432 MHz through OSCAR 7 mode B, some reserve rf power is desirable for DX contacts as well as for use on tropo and local contacts. After I acquired a 10-watt 70-cm transceiver, I soon realized the limitations imposed by the low-power output during OSCAR and 432-MHz terrestrial communications. With 50 to 60 watts output, OSCAR 7 may be accessed when using a simple dipole or turnstile antenna, eliminating the need for tracking the satellite with a directional array. Other OSCAR stations equipped with the Arcos¹ transmitting converter or the WØENC² solid-state converter (1 to 3 watts output) also need a boost in rf power, but the few commercially available amplifiers are expensive. The amplifier described here may be driven directly with the Arcos converter or the Echo 70 (at reduced output) to 50-70 watts PEP, ssb or cw output, providing that extra margin of signal level needed for DX communications.

Circuit Description

A Motorola MRF 306 transistor was selected for the output device. This family of transistors is stable, readily available and relatively inexpensive. A Motorola MRF 5176 provides drive to the output stage with a wide margin of drive power so sufficient output is obtained over the range of 430-450 MHz. Both the MRF 5176 and MRF 306 are designed specifically for linear service in the uhf range. Fig. 1 is the schematic diagram of the two-stage amplifier. Rf input requirements are from 1 to 3 watts. Output from the



Inside-top view of the amplifier, showing placement of components.

*8 Wexford Court, St. James, NY 11780

¹ References appear on page 45.

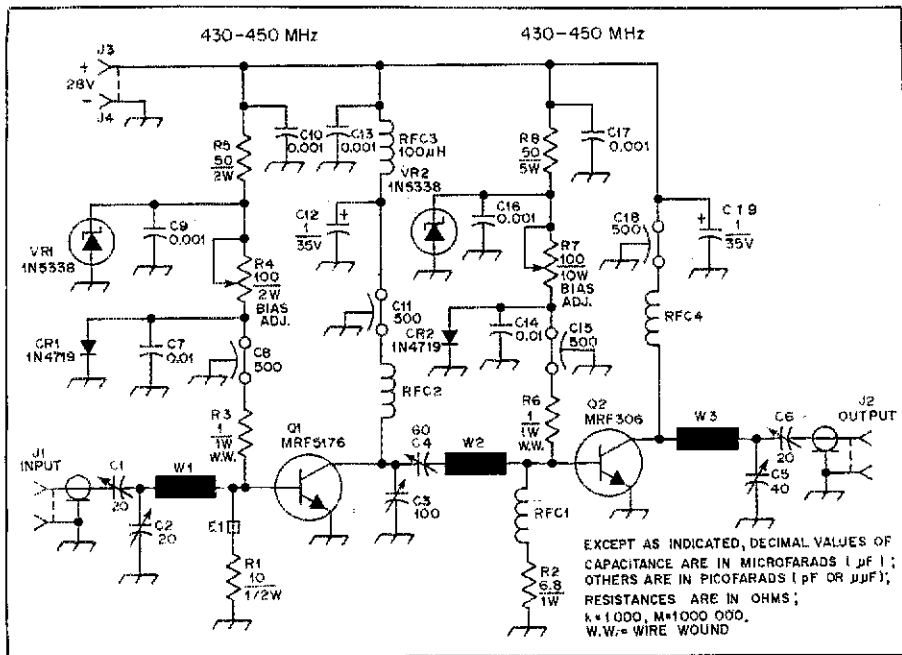


Fig. 1 — Schematic diagram of the linear amplifier. Polarized capacitors are μF.

- C1, C2, C6 — Ceramic trimmer, 20 pF, Elmenco 402 or equivalent.
- C3 — Ceramic trimmer, 100 pF; Elmenco 423 or equivalent.
- C4 — Ceramic trimmer, 60 pF; Elmenco 404 or equivalent.
- C5 — Ceramic trimmer, 40 pF; Elmenco 422 or equivalent.
- CR1, CR2 — Germanium rectifier, 50 PIV, 1 A; Motorola 1N4719 or equivalent.
- E1 — Ferrite bead placed over the lead of R1; Amidon FT-73 or equivalent.
- Q1 — Uhf silicon power transistor, Motorola MRF5176.
- Q2 — Uhf silicon power transistor, Motorola MRF306.
- R3, R6 — Wirewound resistor, 1 ohm, 1 watt.

- See text.
- R4 — Wirewound or carbon potentiometer, 100 ohms, 2 watts, linear taper.
- R7 — Wirewound potentiometer, 100 ohms, 10 watts.
- RFC1 — 4 turns no. 20 enameled wire, close-wound, 1/8-inch diameter.
- RFC2, RFC4 — 6 turns no. 20 enameled wire, 1/8-inch diameter.
- RFC3 — 100-μH ferrite-core choke, 500 mA. Two J. W. Miller 73F224AF in parallel or equivalent.
- VR1, VR2 — Silicon Zener diode, 5.1 volts, 5 watts dissipation; Motorola 1N5338 or equivalent.
- W1, W2, W3 — Printed-circuit stripline. See text.

MRF 5176 driver is about 10-12 watts, and output from the MRF 306 final amplifier is 50 to 70 watts PEP or cw. Microstrip conductors provide wideband matching, high efficiency and ease of construction. C1, C2 and W1 provide an impedance match from the 50-ohm resistive input to the base impedance of Q1. Likewise, C3, C4 and W2 match the complex output impedances of Q1 to the input impedance of Q2. W3, C5 and C6 match the output impedance of Q2 to the 50-ohm nonreactive load. Design techniques for calculating the values of these matching networks are described in several excellent publications available from Motorola.³ By using these techniques, the nominal values for each rf circuit element were calculated as shown in Fig. 2.

Q1 and Q2 are biased into the Class B linear region by the diode-resistor networks in their respective base circuits. Silicon diodes CR1 and CR2 are forward biased, thus maintaining approximately 0.6 V dc across their junctions and stabilizing the base voltages of Q1 and Q2, respectively. These diodes

should be stud mounted on the heat sink to provide some temperature compensation and to help prevent thermal runaway of the transistors. R4 and R7 are used to adjust the quiescent base currents of Q1 and Q2 for best linearity. Do not omit C12 and C19, the 1-μF bypass capacitors; they prevent low-frequency oscillation of the circuit. Since Q1 and Q2 have substantial gain at low frequencies, oscillation is likely and may destroy the devices. The 1-ohm resistors, R3 and R6, should be wirewound types as they also function as rf chokes in the base circuits. Carbon-composition resistors may be substituted if 0.2- to 0.5-μH rf chokes are added in series with them. Zener diodes VR1 and VR2 regulate the base voltage of Q1 and Q2, respectively. If available, regulated 5 volts may be used instead of the Zener diodes. RFC3 in the collector circuit of Q1 may be replaced with an rf choke similar to RFC2, if parts availability is a problem.

Construction

The amplifier is constructed on a

single piece of G-10 glass-epoxy circuit-board material with one-ounce copper on both sides. Recent experience has shown that the additional loss in this material at uhf compared to the more expensive Teflon-dielectric material is of small consequence, particularly in low-duty-cycle ssb service.⁴ Duplication of another uhf amplifier design utilizing glass-epoxy material instead of the Teflon-dielectric type specified yielded no measurable differences in performance.⁵

The circuit-board template is given in Fig. 3. It may be etched in the usual way or fabricated by cutting away the copper foil with an X-acto knife, as there are no intricate patterns involved. Cut shields 1-1/2 inches high from the same material and solder them to the same material and solder them to the mating surface for the rf and power connectors and to isolate the dc and rf subsections. Tin both mating edges with a small soldering iron or gun before assembly. Hold the shield in place and reflow the solder with a 100- to 300-watt solder gun or iron. After the assembly is complete, remove any excess flux with alcohol to prevent corrosion. Clearance holes must be cut in the printed-circuit board so that the transistor flanges will be in contact with the heat sink. Start with a small hole and enlarge it slowly with a needle file to get a good fit. Fasten the circuit-board assembly to the heat sink with eight or ten no. 8-32 screws around the periphery to ensure a good ground surface contact. Use a heat sink of at least the size of the printed-circuit board with 1-1/2- to 2-inch (38 to 50 mm) high fins 0.090-inch thick. A larger heat sink may be used if space

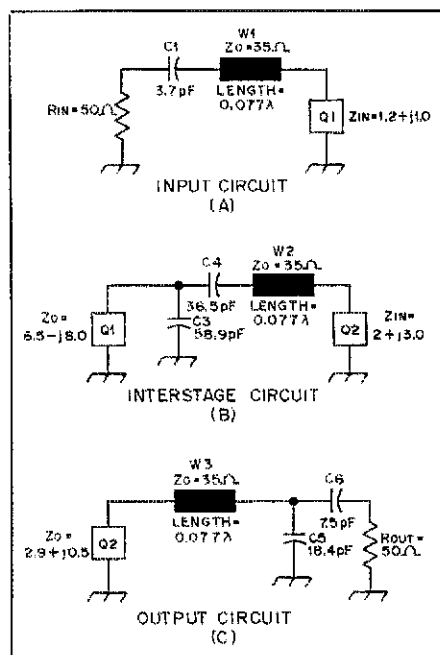


Fig. 2 — Representations of the input, interstage and output striplines, showing design parameters.

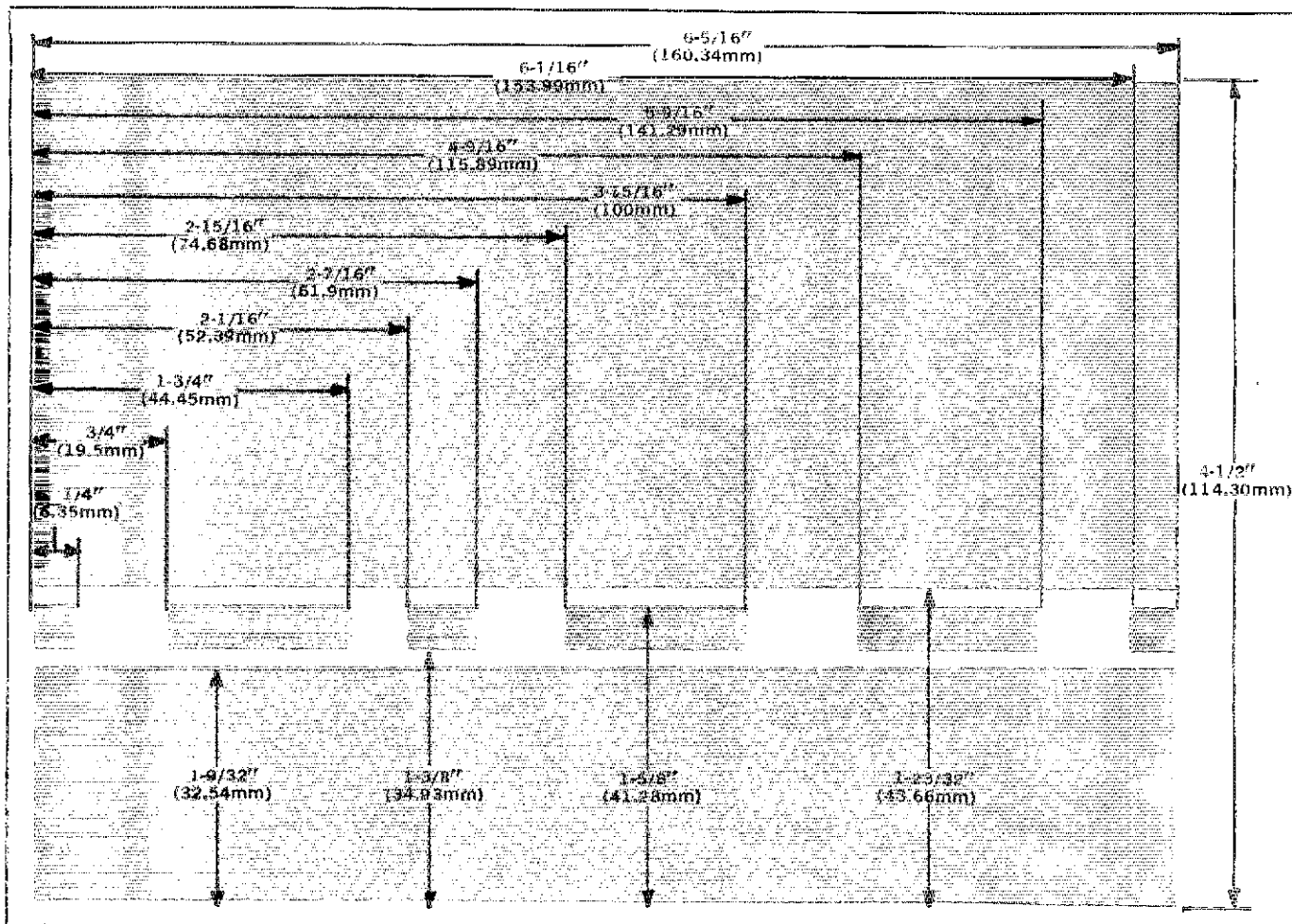


Fig. 3 Layout of the printed-circuit board. Glass-epoxy board 1/32-inch thick is used, with one-ounce copper on both sides.

permits, resulting in a lower transistor junction temperature during cw operation.

The technique for mounting transistors of this type has been described previously in *QST*⁵ and will not be repeated here. Use copper strips placed through the transistor clearance holes to bond the top and bottom foil of the board. Q1 is a stud-mounted device which screws into a no. 8-32 tapped hole in the heat sink. Thin washers may be used as shims between the transistors and the heat sink to provide proper orientation of the stripline leads on the board. An alternative method of mounting would be to drill a clearance hole through the heat sink and cut away sufficient fin material to accommodate a nut on the reverse side of the heat sink. *Do not* overtighten these transistor studs: Finger-tight plus one-quarter turn is adequate if a torque wrench adjusted to 5 inch-pounds is not available. Thermal grease is recommended on all mating surfaces between the transistors, the heat sink, and any shim washers. The remaining components are assembled on the board as shown in Fig. 4. Use a 25- to 40-watt soldering iron and observe the usual "keep-it-short"

rule concerning lead length in vhf-uhf construction.

Power-Supply Requirements

A regulated supply capable of providing 28 volts at 6 amperes is required to operate this amplifier. Lower power levels may be obtained on cw by using an existing 12- to 14-V supply but linearity will suffer since the transistors used are designed for 28-V service. Two 12- to 14-V, 6-A supplies could be connected in series to provide the required voltage if they have isolated output terminals. Because ssb has a low duty cycle, an unregulated supply may be used if a 10,000- μ F or larger filter capacitor is connected in parallel with the output of the supply. The schematic of a power supply capable of powering the amplifier is given in Fig. 4.

Initial Adjustments

Before applying power to the amplifier, preset all capacitors approximately one turn ccw from maximum capacitance. Next, connect a 50-mA meter in series with the collector of Q1 and lift the wire from the plus 28-V line to the base-bias circuit of Q2. With R4 at maximum resistance, apply 28 V to the

remainder of the circuit and adjust R4 for 20 to 25 mA through Q1. Remove the power, reconnect the base-bias circuit of Q2, and connect the milliammeter in series with the collector of Q2. Set R7 for maximum resistance, reapply power and adjust R7 for 40 to 50 mA through Q2. Note any tendency for these currents to increase or become unstable; power should be removed immediately under these conditions and all wiring and dc components checked. After final tune-up, R4 and R7 may be adjusted for best linearity. Adjustments should be made with the aid of a scope or spectrum analyzer for best results.

Final Tune-up

The amplifier is designed to accept 1 to 3 watts of drive at 432 MHz; do not exceed 3 to 4 watts input or the MRF 5176 may be damaged. Arcos and W0ENC transmitting converters provide the proper drive level; the output of more powerful drivers such as the KLM Echo 70 must be reduced to prevent overdriving the amplifier. With the Echo 70, the mic-gain and the cw carrier-level controls inside the unit may be reset to obtain 2 to 3 watts PEP output. A 4- to 6-dB attenuator added in series with the

output will allow the unit to be left in its factory-adjusted condition.

Insert a VSWR bridge or indicator between the driver and the amplifier input and connect a 50-ohm load to the output. Apply 1/2 to 1 watt of cw drive power, connect the 28-V supply to the amplifier, and *quickly* adjust C1 and C2 for best input VSWR. Increase the drive power to 2 to 3 watts and alternately adjust C3, C4, C5 and C7 for maximum output. Finally, readjust C1 and C2 for maximum output. The output power should exceed 50 watts cw under these conditions; dc current drain should be on the order of 5 to 6 amperes with no instability of the dc current noted.

As previously mentioned, final touch-up adjustments of R4 and R7 may be required for best linearity. The standard two-tone test methods are certainly the best way to adjust any linear amplifier, but once initial dc adjustments have been made, on-the-air checks (not through OSCAR) with a local 432-MHz station will yield acceptable results. Do not allow the no-signal dc collector current of Q1 to exceed 50 mA or Q2 to exceed 100 mA, as efficiency will suffer.

Operation

Since this amplifier draws appreciable current during no-input conditions, it is advisable to provide a method of switching the power supply off during

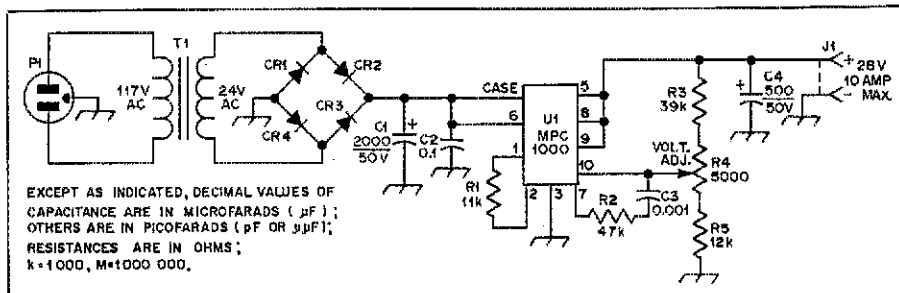


Fig. 4 — Schematic diagram of a power supply suitable for powering the amplifier.

C1, C4 — Computer-grade electrolytic capacitor.
 C2 — Plastic capacitor, 50-V dc rating.
 C3 — Disk-ceramic capacitor, 50-V dc rating.
 CR1-CR4 — Four silicon diodes, each 100 PIV, 10 amps, Motorola 1N3209 or equivalent. A 100-PIV, 10-amp bridge rectifier may be used (Allied 976-2905 or equivalent).

R1 — 5-percent-tolerance, 1/2-watt carbon resistor.
 R4 — Carbon potentiometer, 1/2-watt minimum rating.
 T1 — 24-volt 8 to 10 amp transformer. Stancor P-8619 or equivalent.
 U1 — Voltage regulator IC, mounted on heat sink. Motorola MPC100 or equivalent.

standby conditions. After several hours of ssb operation, expect the heat sink to be at least warm to the touch; if its temperature exceeds about 160°F the air flow from a small fan directed across the heat sink should be used to protect the transistors from overheating. Improved efficiency on cw may be obtained by adjusting R4 and R7 to lower the quiescent collector currents of the transistors. In fact, if cw-only operation is desired, the base-bias circuitry on both transistors may be eliminated by changing R1 to a 0.2-µH molded choke,

eliminating R2 and returning RFC1 directly to ground.

References

- Available from Amateur Radio Component Service, P. O. Box 546, East Greenbush, NY (formerly distributed by Carmichael Communications Co.).
- Available from UHF-VHF Communications, 53 St. Andrew, Rapid City, SD 55701.
- "Microstrip Design Techniques for UHF Amplifiers," AN-548, Motorola Semiconductor Products, Inc.
- "UHF Microstrip Amplifiers Utilizing G-10 Epoxy Glass Laminate," AN-578, Motorola Semiconductor Products, Inc.
- Buscemi, "A 75-Watt Solid-State UHF Amplifier," *QST* for October, 1972.

Strays

□ The advertisement said, "R. F. Macaroni." A misprint, perhaps? Did they mean Marconi? Not so, says WB5OAU, who spotted the ad in the *Albuquerque Journal*. It merely promotes a certain brand of pasta, which John Brewer says his indoor antenna farm resembles, Hi.

□ After Bob May, K4SE, had signed off with E2CL on St. Patrick's Day, he ran into none other than W7SE (ex-W7JEI), making his first contact with his new two-letter call sign. Begorrah!

AN EXERCISE IN FRUSTRATION

□ *Friend:* Hey! I see you got a CB in your car — what kind you got?
Me: That's not a CB, it's amateur radio.
Friend: How come you got two antennas?
Me: One is for 2-meters and one is for 40-meters.
Friend: What's your handle?

Me: My name is Phil.
Friend: No, I mean your handle.
Me: You don't understand. I'm an amateur radio operator, not a CBER.
Friend: I got a 40-channel super MAGNA KAT with twin big sticks that cost 600 bucks.
Me: That's nice.
Friend: What channel do you monitor?
Me: I'm NOT a CBER.
Friend: Sure, fella. Whatever you say.
Me: 10.4 good buddy. — Phil, WB9QXY

QST Congratulates . . .

□ Ulrich L. Rohde, DJ2LR/W2, who has received an appointment to professorship at the University of Florida (Gainesville), Department of Electrical Engineering. He is president of Rohde & Schwarz Sales Co., Inc.

□ Dr. George Williges, WBSIZE, of Kingsville, TX, who has been named chairman of the Biology Department at Texas A&I University.

□ Morton Povman, ARRL Public Relations Assistant and New York City Council member, holds a proclamation

by Queens Borough President Donald R. Manes declaring Jan. 29, 1977, as Queens Amateur Radio Day. At left is Wally West, director of the Hall of Science, a museum housing an active amateur station. On the right is Jim Jaffe, WB2VOS, president of the Hall of Science Radio Club.

□ operators who assisted the Red Cross in Kingsport, TN, when floodwaters struck in early April. Local hams gathered their gear and drove to the heart of the disaster in isolated Grundy, VA, where they handled emergency communications for 6-1/2 days. Other operators manned a base station at Red Cross headquarters in Kingsport. "Without the ham radio capabilities, our hands would have been tied," said Job Director Jim Clayton.

□ the Madison Repeater Club and Yellow Thunder Amateur Radio Club for providing two-way communication during the Wisconsin School Bus Association Roadeo on April 30. The operators linked the Roadeo's supervisors, scoring rooms and judging points, and were highly commended by Dick Rechlicz, the executive secretary of the association.

Product Review

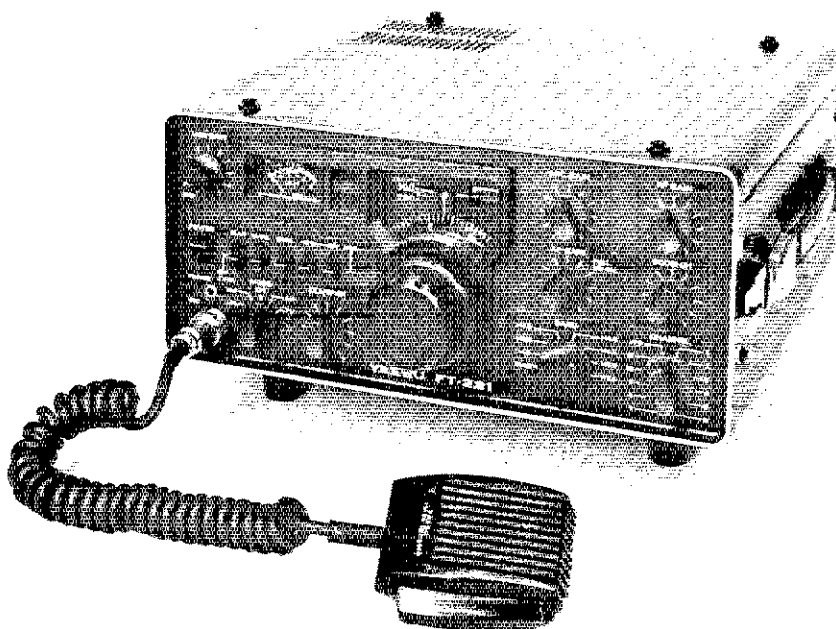
The Yaesu FT-221 Multi-Mode Two-Meter Transceiver

Two-meter transceivers are nothing new. Units for a-m, fm or ssb alone have been available for decades. What is new is the transceiver combining all these modes, plus cw, in one package. One such unit is the Yaesu FT-221. This trim little transceiver covers the entire 2-meter band in 500-kHz segments. For repeater buffs, standard or reversed 600-kHz offset is selectable from the front panel. The FT-221 has built-in VOX and cw sidetone, features not available on some other rigs. Transmitter power output is 20 watts on cw and fm, 20 watts PEP on ssb, and about 8 watts on a-m.*

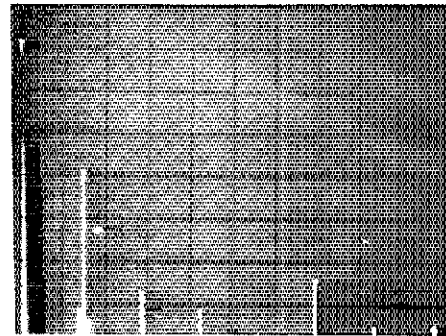
During the testing period, the review unit was used on several vhf modes and gave a good account of itself on all of them. During operation through the OSCAR satellites, several DX stations were worked on ssb, and signal quality received back from the satellites was excellent. When either OSCAR 6 or OSCAR 7 was a few degrees above the horizon, the 20-watt output was adequate for

communications. The transmitting antenna was an 11-element Yagi on an azimuth- and elevation-adjustable mount. During vhf contests the rig was in almost continuous use on all modes except a-m, and showed no signs of fatigue. In such activities the transmitter was helped along by a 70-watt output linear amplifier, but no preamplifier was ever used with the receiver. As this review is being written, an aurora borealis is livening up the 2-meter band, and several contacts have been made. The CLARIFIER control has been useful for fine tuning received signals without changing the transmit frequency, although the CLARIFIER may be used to adjust the transmit frequency if desired. One big help during the tropo and auroral openings would have been a cw bandpass filter for receiving. One other hassle during weak-signal work was the necessity of using an adaptor cable between the nonstandard headphone jack on the front panel and the writer's 1/4-inch headphone plugs. When the headphones are disconnected, the operator must either contend with a dangling cable or find a place to

*Measured in the ARRL lab



The Yaesu FT-221 2-meter transceiver operates in the cw, a-m, fm, or ssb mode.



This is the spectrum analysis of the FT-221 at 20 watts output. The horizontal scale is 100-MHz per division and the vertical scale, 10-dB. In order to avoid overloading the input circuits of the analyzer, the carrier is notch filtered (the carrier is the second pip from the left, approximately 40 dB down from full scale). In order to comply with the latest FCC ruling, any transmitting gear operating from 30 through 235 MHz must have all spurious signals attenuated at least 60 dB if the carrier is more than 25 watts. For 10 watts or less the attenuation must be 40 dB but in no case can any spurious be more than 25 μ W in amplitude. When reading this analysis, keep in mind that the carrier, in relation to the spurious, is actually at full scale. The highest amplitude spur, the one at approximately 700 MHz, is down about 64 dB. This FT-221 passes current FCC amateur requirements with flying colors.

store the adaptor cable until it is needed again. This may seem to be a small point, but a band opening is no time to be plugging cables together. There is no room on the front panel for a standard phone jack, so one assumes the engineers at Yaesu did the best they could. Perhaps as a further sign of lowered interest in cw, the key jack is mounted on the rear panel, beneath the generous heat sink. This writer soon developed a knack for yanking the key lead from the rear panel of his hf rig (not made by Yaesu) and plugging it into the FT-221. Fast band changes took on the appearance of a Charlie Chaplin movie, but one supposes that this is the price of miniaturization.

On transmit, the panel meter indicates relative power output. The only advantages of this function are for adjusting microphone level on ssb and as a source of comfort during all modes. All tuning controls are located inside the cabinet. When changing band segments, the operator need only change the band switch position and set the VFO to the desired frequency. During reception the meter will indicate relative signal strength on all modes, or function as a zero center discriminator on fm. The S-meter function seemed a

bit stingy; by the time the meter started to move, the signal was quite loud. A more sensitive meter would be a great aid in pointing narrow-beamwidth arrays.

As an aid in dial calibration, the FT-221 has a built-in 100-kHz crystal calibrator. The maximum dial error from one segment to another is about 1 kHz, which is hardly noticeable. Dial accuracy and linearity throughout a segment are too close to perfect to notice any error. It is possible to interpolate the dial to less than 250 Hz, making schedule keeping easily possible. At the writer's mountaintop QTH, ignition noise is seldom a problem, but when the occasional car with noisy ignition goes by, the built-in noise blander knocks out the interference. The noise blander was turned on during transmissions by strong local stations, with little harmful effect on receiver dynamic range. These tests were performed during contests when the band was crowded with signals.

For mobile operation, the VFO might be

more of a safety hazard than an aid, so Yaesu thoughtfully included an 11-position crystal-selector switch. This gives the appearance of providing 88 channels, but it is unlikely that this would be the case in practice. The crystal allowing operation on an fm "channel" would most likely fall in an unused portion of some other segment. Amateurs interested in mobile operation will find the FT-221 a bit larger than most fm-only rigs. Cabinet size is 11 inches wide, 5 inches high, and 13 inches deep. These dimensions include the heat sink, but not the cabinet feet. Twelve-volt negative-ground operation is standard, and a 117-V ac supply is also built in. Provision to switch an external relay or amplifier is available through jacks on the rear panel. Both normally closed and normally open contacts are provided. Another jack allows alc voltage from an external amplifier to be supplied to the Yaesu.

Perhaps the best judgment of equipment suitability is the feeling one gets when sitting down to operate. Headquarters staff members

are frequently asked to rate various rigs of similar design. There is no fair method of doing so, because what one operator finds useful, another may find useless. An inconvenience to one person may make operation by another impossible. The multi-mode rig provides a diversion for the operator who is not satisfied with fm for whatever reason, and it allows anyone with the wherewithal to purchase one to try out the various exotic modes on vhf. With the increased popularity of multi-mode rigs, activity on the "other" vhf modes is on the upswing. Hams whose only activity has been on fm have happily discovered that repeaters aren't required for long-distance contacts. The Yaesu FT-221 has performed well on any mode it was used on. The simplicity of operation of a vhf transceiver cannot be overestimated. This reviewer has found it to be a very pleasurable experience. The FT-221 is distributed in the U.S. by Yaesu Electronics Corp., 15954 Downey Ave., Paramount, CA 90723. Price class is \$600. — WJXZ

OPTOELECTRONICS 850-4 LED CLOCK AND TB-1 60-Hz XTAL TIME BASE KITS

Cheap and easy-to-find integrated circuits for digital-clock projects have been around for a few years, and digital clocks are winking away in many an amateur station as a result. But the problem after you buy one lonely clock IC is to come up with the associated parts you'll need to finish the project, including such things as display readouts, driver transistors, a power source and so forth. And sometimes you might even have to come up with your own circuit, working only from a functional diagram of the IC you've invested in. Not so if you obtain the 850-4 LED clock kit from Optoelectronics, Inc. A complete kit with the electronic parts you'll need to finish your project is available for little more cash than a clock IC alone at some parts houses. A circuit board and molded-plug power transformer are available as optional extras.

Shown in the photograph is the completed kit with the extras — all you need to get the project assembled and working (other than solder and some short lengths of hookup wire). The kit itself includes a National Semiconductor MMS314 clock-chip IC (24 pins), LED readouts, sockets, driver transistors, diodes, resistors, capacitors and time-setting switches. All of this comes at a price class of \$10. Add another \$6 for the molded-plug power transformer (117-V ac primary, 10-V secondary) and the circuit board, and you have a clock which is complete (except for enclosure). It can be assembled in one evening.

The MMS314 uses either 50 or 60 Hz as its frequency reference. The circuit board is designed to obtain this reference from the 10-V ac input from the power transformer. During construction the builder wires the kit to operate from either 50 or 60 Hz. Similarly, the display is wired at the builder's choice for either 12- or 24-hour operation. Once the kit is completed and power is applied, the three switches may be used to stop the count, advance the minutes and hours slowly, or

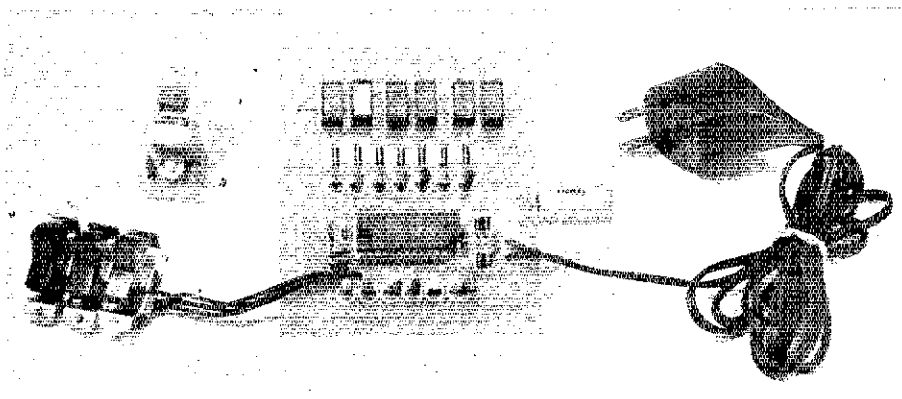
advance the minutes and hours rapidly. As with almost any digital timepiece, the best setting procedure is first to preset the hours, next the minutes, and then to start the seconds count the instant the preset time is at hand.

When the 850-4 clock is operated from the power-line frequency, its accuracy will be no better (nor worse) than an ordinary electric clock. Seldom is the line frequency precisely 60,000,000 Hz, so your clock will most likely be continually gaining or losing time. Over a period of a day or more the losses and the gains usually cancel out and the clock will average being quite close to exact, but we have seen a digital clock gain as much as five seconds in a 1-1/2-hour period.¹ If the utmost in precision accuracy is your desire, the TB-1 60-Hz crystal time base from Optoelectronics is for you. Offered as a separate kit in the \$5

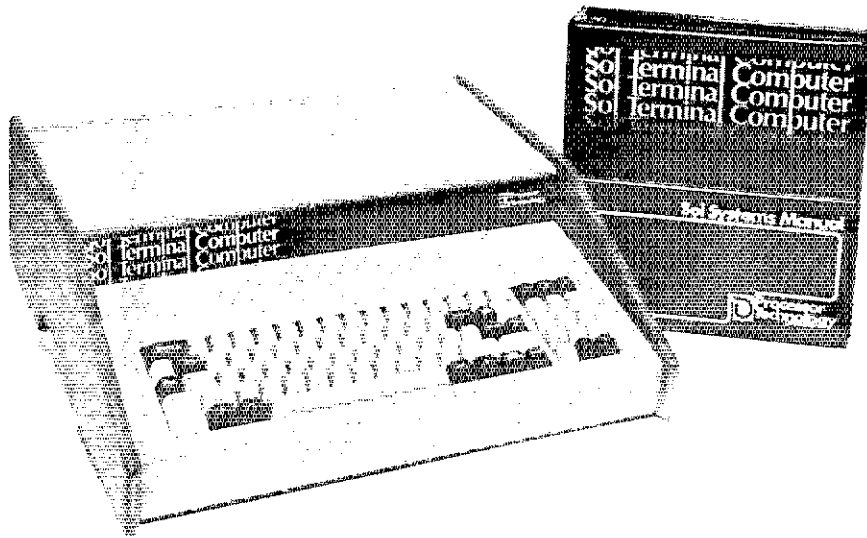
price class, the TB-1 includes everything you need to obtain a crystal-controlled 60-Hz signal.

The heart of this kit is a National Semiconductor MMS369 8-pin IC. This is a 17-stage CMOS device which is an oscillator and divider. It is designed to work with a 3,579,545-MHz crystal. Yes, you're right, that is the color-burst frequency for television sets, and crystals are low in cost. The oscillator section of the MMS369 must be offset slightly from the marked crystal frequency (a trimmer adjustment capacitor comes with the kit) so the frequency-divider output is a precise 60 Hz. To incorporate the TB-1 into the 850-4 clock, one resistor is removed from the clock circuit board and the 60-Hz crystal-controlled signal is wired in. The crystal time base operates at from 5 to 15 volts dc, so power may be taken from the clock itself (which is 12 volts dc with a 10-volt ac transformer). The LED clock kit and crystal time base are available by mail in kit form from Optoelectronics, Inc., Box 219, Hollywood, FL 33022 — KITD

¹ For additional information on short-term accuracy of power-line frequencies, see "Learning to Work with Integrated Circuits, Part 4," *QST* for April, 1976, p. 20.



The 850-4 LED clock is most prominent in this picture, and tucked into the photo above the three switches is the optional TB-1 crystal time base. The molded-plug transformer provides 10 volts ac to the larger circuit board, which contains rectifier and filter components. Six 0.4-inch-high LED readouts display hours, minutes and seconds in a 12- or 24-hour format (builder's discretion).



The Sol-20 comes in this neat package. The outside edges of the enclosure are made from walnut. Processor Technology has an excellent systems manual, shown behind the processor.

PROCESSOR TECHNOLOGY SOL-20

Not long ago some folks thought of the computer as that big expensive electronic "brain" that the banks used to keep track of their money. Or the ever-present "eye" of the government, keeping watch over a few "selected" subjects of the realm. Some only thought of it as a toy for university students and faculty. And, of course, every science-fiction writer worth his salt has depicted a few of these brains running amok and taking (or at least trying to take) over spaceships or the entire world! Fortunately there are still a few level-headed scientists and engineers left who use and design computers to *aid* society. And not only have they succeeded in improving performance of computer systems, but they have also reduced them in size to where one can slip a unit into his shirt pocket or strap it to his side in an attractive leather case.

The shirt-pocket-size computer is, of course, a programmable calculator such as the HP-25 or SR-52A. But nonetheless, these units can do branch functions and other "reasoning" operations that are considered to be computer functions. These units are, however, still restricted to math and, for the most part, they print responses in numerics only (no words).

The advent of the true hand-held computer is not too far into the future, but some of us would like to have a true computer we could use to help us track satellites, or do contest logging and the like, *right now!* The answer seems to be an electronic gadget that is a relative newcomer to amateur radio buffs — the microcomputer.

What's a Sol?

Sol is a microcomputer systems design approach. Sol-20 is the first microcomputer designed as a *complete* system. Some of the more popular computers sort of grew from necessity, adding new expansion modules as the need arose. Circuits that are *extras* in other systems — such as the central processor,

memory, keyboard and display, software, a power supply and a nice-looking package — are all standard with the Sol-20. One doesn't have to buy any additional peripheral equipment to make the system operational. Sol's own keyboard and "smart" terminal are built-in, and Sol is already programmed to

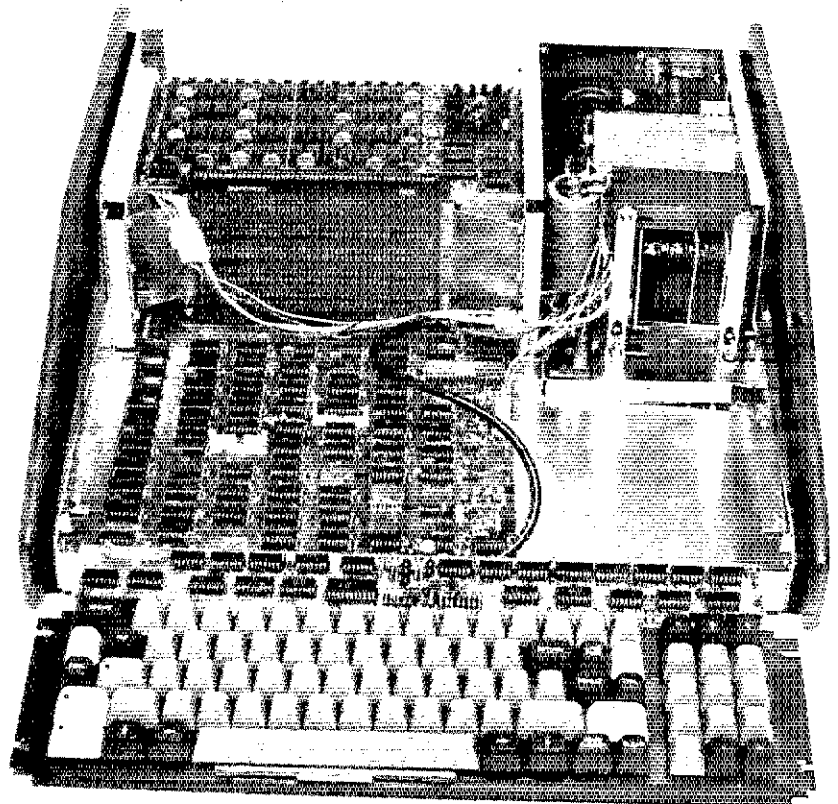
receive commands the moment power is applied. The amount to which one can use the "power" of the computer is controlled by the selection of one of three plug-in ROM boards called "personality" modules. But wait a minute, we're getting ahead of ourselves. Let's start from the beginning and see what makes Sol tick.

Inside the Sol-20 System

The Sol-PC (heart of the Sol computer) is one double-sided pc-board microcomputer/terminal designed and built around the Intel 8080 (National Semiconductor and other IC manufacturers now "second source" the eight-bit 8080) microprocessor IC. Support circuitry permits full implementation of the 8080's set of 72 instructions. The execution time of these instructions varies from 2 to 9 μ s.

The Sol-PC has both serial and parallel communications interfaces, keyboard interface, an audio cassette interface, a video display circuit, 1 kB (kilobyte) of system random-access memory (RAM), 1 kB of display RAM, and a plug-in personality module which contains up to 2 kB of read-only memory (ROM) stored program. And the Sol-PC is bus compatible with all Processor Technology (PTC) firmware. Power requirements for the Sol-PC are +5 V at 2.5 A, +12 V at 150 mA, and -12 V at 200 mA (± 5 percent).

Parallel interfacing is eight bits each for input and output plus control handshaking signals, and the output bus is tristate TTL for bidirectional interfaces. The serial interface



Inside view of the Sol-20 Terminal Computer. The Sol-PC Single Board Terminal Computer pc-board is along the left side of the chassis, perpendicular to the front edge. The back-plane expansion board is in the upper left of the picture with an 8KRA, 8-kB random-access memory board installed. The power supply with the muffin fan installed is in the upper-right portion of the picture. Also shown is the 85-key keyboard.

circuit includes both asynchronous RS-232 and 20-mA current loop provisions and operates at 75 to 9600 baud (switch selectable).

Seven-level, ASCII encoded, TTL keyboard interfacing requires a 2- to 10- μ s strobe pulse after data are stable. The dual-rate, 300 or 1200 b/s (bits per second), audio cassette interface is program controlled and self-clocking with phase-locked loop. The cassette interface circuit includes automatic level control in both the record and playback modes. Recording is CUTS/Byte standard² compatible, asynchronously Manchester coded at 1200/2400-Hz or 600/1200-Hz frequency shift.

The video-display circuitry generates sixteen 64-character lines from data stored in an on-card 1024 \times 8-bit word-display RAM. Alphanumeric and control characters (the full 128 upper and lower case plus control ASCII character set) are displayed black on white or reverse (switch selectable). Solid video-inversion cursors, with switch selectable blink, are programmable. The display output is EIA standard, 1.0 to 2.5 V pk-pk with composite negative sync and with a nominal bandwidth of 7 MHz. The output from the display circuit can be used to drive any standard video monitor. (A monochrome TV, converted for video input, can also be used and instructions for modifying a TV set are provided in the Sol assembly manual.)

Included on the card are 1,024 words of static, low-power system RAM capable of full-speed operation and a plug-in personality module which contains the software control program. Three personality modules are available for Sol:

CONSOL — allows simple terminal opera-

tions plus direct control of the basic computer functions for entering or examining data in any memory location, or executing a program stored at a known location in memory.

SOLED — allows advanced terminal operations with CONSOL plus screen, file and cassette-tape editing/transmission operations.

SOLOS — allows full stand-alone terminal-computer operation.

Kit or Assembled — Your Choice


The unit described in this review is a kit version known as Sol-20. But the unit is also available from PTC factory assembled and ready to run. Amateur radio buffs have traditionally built equipment from scratch or have been kit builders. However, some of the newer (and older, too) hams are more interested in operating or using a piece of equipment and are less inclined to get inside and tinker with the inner workings. This is also true with the computer field. Some prefer to develop software and couldn't care less how the electrons get the job done so long as the computer does what it's told to.

Building a Sol kit is a challenge. The component count is about the same as that for a Heath SB-104. With over 100 ICs, dozens of capacitors and resistors and several transistors, one quickly gets blurry eyed while soldering the components into the Sol-PC circuit board. Assembly instructions are excellent and easy to follow. Several tests are made throughout the assembly process, to find and correct any problems before the unit is completed. Two methods for performing the tests are given, one using an oscilloscope and the other with a VTVM/test circuit. The reviewer tried both methods and found either to be satisfactory. Besides, not many of us have scopes but can manage to round up a VTVM when needed. About 60 to 70 hours

were required to complete the assembly and test of the Sol-20. The reviewer did encounter a problem, which turned out to be a ROM on the personality module that was apparently not programmed properly at the factory. I stop at the factory while on a trip to the West Coast fixed the problem in short order. Quality of the components and pc boards is very good. And the package that is wrapped around the electronics is not only functional, but attractive. The terminal is finished in blue with solid black-walnut wooden end plates. This gives the terminal/computer the look of an attractive piece of furniture which would fit in nicely anywhere in the house, including the living room.

Some Additional Choices

Sol Terminal Computers are available in three basic forms. One can purchase just the Sol-PC Single Board Terminal Computer, or the Sol-10 Terminal Computer which consists of the case, power supply and 70-key solid-state keyboard, or the Sol-20 which includes all the features of the Sol-10 plus a larger (heavier duty) power supply, muffin fan, 85-key solid-state keyboard and a five-slot expansion backplane for adding accessories such as memory, graphic interface circuits and the like.

Also available are complete Sol systems which include memory modules, TV monitor, high-quality cassette recorders, Helios II Disk system and of course the Sol-20 with the SOLOS personality module. Prices for Sol systems start from \$475 for the Sol-PC (kit), to \$5,037 for the Sol System III factory assembled, top-of-the-line system! A 22-page catalog of all the Processor Technology products with a complete price list and a list of PTC dealers is available from Processor Technology Corp., 6200 Hollis Street, Emeryville, CA 94608. — WA6GVC/W3 

² More information on this "standard" can be found in *Popular Electronics*, March, 1976, page 86.

Strays



□ Neighbors who complain about Senator Barry Goldwater's amateur radio transmissions interfering with their TV reception must be rather astounded when the Arizona Republican goes over to their house and installs a simple filter, costing about \$1.50. But that's what he does, he told the Senate on March 2, 1977, while introducing a bill to give the FCC power to require such devices in TV and stereo receivers. Goldwater said installation by the manufacturer would be "far simpler and more efficient." From the *New York Daily News*, March 3, 1977. Thanks to K2UFM for submitting the article.

□ The Totah Amateur Radio Club, station K5WX1, of Farmington, NM, will be holding its field day at Four Corners National Monument (New Mexico, Arizona, Utah and Colorado) on July 30 and 31. Participants will work ssb and cw on 15, 20 and 40 meters. All contacts will be confirmed on request.

I would like to get in touch with . . .

□ anyone interested in starting a NIFTY (National Federation of Temple Youth) net. Contact Shaun E. Breidbart, WB2STZ, 132 Madison, Scarsdale, NY 10583.

□ another SWL or a ham, OM or YL, to exchange correspondence. Prefer my age group (50s). Write Hal Collard, ex-G2CVA/ZE2JO, 95 Hart Road, Thundersley, Benfleet, Essex, England.

□ North Carolina amateurs are turning the traditional summer hamfest into a full-fledged communications show. To the technical talks and flea market they have added NASA exhibits, seminars, events for spouses and children, CB, ham and other radio equipment displays — a "coffee break," CB Jamboree, trade show and ARRL hamfest in one air-conditioned package at the Greensboro, NC Coliseum, July 29-31. Perhaps your hamfest too can be made a general public event, where others can see what ham radio is all about.

□ any amateurs interested in playing chess with a computer (or a Class B chess player) over the air. Contact Ken Rothfield, WB2LRI, 971 Pittsford Mendon Road, Pittsford, NY 14534.

□ present owners of Hallicrafters FPM200 (not 300) limited production transceiver to exchange service information and possibly form a club. Jerry Swartzlander, W8EPI, P. O. Box 666, Fremont, OH 43420.

□ hams who are hams (in a community theater, that is). Robert C. Jarvis, WA8CGR, 3247 Bradley Rd., No. 2, Huntington, WV 25704.

□ amateurs interested in radio-telemetry, especially of physiological data. Timothy A. Stabler, WB9NLZ, Dept. of Biology, Indiana U./Northwest, Gary, IN 46408.

□ hams, especially women, to join "Stitch & Chat" net on Wednesday mornings, at 1345 or 0845 on 3780 kHz. Control station is VE3DBQ, Ingersol, ON.

Feedback

□ In "PEP Wattmeter — a la Heath" (*QST*, December, 1976) author George D. Rice, W6OGR, advises that the ground symbol on S3 (Fig. 1) should be omitted. Also, in Fig. 5, the 0.01 disk capacitor from U1, pin 3, to ground should be labeled 0.1; the schematic is correct in this respect. Finally, the circuit board pattern should be labeled *component* side, *not* foil side.

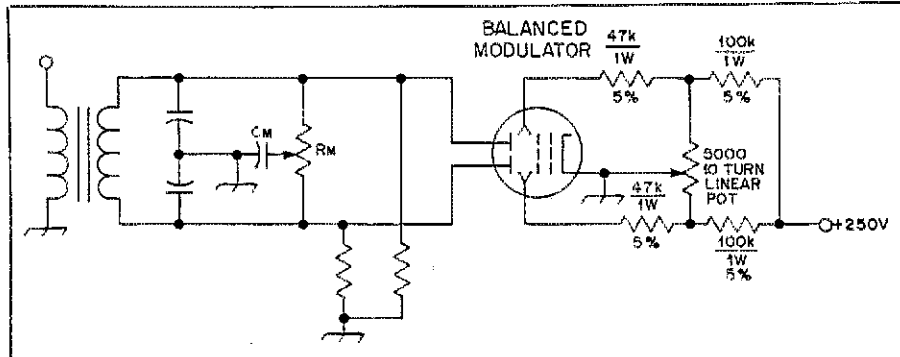
Hints and Kinks

TWO MORE TIPS FOR THE SWAN 250

Many Swans seem to have, to some degree, residual carrier after balancing. With this modification the problem can be eliminated effectively. Refer to the accompanying diagram and then proceed with these changes. Replace the 1/2-watt 47-k Ω and the 100-k Ω resistors with 1-watt 5-percent resistors. Change the carrier balance 5000-ohm potentiometer to a linear 10-turn potentiometer.

Across the primary of the balanced-modulator transformer connect a 10-k Ω , 10-turn linear trimmer potentiometer, grounding the center tap through a 0.01- μ F disk ceramic capacitor. The trimmer must be of the noninductive type, a Cermet or one with a carbon element works fine. Connect the ground end of the 0.01- μ F disk capacitor to the same lug that grounds the center tap of the modulator transformer.

To adjust the balance, set the trimmer potentiometer to midrange. Turn the carrier-balance potentiometer on the front panel for maximum carrier suppression. With a sensitive rf indicator in or near the transmission line, use the trimmer to balance out the residual carrier. — *Hamp Richardson, K5EFW*



Carrier-balance modification for Swan 250.

If you purchased a used Swan 250-C with which reception is not up to par, and if it does not have a noise blanker, then check J6 and J8. A jumper should be wired between these two jacks. Without the jumper as originally installed at the factory, a 6- to 9-dB signal-strength loss could be experienced. — *Richard Mollentine, WA0KKC*

MORE PEP — LESS PAINT

Two difficulties arose after I built the "PEP Wattmeter — a la Heath" described in *QST* for December, 1976. One problem was the failure of the meter to maintain the required zero indication. Invariably, within a period of time after zeroing the meter, the drifting would be observed.

I discovered while monitoring the voltage appearing on the wiper arm of the zero-set potentiometer (with the remainder of the circuit disconnected), that the voltage would increase. The change would be positive or negative in direction.

My solution for this difficulty was to add regulators to the +9- and -9-voltage supply (important with op amps). These regulators are Radio Shack type 723 (catalog no. 276-1740) precision units or equivalent devices. The changes also include modification of the input circuit to U1B as shown in the diagram. To install the regulators, the power transformer, T1, must be modified. I added 20 turns of wire to each side of the secondary. This produced about 18 volts ac. The regulators need a minimum of 9.5 volts dc for proper operation. A Radio Shack pnp transistor (RS2023) or any general-purpose transistor rated to handle an $I_A > 50$ mA may be used for Q1. The rf choke was Radio Shack part no. 273-102.

Stray rf was determined to be the cause of erratic readings observed on the meter. The cure, a simple one, was to remove all paint where the two chassis join at the meter case. Paint should also be removed from the cover plates of the meter case in order to permit good contact with the case. A day that will be long remembered is when manufacturers stop painting enclosures entirely so that rf will not leak in or out! I also connected a wire from the ground terminals of the circuit board to the case.

In order to control the power for the wattmeter from the transmitter 117-V ac

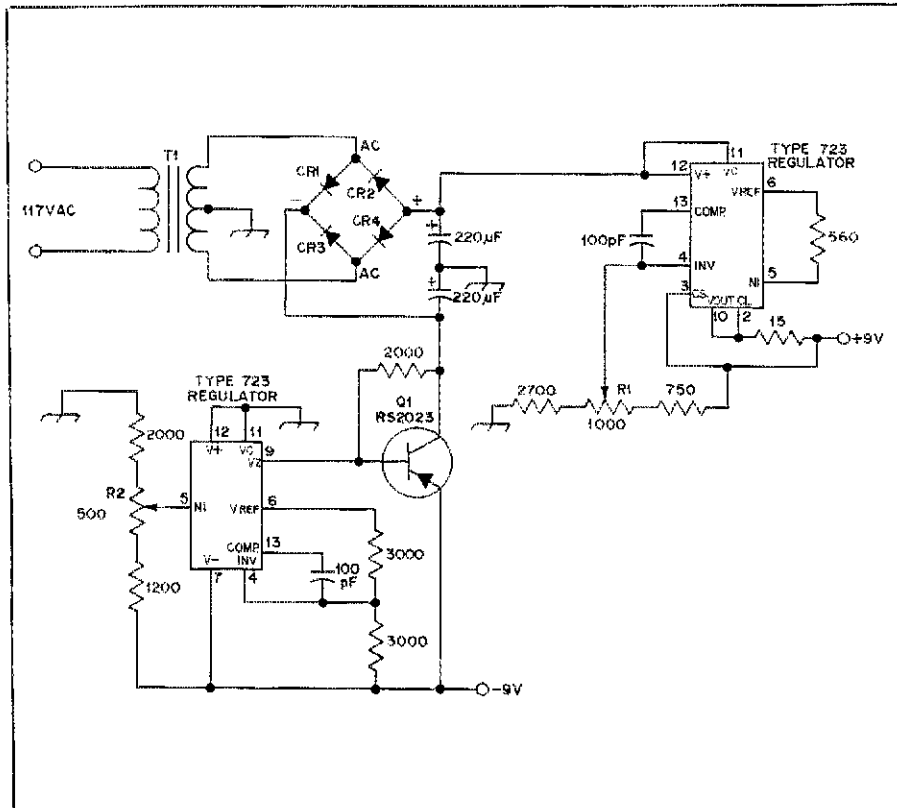


Fig. 1 — Regulators for PEP-Wattmeter power supply.

switch, the ac power circuit was rearranged as shown in the illustration. While these modifications eliminate the zeroing of the meter, it must be remembered that the meter should still be calibrated according to instructions in the original *QST* article. — Jay Kobelin, WA2FJ

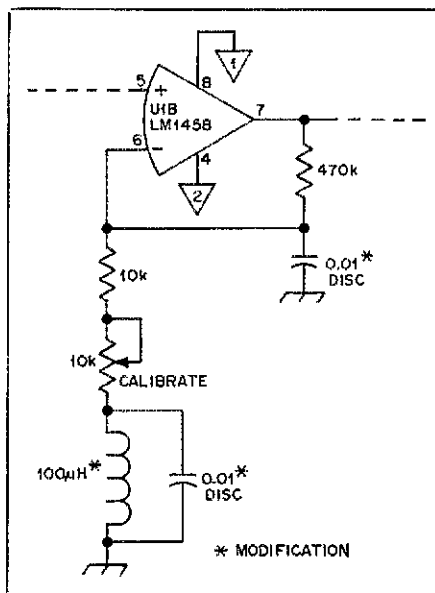


Fig. 2 — Modified PEP-Wattmeter input circuit.

CLEANING EQUIPMENT

A recent issue of *Tekscope* published by Tektronix, Inc., contained some useful information about cleaning electronic equipment: Some of the points covering the cosmetic aspect are given here.

Many cabinets may be removed easily from the chassis. They should be washed with detergent, Kelite or equivalent, mixed with water (a ratio of 1 part detergent to 20 parts of water). After thoroughly drying the cabinet, the appearance of the instrument can be enhanced by applying WD-40 (a lubricant available in many hardware stores) or furniture polish to the exterior. For front or side panels, WD-40 should be sprayed on an absorbent towel and then applied to the panels. Do not spray it directly on the surfaces. Follow the application with a thorough wiping. Use a soft 1-inch brush to spread WD-40 in the areas around knobs and switches. WD-40 is made by the WD-40 Company.

Aluminum graticule covers and panels may be made to look like new by using a wet sponge and a little Ajax. Rub the scratches and other marks until they are clean. Knobs may be restored by using a stiff bristle brush and detergent mixed with water to remove finger marks.

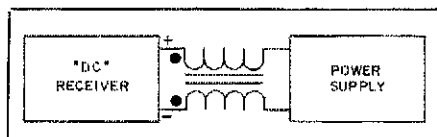
While the cabinet is removed it is well to take a few minutes to apply lubricant to the switches, controls and motors, if any. For switches, lubricate the detents with a light grease and clean the contacts with No-Noise, a product of the Chemical Electronics Engineering Co., Matawan, NJ. Potentiometers should be treated with one or two drops of No-Noise

or WD-40 applied to the shaft, contacts and open areas around the covers. Cover removal from potentiometers is neither necessary nor desirable. Rotate the control rapidly to eliminate any noise.

Cleaning agents such as trichlorethylene, Freon and others containing halogens, should not be used. They can damage aluminum electrolytic capacitors and some printed-circuit materials.

Use liquid silver cleaner (available at hardware and grocery stores) with a Q-Tip or toothbrush to remove tarnish from silver-anodized BNC connectors and other types. After cleaning the connectors, be sure to protect them by washing each with detergent and water, or by using WD-40. Otherwise, the connector may develop a small potential from the connector to ground that may appear as grid or input leakage. — *Tekscope*

[Editor's Note: Above information taken in part from *Tekscope*. Permission to reproduce granted by Tektronix, Inc. All rights reserved.]



Using a toroid with bifilar winding to reduce hum.

PLASTIC-TAB TRANSISTOR INSULATORS BY THE YARD

Recently I had to mount several plastic-tab (TO-220) power transistors and voltage regulators in the same package. I found a good insulator for use where the tab must be mounted above ground potential, but still well attached to the heat sink. A strip of Teflon Thread-Seal tape (found in plumbing-supply departments) does a good job of insulating the transistor, yet permitting good heat transfer. Nylon hardware (available at Radio Shack) can also be used as well as a 4-40 machine screw wrapped with several layers of the same type of Teflon tape. The Thread-Seal tape, 1/2 inch (13 mm) wide and 260 inches (0.66 m) long, provides mounting material for numerous transistors. It's also useful for a very professional base layer or finish wrap on toroids. — James V. Joyce, WB4MTY

COMMON-MODE HUM IN DIRECT-CONVERSION RECEIVERS

A direct-conversion receiver may be virtually impossible to use with ac-line operated power supplies, owing to excessive hum. Part of this problem is that a direct-conversion receiver obtains most, if not all, of its gain at audio frequencies. Hence, the high audio gain makes the system subject to the smallest ac hum on the power supply. The cure for this problem is just better regulation in the power supply, which is easily realized with an integrated-circuit regulator.

A more subtle form of hum is also common and does not depend upon power-supply regulation. This hum is not present when no antenna is connected to the "dc" receiver. However, when an antenna is at-

tached, a very rough sounding hum-like noise is noted. The amplitude of this response peaks as the antenna trimmer is tuned. There are a number of possible explanations. The most realistic is that local-oscillator energy from the dc receiver is coupled into the power-supply lines. This energy is transferred back through the power supply where it is modulated by the rectifier diodes. The resulting hum-modulated note is now coupled into the ac line. This signal is radiated and picked up by the nearby station antenna. Only the sidebands are detected.

While diagnosis of this problem may be subtle, a solution is deceptively simple and is shown in Fig. 1. A large ferrite toroid is wound with a bifilar winding of reasonably large wire diameter. Ten turns of no. 18 are usually suitable. The core is not critical although it should have a high permeability. An Amidon FT-82-75 is recommended. The effect of this balun-like circuit is to present a high impedance for any rf paths between the receiver and the power supply. Only the dc difference voltage from the power supply is applied to the receiver.

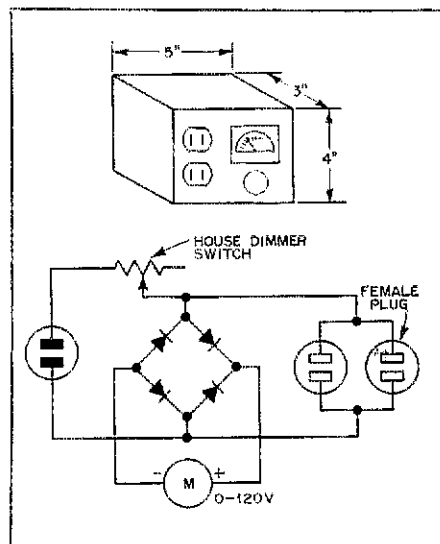
In the writer's station this method was applied with three different direct-conversion receivers. In two of the three cases the receivers were previously useless except with battery power sources. With the toroid, no differences could be detected when switching from a battery pack to a well-regulated ac supply. — Wes Hayward, W7ZOI

JUNK-BOX SOLDERING-CONTROL UNIT

Here is a unit that is simple to build and can control the temperature of your soldering-iron tip when you don't need too much heat. You will note that this unit uses a full-wave bridge rectifier but, it is only necessary if a dc voltmeter is to be used. The bridge rectifier is eliminated if an ac voltmeter is employed.

Remember, for good soldering keep the iron tip clean. Use a damp sponge to clean excess solder from the tip before putting your iron away. — From Wellesley Amateur Radio Club bulletin, *The Spark Gap*.

QST



Junk-box soldering-control unit.

Phase III: Toward the Ultimate Amateur Satellite

Part 2: Most users of the AMSAT-OSCAR 7 Mode B transponder would agree that it has provided consistently strong and reliable signal levels. The transponders aboard the Phase III should at least match that performance level, due to its innovative communications system. And this despite the new spacecraft's far greater distance from earth.†

By Jan A. King,* W3GEY

Think about it: Amateurs can now transmit to and receive high-quality signals from an orbiting spacecraft for up to 23 minutes at a time. How do we go about providing that same level of signal strength over a 12-hour elliptical orbit that will bring the satellite about 10 times farther from its users?

How can we determine the most useful and practical frequencies for the transponders and beacons aboard this revolutionary satellite?

With everyone's time at a premium, how can we meet our vital deadlines while relying largely on scores of volunteers?

How can we assure the agency launching the satellite that we will come up with the money needed to build and test it?

Those are a few of the challenges faced by those planning the Phase III satellite, now scheduled for launch in 1979. Whether or not it will fly depends not only on our engineering capabilities but on our ability to search out creative solutions to the varied challenges we face. This part will explore some of them in detail.

Communications System: Challenge No. 1

To provide consistently strong signal levels at 20,000 miles as well as at

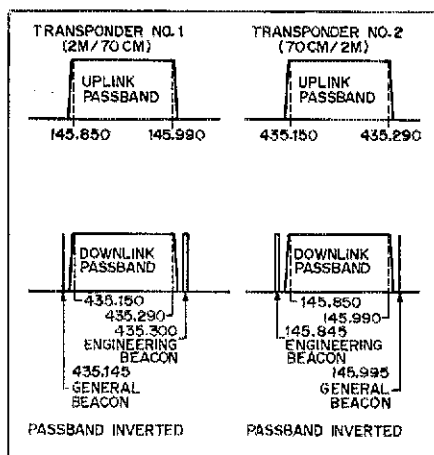


Fig. 1 — Transponder frequencies of the Phase III spacecraft. Notice that each transponder will have two beacons.

2,000, the effective radiated power (erp — apparent power level out of the antenna) of the Phase III spacecraft must be increased by 20 dB over that of AMSAT-OSCAR 7, to a level of 1,000 watts. As with ground stations, this can be achieved through a combination of increased transmitter power output and antenna gain.

The transmitter power output impacts dramatically the power system which must deliver the dc input. It also affects the thermal design of the satellite, since the additional heat produced must be conducted and radiated away from the final stages. In turn, the

antenna affects the attitude control system; the higher the antenna gain, the more accurately it must be pointed toward the earth.

A comprehensive trade-off study has shown that the power system will support a transponder with a 50-W peak-envelope-power (PEP) output and that a downlink antenna gain as high as 10 dBi may be realistically achieved. This would give an erp of 500 watts, 3 dB short of the desired goal. When compared to A-O 6, this 3-dB loss seems an acceptable compromise.

In the design being considered, the antenna will be located on the spinning axis of the spacecraft and will be pointed directly toward the earth at apogee. The attitude of the spinning body will remain fixed throughout the orbit. As the satellite comes away from apogee, the distance to the user will decrease and the path loss will drop. The earth, however, is no longer centered in the beam, serving to decrease antenna gain. The antenna can be designed such that the reduced path loss is almost exactly counteracted by the decreased gain, resulting in a nearly constant signal level to the user during the entire pass.

To provide high-quality signals for the perigee part of the orbit, the transmitter will be switched to an omnidirectional antenna just north of the equator. It will switch back to the high-gain antenna on the outbound leg of the ellipse.

The uplink performance will suffer a

†Part 1 appeared in *QST* for June, 1977.

*Project Manager, AMSAT-Phase III, P. O. Box 27, Washington, DC 20044

similar 20-dB increase in path loss with the Phase III orbit. This increase will be overcome by a similar amount of antenna gain (about 10 dBi), improved receiver noise figure, and increased overall transponder gain. Users should expect to need only slightly more power than required for A-O 6 and 7. Despite the great distances involved, the Phase III user will access the spacecraft with the same simple low-power equipment required for the earlier satellites. This remains an important objective of the

amateur satellite program.

Which Bands?

It was found that the best bands for the Phase III communications transponders are 2 m and 70 cm. Ten meters was eliminated because antenna gain at the satellite would still be required, and such antennas would be very difficult to implement. The transponder bandwidth is limited to 155 kHz by an IARU Region I agreement regarding the satellite subband at 2 meters. This frequency

band, from 145.845 MHz to 146.000 MHz, will be completely used by the communications system.

An AMSAT survey on user frequency preferences showed a 50:50 split between users who desired the downlink to be on 2 m and those who wanted it to be on 70 cm. There were strong technical and nontechnical arguments on either side. As a result, AMSAT will endeavor to provide reciprocal transponders (not to be operated simultaneously) that will test the advan-

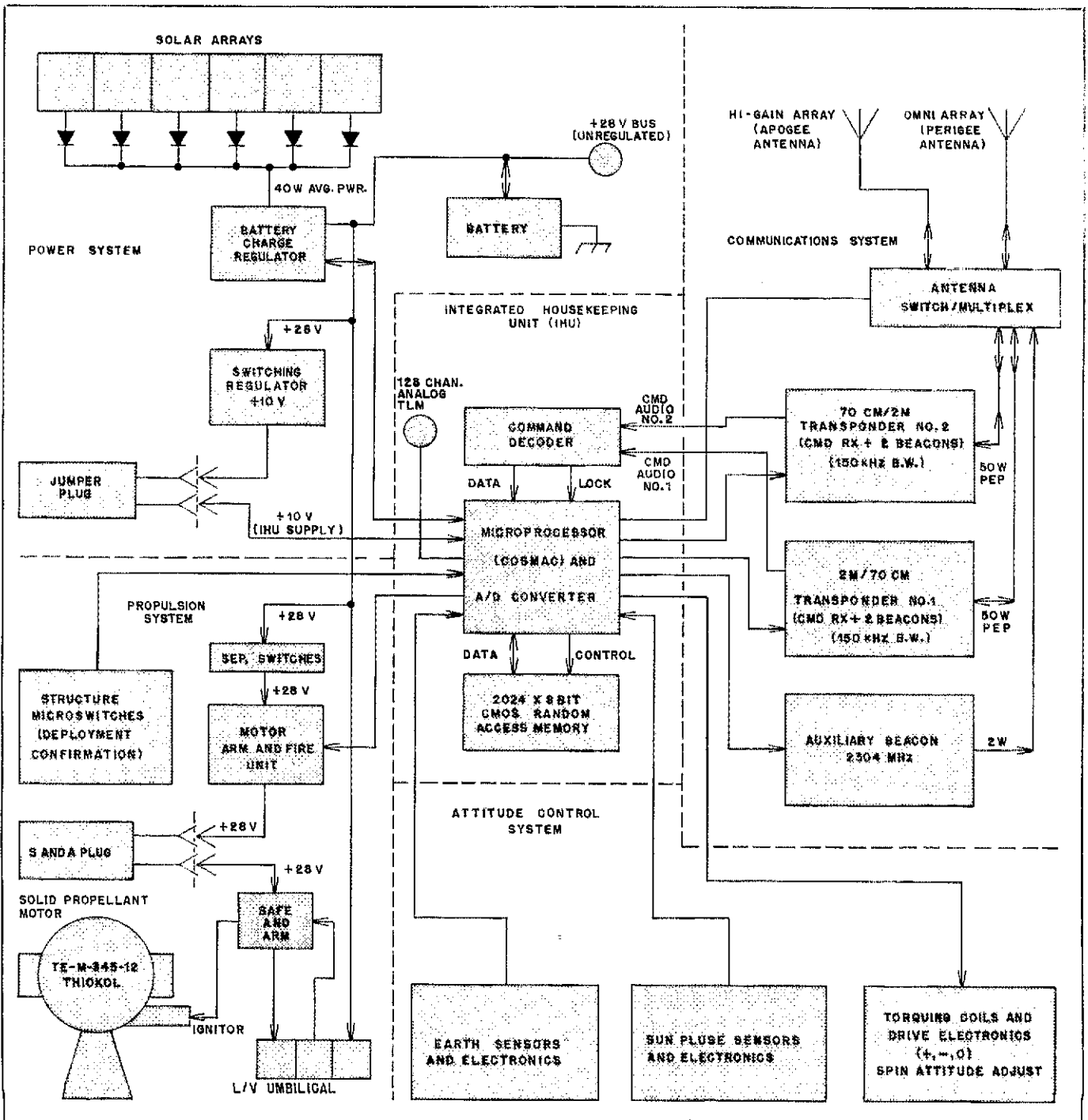


Fig. 2 - Functional Block Diagram, AMSAT-Phase III.

tages of each link choice. The bandplan for the communications transponders is shown in Fig. 1.

Two beacons will be associated with each transponder, one at each end of the downlink passband. One will be a general beacon, providing bulletin information and low-speed telemetry of interest to users. The other will be a 400 bit-per-second engineering beacon which may be utilized by individuals with home microprocessor systems.

A 2-watt S-band beacon at 2304.1 MHz will be included to provide Doppler measurements for orbit determination and to provide a source of backup telemetry. This beacon will be operated on an as-needed basis near orbit apogee.

Power System: Challenge No. 2

The demands on the Phase III power supply far exceed those of the Phase II satellites. In fact, the signals received by its users will be dependent largely on how much power can be produced by this system. For a given ERP output requirement from the satellite, a greater power from the solar arrays can be used to increase the transmitter power and decrease the required antenna gain. This is desirable since it would relax the requirements on the attitude control system and allow the solar arrays to be oriented more favorably toward the sun. This in turn, would produce more power. Unfortunately, the limitations on the power that can be generated are rather severe: specifically,

1) The physical size of a secondary satellite (piggyback) is very restricted. Surfaces for mounting solar panels are limited.

2) Solar panels are very expensive. Present costs are about \$3,000 per square foot.

3) Losses in distributing power within the spacecraft are about 10 percent.

The results of the trade-off study show that a piggyback structure large enough to support approximately one square meter (10.8 ft.²) of solar cells could realistically be fitted into most launch vehicles. Distributed around the body of the structure, these cells will produce 45 watts of power at the beginning of the spacecraft lifetime and will degrade to about 30 W output in five years. This much power will support a single 50-W PEP transponder which requires an average input power of 25 watts and will provide sufficient reserve to operate the remainder of the on-board systems throughout the satellite's lifetime. During eclipse periods, which can be rather severe in elliptical orbits of this type, transponder operation will be assured by using a nickel-cadmium battery similar to the type used on Phase II satellites. The battery

will be able to recharge completely during the very long periods of sunlight near orbit apogee.

Microprocessor Will Provide Continuing Control

With the advent of the microprocessor, minor design faults such as those that have become apparent from time to time in OSCAR 6 and 7 often can be corrected remotely. In this way, the two OSCARs now in orbit are serving as orbiting laboratories for the designers of the Phase III.

With the untold benefits that will accrue from its ability to affect the control system after launch, a CMOS microprocessor will be utilized in a system to be known as the Integrated Housekeeping Unit (IHU). This system will consist of a command decoder, analog-to-digital converter, microprocessor and at least 2048 bytes of random access memory (RAM).

Responsible for controlling virtually every function on board the spacecraft, it will execute all telemetry and command requirements, monitor the condition of the power and communications systems, and take corrective actions as necessary. It will establish clocks needed for various spacecraft timing functions, and it will interact with the attitude sensors and torquing magnet to adjust orientation of the spinning body in space, its most demanding task. In addition, the IHU will make the final decision on whether all on-board systems are "go" for the kick-motor firing. If confirmed, the computer will send the command to fire, not a ground control station.

The functional block diagram (Fig. 2) summarizes the interconnection of Phase III components.

Schedules and the Amateur: Challenge No. 3

The special relationships between the professional and amateur worlds place a new set of constraints upon the amateur builder of space hardware. In addition, among the amateurs capable of designing and building amateur space hardware (and there are many more capable than think so), volunteers are hard to find. Perhaps it's not so surprising. While the rewards are great when solving a challenging design problem that will benefit thousands of others, the pressures of the professional world are transferred to the shoulders of the amateur space volunteer.

Perhaps the greatest of these is schedule. As anyone who has built a homebrew knows, there never seems to be enough time to get the new gear on the air and working, within its intended specifications, by the original deadline. The amateur space buff must design his own electronics (considering the space

environment), build a breadboard, design and build the package it goes in, build a flight model with high reliability components (which take as long as nine months to obtain), and test the final product. Remember, you can't fix it later! And it must be done on schedule. It is this last factor that seems to take the toll. Few volunteers get hooked hard enough on their hobby to sacrifice their family or employment for periods of several months or several years in order to "make it" on time. The alternative to being late is simple — no launch and a tremendous amount of wasted effort, talent and money.

Again, Phase III stretches this tenacious situation to the limit. Significant development effort is required, much of it not in electronics. Volunteers, like long-distance runners, must pace themselves. A steady work pace over the next three years is required if the amateur space buffs who work on Phase III are to avoid "burn-out" or a sudden decrease in interest after a period of intense progress. Amateur technological breakthroughs, like the DJ4ZC transponder in A-O 7, will be needed. Solutions for each new problem must be found and while the calendar marks the days 'til launch, the clock will not stop. Failures in testing must be fixed and new tests run again. It seems like a long time from beginning to end of a project of this magnitude, but for the amateur satellite volunteer, it must be done on time and it must be perfect — once you let go, you may never touch it again.

The Cost of Doing Business: Another Halfway Problem

Without doubt, the most frequent question asked by professionals in discussions with AMSAT is, "Where do your funds come from?" The question they are really asking is, "How do you build these satellites for such a small amount of money?" Again, the question of credibility arises. Part of the answer, as most amateurs already know, is that an incredible amount of free labor goes into such a project. But even if it were valued at 50 dollars per hour, volunteer labor would not make up for the difference in cost between what amateur radio paid for AMSAT-OSCAR 7 and what the aerospace industry would have charged had they been asked to do the same job. The reasons for this difference in cost are many and complex. Simply stated, in thinking about designing and building a satellite of this sort, amateurs and professionals would approach the problem in completely different ways.

Most importantly, it is possible to construct reliable, long-lived satellites which will tremendously increase amateur capability at relatively low cost. How low is low? Let us put things in perspective. Commercial communica-

tions satellites typically cost between \$10 and \$50 million. A complete system, including ground stations, could easily top \$100 million. In contrast, typical amateur installations range from a few hundred dollars to perhaps as much as \$5,000. Amateur satellites have been and can continue to be built and launched for from \$50,000 to \$200,000 — a range significantly below the cost of commercial systems and far above the level amateurs usually pay for their

equipment. The result is that amateur satellites are in a middle ground — outside the experience factor of both professionals and amateurs.

Another problem which must be faced is that there is no way of deriving funds directly from the satellites. AMSAT cannot, nor does it have any intention to, charge for the communications provided by the satellite transponders. It is also AMSAT's policy, contrary to some terrestrial repeater

groups, not to require membership in any organization in order to be able to use the satellite transponders. Requiring membership would undoubtedly restrict the growth in the number of users and discourage many of the satellite's applications. So, other means must be found to raise the necessary money.

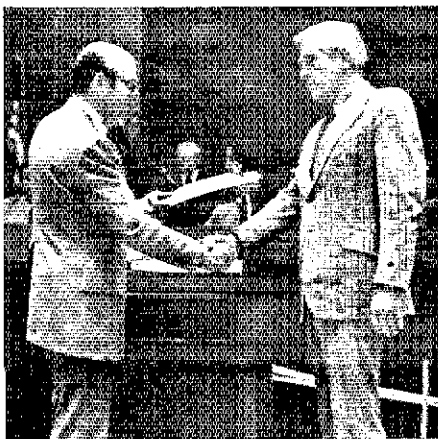
Part 3 of this series will explore the financial challenge that must be met by the amateur community if Phase III is to meet its 1979 launch deadline. **QST**

Strays



This Old Mutt (a Great Dane, actually) seems to enjoy chewing the rag — no doubt DXing to his relatives in Denmark. His owner, Thomas Marshall, of Geneva, FL, says the dog takes advantage of his absence occasionally to pound the brass. Too bad they don't live in the midwest; Fido could apply for a K9 call.

Fort Worth, TX. Mayor Cliff Overcash presents Ben Meyers, WB5HFH, with a proclamation making March 14, 1977, "Ben Meyers Day." Citing Meyers' efforts to establish a 400-member weather watch repeater hookup, Overcash thanked him on behalf of the citizens of Fort Worth "for his untiring efforts in this public service." — *Walt Bauguess, WA5JH*



□ Worked an out-of-the-country ham the other day who said he would QSL via the "burro." Our postal service may be lacking in speed, but at least we are beyond the days of the pony express! — *Joe Kadlec, W9UIN*

□ If your next QSO contact greets you with a bracing "Ahoy matey," you've probably hooked an amateur at sea — or on lake or river. It seems that amateur radio is being lauded by mariners who have discovered it's a great communication service, especially when one is far offshore and needs assistance or just a friendly word. One sailing-equipment retailer in Washington even lists Atlas receivers and ARRL publications in its catalog, and points out to its customers that they should consider becoming licensed amateurs.

□ Retired old-timers and stay-at-homes can enhance their lives by keeping tuned to one spot on the 80-meter Novice band and by letting others know they are monitoring. Stations will call from day to day just to talk to someone who knows them by name. Beginners will get on to talk to someone who will be kind enough to go slowly. I have a ball working Novices who are out for their first QSO. Sometimes it takes me an hour to get my call over to them but they never forget that first contact! — *K7CD*

□ Mrs. Renee Fuchs, WA3OTO, of Aliquippa, PA, has a husband, two sons and two daughters-in-law who are all hams. Recently her children honored her with an appropriate birthday card:

M is for the *megalove* we hold for you;

O is for the way you've made sure there's no place like *ohm*;

T is for the joy you *transmit*;

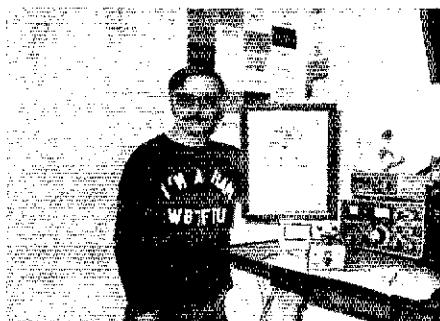
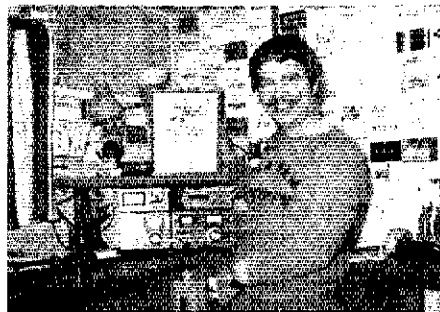
H is for the way you make it better when it *hertz*;

E is for the *extra* you'll always be for us;

R is for the path of least *resistance* you constantly offer us.

□ A place for everything and everything in its place. That seems to be the motto of Georges Gallant, VE2SZ, of Chambly, ON. A ham for 30 years, most of Gallant's station was salvaged or bought used. He works for Bell Canada, teaches electronics two nights a week, and has applied for membership in the "Old-Timers' Club".

The fastest fists in the West! Burt Gigoux, WB7FFU and Ed Buckmaster, WB7FFW, received their Novice tickets in September, 1976. Less than four months later they both qualified for the Bicentennial WAS award, all on cw in the Novice bands. Ed said, "Sure took lots of key time but it helped my code speed." XYL Dee, WB7FFX, just sighed. — *K7LTV*



FCC WARC Proposals, Round 2

Here is your best (and last?) chance to take part in the all-important U.S. WARC preparations.

By David Sumner,* K1ZZ

August 1 may be the last opportunity for the general public in the U.S. to register its views on an all-important question: How is the radio spectrum to be divided internationally for the remainder of this century? A resounding response from individual radio amateurs and local clubs around the country can help influence the position the U.S. delegation will carry to Geneva for the 1979 World Administrative Radio Conference (WARC). In particular, your comments to the Federal Communications Commission may spell the difference between success and failure in obtaining much-needed new amateur bands at 10 and 18 MHz. Here's what's happening on the domestic WARC front, and how you can take part.

*Assistant General Manager, ARRL

Last December, the FCC released its initial draft of how the radio spectrum might best be allocated between the dozens of different radio services, including the amateur service (see related story). The timing of the release of the document, officially known as the Third Notice of Inquiry (NOI) in Docket 20271, and the closing date for comments, made it impossible to provide *QST* coverage before the closing date. However, the League made a special effort to get the word out via other channels, especially through a mailing to affiliated clubs. As a result, more than half of the comments filed in response to the Third NOI represented radio amateurs' views.

A Good Chance to Respond

In late May, after considering the

comments which had been filed and after additional coordination within the government, the Commission released a revised draft Table of Frequency Allocations as a part of the Fifth NOI in Docket 20271. (The Fourth NOI, released a week earlier, deals with satellite ground stations and technical standards and not with frequency allocations.) A number of changes made between the Third and the Fifth Notices affect the amateur service. These changes are summarized in Table 1. The comment deadline for the Fifth NOI, August 1, gives amateurs a good chance to respond.

In general, the Amateur Radio Service gained ground between November and May. The proposed rearrangements of the allocations at 160, 40 and 15 meters are improvements over the existing situation, and the addition of a

ARRL Preparations: So Far, Four Years of WARC Work

More than four years ago, even before the next general World Administrative Radio Conference was firmly scheduled, the ARRL became involved in shaping the position which the United States delegation will carry to Geneva in 1979. The reason for such early involvement was the realization that there is nothing more important to the future of amateur radio than this Conference. It is deserving of the League's best efforts to represent the Amateur Radio Service.

U.S. preparations began with service-by-service studies of requirements for spectrum through the year 2000. The League participated fully in this process, both in helping to develop the requirements of the amateur service and in monitoring the activities of groups representing other services. The League's involvement, especially within the FCC Advisory Committee for Amateur Radio (ACAR), is detailed in *QST* for November, 1976, beginning on page 9.

In March, 1976, the FCC released a Public Notice listing all of the identified requirements of the nongovernment users of radio. Of course, there were numerous conflicts, with several services requesting access to the same spectrum for incompatible uses. Amateur requirements included new bands at 10, 18 and 24 MHz; expanded bands at 7, 14 and 21 MHz; and additional frequencies for the Amateur-satellite Service at vhf, uhf and microwave. The amateur requirements were backed up by an extensive report prepared by the ACAR which demonstrated the public-interest need for the new and expanded allocations.

In December, 1976, after considerable work by its International Conference Staff, the FCC released the results of its first attempt to resolve the conflicts between the services. This document, the Third Notice of Inquiry in Docket 20271, proposed some expansion of the 7, 14 and 21 MHz bands, and some new satellite bands. However, it made no provi-

sions for the new bands at 10, 18 and 24 MHz, did not resolve the existing conflict with broadcasting at 7 MHz and unnecessarily relocated the 21-MHz band (*QST* for February 1977, page 62). The League, along with dozens of individual amateurs and clubs, commented favorably as to the proposed expansions but continued to argue for the new bands, even if on a shared basis with the Fixed Service (*QST* for April, 1977, page 64).

Now the Commission has released another draft of the Table of Frequency Allocations showing the results of its consideration of the responses to the Third Notice and of continuing coordination with the government spectrum representatives. While new bands at 10 and 18 MHz are still not a part of the draft Table, support for these bands has been building. The League is continuing to present strong arguments for the new allocations. A strong showing of support in comments by individual amateurs could play a vital role in making these new ham bands a part of the official U.S. WARC position.

new high-frequency band at 25.76-25.86 MHz, while not entirely meeting the requirement for a 500-kHz-wide band at 24 MHz, is at least a step in the right direction. And, the Amateur Radio Service has been reinstated at 48 GHz with a narrow exclusive allocation at 49.8-50 GHz. On the negative side, a new band which was proposed at 160-190 kHz has been deleted in favor of an allocation to the Broadcasting Service, and the shared band at 1215-1240 MHz has been deleted because of anticipated sharing problems with the Radionavigation

provide excellent examples. During the hours of darkness, communication was spotty or nonexistent at 14 MHz and higher frequencies. Use of the lower frequencies, though, posed serious problems. At 7 MHz, operators had to contend with severe interference from international broadcasting and from other nonamateur intruders. At 3.5

MHz, signals were weak and often masked by atmospheric noise and other interference. An amateur band at 10 MHz would have expedited communication into and out of the affected areas.

Another advantage of the new bands would be improved ability to select the frequency most suited for communi-

"Why have a 10-MHz amateur band? It's probably better than 20 and 40, antennas won't be too big, it'll relieve some of the pressure on 20, muf will be lower. It's a good band!" — John Kenode, W4WSF/N4MM

Satellite Service. Also, several critical requirements still have not been addressed adequately, especially at 10 and 18 MHz.

Why 10 and 18 MHz?

In its response to the Third NOI, the League stated, in part: *In order to practice efficient spectrum management, a service must have access to bands at suitable orders of frequencies to adjust its operations to prevailing propagation conditions. The vast gulf between the 7-MHz and the 14-MHz amateur allocations makes it extremely difficult for a low-power service such as the Amateur Radio Service to meet its long-distance communications needs on a reliable basis, in the face of widely varying propagation conditions. . . . In*

"10 MHz would be a night-time DX band and a pretty good day-time DX band too. It'd be less subject to QRN and storms than 7 MHz. I'd be in favor of it and I'd sure use it if it were granted." — Ken Bishop, W1EWD

countless cases, even a narrow or shared allocation at 10 MHz would significantly improve the amateurs' ability to communicate reliably over long distances. Similar allocations at 18 and 24 MHz would also be beneficial under conditions of greater solar activity, for the same reasons.

The need to bridge the gap between 7 and 14 MHz is most acute in the event of earthquakes, floods or other natural disasters in remote areas. The 1972 and 1976 earthquakes in Central America

Table 1

A comparison of the present amateur frequency allocations in North and South America with the FCC draft proposals of November 1976 (Third Notice of Inquiry, Docket 20271) and May 1977 (Fifth Notice). See QST for February, 1977, page 62, for a discussion of the Third Notice. The Fifth Notice proposals supersede those of the Third Notice. Unless otherwise indicated, frequencies are in MHz. "Sat." indicates that an allocation to the Amateur-Satellite Service has been proposed; an asterisk indicates exclusive allocation; "same" indicates no change between the Third and Fifth Notice.

BAND (METERS)	PRESENT ALLOCATION	FCC THIRD NOTICE PROPOSAL	FCC FIFTH NOTICE PROPOSAL
1750	None	160-190 kHz*	None
160	1.8-2.0 shared extensively	1.75-1.8 shared, 1.8-1.9*	1.8-1.9*, 1.9-2.0 shared
80	3.5-4.0 shared	3.5-3.9*, 3.9-4.0 shared	Same
40	7.0-7.1*, 7.1-7.3 shared with broadcasting in other regions	6.95-7.1*, 7.1-7.3 shared with broadcasting in other regions	6.95-7.25*
30	None	None	None
20	14.0-14.35*	13.95-14.4*	Same
17	None	None	None
15	21.0-21.45*	20.7-21.2*	20.95-21.45*
12	None	None	25.76-25.86*
10	28.0-29.7*	No change	Same
6	50.0-54.0*	No change	Same
2	144-148* (amateur satellites 144-146)	No change	Same
1-1/4	220-225 shared with government radiolocation	Add amateur satellite, share with mobile	Same, except no sat.
(CM)			
70	420-450 shared with radiolocation (amateur satellites 435-438)	Greater flexibility for amateur satellites, 435-438; no other change	Same
33	None	902-928 shared with ISM, fixed, radiolocation and mobile	Same
	PRESENT ALLOCATION	FCC THIRD NOTICE PROPOSAL	FCC FIFTH NOTICE PROPOSAL
	1215-1300 shared with radiolocation (RL)	Sat. 1290-1300, add sharing with radionavigation satellite at 1215-1240	Same, except delete 1215-1240
	2300-2450 shared with RL, fixed, mobile	Sat. 2310-2320, add sharing with wireless transmission of power at 2400-2450	Sat. 2390-2400, add sharing with wireless transmission of power at 2440-2450
	3300-3400 shared with RL, 3400-3500 shared with RL, fixed-satellite (space to earth)	Sat. 3400-3410 (subject to agreement by government users), add sharing with fixed at 3300-3400	Same, except sharing at 3300-3400 is with mobile
	5650-5670 shared with RL, 5670-5725 shared with RL and space research (deep space), 5725-5925 shared with RL and ISM	Sat. 5650-5670, sharing with wireless transmission of power at 5750-5850	Same, except sharing with wireless transmission of power is at 5790-5810; add sharing with fixed-satellite (space to earth) at 5850-5925
	10.0-10.5 GHz shared with RL	No change	Same
	24.0-24.05 GHz shared with ISM, 24.05-24.25 GHz shared with ISM and RL (amateur satellites at 24.0-24.05 GHz)	Add sharing with radioastronomy at 24.11-24.16 GHz	Same
	48-50, 71-76, 165-170, 240-250, above 300 GHz shared with experimental stations	Delete 48-50 GHz, add amateur satellites and various sharing arrangements in other bands	Same, except add 49.8-50.0* GHz

cation between two points at a particular time. This kind of flexibility is very important to good spectrum management, as it permits the use of minimum transmitter power and reduces the possibility of interference to other stations desiring to use the same frequency on a different path.

New Allocations Needed

Finally, with the Amateur Radio Service growing at a record pace in many parts of the world, including the U.S., new allocations are needed in order to accommodate the expanding number of stations. New allocations at 10 and 18 MHz would reduce the load on the neighboring bands at 7, 14 and 21 MHz, which are already extremely crowded during high-activity periods and which will become even more so, even with the modest expansions proposed by the Commission, as we approach the year 2000. Projections of worldwide growth of the Amateur Radio Service show a strong possibility of there being as many as six million amateur stations by the end of the century, compared with 800,000 today.

Furthermore, amateur allocations at 10 and 18 MHz can be accommodated with a minimal impact on the other radio services. Today, the Fixed Service — the primary occupant of the high-frequency bands — enjoys exclusivity in the entire band from 10.100 to 11.175 MHz. The Fixed Service also has exclusivity from 18.030 to 21.000 MHz with but a tiny segment of 16 kHz shared with the Space Research Service and a segment of 20 kHz set aside for standard frequency stations such as WWV. The Commission proposes to reduce this stranglehold somewhat, by making the bands 10.700-11.175, 19.000-19.500, and 20.400-20.700 MHz also available on a shared basis to the Mobile Service, primarily for maritime use, and to reallocate 20.010-20.230 MHz to Maritime Mobile and

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION Washington, DC 20554	
In the Matter of	
An Inquiry relative to preparation for)
a General World Administrative Radio)
Conference of the International)
Telecommunication Union to consider)
revision of the international)
Radio Regulations...)
	DOCKET NO. 20271
RESPONSE TO FIFTH NOTICE OF INQUIRY	
To: The Commission	

Fig. 1 — This is how the heading of your filing with the FCC should look. Comments should be addressed to the Secretary, Federal Communications Commission, Washington, DC 20554, and should be mailed so as to arrive by August 1.

20.950-21.000 MHz to the Amateur Radio Service. In response to the Commission's Third Notice in Docket 20271, the League counterproposed co-equal, shared allocations for the Amateur and Fixed Services at 10.100-10.400 and 18.300-18.600 MHz. In view of the generous allocations which continue to be available to the Fixed Service just below 10 MHz and above 11 MHz, and in view of the lack of interest in the high-frequency Fixed Service among nongovernment users in the United States, the League firmly believes that amateur bands at 10 and 18 MHz are both realistic and in accordance with sound frequency management principles.

Fixed Service circuits are shifting rapidly to cables and satellites; while no one can say for certain what the spectrum requirements for the various services will be in the year 2000, it is obvious that the Fixed Service needs in the high-frequency portion of the spectrum will *not* grow, and in all likelihood will decline markedly. If the 1979 Conference continues the present exclusive allocations to the Fixed Service, with no provisions for the immediate or eventual use of this vast reservoir of frequencies by other services, the result of that

inflexible position will be a gross misallocation of spectrum by the end of the century.

What Can You Do?

Docket 20271 is an extremely complex proceeding; here we can give only the highlights of the Fifth Notice, since the document itself runs to nearly 300 pages. Because we believe that a new amateur band at 10 MHz is vital to the future of the Amateur Radio Service, we have concentrated on that. But there are many other features of the proceeding which will have a substantial impact on future amateur operations, and you may want to examine them in more detail. Extracts of the Fifth Notice as it applies to the Amateur Radio Service are already in the hands of all League-affiliated clubs and all Assistant Directors. We'll be happy to furnish additional single copies free of charge to anyone who sends a self-addressed envelope bearing 35-cents postage and clearly labelled "WARC FIFTH NOTICE EXTRACT."

We believe it is extremely important that there be a clear expression of sentiment from amateurs on several key WARC issues. Therefore, in response to the Fifth Notice we urge amateurs to

What Will Happen at Geneva in 1979?

On September 24, 1979, representatives of more than 150 countries will attend the opening session of the ITU general World Administrative Radio Conference. For 10 weeks, they will meet — both in full sessions and in small, specialized working groups — to reach agreement on how the radio spectrum is to be shared for the remainder of this century. Some amateurs will be on national delegations; others will attend as official observers carrying credentials of the International Amateur Radio Union (IARU). But it is not amateurs, or broadcasters, or other communicators who vote at a WARC; it is *nations*, with each nation having one vote. For the amateur service to come away from Geneva with adequate frequency allocations, a majority of the nations of the world must be convinced to support amateur radio as a matter of national policy. This task doesn't begin in 1979; on the con-

trary, it is an ongoing project for the IARU and its member societies of national amateur radio organizations throughout the world.

For the member-nations of the ITU, a great deal of discussion and preparation will precede the opening of the conference. In fact, the United States is already holding bilateral discussions with other nations in order to exchange views and preliminary positions. In other parts of the world, blocs of neighboring countries are cooperating closely in the development of their positions so as to have a strong collective position in 1979. Even so, the magnitude of the job that will face the delegates in 1979 — the carving up of a frequency pie that extends from 10 kHz to at least 275 GHz — is staggering, to say the least.

Without a doubt, some changes to the present Table of Frequency Allocations are going to be made by the 1979 conference. It is even possible that the post-1979 Table will bear

little resemblance to the present one. Some radio services will gain spectrum, especially if they are growing rapidly and are widely used in many countries. Because the radio spectrum is a finite resource, this means that other services must lose spectrum, or must share what they now have. Generally, these will be services which have been rendered obsolete by technology, which are growing slowly or declining in importance, or which are useful only in a limited number of countries.

The agreements reached at the conference, once ratified by each country, have the force of a treaty between all signers. Any changes which are made to the present Table of Frequency Allocations will not take place immediately, however; there will be a period of at least two years for stations to prepare to change frequencies, if necessary, and there may be an even longer period for the phasing in of the revised Table.

The Big Picture: Worldwide Amateur Preparation

While domestic U.S. preparations for the 1979 WARC are important, the U.S. has only one vote out of 153 at ITU conferences. How the other countries vote, even the smaller ones, is equally important to the outcome. Fortunately, amateur radio has never been in a stronger position internationally.

At the time of the last general WARC, in 1959, the U.S. was home to a majority of the world's amateurs. Today, even with the number of U.S. hams at an all-time high of more than 300,000, non-U.S. hams constitute 65 percent of the world's total amateur population. One result of the rapid overseas growth and the improved economic conditions in Europe and Asia has been a great strengthening of national amateur radio organizations in other countries. At the time of the 1959 conference, only a tiny handful of amateur societies were in a position to effectively represent the Amateur Radio Service to their governments; today literally dozens are doing so.

There has also been a strengthening of the International Amateur Radio Union, Organized in Paris in 1925 by a group of far-sighted amateurs led by the founding President of the ARRL, Hiram Percy Maxim, the IARU has international conference preparation as its number-one pri-

ority. The ARRL has served since the very beginning as the administrative headquarters of the IARU, and still plays an important role in the coordination and dissemination of information to and between the 97 member-societies. However, today there are three Regional Divisions, corresponding to the three ITU Radio Regions, which perform very effectively in guiding individual member-societies in their WARC preparation. Every country which has any sort of national amateur organization at all is either represented in the IARU, or is in contact with the Union on WARC matters while an application for membership is pending.

Of course, a viable national organization is the best representative of amateur radio to a telecommunications administration. However, in about 85 countries no such national organization exists. The votes of these countries are important, too, and the IARU makes every effort to present the case for amateur radio to the policy-level officials of these countries. If there are hams in a country, but no national organization, the hams are aided in organizing one. If this is not possible, individual amateurs are sought out and provided with encouragement, guidance, and information. Members of the Executive Committees of the IARU Regional Divisions travel extensively in such countries, and establish a rapport

with telecommunications administrators whenever possible. IARU hq. staff members also travel, mostly to provide support and encouragement to member-societies but also to talk with administrators when this is appropriate, such as at seminars and meetings at Geneva.

Times have changed since 1959. Dozens of new nations have joined the world community. Fiercely independent, they are often distrustful of the motives of the more-developed countries. A representative of amateur radio who carries a U.S. passport is often at a disadvantage when trying to convince the officials of these countries that amateur radio can make important contributions to their technological development.

Fortunately, amateur radio has changed with the times. There are dozens of hams throughout the world who are thoroughly versed in WARC matters, and who keep in touch through the mechanism of the IARU. They understand the problems and the cultures of the less-developed countries, and do a job of representing amateur radio which could never be done by the ARRL alone.

It's true that from time to time, the League has dominated the IARU. The League continues to play a key role, but it's not an all-League show. Nor should it be.

file comments touching especially on one or more of the following areas:

1) The need for amateur allocations in the vicinity of 10 and 18 MHz. Provide concrete examples of how such allocations would improve our ability to communicate over long distances, especially for public-service (disaster communications) activities but also for the enhancement of international goodwill.

2) Gratitude that the Commission has supported the Amateur Radio Service position as much as it has, in the face of competing claims from other services. This is especially important at 14 MHz, where the Commission has proposed a much-needed expansion of the band which now supports a majority of intercontinental amateur communication. There is no guarantee that the gains we have made will stick, so we

"10 MHz would give us more room between 40 and 20 meters. I'd definitely use it. The way it is now, you almost have to belong to a net to operate on 20." — George Bose, W2CJJ

must continue to put forth our justifications for those gains whenever and wherever possible.

3) The need for access to the low-frequency spectrum (160 to 190 kHz) for experimentation, including concrete examples of the benefits of such experimentation.

4) The need for continued access to

1215-1240 MHz to accommodate growth in amateur repeaters, television, data transmission, etc. Again, specific examples of amateur use are important.

Extra Effort Worthwhile

Elsewhere in this article you will find a sample heading which should be used at the top of comments submitted to the Commission. It is especially important that "Docket 20271" and "Response to Fifth Notice" be at the top of the first page. Organize your comments under the following headings, as appropriate: Spectrum Between 10 kHz and 4000 kHz; Spectrum Between 4 MHz and 27.5 MHz; Spectrum Between 27.5 MHz and 1215 MHz; Spectrum Between 1215 MHz and 10.7 GHz; Spectrum Above 10.7 GHz.

Although the statutory requirement for copies of comments to the Commission is an original and five copies, to be especially effective in the WARC proceeding the original must be accompanied by 19 copies so as to reach all of those in a position to influence eventual Commission actions. Although we realize this copy requirement will work a hardship on many individuals, we urge you to make the extra effort required to make an original and 19 copies. Of course, if this is impossible even an original and one copy is better than none, and will reach at least a limited audience within the Commission. The comments should be typed, preferably double-spaced, with a generous left-hand margin. Clearly indicate your area of special interest

(amateur radio) and list whatever particular qualifications and relevant experience you might have.

Nothing that happens in this decade will have as much importance for the amateur service as the 1979 WARC. The League will be working especially hard in the next several months to see that

"10 MHz would be great for chasing DX, but the public service and emergency communications applications are most obvious and important. During the Managua situation, 20 and 40 were unstable at times; a 10-MHz band would have helped. It would be one more step toward providing hams with worldwide communications. A tremendously good allocation." — Peter Erk, W9SQ

the needs of the amateur service are met to the greatest extent possible in the formulation of the U.S. position. We urge you to be a part of this effort by making your personal filing in this all-important FCC proceeding. **QST**

Bibliography

For additional background on the World Administrative Radio Conference, see especially the following:
December, 1974, *QST*, p. 9.
September, 1975, *QST*, p. 9.
March, 1976, *QST*, p. 42.
May, 1976, *QST*, p. 9.
October, 1976, *QST*, pp. 9, 65.
November, 1976, *QST*, p. 9.
February, 1977, *QST*, p. 62.
April, 1977, *QST*, p. 64.
June, 1977, *QST*, pp. 9, 64.

Assessing the CD

Appointment Structure

Part 2: In Part 1 (June QST) we took a look at the present structure and what appeared to be wrong with it. In this concluding installment, we'll explore some proposed alternatives, both past and future.

By George Hart,* W1NJM

Introspection is a good thing. More of us ought to indulge in it. One of the criticisms of the CD we hear most is that we are "behind the times." And yet the CD, perhaps more than any other department of the Headquarters, is sensitive to and responsive to membership demands. So, it seems, if the CD is behind the times, it is because CD-oriented amateurs want it that way. Our periodic polls of operating activities appear to substantiate this.

But, say the opponents, the reason it seems this way is because your *CD Bulletins* address mostly those who are wedded to your outworn structure. If you addressed the general amateur operating fraternity, you would get a far different result; because many amateurs, alienated by your archaic outlook, have already taken their operating activities elsewhere and are no longer tuned in to you.

Well, we have to strive to serve and please as many as we can. Not everybody, because that's impossible. But we remain ever sensitive to the need to be alert to embrace those thousands who are today coming into amateur radio with opinions, ideas and attitudes alien to tradition. The new members shall be served! So, if ham radio is changing rapidly, our CD operating structure is going to have to change with it.

The Crossroads

Is it true, then, that we are at a crossroad and must determine whether to continue on in the same direction and pace or to turn 90° and pour on the coal? Or do we turn only 45° and proceed with caution? Or *what?* The temper of the times is to make a

decision and then to GO! Follow the leader, and the devil take the hindmost. Time and tide wait for no man, and other assorted platitudes. Let's get on with it, say the young and impetuous. Let's leave well enough alone, say the old and tired. Somewhere in between these two extremes must be the optimum course to follow. Let's see if we can find it. We'll need your help.

Past Proposals

The first modern-day (this means in the last ten years or so) proposal came in 1967, and was reflected in a *CD Bulletin* poll in 1968 (see box and table), after a lot of philosophizing and discussion. The results were pretty negative, setting the trend of future polls, as you can see. *CD Bulletin* readers (mostly appointment-holders) apparently wanted the structure to remain just about as it was.

Then along came a proposal by the Dakota Division director, WØPAN. It bore some similarities to our 1967 proposals, but also had some differences. We ran the details in the *CD Bulletin*, thinking that perhaps a proposal from a field official instead of from Headquarters might be better received, asking for comments (i.e., no poll). Alas, the results were again decidedly negative.

Did we get the message? Not on your life. We kept trying — again in 1973, 1975, 1976. Run your eye down the vote columns of the summary table. How many "pro" votes do you see? That's right — two, out of nineteen! When it came to making acceptable proposals to the field organization, we were pretty raunchy. Of course appointees don't know everything, and in a couple of cases the negative votes were upset by other considerations.

What did become increasingly apparent as time went on was that we were asking the penguins if they wanted to be moved to a tropical climate. The appointees liked the environment they were in and wanted to stay there, whether it made much sense to the rest of us or not. It is only right that they should have something to say about the structure they are being asked to participate in. Very well, they have spoken, loud and clear, several times. They want status quo. How about the rest of the ARRL-member operating amateurs?

Where Do We Go from Here?

There are many operating activities that are not specifically covered in the appointment structure. For example, how about two of the most popular, DXing and contesting? Are they adequately covered by awards alone, or should they be included as appointments? How about repeater operating — over 50 percent of active hams use repeaters. How about satellite operating? Pretty important in developmental stages these days, ready to make the transition from experimental to practical. Should RTTY have its own appointments, instead of being "tacked" on to others? What about mobile operating?

Or, is the whole idea of appointments by elected officials passe, and should it all be replaced by an expanded awards program, ringing in the competitive urge in order to produce advocates or adherents? Should we recognize mode, type of activity, part of spectrum used, or off-the-air activities such as public relations, hamfest and convention organization, club activity? Should the basic appeal be to the ego, the competitive instinct, the sense of fraternity, dedication, duty or responsibility?

*Communications Manager, ARRL

What Is Your "V" Rating?
(Adapted from the July, 1967, *CD Bulletin*)

A lot of things that are perfectly natural are not necessarily good. This is a truism that needs no explanation, it's that logical. We are thinking about it in connection with our Communications Department appointment structure.

It is perfectly natural for those interested in a particular phase of amateur radio to want to fit in to the structure within their specialization limitations. That's why we have an OPS appointment for phone, an ORS for cw, and an OVS for vhf. This is an age of specialization; everyone's doing it. Even some of the specialization groups have specialties; for example, within the vhfers we have fm specialists, satellite DXers, afsk, RTTY, etc.

Yes, all this is perfectly natural, but it ain't necessarily good. For specialization tends toward narrowness and narrowness toward limited vision and horizons. Too

often, an amateur deeply embroiled in his speciality tends to take the view that anyone who prefers some other phase necessarily has something wrong with him and doesn't deserve much consideration. Do you know some amateurs like this? We'll bet you do, because we sure do. Through the years we have developed a kind of segregation and standoffishness among interest groups — a factor thoroughly inimical to our overall organization.

V is for Victory, but we aren't going to be very victorious if we don't have more *versatility*, and we aren't going to get that as long as we keep on encouraging specialists to stay within their specialities to the exclusion of the many other phases of amateur radio available to them. Isn't it time we paid some attention to the versatility factor? The appointee, with the greatest versatility is the most valuable appointee, for he is just as much at home whether he is behind a key, a microphone or a teletype keyboard, handling traffic or working DX, on hf or vhf, or busily at

work on a project, soldering iron in hand; or out in his fully-equipped mobile rig participating in a communications emergency exercise, simulated or real.

We visualize the possibility of a "V" rating for every appointee. What is *your* "V" rating? Can you and do you operate both phone and cw? Are you equipped for both ssb and fm, hf and vhf? Do you have an operating RTTY printer and mobile capability? Do you have DXCC? An Extra Class license? If so, you have a high "V" rating and are the more valuable because of it.

If we *should* add a versatility factor to our appointment structure, what standards should be set? How about an ARRL 25-wpm certificate for your cw factor? A DXCC to attest your operating ability? An Extra Class license for your technical ability factor? OSCAR achievement awards? Certified contest achievement? There are many other possibilities, bearing down on a single question: Should we add versatility factor to our appointment structure?

Just to name a few of the many things to consider. You didn't think this was going to be easy, did you? Probably it will be necessary to consider all of the above in one way or another, but right now let's talk about two appointment structure considerations: first, to continue or discontinue it; and second, if we continue it, what changes to make so that it better reflects today's amateur radio.

A Specific Proposal

There are valid arguments to discontinue the appointment structure, but so many operating amateurs are wedded to it that they are probably losing arguments. In order to "move right along," let's first approach the problem by assuming the appointment base is valid

and present a specific proposal for you to shoot at (or down). This will bear a very close resemblance to proposals already made to the existing appointee group, but this is okay because the general membership (you) hasn't had a chance at it yet. It will also aim at resolving some of the "things wrong with the structure" that have already been discussed (June *QST*, p. 53).

In order to graphically show proposed changes, we present two diagrams, a sort of "before" and "after" demonstration. Fig. 1 is the diagram of the existing structure, the same one shown in the previous installment. Fig. 2 shows how the structure would be changed to continue existing concepts and include several more, so that virtually all amateur radio operating is

covered. Note some of its features:

1) ORS and OPS are combined into a single appointment: Official Traffic Station (OTS). It is available to members handling record traffic by whatever means, using whatever mode, on whatever band or spectrum segment. Yes, including vhf.

2) Three new basic appointments are created: Official Emergency Station (OES), Official DX Station (ODS), Official Contest Station (OCS). The first fulfills a longstanding vacancy for a basic appointment in the emergency communications field. The latter two make basic operating appointments available to two specialty groups, both of which could stand some example-setting.

3) The Official Bulletin Station

How the Appointees Reacted to Structural Change Proposals

PROPOSAL	DATE	PRO	CON	REMARKS
1. Apply versatility ratings to appointments.	4/68	185	188	Not enough "pro" to execute.
2. Revise appointment structure (in general).	4/68	171	211	Apparently appointees are satisfied the way it is.
3. Make Tech licensees eligible for EC appointment.	10/68	313	414	But we did it anyhow when a poll of SCMs indicated they were in favor.
4. Combine ORS/OPS and RM/PAM into single appointments.	10/68	335	356	OPS/PAM contingent slightly in favor, ORS/RM contingent against.
5. Abolish OVS, make Techs eligible for OPS.	10/68	135	520	You can't "abolish" anything!
6. Set up new appointments for emergency operation and traffic leadership.	10/68	234	379	No enthusiasm on this one.
7. Create new DX and contest station appointments.	10/68	189	468	Here either.
8. Create new mobile station appointment (OMS).	10/68	391	270	But stipulation we have to abolish something first.
9. Make Technicians eligible for OO.	7/73	128	193	Put into effect at a much later date after further study (OO-V).
10. Make Novices eligible for regular ORS.	7/73	73	173	Low vote, but definitely negative.
11. Make Novices eligible for ORS Junior.	7/73	224	95	Just as definitely positive, and so be it.
12. Combine ORS and OPS to make room for a new repeater appointment.	7/73	219	279	A vote against combining, not against the repeater appointment.
13. Combine ORS/OPS and RM/PAM.	7/75	249	338	Logical as it seems, appointees just won't buy it.
14. Create new "emergency station" appointment.	7/75	189	362	Can't sell this one either.
15. Make Technicians eligible for SEC.	7/76	142	354	A resounding negative.
16. Change OVS back to OES (Official Experimental Station).	7/76	179	270	Can't win for losing!
17. Eliminate OBS appointment.	7/76	122	369	Tut tut, can't abolish anything.
18. Regularize Regional Emergency Coordinator appointment.	7/76	176	241	Ho hum.
19. Should CD Bulletin polls be eliminated?	7/76	30	461	But come up with some acceptable proposals, for a change.

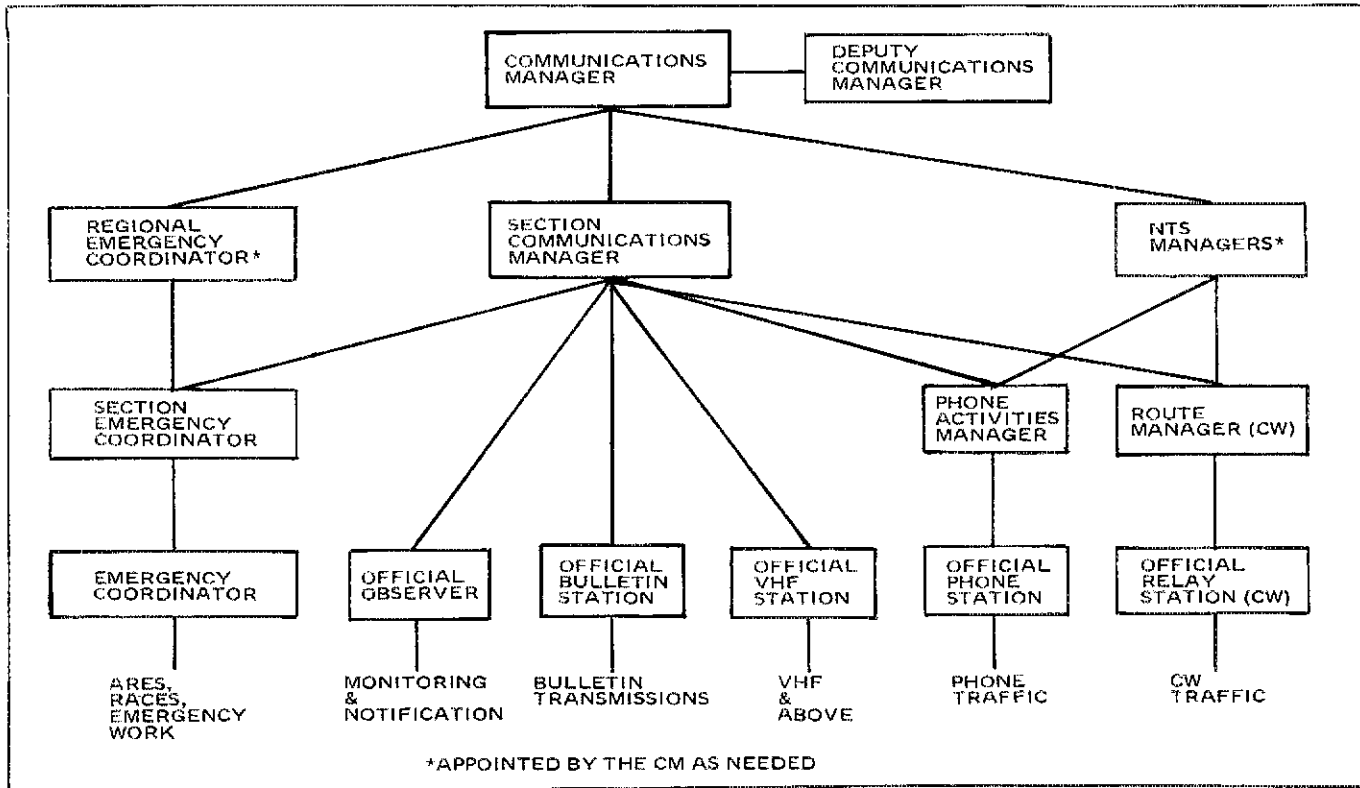
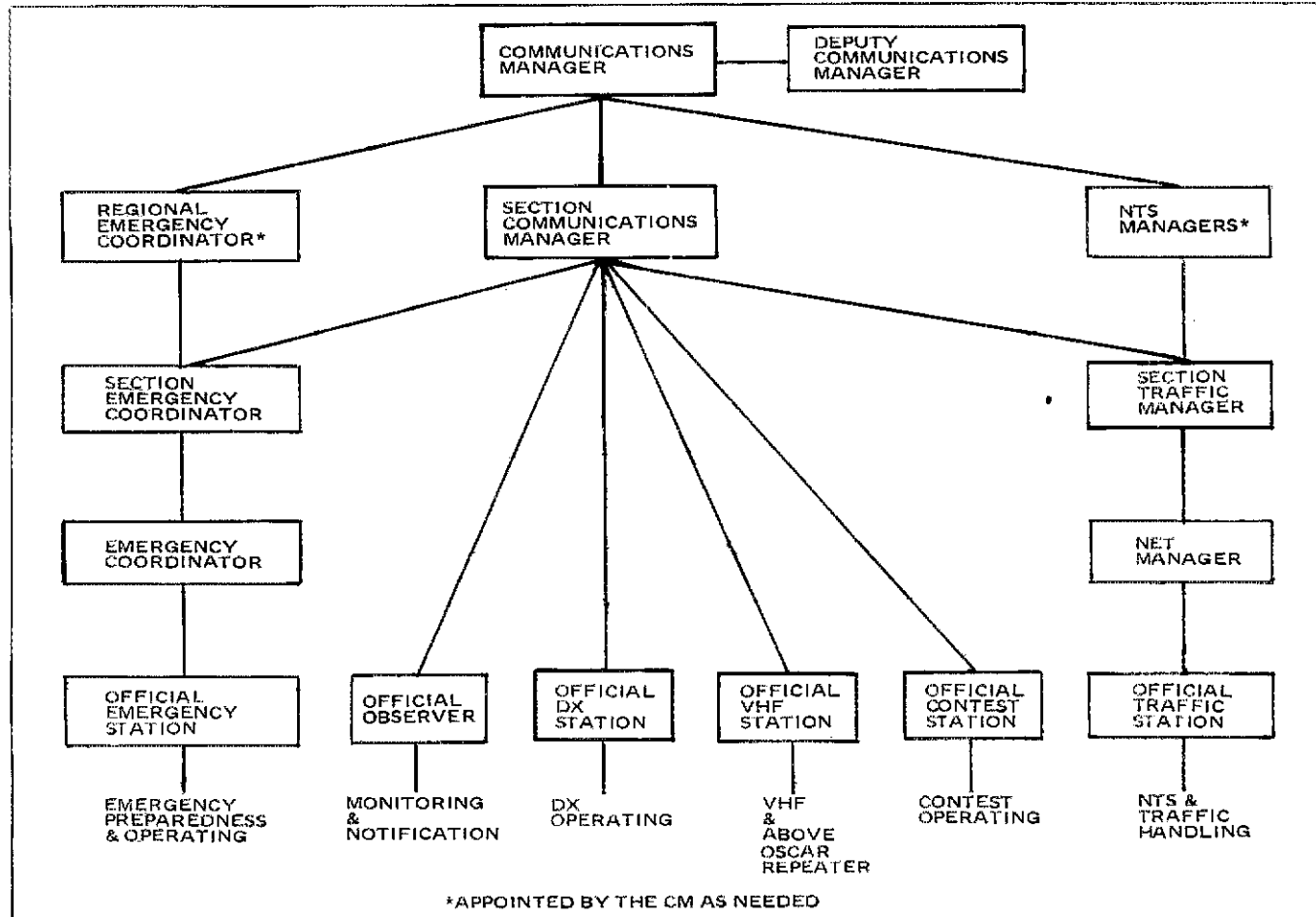


Fig. 1 — Present structure.

Fig. 2 — Proposed structure.



Proposed Appointments and Qualification Requirements

BASIC APPOINTMENTS¹	MIN. LIC.	PRESENT COUNTERPART	FUNCTIONS, OTHER REQUIREMENTS
Official Traffic Station (OTS)	Technician	ORS/OPS	Set standards in handling of third-party traffic. Regular traffic-handling and net participation.
Official Traffic Station-II (OTS-II)	Novice	ORS-II	Same as above, but restricted to Novice licensees.
Official Emergency Station (OES)	Technician	None	Set standards in emergency operating, both in preparedness and in actual emergencies. Regular participation in emergency-preparedness activities.
Official Observer (OO) Class I	General	OO-I/II	General amateur band monitoring and notification of discrepancies, including frequency measuring to prescribed tolerance. Submission of periodic evidence of frequency-measuring ability. Must have at least four years amateur experience as General or higher.
Class II	General	OO-III/IV	General amateur band monitoring and notification of discrepancies. Must have at least four years experience as General or higher.
Class III	Technician	OO-V	Monitoring and notification of discrepancies in bands open to Techs, especially repeaters. Must have at least four years experience as Tech, or higher.
Official Contest Station (OCS)	Technician	None	Set standards in contest operation. Regular participation in ARRL-sponsored contests.
Official DX Station (ODS)	Technician	None	Set standards in DX operating. Regular participation in ARRL-sponsored DX activities.
Official VHF Station (OVS)	Technician	OVS	Set standards in vhf operating, particularly repeaters and OSCAR. Participation in on-the-air experimentation on vhf and uhf.
Net Manager (NM)	General	PAM/RM	Management of ARRL-sponsored nets, supervision of specific section traffic objectives.
Section Traffic Manager (STM)	General	None	Section leadership in all traffic activities, supervision of all within his section. Only one STM per section.
NTS Net Managers ²	General	Same	Management of ARRL National Traffic System nets at regional and area level, in accordance with concepts beyond the scope of this article.
Emergency Coordinator (EC)	Technician	EC	Organizational leadership of emergency-preparedness efforts at the <i>local</i> level, in accordance with section plan.
Section Emergency Coordinator	General	SEC	Organizational leadership of emergency-preparedness efforts at the <i>section</i> level. Implementation of a section emergency communications plan. Only one SEC per ARRL section.
Regional Emergency Coordinator (REC) ³	General	REC	A special and rather rare appointee who exercises leadership functions transcending sections, beyond the scope of this article.
Assistant SCM	General	ASCM	General section operation leadership or to cover a function not covered by one of the above. One ASCM is designated as the successor to the incumbent SCM in case the latter fails to serve out his term.

¹ All appointments are made by the elected SCM unless otherwise indicated. All appointees must be full ARRL members. All appointees must submit monthly reports.

² Appointed by the ARRL communications manager or delegatee, usually on recommendation of an NTS area staff.

³ Appointed by the ARRL communications manager on recommendation of SCMs of the region concerned.

appointment would be phased out. With three new appointments, the structure will become top-heavy, or at least overloaded, if we don't eliminate something. With WIAW's improved coverage and the existence of various amateur news publications, the need for OBS has been diminishing for some time. We have in mind the possibility of two or three volunteer "satellite" stations (but not in outer space) to carry WIAW bulletins in the South, Midwest and Far West.

4) The OO appointment would remain in the structure, reduced to three classes: Class I, frequency measurement, with realistic tolerance qualification standards; Class II, high and medium frequency observing; Class III, vhf/uhf observing, to bring in qualified Tech observers.

5) OVS would remain, despite its spectrum limitation association, but standards for this appointment would be devised to apply to repeater and OSCAR operation and vhf/uhf on-the-

air experimentation. Other traffic handlers and emergency-preparedness operators on vhf or uhf would be eligible for OPS or OES appointment respectively. Traffic, emergency-preparedness, and contest operators would receive appointments as OPS, OES and OCS respectively, not as OVS, even if they conduct such operations above 50 MHz.

How about leadership appointments? If we follow the pattern of present traffic and emergency appointments, we would have leadership appointments for each of the basic appointments above. ORS and OPS have RM and PAM. EC is a leadership appointment whose "indians" are non-appointees, just ARES members. OO, OBS and OVS have no one to lead them. How come?

The answer is simply that some basic appointments' functions do not lend themselves to the need for appointive leadership people, other than the SCM

himself and administration people at Headquarters. Under the new proposal, leadership for ODS and OCS would come out of their respective administrative branches within the CD at Headquarters. Leadership for OVS would continue to be provided by *QST's* vhf editor and "World Above" columnist. OO leadership has traditionally been supplied by the communications manager, and this has worked out all right so far. In any case, however, leadership appointments in any of these fields can be set up later if or when they are found to be needed.

So here is the proposed lineup of leadership appointees:

6) A new section-level traffic leadership appointment would be called Section Traffic Manager (STM). He would be to traffic handling what the SEC is to emergency preparedness, one to a section.

7) RM and PAM would be combined into a single leadership appoint-

ment, Net Manager (NM), who functions about what the name implies.

8) Emergency Coordinator (EC) and Section Emergency Coordinator (SEC) appointments would remain as at present -- EC at local level, SEC at section level.

Note that all appointments except OVS are based on the *kind* of activity, not the mode, band or part of the spectrum. We want traffic men to handle traffic, emergency operators to prepare to operate in emergencies, contesters to set example in contests, etc. We don't care how they do it, or where, or what they use. OVS is excepted, for reasons already mentioned.

Well, there it is; how you like? Almost nobody is going to like every part of it; in fact, we may read it tomorrow and decide we don't like some parts of it either; but, as we said, this is just something to take pot-shots at, not something we intend putting into effect over the prostrate form of the collective membership.

The Trauma of Restart

If we decide to abandon the appointment structure altogether and start over on a different basis, we find ourselves faced with incredible difficulties. First of all, there would be screams of anguish from those wedded to the present setup and liking it -- something like 5,000 of them, and that's a lot of screaming. Then you have to change all the literature, all the forms, certificates, records, and set up a completely new and different way of doing things -- only perhaps to find out that the new way is no improvement over the old after all. Thus, before starting over we would want to be pretty sure that any

new procedure will (eventually, perhaps) be an improvement.

So what kind of a restart are we talking about? Well, if appointments are considered *passee*, we're probably talking about awards and competitions. They seem to attract the biggest following, as witness DXCC and contests. Instead of appointments, we would start issuing awards for traffic handling (more than we already have), for emergency preparedness and operating (an expanded Public Service Award?), add some awards for observing, various kinds of repeater operating, OSCAR, and whatever else will encourage the most beneficial kinds of activity, not to mention the most popular. We seem to have a tendency to encourage that which is already popular, and to find reasons to justify it, thereby in effect neglecting those activities we know to be beneficial. Objectivity is a mighty hard viewpoint to attain, amidst a clamoring membership.

Most likely a combination between appointments and awards is required. We already have this, and it will be continued, but both concepts need some rethinking. There is no dearth of suggestions for new, different awards. We get them all the time. But the appointment structure is something else again, something for which we need some definite, specific objectives. An intra-departmental conference considering all these things recently found a lot of us holding our heads in anguished anticipation of aches to come if the above new proposed program is instituted.

Miscellany

Pretty complicated, eh? The various

charts and boxes are designed to uncomplicate; hope they accomplish this. It is just very difficult to convey a highly complex situation in simple form. If the average *operating* amateur can make head or tail out of it, it will have accomplished its purpose. However, we'll be glad to answer questions, in any case.

In the box labeled "Proposed Appointments and Qualification Requirements" you will note a couple of "jokers" not explained in the text. This is just a hint that there is more to the structure than just the basics we have set down. The phrase "beyond the scope . . ." is not a cop-out. Be the good editor willing,¹ further explanation of these things will be forthcoming in future issues. Right now, they would be detractive.

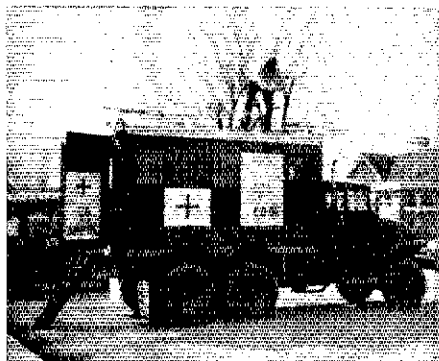
Conclusion

So there you have it. None of the above constitutes a decision. This is just a trial balloon to assess the climate. Shall we pull out the stops and go full speed ahead? Shall we conduct a membership poll? Shall we ask the Board of Directors to decide? Divergence of opinion makes going with the majority impossible. Everyone is sure he is right, but there is no majority. We have to decide on the basis of two factors -- popularity or acceptability with the membership, and leadership determination of the best way to proceed. The two factors are seldom compatible.

Give it some thought, eh? We are an amateur *service*. We ought to be doing something better than just playing.

¹ That means, if he thinks anybody will read it.

Strays



Hickory County Civil Defense Director Rusty Boller sets up an array of communications equipment in the annual test of the emergency readiness of the area. Several volunteers participated in the test, which involved the county's schools.

□ The Hickory County (MD) Amateur Radio Emergency Corps was active in a tornado alert exercise March 9, although three of the eight operators were hospitalized at the time. The Hermitage Civil Defense communication van was activated as an emergency-operations center near the school complex. The schools had the students in proper areas and positions to provide maximum safety in less than two minutes, according to Bob Boller, W0KYD, Amateur Radio Emergency Coordinator.

NEW BOOKS

□ 1977 *Amateur Radio Equipment Directory*, edited and published by K. Gordon, W2TGH and distributed by

Ham Radio Books, Greenville, NH 03048. Soft-cover version, 8-1/2 × 11 inches, 136 pages. Price: \$2.95.

This publication contains an extensive listing of commercial amateur products. Performance specifications and photographs are included with the unit prices (at the time of publication of the book).

This booklet should be especially useful to the newcomer to radio, as it may help him to decide which products should be selected for use in his station. The volume will enable the reader to have a single handy reference between one set of covers, thereby eliminating the need to search through countless amateur magazines for a particular descriptive advertisement. -- W1FB

Happenings

Conducted By Perry F. Williams,* W1UED

ARRL—Our Mini-Republic

For most members, receiving *QST* each month is the most important reason they belong to ARRL. It is very easy to lose sight of two facts: that behind *QST* is a League which does a great many things for amateur radio in addition to its publishing activities, and that you the members control its destiny, you help decide what services it will perform, what priorities it will set, through a Board of Directors which you elect on a geographical basis. The League is, in effect, a miniature republic, and the Board is its Parliament or Congress or legislature.

The 16 directors serve for two-year terms, with half standing for election in the even numbered years, half in the odd. Just as in national, provincial or state politics, the voters/members have the privilege and the responsibility either to decide they like the actions of their incumbent representatives and thus support them actively for reelection, or to decide that other representatives could do a better job, and work for the election of those persons. At the same time that directors are elected, vice directors are also chosen, who can fill in when the director is unable to serve.

The quality of future League decisions will depend on the care with which ARRL members choose their leaders — apathy can be deadly! So onward to the Election Notice

Nominations Are Open

It is time for ARRL Full Members in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions to begin picking a director and a vice director in each division for the two-year term which will begin January 1, 1978. From now until September 10, at noon, nominations will be accepted at League headquarters bearing the signatures of 10 (or preferably more) Full Members of a division naming a Full Member of the division as a candidate for director or vice director. The nominee must be the holder of at least a General class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of the election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communication. Neither is a person eligible who is commercially or

governmentally engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs. The idea behind these rules is to insure lasting interest in amateur radio and the League, legal capacity to make decisions for ARRL, and freedom from conflicts of interest.

Balloting Later

Wherever there is more than one candidate for either office, ballots will be sent to all Full Members of the League in that division who were in good standing on September 10. The ballots will be mailed not later than October 1 and, to be valid, must be returned to Headquarters by noon, November 21. A group of nominators can name a candidate for director, for vice director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he wishes.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the division, or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form can be obtained from Headquarters on request:

*Executive Committee,
The American Radio Relay League,
Newington, CT 06111*

*We, the undersigned Full Members of the ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1978-1979 term.
(Signature . . . Call . . . City . . . Zip . . . Date)*

Nominees or, indeed, any member, may obtain a copy of the Articles of Association and Bylaws, along with a pamphlet outlining the duties and responsibilities of elected

League officials.

"Absentee Ballots"

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are now eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 10 will be able to vote this year where elections are being held.

Even within the U.S., Full Members temporarily residing outside the ARRL division they consider home may now notify the secretary prior to September 10, giving the current *QST* address and the reason why another division is considered home (as for instance, holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Division, but your *QST* goes elsewhere, please let the ARRL secretary know, as soon as possible but no later than September 10, so you'll receive a ballot for your home division.

The Incumbents

Presently these persons hold the office of director and vice director in the divisions conducting elections this year: *Atlantic* — Harry A. McConaghy, W3SW and Jesse Bieberman, W3KT; *Canadian* — Ronald J. Hesler, VE1SH and William W. Loucks, VE3AR; *Dakota* — Garfield A. Anderson, KØGA and Tod A. Olson, WØIYP; *Delta* — Max Arnold, W4WHN and Malcolm P. Keown, W5RUB; *Great Lakes* — Richard A. Egbert, W8ETU and William E. Clausen, W8IM1; *Midwest* — Paul Grauer, WØFIR and Claire Richard Dyas, WØJCP; *Pacific* — J. A. "Doc" Gmelin, W6ZRJ and William W. Eitel, WA7LRU; *Southeastern* — Larry E. Price, W4RA and Bev. B. Cavender, W4ZD.

In summary: Petitions need 10 or more signatures of Full Members and are due at Headquarters by noon, September 10. If there is only one candidate for an office, he'll be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full Members of record September 10. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1978.

For the Board of Directors:
June 1, 1977

*R. I. Baldwin, W1RU
Secretary*

REQUESTS FOR RULES

There have been a number of petitions filed recently with the FCC concerning proposed changes in the Rules and Regulations of the Amateur Radio Service.

The North Jersey DX Association is petitioning in RM-2828 for an amendment to Part

97.7(a) of the Rules for an expansion of the radiotelephony allocation in the amateur 40- and 20-meter bands. They propose the following:

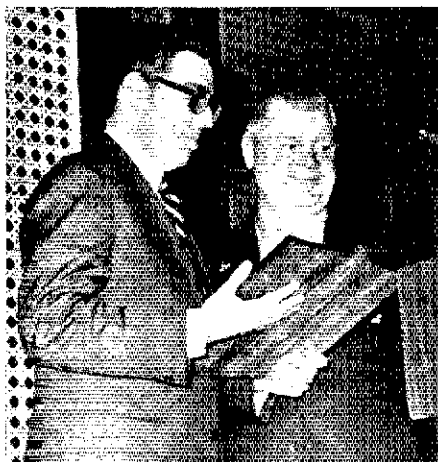
	PRESENT kHz	PROPOSED kHz
Amateur Extra	{ ---	7075-7100
Only	{ ---	14150-14175
Amateur Extra	{ 7150-7225	No change
and Advanced	{ 14200-14275	14175-14250

Amateur Extra { 7225-7300 No change
Adv. & Gen. { 14275-14350 14250-14350

A petition, RM-2838, to allow Technicians and Novices(!) A1, A3 and F3 emissions in the 10-meter band (28.9-29.4 MHz) with a final plate input limit of 250 watts was submitted by James J. Walsh III, WA2WAL, Seven Valleys, PA.

The San Antonio (TX) Repeater Organization requests in RM-2839 that Part 97 of

*Manager, Membership Services, ARRL



FCC Chairman Richard E. Wiley was presented a plaque by ARRL President Harry J. Dannals, W2HD, attesting to the great esteem which amateurs have for the chairman, who has by all accounts done a difficult job efficiently and with fairness to all the conflicting interests striving to be heard. The presentation took place during the annual QCWA dinner held each March in the Greater Washington, DC, area.

the Rules be modified. They want FCC to require that a valid amateur radio license be presented for the purchase of any non-type accepted or non-type approved transmitting apparatus or equipment generating rf energy. The rules would apply to any dealer, manufacturer or individual possessing such equipment. These rules would be an alternative to the proposals by FCC in Dockets 21116 and 21117.

James P. Talley, W5JTE, of Dallas, TX, has petitioned the following via RM-2844 to the Commission: That all repeater stations operating on amateur frequencies be operated as "open" repeaters; or if such repeaters are tone activated, that the frequencies and tone sequence be made public and be available to all amateurs.

Robert H. Beeman, K9PLH, has submitted RM-2849 which would move the citizens band radio service to the 48- to 50-MHz band where the Part 15 devices will be operating in 1978.

Petition RM-2856, by William R. Howard, requests amendment of Part 97 of the Commission's Rules and Regulations (47 CFR 97.3(b)) to delete from Section 97.3(b) the words "and without pecuniary or business interests," on the grounds that such language is vague and ambiguous.

The National Radio Astronomy Observatory at Green Bank, WV, and the Naval Research Laboratory at Sugar Grove, WV, have petitioned the FCC to amend its personal radio and amateur radio rules. The changes would bring those operations within the interference protection criteria that the Commission adopted for the two locations in 1958; it's RM-2857.

RM-2861 proposes allowing SSTV (A5) on all hf frequencies where voice transmissions are presently authorized by the FCC. Alternatively, SSTV should be permitted at the top 100 kHz of 80 meters, the top 50 kHz of 40 meters, 20 meters and 15 meters and all portions of 10 meters as well as preservation of the mode on all vhf and higher frequencies

as presently permitted. It was submitted by Henry B. Ruh.

Ronnie D. Carter, WA4WUS, proposes in RM-2863 that Technician class amateurs be allowed to utilize all frequencies available to General class amateurs with the exception that when operating below 30 MHz, the Technician class amateur shall be restricted to the Novice subbands.

In RM-2866, Frank W. Napurano, K2OKA, proposes the following regulations to control the sale of amateur radio equipment: (1) That the Commission require that the seller of amateur radio transmitting devices (whether a dealer or an individual) obtain and record proof that the buyer possessed a valid amateur radio license at the time of purchase. (2) That serial numbers of such equipment, together with the call sign of the purchaser, be recorded and maintained in the seller's files. (3) That the buyer, upon showing false credentials, be held accountable to the FCC. (4) That there should be a registration program for transmitting equipment, not unlike that used for motor vehicles. (5) That the Commission maintain the right to inspect any and all records at any reasonable time.

A proposed change in Section 97.61(a) to allow Amateur Extra Class operators use of A3 emissions in the 14.150- to 14.200-MHz band was submitted on March 24, 1977, by Theodore Pauck, Jr. of Troy, MI; it's RM-2870.

Gordon H. Piper, WB4EKC, is requesting, via RM-2877, the amendment of Part 97, Section 97.28(b), to lower the age of volunteer examiners to 18 years minimum.

Although there is a nominal 30-day period allotted for replies following submission of petitions, in practice the FCC accepts comments right up to the time action is taken on a particular Notice of Proposed Rulemaking.

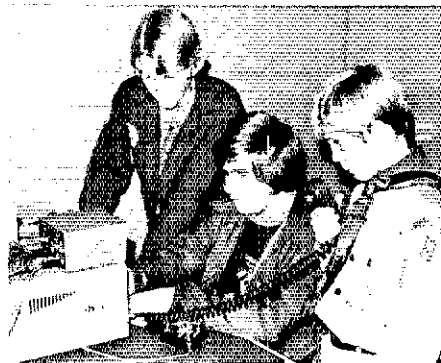


"PHD degrees in amateur radio" were presented to "Dr." Harry Dannals, W2HD and "Dr." Paul Grauer, W0FIR, Midwest Division Director of ARRL, at the Northwest Missouri Hamfest. Chuck Miller, WA0KUH, president of the PHD Amateur Radio Association conferred the degrees, which make Harry and Paul members of the "PHD Lid Society."

If you have something to say, pro or con, write FCC, Washington, DC 20554, with the RM number prominent on your letter. — WAITZK

RULEMAKING DENIED

The following petitions were dismissed by the Commission on February 7, 1977, because



Scouts always seem to enjoy opportunities to participate in amateur radio. Here, Dan Bier-nocki, left, and Ted Standish, right, of Meriden, CT, take part with the help of control operator Jim Parisi, WA1VGP, during the Jamboree on the Air. Another opportunity coming up: 40,000 boys and men gathered at Moraine State Park, PA, for the National Scout Jamboree, August 3-9, 1977, will have a chance to see K2BSA/3 near the Merit Badge Midway. Those who have the original of their licenses will be able to get in some operating time, too.

adoption of Docket 20282 in July, 1976, incorporated the main points of the two requests. RM-2443, filed by Donald W. Keith of Fairfield, AL, proposed eliminating administration of Technician exams by mail. RM-2636, submitted by George B. Smith of Seguin, TX, proposed the addition of the Novice bands to the existing Technician class privileges to improve the radiotelegraphy skills of the Technician class amateur. — WAITZK

CANADIAN NOTES

Imagine having the Telecommunications Regulatory Services of DOC any place but Ottawa! Nevertheless, during a debate in Parliament the Parliamentary Secretary to the Minister of Communications confirmed that the government is considering the relocation of the Telecommunications Regulatory Service Group to a location east of Quebec City. Those who deal regularly with the Government are aghast at the proposal, seeing "nothing but problems for the Canadian Radio Technical Planning Board (CRTPB), for the industry, for all the government departments that need close contact with the regulatory Service Group and for the public purse," to quote from CRTPB's letter.

Amateurs who have opinions on the proposal may wish to write to the Hon. Jeanne Sauve, Minister of Communications, Ottawa, expressing their views.

RTTY on 160 is now permitted Canadian amateurs who have had their licenses specially endorsed for this privilege. The news is contained in a letter from the Department of Communications dated April 25, 1977.

Model-aircraft radio control would be facilitated by a proposal currently under study by DOC. The proposal, identified as notice no. DGTR-004-77, would increase from four to eight the number of frequencies in the 72-MHz band that are allocated for the control and operation of model aircraft by

radio and would prescribe a one-watt power limit. Model aircraft control could then be accomplished on 72.08, 72.24, 72.40, 72.72, 72.76, 72.80, 72.84 and 72.96 MHz. All kinds of model control could continue to utilize 26.995, 27.045, 27.095, 27.145 and 27.195 MHz. Comments should be addressed to the Director, Operations Branch, Telecommunications Regulatory Service, 300 Slater Street, Ottawa, Ontario K1A 0C8 and should be postmarked not later than 5 July.

NO NEW CODE TEST FOR 30 DAYS

Last summer when FCC issued its first report and order in Docket 20282, the restructuring matter, it adopted language for section 97.33 which said: "An applicant who fails a written examination for an amateur radio operator license may not take another written examination for the same or higher class license within 30 days." In an order issued April 21, 1977, FCC said in part: ". . . Such an amendment was not proposed and was not discussed by the comments in this proceeding, and we are by this Order acting to correct our previous error by amending Section 97.33 of the Rules to prohibit the retaking of both written and telegraphy examinations by applicants who have failed such examinations within the previous 30-day period."

So Section 97.33 now reads: "Eligibility for re-examination. An applicant who fails an examination element required for an amateur radio operator license shall not apply to be examined for the same or higher examination element within 30 days of the date the examination element was failed."

Lower elements may still be taken: One can fail the General class code test, for instance, and still proceed with the entire Technician class examination, on the same day or a week later.

W6MLZ STEPS DOWN: K4NSS NAMED

One of the organizations maintaining a warm relationship with amateur radio is the Armed Forces Communications and Electronics Association. So much so that for years Ray E. Meyers, W6MLZ, has served as its "Regional Vice President at Large for Amateur Radio." Ray has led a fascinating life. For instance, in 1931, he was part of the first attempt to reach the North Pole by submarine, with Sir Hubert Wilkins. Before it was over, he had to send an SOS with an oscillating receiver when all other equipment failed. He went on an expedition to the Amazon jungles; crashed an airplane deliberately while making a movie; and served on Admiral Nimitz' staff in the Pacific during World War II. Less adventurously, he has been a director of ARRL, ham radio columnist for the Los Angeles *Herald-Examiner*, editor of *Spark Gap Times* and executive secretary of the Old Old-Timers Club, just to mention a few of many et ceteras. Now he's stepping down from the AFCEA post.

His replacement as RVP for amateur radio is Lt. Col. Peter M. Hurd, USAF, K4NSS who has quite a string of et ceteras himself! Pete is with the Office of Secretary of Defense Staff;

has written articles for *Signal* (AFCEA's journal), for *All Hands*, and for *Worldradio*; is a member of the FCC National Industry Advisory Committee and its Amateur Radio Services Subcommittee; and is Executive Secretary of the FCC Advisory Committee for Amateur Radio preparing for the World Administrative Radio Conference in 1979.

INDIANA HAMS WIN ONE

The Indiana legislature moved earlier this year to strengthen its rules about possession of portable or mobile radio equipment capable of receiving signals transmitted on frequencies assigned for police emergency vehicles. The bill, SB454, is fairly stiff, carrying possible penalties of 180-days imprisonment and \$1,000 fine.

The Indiana Radio Club Council, and its vice chairman, Attorney Malcolm C. Mallette, WA9UBS, have succeeded in amending the bill to include the phrase:

"Notwithstanding subsection (a) of this section . . . a person who holds an amateur radio license issued by the Federal Communications Commission . . . may possess such a radio. . . ." One caution: The new law doesn't become effective until October 1, 1977; hams aren't exempt until then. With such a clean-cut exemption in the rule, it will be unnecessary for an amateur to demonstrate that any interception of police communications, as through fundamental overload, was unintentional. Our congratulations to the council and its vice chairman!

FCC STAFF PROTECTION BILL

Senator Harrison A. Williams of New Jersey has introduced a bill, S-998, to make killing, assaulting or intimidating any officer or employee of the Federal Communications Commission a Federal offense. It would apply while FCC personnel were performing investigative, inspection or law enforcement functions. It thus extends to FCC staff protection already afforded other government personnel under Section 1114 of Title 18 United States Code. The bill has been assigned to the Committee on the Judiciary.

AMATEUR RADIO WEEKS

Each year the week of June which ends in Field Day is listed as Amateur Radio Week by *Chases' Calendar of Annual Events*, a book available in most libraries. In addition, a number of political jurisdictions also proclaim Amateur Radio Week each year, either for the last full week in June or for a time with local significance. The first Amateur Radio Week of the year generally is that of the State of Nevada, in observance of the Sahara Amateur Radio Operators Convention (SAROC) held in early January.

One of the most regular proclaimers, he has been a director of ARRL, ham radio columnist for the Los Angeles *Herald-Examiner*, editor of *Spark Gap Times* and executive secretary of the Old Old-Timers Club, just to mention a few of many et ceteras. Now he's stepping down from the AFCEA post.

His replacement as RVP for amateur radio is Lt. Col. Peter M. Hurd, USAF, K4NSS who has quite a string of et ceteras himself! Pete is with the Office of Secretary of Defense Staff;

Another frequent participant has been

Alabama's Governor George C. Wallace. His message this year covered some of the same points as Governor Askew's, but then he went on specifically to mention Alabama nets and the ARRL National Traffic System. The Alabama celebration was June 20-26.

And Englewood, NJ, again issued a proclamation which, in setting aside June 19-25, dwelt heavily on the past Field Day successes of the Englewood Amateur Radio Association, Inc. The Proclamation was signed by Sondra Greenberg, mayor.

Have you observed Amateur Radio Week officially in your city, state or province? Let us have the details for the record.

MORE ON REPEATER DEREGULATION

Last month in this space we reported on ARRL's filing in Docket 21033, FCC's proposals for deregulation of repeaters and remotely controlled stations. Since that was written, the League has filed "reply comments," in response to the comments of other parties.

Our reply comments summarized the remarks of several organizations who had filed, especially with respect to deleting the requirement that repeater logs must contain notations of third-party traffic handled. Then we quoted from the Northern Amateur Relay Council of California:

"Since it is proposed to delete the requirement for real-time monitoring or recording of repeater stations operating under automatic control (in the same manner as now authorized for closed repeaters), it appears to us that there is no way for the licensee of a station in automatic-repeater operation to comply with the third-party traffic logging requirement and at the same time take advantage of the proposed relaxation of the monitoring/recording rule. This is because he cannot automatically prevent the use of his station by others handling third-party traffic. We feel that the Commission intended the deletion of the monitoring/recording requirement to extend to the notation of the traffic in the log of the station not in repeater operation to suffice as a record."

Our comments continued: "The League is in full support of the comments set forth above by NARC. Clearly, if the Commission is proposing the deletion of all real-time monitoring and/or tape logging of transmissions on automatically controlled open-access repeaters, the Commission could not have intended that such monitoring and tape logging would be required for the recordation of third-party traffic on such repeaters. . . ."

The purpose of third-party traffic rules is to prevent the use of a station on behalf of third parties for business communications, or where there may be some pecuniary interest by a third party or by the licensee, or to prevent third-party communications with countries who don't permit it. But at best the log of a repeater in automatic operation would merely record that violation had taken place; it would not prevent it. In the final analysis, the burden of compliance with the Commission's rules falls on the originating station, as it does in all other amateur communications. Thus, the recording of third-party traffic at repeater stations does not appear to be useful or necessary and it should be dropped.

YL News and Views

Conducted By Louise Moreau,* W3WRE



1977 YL-OM Contest

DX was the name of the OM-YL game, with a spurt in interest from all continents. This increase may be a result of CLARA and YLRL incentive certificates awarded for DX contacts plus the prizes offered for the top scores.

The winners were YL phone: I3MWP 57,750; HB9ARC 26,934; FG7XL 25,125*. OM phone: W4CHK 1,538*; W7ULC 805*; W0GNX 648. YL cw: WA5VJW 17,010*; K8ONV 13,484*; K1NEI 10,710. OM cw: W4CHK 1,463; W7ULC 1,295*; VE3EMA 990*. A cup is awarded to the first-place winners and certificates, to second- and third-place contestants.

The Scores

YL phone: W2EEO 143; WB5UKP 260*; WB6QVD 10,375*; W7JYX 23,552; K8ONV 17,843*; WB9NUL 3,623*; WA9TVM 9,790; K0EPE 19,008; WA0YNC 5,625; DJ5UAC 7,331.25*; DJ0EK 5,880; DL7XA 5,858*; DJ0YL 5,731.25*; DK9XS 2,888*; DF2SL 1,069*; F5RC 3,500*; G3NOB 914*; OK1OW 4,680*; OK1OZ 1,632; SM5EUU 850; ZL2JO 600*; ZL2QY 396; E17CW 2,500*; OZ1AVV 3,299*; VK3KS 14,813*; VE5FK 3,137*; VE4ST 1,820; VE3HQH 100*; PY8JO 1,242; HA6KVB 14,063*; I3MWP 57,750; HB9ARC 26,934; FG7XL 25,125*.

OM phone: W1AINLA 180*, W1PEG 124*, K2MJM 320*, W3ETB 169, WA3EXX 263*, W3IEZ 575, W4JUJ 80*, W4KFB 125, WB7ATH 3*, W9LNQ 101.25*, W9QWM 113*, K0ETA 210*, DL8YB 471.25*, JA3CMD 11.25*, SP9ADU 45*, SP2FAP 1, G3NFV 105*, OK1AGN 616.25*, OK2BKH 420*, OK2JK 273, OK1DKS 213*, OK3YIH 163*, OK3TDN 106*, OK1AFB 75, OK1NMV 75*, OK2BNK 9, HA7SD 44*, OH6UM 255*, VE4JV 263*, VE3BR 243*, EA7ABV 104, VK3XB 19*, W4CHK 1,530*.

*YL Editor, QST. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.



Laurel Lasses members of the YL Repeater Association have their repeater at the Butler County Amateur Radio Association Club. The girls begged, borrowed and sold to get the parts. L-r: K3ENM Hazel, W3WKD Jackie, WA3ZUE Becky, WA3EYQ Gail, WB3AWF Shirley. (W3CG photo)

W7ULC 805*, W0GNX 648.

YL cw: K1IJV 8,890*; K1QFD 7,744*; WA2DMK 10,473*; W2HFR 1,107; WA2NFY 980; WA2WHE 10,106.25*; WA2BQY 1,276; K4LMB 1,740; W4KZT 3,610*; WB4PRM 4,950*; K4UM 1,505*; W5QWI 3,285*; K6DLL 20*; WA0OZS 4,450*, WA8USU 4,623*; WB8WBS 1,914; WA8YPY 3,465*; WB9OJA 2,599*; WA9TVM 4,655; WA0YNC 7,076*; I3MQ 9,420; F2SQ 88; F5RC 1,25*; OZ7YL 442; AX3KS 6,637; OK1MYL 1,318*; HA3GQ 1,328*; HA9OY 1,137*; SPIPGM 3,300*; SP5YL 3,219; DK8LE 5,092; DJ0YL 3,160; DF2SL 1,200; YU1JDE 2,310; WA5VJW 17,010*; K8ONV 13,484*; K1NEI 10,710.

OM cw: W1GNR 720, W2HDC 625*, W1AINLA 6, W1OPI 90*, W1PEG 858, W1PWK 137*, K2DNN 90*, K2LFG 570*, K2MJM 99, W2RPZ 621, W2UAP 280*, W2WSS 208, W3ARK 709*, W3EE 378, WA3EXX 656.25*, W4GXW 20, W4JUJ 208, W4KFB 495*, W4VQ 616, W4ZRJ 135, W5NR 238, W6KZJ 36, W6OUL 120, WB7BQN 518*, W7NT 391, W9LNQ 761.25*, W9NU 378, WA0CTX 260.25*, WA0VBW 480, OE1TKW 54, HB9LW 190*, HP1AC 276.25*, AX3KB 7.5*, I2BVS 745*, I3DUU 471.25*, IT9AGA 150*, IT9XNM 9, F6ERZ 270*, F2PO 70, F8TM 8, SM5RH 2*, G3NEV 97*, DF5XN 98*, VE3ISW 375*, VO1KO 182, OK1DXZ 315*, OK3YIH 131.25*, OK3FON 91, OK3BA 50*, OK2UD 11.25*, OK3IF 1, OH3MF 225*, OH5PT 24, YU1SF 19*, JA1JT 5*, JH2IHH 2.5*, JE1HJJ 1.25*, W4CHK 1,463, W7ULC 1,295*, VE3EMA 990*. Note * indicates low-power multiplier.

Soapbox

After 10 years I finally got up enough nerve to rejoin YL-OM. Had a ball. (W2UAP) Seems we should dig up more YL participation in this yearly contest on cw. (W3ARK) Found the OM who showed up to QSO me in 22 contests in succession. (W2HFR) Very few stateside signals were heard. (ZL2QY) Keep smilin' on the scores; next year someone else will do the work. (K0ETA) Perhaps the representation would have been better if the contest had not been on the weekend of DX competition. (DJ0YL)

W.A.Y.L. CERTIFICATE

SAWARC, the South African YL club is offering a certificate to all amateurs. Hams in South Africa must submit proof of two-way communication with 12 women in South Africa covering ZS, ZE, 9J2, CR6 (now D2, D3), CR7 (now C8A-C9Z), 7Q7, 7P8; 3D6, A2C. Dx stations must work five women operators from these areas, but three must be from South Africa (ZS). Only QSLs dated since July 1, 1982, are eligible. Custodian is Susan Smith, ZS1SM, 3 Bournemouth Road, Muizenberg 7945, South Africa.



W3CG Norma Vanderhoff, active 3rd district chairwoman of YLRL, received her Extra Class and changed to the two-letter call from WA3KKT in February. Busy on all bands, Norma still finds time to serve as an officer of the Erie Radio Club.

BUCKEYE BELLE 1977 OFFICERS

The Buckeye Belles installed the 1977 club officers at a banquet in April. The speaker was Rosalie Cain, WA1STO, from ARRL headquarters. New officers for 1977 will be President Eila Russell, WA8EBS; Vice President Shirley Rex, K8MZT; Secretary Ruth Rickett, W8LGY; Treasurer Elizabeth Isham, K8UKM; editor, *Buckeye Burr*, Lillian Abbott, K8CKI. The club voted to accept associate members from outside the state of Ohio. Again this year the governor of Ohio issued a proclamation designating the installation date, April 17, 1977, as "Buckeye Belle Day" throughout the state in recognition of the YL contribution to public service in times of emergency in the state. The Belles meet regularly on Mondays at 1200 UTC on 3,950 MHz, Tuesdays at 0100 UTC on 3,972 MHz and Wednesdays at 1500 UTC on 50,335 MHz. All YLs are welcome to join these nets.



1977 Buckeye Belles officers (l-r): K8MZT Shirley Rex, vice president; WA8EBS Eila D. Russell, president; K8CKI Lillian Abbott, editor *Buckeye Burr*; W8LGY Ruth Rickett, secretary; K8UKM Elizabeth (ZIP) Isham, treasurer. (W8BU photo)

Correspondence

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

THE LAST WORD

□ In order to properly honor Jack Anderson for his April article on ham radio, I have named my "Cantenna" after him. — *L. C. Brenner, K3NPC, Malvern, PA*

THE REAL MCCOY

□ I have long been troubled by antennas for a small 60 X 100-foot lot, but I really learned much from the April articles on various antennas that I did not know before.

My interest in antennas was rekindled by Lew McCoy who made a guest appearance at the February meeting of the Long Island QCWA and gave a talk on antennas and SWR. He made sense and his charts told the story. In fact after listening to Lew I found the right answer to the antenna vs. SWR problem. I bought a Cantenna, filled it with transformer oil, put it up 33 feet in a V-shaped tree, attached 66 feet of coax and you won't believe what I can QSO these days. — *Robert H. Scruggs, W2FRX, Valley Stream, NY*

□ Congratulations to Lew McCoy for his article in the April issue. I gained more practical knowledge from his three-page basic article than I have from any technical volume on the subject. How about a series of articles on basic practical radio theory for us button pushers and knob turners who would like to know more about what's happening inside our rigs? — *Larry Anderson, WB6WMM, Sonora, CA*

HELP!

□ DON'T LET THE FCC PHASE OUT THE NOVICE CLASS!! — *P. Haishun, WB2JRE, Passaic, NJ*

OFFENSE AND DEFENSE

□ I was sorry to read the scathing attacks on your dues increase in the May issue. Considering the hectobucks or possible kilobucks hams have invested in their gear, the increase is miniscule. The League is the only way I found out about amateur radio, and I suspect the same is the case for many others. Your publications alone justify your existence. — *John Hunt, WB9VJZ/CG, Madison, WI*

□ The literature and pamphlets that you sent me are visually and intellectually great and have the kids here at school literally jumping out of their seats with excitement. I already have organized code and theory classes to begin in a few weeks. I'm now thinking about opening the classes to the public. My only hesitancy stems from doubts about the capacity of our gymnasium! Several students already sold their CB radios and are out scouting for amateur receivers.

The second reason for this letter is to renew my membership in ARRL. Unfortunately, when my interest in amateur radio waned somewhat, I allowed both my license and my membership to lapse. I was going to wait until my newly won General class call letters arrived to renew, but I've decided I can't bear to miss another issue of QST. — *Donald Froula, Addison, IL*

□ May I reflect upon a year of "the League" and ham radio in general. I now wonder why I even became involved in such childishness in

the first place. Twelve months of acting like CBers is all that I can or will take. The only thing the CBers don't do is take expensive vacations to exotic lands to enhance their conceit, and then take up an entire issue of a magazine to exploit it. — *Kenneth Bird, ex-WN7SIU, Granger, UT*

□ Just a small letter of thanks to all the great bunch of guys at ARRL headquarters for the many services that you provide to amateur radio. Your April issue was dynamite. Being a great fanatic on antennas, I got enough to keep me busy all summer long. Great job! — *Paul Sherman, WB3ETB, Houghton, MI*

□ Membership rates are ridiculous! I'm a college student! If they go up anymore, I quit! — *Paul Jones, WB9HEG, Hinsdale, IL*

□ After an absence of 10 years, I decided it was about time I rejoined the group! You are the true friend and advisor for all hams. Without you, I doubt that ham radio could have survived. — *Donald L. Taft, W6SMA, Downey, CA*

□ I received your letter today, and you are right, I do not belong to the League, but enclosed you will find my check for my first year's membership. I would like to say, keep up the fight for phone privileges on the 10-meter band for the Technicians. — *Gerald E. Martin, K7VKK, Portland, OR*

□ As a new ham and member of ARRL, I've been impressed with your professionalism and service. I look forward to QST and read it cover to cover each month. Your advertisers would probably be happy to know that I spend an equal amount of time pouring over their material, too. — *John Schwandke, WB0YRN, Muscatine, IA*

DIRTY ABUSE OF POWER

□ With all the talk of energy conservation, I wonder if anyone has attempted to estimate the total loss across the nation due to electric power-line leaks. Almost every ham in the country is plagued by noise due to arcing from faulty and/or dirty insulators, lightning arrestors, poor grounds, etc. Not only does the ham put up with this abomination of "line noise," but as a consumer he actually pays for this power loss since the power company must include it as part of operating costs. — *John D. Davies, K4NW, Rockledge, FL*

WE AREN'T NEWS

□ Hams are a funny breed of cat — so says my wife and I have to agree with her. Why in blazes do they crow about themselves in their ham magazines? I agree with her query 100 percent. We aren't news to ourselves, but we are news to the general public. This has been one of the serious faults I have found with ham periodicals. And it is another reason why so many of the general public, officials, etc., know very little of ham radio because we show little common sense in getting our PR out of ham magazines and into newspapers where it can do the most good. I've screamed about this for years. — *Col. Ronald G. Martin, W6ZF, Napa, CA*

□ At an open house at my junior high school as part of a demonstration for our radio club,

I brought my rig and hooked it up to existing antennas from a defunct radio club. I am happy to report that both children and parents alike were very interested. I think it is important for us that ham radio become more "known." I recommend that hams find any possible way to demonstrate the uses of ham radio. — *R. Geoffrey Werbin, WB2ISM, Maplewood, NJ*

SOLID SOLID STATE

□ Your latest effort, *Solid-State Design*, is another in what is a new series of excellent books from ARRL. It follows in the tradition of the *Data Book* and goes even further in clarity of presentation and useful material. It sets an example of excellence worthy of emulation by all other ARRL publications. — *Dr. Stanley R. Jaffin, WB3BGU, Silver Spring, MD*

□ I have just received my copy of *Solid-State Design* and after reviewing the contents for several hours I have concluded that it is "just what the doctor ordered." For one like myself, who has limited knowledge and experience, the book has very valuable reference material. It is the most useful book in my library. — *John Lawson, K5IRK, Hunt, TX*

NEW SKED — WHOOPEE!!

□ Your new code-practice schedule is excellent and the mixture of numbers and calls most valuable practice at the 20 wpm level. — *Charles Homewood, WB6WRV, Sacramento, CA*

□ I do not like the new code-practice schedule which began last weekend with daylight savings time. I have been trying to develop 20 wpm code speed to sit for my Extra exam. I find much less worthwhile code practice under the new schedule and I must stay up later in the evening to get it. — *J. A. Wright, WAUEB, Edenton, NC*

LIFER

□ I want to thank you for your good letter of March 24, 1977, advising me that my application for Life Membership in ARRL had been approved and enclosing lapel pin and decals. Since I shall hit 70 on my next birthday, Life Membership may not make too much sense actuarially, but I have been a member of the League for many years, have admired its effective support of radio amateurs and thought that taking out life membership might be one way to express my appreciation. — *Wendell Jackson, W3WW, Annapolis, MD*

BREAKER BREAKER 900

□ I strongly support your May editorial. Well done! — *Bud Southard, N9II, Cedar Rapids, IA*

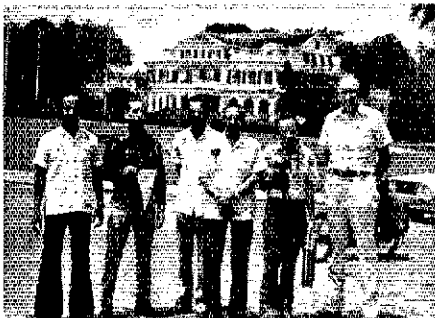
□ Your editorial in the May issue speaks of the kind of communications CBers need; i.e., a mobile service with a range of three miles. I think the CB mess is due to two serious blunders by the FCC: using a skip band and failing to require an operator's examination. It is too late to correct that now. — *Frank Warden, W1AGB, Adamsville, RI*

International News

Conducted By Bruce A. Johnson, *WA6IDN/WA1ZQP

An Exchange of Ideas

Here at Headquarters, we administer something called the IARU Fellowship Program. The program invites representatives of IARU member-societies around the world to come to Newington for one or two weeks solely to study amateur radio. Here, the representatives are fully educated on the status of WARC preparations, given any help they require in meeting with their national governments, taught the history, structure, and present-day position of the IARU and ARRL, and are allowed to consult ARRL/IARU records and materials of interest to them. The result? A well-informed national society, armed to the teeth with crucial information on how best to go about preparing for WARC-79 — and how to promote amateur radio in their own countries. Member-societies are encouraged to contact IARU hq. regarding this program.



IARU Vice President Vic Clark, W4KFC (far right), stands outside the Presidential Palace in Paramaribo, Surinam, with (l-r) PZ1BQ, PZ1AC, PZ1AK, PZ1BK and IARU Region 2 Vice President Pedro Seidemann, YV5BPG. (PZ1AP photo)

A SWEEP THROUGH CENTRAL AND SOUTH AMERICA

IARU Vice President/Region 2 President Vic Clark, W4KFC, joined Region 2 Vice President Pedro Seidemann, YV5BPG, in early March to call on various member-societies in preparation for the all-important 1979 World Administrative Radio Conference.

Beginning with Radio Club Venezolano, the two visitors were able to meet with both RCV officers and the Venezuelan Ministry of Communications in Caracas. It was learned that RCV had received favorable response from the Ministry and that it is probable that an amateur will be appointed to Venezuela's WARC delegation.

Following the round of discussions in Venezuela, Clark and Seidemann proceeded to Curacao, where they were met by PJ2VD, PJ2CW, PJ2DH and PJ2MP. Later in the day (3 March), meetings were held during airport stops at Port-of-Spain, Trinidad, with Trini-

In April, President Jean Coussi, F9FF, and IARU Liaison Officer Joseph Malbois, F6CCI, flew from the Reseau des Emetteurs Francais headquarters in Paris to spend a week in Newington as participants in the program. Their visit made possible an important exchange of ideas on WARC, and the REF officers learned much about the worldwide efforts to prepare for the Geneva conference. Much discussion was centered around the Intruder Watch program, U.S. preparations for WARC, the International Telecommunication Union (ITU) and how it works, and the successes and failures experienced at other telecommunications conferences and WARCs. Headquarters extended a warm welcome to Messieurs Coussi and Malbois, and all here found that their visit went far toward strengthening U.S.-French relations.



DXCC Assistant Barbara Johnson played interpreter's role during the visit of the REF. She and REF President F9FF are here discussing WARC materials. (W1YL photo)

dad and Tobago Amateur Radio Society representatives 9Y4LP and 9Y4TS, and at Georgetown, Guyana, with president 8R1Q of the Guyana Amateur Radio Association. The following day was spent with officers of the Vereniging van Radioamateurs in Surinam at Paramaribo, and included a visit to the Ministry of Communications there for a meeting with LTT Control Service Chief Frank Latour and Planning Manager John Neede. Again, WARC was the topic.

Arriving in Belem, Brazil, the following day at 2:35 A.M., Vic and Pedro were surprised to be met by PY8EL, who had been waiting for the delayed plane for two hours. Proceeding on to Brasilia later that same morning, they were greeted by President PT2ZZ of the Liga de Amadores Brasileiros de Radio Emissao, and a group including PT2JN, PT2GBZ, PT1AS, PY7FC, PT2CN, PY1AFA, PT2ZAB and PT2ZBE. There followed a round of activities, including full discussions of WARC preparations, inspection of the attractive new LABRE headquarters building, and visits to points of interest in the Brazilian capitol.

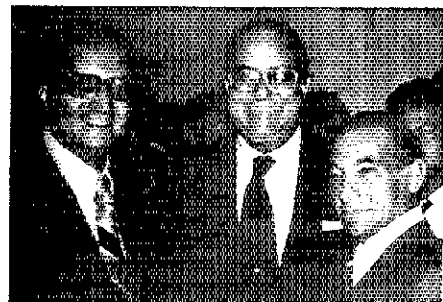
Prior to joining Pedro Seidemann in Caracas, President Clark attended a hamfest in the Panama Canal Zone, and met with the Liga Panamena de Radioaficionados in Panama to discuss plans for the 1978 IARU Region 2 Conference to be held there. A visit was also made to Panama's Ministry of Communications with HP1SF and other Liga officers.

En route to Panama, Vic also attended the 18th annual conference of the Federacion de Radioaficionados de Central America y Panama (FRACAP), where he met with officers of the Club de Radioexperimentadores de Nicaragua, the Radio Club de Costa Rica, the Club de Radio Aficionados de El Salvador, and the Club de Radioaficionados de Guatemala.

The objective of the visits was to strengthen relations among Region 2 member-societies, and to coordinate preparations for WARC-79 throughout the region.



The Japan Amateur Radio League's Committee for Preparations for WARC-79 is shown here during a meeting on 12 February 1977. Of the 15 members, shown here are (l-r) JA1BSN, JA1KAB, JARL President Shozo Hara, JA1AN and Hon. Nishizaki, who was a director of the ITU International Frequency Registration Board until last year. Mr. Nishizaki is Japan's leading WARC specialist, and is assisting JARL in their WARC preparations. JA1AN reports that at least one amateur will be appointed to the official Japanese WARC delegation in 1979. The Japanese administration's attitude toward the Amateur Radio Service is reported to be very favorable, largely as a result of the outstanding work done by JARL.



Most amateurs know that several heads of state are hams. Shown here (center) is His Excellency General Don Anastasio Somoza Debayle, YN1AS, the President of the Republic of Nicaragua. Standing with him are FRACAP Chairman YN1FZC (l) and delegate from Mexico, XE1JJW (r). (W4KFC photo)

*International Services Assistant, ARRL

FM Repeater News

Conducted By Lew McCoy, * W1ICP/WR1ABH

Getting the Dues In — How Do We Do It?

Recently, one of the repeater clubs in the country found that when the yearly dues paying time came around there was an appreciable number of members who failed to send in their money. The club took the step of publishing a list in their monthly bulletin of all those amateurs who were delinquent. This action brought about a tremendous uproar, including letters to ARRL hq. (most likely from those whose calls appeared in the list!). What are the pros and cons of such actions? On the one hand, you can argue that it is unethical to publicly "dun" someone who doesn't pay their bills. It can be stated that it

is unfair to list someone (as a deadbeat or slow-pay) who never intends to renew because he or she has quit repeater operation. It is possible to get around that one to a degree by having a committee listen on the air for 30 days or some other period and then list only those users who have not paid up. That takes the onus off those who never plan to come back on.

It can be argued that a repeater is a group effort and it cannot exist without the support financially of *all* local users. (Note we say local to differentiate from visitors.) Still another approach would be to send a bill to each member by mail saying that if they don't reply by a certain date then the bulletin would list them. However, this costs the club postage and mailings and so forth while the straight bulletin route is simpler.

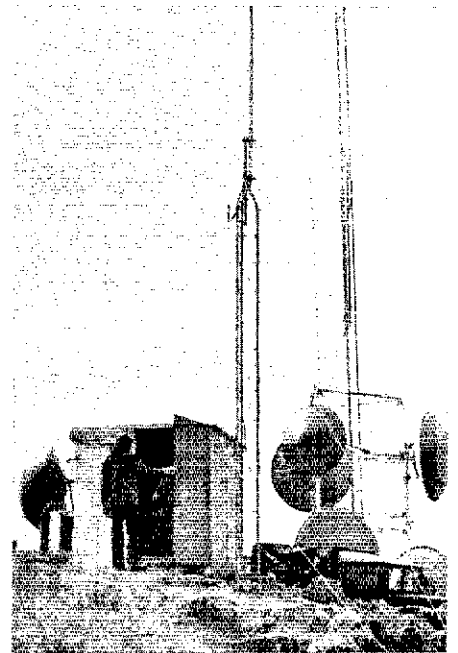
Now that we've played the devil's advocate on that side, let's take the opposite approach. Before we do though, there is an old saying that goes something like this: It is absolutely impossible to insult a true deadbeat! Outside of cutting off the guy's coax there isn't a heckuva lot we can do about such people. Okay, so I plan on only getting on the repeater on very rare occasions. I won't be going to any of the club meetings because I don't have the interest anymore. Now you clowns running the repeater list my name or call as not paying dues with the implication that I am a deadbeat — man, that's a lotta nerve and I am thinking about calling my attorney. (Is this ham right? We think he is.)

"Hey gosh, fellows, you know I lost my job a month ago and I just don't have the green to pay up; kind of stinky on your part to hit me when I am down isn't it?" (How would *you* like to answer that complaint?!) Or, were you club officers aware that Tom's wife was in the hospital for expensive surgery before you listed him as a nonpayer?

Well, by now the point should be well made but we'll let you club officers decide which way to go. Oh sure, there is always the one of listing only those who have *paid* their dues but that method has problems also. Maybe the best way to go is to sell the repeater on the basis of what the repeater can do for a member and that it must be a united effort — in work, operating, and in dues paying.



This is the Southwestern Oklahoma Repeater Assoc.'s new machine, a G.E. Master II, made especially for the Altus, OK, group. At the left is the president of SORA, Dwight Dennis, WB5KRH; George Earp, WB5TLJ and Bob Henry, WB5VUM. We cannot help but remark that last month we ran a photo of Jesse James in this column — this month we have one of the Earp boys. Anyone named Dillinger for next month?

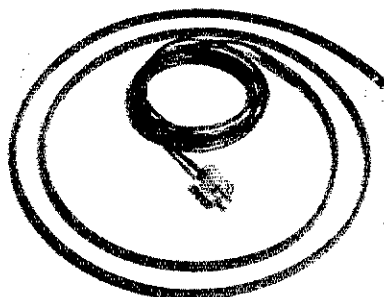


A view of the building housing SORA's repeater, WR5ANX on 146.19/79. The repeater is open and visitors are welcome; but then Oklahoma always was a friendly state.

TRAVEL-TENNA

A neat idea we saw at the Dayton Hamvention was an antenna called a "Travel-tenna." For the traveling person who wants a simple to erect antenna for motel-room operation, this antenna looks ideal. It is a 2-meter, one-half wavelength dipole in a J configuration made from twin lead and fed with the small diameter coaxial cable. A piece of string at one end is used to hang the vertical from a curtain rod or whatever. We checked the antenna in operation to see what kind of SWR would be present. The antenna, when suspended at least two feet from a metal pipe or structure, showed a very good match across the 146- to 148-MHz segment. The company has an option of feed-line connectors available to fit practically any rig. Price class is \$8 and

*VRAC Liaison, ARRL hq.



"Travel-tenna" by R. F. Products.

for further details write to R. F. Products, P. O. Box 570-252, Miami, FL 33157.

LATEST UNITED STATES REPEATER CENSUS

Jim Morris, KH6HQG/W1, our communications assistant who has the job of compiling the latest *Repeater Directory*, passes along these latest figures on numbers of repeaters: 10 meters, 16; 6 meters, 123; 2 meters, 2103 (!); 220 MHz, 236; 450 MHz, 384; and 6 repeaters on 1215 MHz or higher. Also, 8 repeaters are listed for 450-MHz ATV.

At the time this appears, the new *Repeater Directory* will be available. The directory is free but please enclose an s.a.s.e., 46-cents postage affixed to a 6 x 9-inch envelope or larger.

QST

Coming Conventions

June 18-19
Georgia State, Atlanta, GA

July 2-3
West Virginia State, Jackson's Mill, WV

July 9-10
Roanoke Division, Norfolk, VA

July 30-31
Northwestern Division, Seattle, WA

September 16-18
Virginia State, Falls Church, VA

September 23-25
New England Division, Hartford, CT

September 24-25*
Delta Division, New Orleans, LA

October 7-9
Midwest Division, Wichita, KS

October 7-9
Southwestern Division, Santa Maria, CA

October 8-9*
West Gulf Division, Austin, TX

October 15-16
Pacific Division, San Mateo, CA

Hamfest Calendar

Alberta: The Waterton Glacier International Hamfest is July 15-17 at the Hiawatha Campground (one mile south of Burmis and one mile west, or 45 miles west of Fort McLeod, just off Hwy. 3 in the foothills of the Canadian Rockies). A repeater made by the Amateur Radio League of Alberta will be displayed and operational on 34/94, by Norm Simons of Edmonton. Vhf discussions, Saturday night barbecue, Sunday morning hot cakes; info from VE6ASL.

British Columbia: The Okanagan International Hamfest is July 30-31 at Gallagher Lake KOA Campsite, 8 miles north of Oliver. Great family outing, bring hobbies, homebrew gear, etc. Potluck Sunday noon. Talk-in 3800, 34/94 and .76 simplex. Rates \$3 amateurs, XYLs \$2, family rate \$5. Info: VETASY.

California: The Golden Empire Amateur Radio Society's hamfest is July 16 in Durham Community Park, all day Saturday, July 16. Fun, games, technical talks and refreshments.

Florida: The Bold City Hamfest sponsored by the Jacksonville Range Assoc. is at the Jacksonville Beach Auditorium, Saturday and Sunday, August 6-7. Bring the family and vacation at our hamfest. Visit our special "solar" and "QRP" forums. Requests for tables and info write Jacksonville Range Assoc., P. O. Box 10623, Jacksonville, FL 32207. Motel reservations, toll free Ramada Inn 1-800-228-2828.

November 19-20
South Florida Section, Clearwater, FL

*Date Change

NORTHWESTERN DIVISION CONVENTION

July 29-31, 1977, Seattle, Washington

The last weekend of July will see hundreds of amateur radio enthusiasts descend on Seattle for the Northwestern Division American Radio Relay League Convention. Along with the ARRL features will be conventions for the Quarter Century Wireless Association (a national association of old-timers licensed more than 25 years), Northwest DX Club plus computer organizations. Activities will be held at the Washington Plaza Hotel, where a complete amateur station will be in operation, and the large Seattle Center where Amateur Radio Public Service seminars and scientific experiments will be featured. Many forms of communications via the personal, experimental, radio service will be displayed, such as space satellite, repeaters, slow-scan television, radio teletype and various other modes of communication that are common to the Amateur Radio Service.

Featured guest speaker will be Armin Meyer, W3ACE, who was U.S. ambassador to Lebanon, Iran and Japan under Presidents Kennedy, Johnson and Nixon. He is an author, lecturer, college professor and diplo-

matic observer whose comments are timely and interesting.

Come and meet ARRL President Harry J. Dannels, W2HD and Northwestern Division Director Robert B. Thurston, W7PGY, who will take part in the ARRL Forum. Ellen White, W1YL, Deputy Communications Manager, ARRL headquarters, will conduct the Contest Forum and participate in the Public Service Forum. Other notable amateur radio operators who are publishers, engineers or foreign operators, such as John Devoldere ON4UN of Belgium, will be seminar speakers. Master of ceremonies for the Saturday evening banquet will be Seattle television personality, Milt Furness, K7JKH.

Special programs have been arranged for the ladies and the Royal Order of the Wouff Hong ceremony will take place Saturday evening.

The convention amateur radio station, NW7ARL, will be on the air and will monitor 2 meters on 146.28/88 and 75-meter phone on 3970. QSL cards will be issued for working NW7ARL by contacting the local operators.

Registration is required for admission to all activities. Complete registration package (tech sessions, exhibits, banquet) is \$17 in advance, \$19 at the door; registration without banquet is \$5, advance, \$7 at the door. Advance registration closes July 6. For further details contact SEA-Q-DX Convention, P. O. Box 25537, Seattle, WA 98125.

Room accommodations will be handled directly with the Washington Plaza Hotel, P. O. Box 1826, Seattle, WA 98111.

Idaho: The 45th Annual WIMU Hamfest is at Mac's Inn, Idaho, just about 25 miles southwest of Yellowstone, August 5-7. Tour Yellowstone Nat'l Park. Before July 1 registration is \$6. Later \$7. Please send all pre-registrations to WIMU Hamfest, P. O. Box 30756, Billings, MT 59107 c/o Ronald Conley General Chairman.

Illinois: The Quad-Co. Amateur Radio Club annual hamfest of the "Breakfast Club" is on July 16-17 at Terry Park, 3/4 mile east of Palmyra. Dancing and movies Saturday night. Bring basket lunch. Sandwiches and soft drinks available on the grounds. Mobile talk-in on 3973 MHz from noon Saturday to 11 A.M. Sunday. Games, contests, golfing and fishing. Bring your swap gear. Camping facilities open from Friday afternoon til Monday morning. Pre-registration until July 7 is \$1.50; \$2 at the gate. Write "Hamfest" c/o Quad-Co. ARC, Box 81, Chatham, IL 62629.

Indiana: The 31st Annual Turkey Run Hamfest is on Vigo County Fairgrounds (one mile south of I-70 on U.S. 41 south of Terre Haute). For overnight campers only, open Saturday July 16. For general public opens Sunday, July 17, at 1300. Flea market, XYL bingo, refreshments. Vendor spots under cover; flea market with ac service, \$10. Giant shopping mall nearby. Advance adult tickets \$1.50, \$2 at gate; advance 4 for \$5, at gate 3 for \$5. Children under 12 free. Talk-in 25/85 and 52 simplex. S.a.s.e. WVARA Hamfest, P. O. Box 81, Terre Haute, IN 47808.

Indiana: The 6th annual Indianapolis hamfest is Sunday, July 10, at the Marion County Fairgrounds. Gate admission is \$2. Commercial exhibitors, indoor flea market with electricity at most places.

Indiana: The "Original FM Hamfest" is sponsored by the Fort Wayne Repeater Assoc. of Fort Wayne on Sunday, August 7, 5,400 feet of exhibit area, air-conditioned, and acres of flea market grounds. Located at the Allen County Police Dept. Reserve Center, 3022 Easterday Rd., Fort Wayne, IN. Talk-in

WA9EAU on 16/76, 52/52 and 52.525. Write Fort Wayne Repeater Assoc., Inc., P. O. Box 6022 Fort Wayne, IN 46806.

Indiana: The Steuben County Radio Amateurs' 19th annual E.M. Picnic and Hamfest is Sunday, August 7. (Located at the Steuben County 4-H Park, approx. 2 mi. west and 2 mi. north of Angola.) Picnic-style B.B.Q. Chicken & Refreshments; inside tables for exhibitors and vendors; overnight camping permitted in the park for those desiring to arrive Saturday; movies Saturday night as usual. Tickets \$1. Talk-in frequencies 52.525, 146.52, 223.5, 446.0.

***Kansas:** The Pittsburg Repeater Organization, Inc., Hamfest is July 10 in Lincoln Park, Pittsburg. Admission \$2.

Kentucky: The Bluegrass Amateur Radio Club in Lexington is sponsoring the annual Bluegrass Hamfest, August 14, at the Lexington National Guard Armory located adjacent to the Bluegrass Field on Airport Rd., Lexington, KY.

Massachusetts: The Northern Berkshire Amateur Radio Club Hamfest is July 9-10 at the Cummington Fairgrounds, Cummington, MA.

Michigan: The Shiawassee Amateur Radio Assoc. is hosting the Buzzard's Roost, Michigan Emergency, and Wolverine Nets picnic and S.A.R.A.'s 3rd annual free swap and shop, Saturday and Sunday, July 16-17, at McCurdy Park in Corunna just east of Owosso. The swap and shop is open from 8 A.M. to 5 P.M., both dates. Sunday the Wolverine Net meeting is at 11:30 A.M., the picnic at noon; bring 1 dish to pass for single persons, 2 dishes for families. Refreshments available. The Buzzard's Roost/Michigan Emergency Net meeting is at 1:30 P.M. Women's and children's games start at 2 P.M. A small fee for on-site camping in self-contained campers. Nearby motels available. Swap n' shop tables and trunk-sale spaces available at \$2 for 1 day and \$3 for 2 days. Talk-in with W8QQQ on 3930 kHz, 146.52

MH, 147.63/03 repeater 449.3/442.1-MHz repeater. For a flier with a map and further info, write S.A.R.A. - W8QQQ, 1302 West Main St., Owosso, MI 48867.

*Michigan: The Delta County Amateur Radio Society's hamfest is in Escanaba in the student center of the Bay de Noc Community College on August 6-7. The cost is \$3 per family.

Minnesota: The Northern Lakes Amateur Radio Club's hamfest - also a reunion of Golden Shovel Net - is Sunday, July 17, at Gunn Park 4 miles north of Grand Rapids on Hwy. 38. All hams welcome. Contact Ed Lee, W8QOB, Warba, MN 55793 218-492-3105.

Minnesota: The Mankato Area Radio Club's annual hamfest and auction is July 31 between 10 A.M. and 4 P.M. at Spring Lake Park in North Mankato. Talk-in on 3.93, 146.94 and 25/85. Liquid refreshments; bring your own dinner. For info call Allen Windhorn at 507-931-1349.

Missouri: The 2nd annual Hamfest and Communication Show is Sunday, July 24, at the Slater Park with fly-in facilities. Registration \$1 advance; \$1.50 at the gate. Sunday noon meal for a nominal fee. Flea market, XYL activities. For info and advance tickets write Dale Beilsmith, W0KNF, Box 74, Slater, MO 65349. 816-529-2173.

*Missouri: Hamfest at Missouri Western State College, Engineering & Tech. building, St. Joseph, is July 30-31. Contact WA0QPW.

Missouri: The Zero-Beaters A.R.C.'s annual hamfest is on Sunday, August 7, at the Washington, Missouri City Park. Free parking, auction, and bingo for the XYLs. No admission or parking fee in the trader's row. For info or tickets contact Zero-Beaters A.R.C., WA0FYA, Box 24, Dutzow, MO, 63342.

New York: The Kings County Repeater Assoc. of Brooklyn's annual outdoor flea market (rain-indoors) is on Sunday, July 10, from 9 A.M.-4 P.M. (located at 17 Eastern Parkway at Grand Army Plaza, Brooklyn.) Sellers \$6 per table, \$3 half table; buyers \$1. Refreshments available. Talk-in on 147.43 and .52 direct. Info call WA2UMY, 212-941-8780.

North Carolina: The Cary Amateur Radio Club's 5th annual Mid-summer Swapfest is Saturday, July 16, from 10 A.M. to 3 P.M. at the Cary Lions Club Shelter (near Raleigh). Auction at 1 P.M., no commissions or selling fees. Info C.A.R.C., Box 53, Cary, NC 77511. Talk-in on 28/88.

*North Carolina: A joint venture of the Greensboro Amateur Radio Assoc. and the Greensboro Coliseum Complex is to be an exciting educational experience for the general public and citizens band radio operators. The theme is a panoramic view of radio communications from the beginning to the present and into the future. Displays by companies and groups in communications both commercial and noncommercial. The event is July 29-31, beginning Friday night with amateur fellowship display setup. Open Saturday morning to the public. Seminars, lectures, special events for the wives and

children. Repeater groups and clubs are being offered display space free of charge on a first-come basis (advance reservations). Plenty of antenna space available. A commemorative call with full-power stations on all amateur bands to be operating 24 hrs. per day. Camping facilities with hookups; motels close by. Interested exhibitors are asked to contact WB4DCS at 919-275-7262 or 919-294-2140 soon. For info and reservations write The Coliseum at 1921 W. Lee St., Greensboro, NC.

North Dakota: The 14th annual International Hamfest is July 9-10 at the International Peace Garden between Dunseith, ND and Boissevain, Manitoba; this year in the American Lodge. Excellent camping, contests, party & dance and meetings. For info contact WA0LRE or VE4MN.

Ohio: The Wood County ARC's annual Ham-a-rama is Sunday, July 17, from 8 A.M. to 5 P.M., at the county fairgrounds in Bowling Green (about 25 miles south of Toledo). Free parking. Admission \$1.50 advance, \$2 at door. Tables \$2. Talk-in on 146.52. Refreshments available. Write WCARC, 7929 Rudolph Rd., Rudolph, OH 43462.

Ohio: The Tusco Radio Club and the Canton Radio Club W8AL hamfest is in Canton in the Fine Arts Bldg. and 4-H Bldgs. at Stark Co. Fairgrounds on August 7. \$3 for OM/XYL tickets, under 12 free. Write Max R. Lebold, WA8SHP, Sandyville, OH.

Oklahoma: The Oklahoma Ham-Holiday is August 6 and 7 in the Southgate Inn Best Western, 5245 South 135 in Oklahoma City. Make your own reservations; bring the entire family for a mini vacation. (405-672-5561). Pre-registration \$3, at door \$4. Contact H. O. Townsend, WA5MLT.

Pennsylvania: The Tri Club Hamfest of WA3GYE, W30I and W3OK is from 8 A.M. to 5 P.M. at the Allentown Police Academy pistol range in scenic Lehigh Pkwy. south at Allentown. Admission is \$1 to all including sellers; children free. Talk-in on 34/94.

Pennsylvania: The Two Rivers Amateur Radio Club of McKeesport 13th annual hamfest is on Sunday, July 17, at the Green Valley Fire Dept. grounds off U.S. Rte. 30 near East McKeesport. Check-ins on \$2/\$2 and 22/82. Write Andrew Salitros, W3OEM, 2901 Stewart St., McKeesport, PA 15132.

Pennsylvania: The 40th annual Hamfest of the South Hills Brass Pounders and Modulators is August 7 from noon til dusk, at St. Clair Beach, Upper St. Clair Township (5 miles south of Mt. Lebanon, on Rte. 19). Swap n' shop, picnic space and swimming for the family. Mobile check-in on 29.0 and 146.52. Info and pre-registration at 1.50 per ticket (\$2 at door). Write Rich Eckenrode, 1410 Bellaire Pl., Pittsburg, PA 15226. Vendors must register.

Quebec: Montreal Hamfest "77" is August 6 and 7 at the St. Lambert Recreation Assoc. Arena, easily accessible from Metropolitan Montreal. For hotel, motel, camping reservations, advance bookings, and indoor flea-market space write Lloyd Courtice, VE2WX,

65 des Lilas St., St. Bruno, Quebec, J3V 2R8.

South Carolina: The Charles Towne Hamfest in Charleston is July 9-10. Saturday, July 9, the Charles Towne hospitality room is at the heart of Charleston Motor Inn starting at 7:30 P.M., Sunday, July 10, the flea market and swapfest is at the Gaillard Municipal Auditorium starting at 8 A.M. For details write Charles Towne Hamfest Comm., Box 4555, Charleston Heights, SC 29405.

*Tennessee: The Oak Ridge Amateur Radio Club, Inc., hamfest is in Crossville at the Cumberland on July 23-24. Write R. F. Wilson, WA4SJK, Rte. 20, Guinevere Dr., Knoxville, TN 37921. Free admission.

Texas: The 12th annual West Texas Emergency Net Picnic and swapfest is Sunday, August 7, in the city park, Levelland. Bring your own picnic basket. Registration begins at 8 A.M., lunch at 12:30. Swapping all day. Tables are provided. This family event is jointly sponsored by the Hockley County Amateur Radio Club and the West Texas Emergency Net. Mobile talk-in frequency is on 2 meters only on 28/88. \$2 donation appreciated but not required.

Utah: The Utah Amateur Radio Club's annual hamfest and steak fry is on July 16 at Saratoga resort. (Saratoga is located between Salt Lake City and Provo on Utah Lake.) The bill of fare includes swap tables, cw contest, homebrew contest, OSCAR demo, women's activity, steak fry and many more ham games. On grounds camping is available with lodgings nearby. Registration is \$2 for UARC members, \$5 for nonmembers and \$1 for children under 12. Registration includes choice steak, discount on rides, hot dogs for kids and all other activities. Starts 9 A.M. and runs until after dark. Talk-in on the club's 16/76 repeater. Info contact John Dehnal, c/o the Utah Amateur Radio Club, 1547 Redondo, Salt Lake City, Utah 84105.

*Virginia: The Shenandoah Valley Amateur Radio Club, Inc. hamfest is in Berryville at the Kuritan Fairgrounds on August 7. H. Fred Wetzel, 308 W. Main St., Berryville, VA.

Washington: The Spokane Amateur Radio Council's 3rd annual hamfest is July 16-17 in the Pence Union Bldg. at Eastern Washington State College, Cheney, about 15 miles west of Spokane. Preregistration is \$9.50, the same price as last year. Includes the banquet on campus, QCWA and ARRL displays, flea market, new equipment displays, seminars and activities XYLs, MYLs and YLs. Send checks for preregistration to Jim Johnson, WA7BWO, P. O. Drawer 4, Cheney, WA 99004.

Northeast Wisconsin Swapfest is in Neenah on Sunday, July 24, from 0900-1500. Talk-in on 94/94. Admission \$1.50; tables \$2. Inside tables, food and refreshments, bar and easy access from U.S. Hwy. 41. (Take Wisconsin Hwy. 114 exit east, then take first left to the Neenah Labor Temple at 157 South Green Bay Rd.) Dealers, auction and a special rate for families. Send advance reservations to 3-F's, Box 1032, Neenah, WI 54956.

*ARRL hamfest

QST

Strays



It's a well-known fact that retired persons love to travel, but students such as Cliff Davidson, WA0KXJ, manage to do pretty well also. Operating portable and/or mobile from his compact car, Cliff and his XYL have operated from every state except Alaska, six provinces and more than a dozen DX locations. This enviable total has been achieved over 10 years and several dozen trips.

Among Cliff's most memorable QSOs was a chat with a UA1 on ssb while mobiling in VE1-land. In another instance, a lengthy QSO with a VK3 as well as short chats with ZLs and JAs on ssb kept boredom to a minimum while driving across the Mojave Desert in the

middle of the night.

Preferring ragchews to chasing DX while mobiling, Cliff has nonetheless snagged some juicy contacts - a hoard of Europeans including an M1 from Delaware, an FK8 and HM1 from lonely California mountain roads and, on occasion, Europe from the West Coast and the Pacific from New England.

By now you're wondering about his gear: a Galaxy V transceiver tuned to 100 watts to save the battery, and a Hustler antenna.

After he graduates from the California Institute of Technology, Cliff and his XYL will be heading for Pittsburgh, and a few more portable/mobile contacts, no doubt.



Snagging juicy contacts while portable/mobile is the specialty of traveler Cliff Davidson, WA0KXJ.

Washington Mailbox

Conducted By Harold M. Steinman,* K1FHN

REPEATERS

Q. I constantly see references in amateur radio magazines to "repeaters," but no one ever says what a repeater is. It's just taken for granted that everyone knows what a repeater is. Would you please give me a definition of "repeater"?

A. A repeater does exactly that: repeat. It repeats - or retransmits - the signals of other amateur radio stations. A repeater receives a signal on one frequency (called the input frequency) and simultaneously retransmits it on another frequency (called the output frequency). It performs a relay function and it does it automatically with no delay. Whatever comes in goes out.

Q. That doesn't seem very exciting. Why do amateurs need repeaters?

A. Well, repeaters are usually located on a very high spot where they are capable of receiving transmissions over a wide area. You'll find repeaters on mountaintops, on skyscrapers, even on existing commercial radio towers. Repeaters effectively increase the communications range of other amateur radio stations in the area, particularly mobile stations. A low-powered vhf mobile rig, for example, would normally have an effective range of only a few miles. But in conjunction with a repeater its range can be extended to 35-50 miles or more.

Q. You said that repeaters utilize an input frequency and an output frequency. That means two frequencies are occupied simultaneously. Isn't that wasteful of the radio frequency spectrum?

A. Not really. What appears at first glance as being wasteful, is actually a much better situation than you realize. First of all, many feel that the increased communications range and reliability of communications far outweigh the fact that two frequencies are required rather than one frequency as in direct station-to-station (simplex) contacts. But repeaters are actually a very effective way of conserving spectrum. This is because many amateurs find that they can best handle their local communications needs by utilizing one repeater, or a small number of repeaters, on a day-to-day basis. Repeater frequencies have been channelized (on a voluntary basis), and this allows amateurs to monitor a particular repeater-output frequency to listen for calls from other amateurs in the area. Conversely, an amateur may call another amateur over a repeater that they are both monitoring and know that the odds are good that the other amateur will be listening. Because there are many amateurs utilizing each repeater frequency, repeaters are actually an effective way of conserving valuable spectrum space.

Q. Are there any special rules and regulations governing repeater operation?

A. Yes, there are. The Commission has recently proposed (Docket 21033) to drastically reduce the number of rules governing repeaters. But until such time as action is taken on that docket, the present rules apply.

Repeater operation is allowed only in specified repeater subbands (97.61). They are 29.5-29.7 MHz, 52.0-54.0 MHz, 146.0-148.0 MHz, 222.0-225.0 MHz, 442.0-450.0 MHz, any amateur frequency above 1215 MHz.

There are also rules concerning maximum effective radiated power versus antenna height above average terrain, intended to provide reasonable coverage (97.67), rules on controlling a repeater (97.88), and some logging regulations (97.111). It's not really all that complicated, but would be too lengthy to go into here. If you are thinking of licensing a repeater, you may obtain a "Repeater Licensing Packet" from the ARRL. Just send a large self-addressed envelope with 24-cents postage to ARRL, 225 Main St., Newington, CT 06111.

Q. What is a "closed" repeater?

A. It's a repeater which requires a special method of activating the input. Usually a specific tone on the repeater-input frequency is required. It is a way of limiting the number of potential users to only those who know the special method.

Q. Wouldn't it be considered illegal to restrict the use of a repeater to a chosen few? Aren't the airwaves for everybody?

A. It is not illegal because repeaters are individually licensed stations operated by individuals or clubs. In this sense it is exactly the same as your own primary station. You have the right to restrict the use of your station to whomever you desire. So it is with a closed repeater.

It should be pointed out that repeaters do not have priority on any given frequency. All present channel assignments are on a voluntary basis and by gentlemen's agreement. There are no FCC rules governing channel selection. So a closed repeater is not preempting a frequency for its own use.

Q. With so many repeaters in operation, how do amateurs voluntarily coordinate their frequency use?

A. There are volunteer frequency coordinators who keep extensive records on repeater input, output and control frequencies. They are listed in ARRL's *Repeater Directory*, which may be had for a large envelope with 46-cents postage from ARRL, 225 Main St., Newington, CT 06111.

RENEWALS

Q. What is the "year of grace"?

A. If you inadvertently forget to renew your license before it expires, you have up to one full year after expiration in which to renew it without taking the test over again.

Q. Can I remain on the air during this time?

A. No. If your license expires, and you submit your renewal during the year of grace, you must remain off the air until your renewed license is received.

Q. If I apply for renewal before my present license expires, may I remain on the air past the expiration date even if I haven't received my renewed license?

A. Yes, as long as you mail in your application for renewal before the expiration date of your current license, you may operate your station until your renewal is acted on.

DUPLICATE LICENSES

Q. If I lose my license, or if it's mutilated or destroyed, how do I obtain a new one?

A. You simply apply by letter for a duplicate license; there is no application form involved. Explain how the license was destroyed or lost. If it was mutilated, send it along with your letter explaining the circumstances. Send the letter to FCC, Box 1020, Gettysburg, PA 17325.

INTERIM PERMITS

Q. Interim amateur permits, which allow those already holding an amateur radio license to immediately use new privileges upon successfully upgrading, are valid for 90 days or until the higher class license arrives in the mail. What happens if my new license hasn't arrived in 90 days? Do I have to stop using my new privileges?

A. An applicant will normally receive his new upgraded license within the 90-day period. Should he not receive it at the end of this time period, he should write the Personal Radio Division, FCC, Washington, DC 20554 and a check will be made to determine the whereabouts of his application. If warranted, a special temporary authorization (STA) may be issued to him until he receives his new license.

Q. I recently upgraded to Amateur Extra and received my interim amateur permit authorizing me to use my new privileges. May I use this interim amateur permit as evidence of having passed the Amateur Extra test when applying for a 1x2 call, or must I wait until I receive the actual license?

A. A photocopy of the interim amateur permit will be accepted as evidence when applying for a 1x2 call.

[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.]

*Asst. Manager, Membership Services Dept.



The Case for Identity

We've known Grommethead Schultz for a long time, even since before he discovered anchovy pizza. Always been able to spot him on the air in a flash: that rock-and-roll cw swing or his snorty audio. But now with a tediously precise keyer and factory-processed speech he sounds almost like anybody else. Wait till he signs? No good, we're still not sure. Grom's an avid collector, you see. Recently, he has held four different call signs at the same QTH.

Long ago in radio's dim dawning it seemed logical that accurate station/operator identification would be necessary and desirable. Your initials did the job for neighborhood spark chitchat until another "JS" joined the group. Then it was a great relief to have Uncle Sam start issuing stable, unduplicated, individual

ids. Lots of John Smiths around but only one 9JS. People tinkered with their calls as little as possible: the *callbook* appeared as a convenient tool. Whoops — newfangled shortwave DX turned up other 9JSs around the world! No problem. The geopolitical prefix was born. France's 9JS became F9JS, Argentina's LU9JS, and so forth. Very logical, effective and handy to handle.

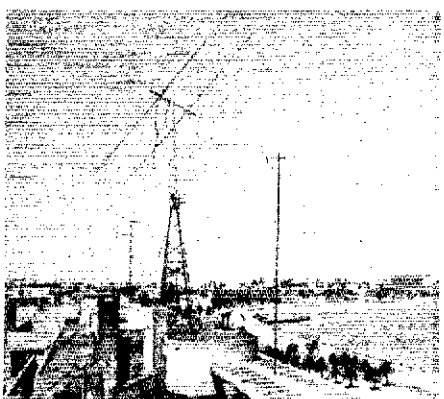
Logical, effective and easy until we lost grasp of their purpose. Then a curious fad of rubberized prefixes and suffixes made the wireless scene. Much like that weird tulip-bulb craze of the '20s, identification? Maybe later sometime. We were tuning for old friends in the Connecticut QSO Party on 40 cw some weeks ago. Spotted very few among lots of strange new labels. Just as we gave up the

masquerade, we heard the suffix "FOI" finishing a transmission downband. Could it be? We slid over and keyed W9FOI? DE W9BRD. Sure enough, after 20 years it was old Sig, our Sweepstakes nemesis of yore. A "QSO of the Month" ensued. Some ragchew! Talk about water under the bridge — we had both become grandfathers and lost wives since our last gabfest. Sig's familiar call sign made our reunion possible.

There are those who enjoy life and ham radio more or less incognito. They don't mind anonymity in the faceless crowd. Any tag will do, obscure or not. Most of the world, however, still seeks identity. The longer you hang onto one well-radiated call sign the more valuable and effective an identification it becomes. No alphabet soup for us, eh, Sig?



CX2CS offers your QTH of the Month, a fine Montevideo spread. Ricardo's signal is among the more familiar of South America's nightly reliables during the sunspot minimum's dominant north-south skip. (WAFBIO photo)



Plenty of QSLs left for my November activity as VP2MNR on Montserrat. (WA6VNR) . . . G4CJU still holds logs and a few QSLs for his mid-'60s MP4BBL operation. (K7ZLO) . . . Let's be considerate — more and more mail arrives for hard-working QSL managers without the necessary s.a.s.e.s or, where appropriate, IRCs. Slow liaison with IS0s AEW and LYN may delay their QSLs. (WB61ZQ) . . . F9AP denies connection with C31NB QSLing. (K6RM) . . . My responsibility for FG7AR/FS7 QSLs includes only QSOs of March 16-17, 1977. (K3RYA) . . . Visitors to the Caymans sign ZF2 calls as of March 30, 1977. (W1XX) . . . W/K/VFs can QSL to my home QTH for early-'77 work as K7VPF/KV4/VP2A/VP2D-VP2LDT, others via JA1RUR. (K7VPF) . . . Just received JW4FG's 1975-'76 logs and can also help with JW2CF confirmations. (LASNM) . . . I strive to QSL 100 percent via manager JAIVE. (EL0AP/MM-HM5AP) . . . Finland's hams may use the prefix OF commemoratively through December, suffixes unchanged. (OF2BN) . . . Last recent comments on ungod HP calls be misconstrued, HP1X type labels are normal and numerous. (HP1XCA-KZ5CA) . . . Be advised that the ITU-allocated C4 prefix is not yet issued for amateur use. Cards for QSOs with 5B1-3-9 stations arrive at our CARS QSL Bureau without hope of delivery. Only 5B4 is correct. (5B4AZ) . . . I have weekly schedules with VP2AZB (G3RBB) and can give good QSL service on receipt of QSO particulars and s.a.s.e. Bob assists RSGB in the distribution of cards for other VP2A stations. (W1RF) . . . I confirm the contest QSOs of AY8CW (LU8CW) in response to s.a.s.e. or s.a.e. with IRCs. (LU1BAR/W3) . . . My QSL efforts for FO0RS include only QSOs made from March 4 through 15, 1977. (K6NA) . . . Contacts with 9U5s CB in 1964-'71, CR '66-'73, DL '68-'72, RN '70-'72 and IA '66-'67 may be confirmed through ON5TO. (W4PZV) . . . QSLs for HR6SWA QSOs made after last August should be directed to U.S. Weather Service, P. O. Box 120, Grand Cayman Island, B.W.L., marked "for Swan Island." (W1CW) . . . Thanks to ARRL's new Membership Overseas QSL Service amateur radio may yet hang onto its QSL tradition without inflationary bankruptcy. (K1MC) . . . As if there aren't enough QSL-associated worries, watch the quality of ink you use on your cards. One local's only VP1 confirmation has completely faded. (WCDXB) . . .

GETTING 'EM ON THE WALL

Encouraging batch of "QSLers of the Month" this trip, each commended in correspondence from Ws 1BFK 1GWM 4LVP 5BZK 7HPI 0UBT, Ks 1MC 4MZE, WAs 1PYK 4PSL 8FIO, WBS 1ATD 4WHE 5HYV 8ZRL and 9YSP for rapid and/or reliable card comebacks: A9XBD, AJ3AA, BV2B, CTs 3AF 4AT, CW3BR, DF2SJ, DJ0YD, DK8EL, DL2FV, DM4YEL, DUs 1XKE 6RH, EASMO, F6BWJ, F08EX, FR7BE, FY7YE, GC4CHY, GI4DQO, GM3GJB, HBs 9ACZ 0NL, HCs 1LT 2SL, HS5AKW, HV3SJ, 1K0XPS, JAs 1BWD 1PIG/PZ 8FCB, JH1PBR, Ks 21ZN/4X 4BR/VP9 4IF/C6 9KDI/6Y, KH6UJ, KL7ITX, KP4s EAJ ENS, KX6BU, LABEU, OAs 4EK 4Y 8V, OHs 1XX 2BAH, OK2BLG, ON8WO, PAs 9TK 0LOU, PJs 2VD 8KG, PYs 2ERW 2OB 6XJ, T12BEV, TU2DE, UAs 1BJ 1CQ 3PBN 6HCF, UBs NJ RAB, UF6BD, UKs 5QBE 9AAN 0FAJ, UO2PO, UTs IT UH YD, UY50B, VEs 1APY/SU 2AQS/TG, VPs 2DD 2KJ 5M 8MS, VR3s AH AR, VSs 5BSJ 6AF, W6QL/VP2A, WBS 4SJG/6Y 5LBJ/DU 5LSU/TI 5SGZ/DU 5TUV/VQ9, XT2AG, Y2CR, YK1AA,

YN1RWG, YS1s GMV JWD WPE, YU1EXY, ZK1BA, ZS6WW, 3D2CM, 6W8EX and 9V1SH, along with QSL helpers Ws 1YRC 2BZL 3HNK 4FLA 4KA 4MYA 4ZD 5ILU 6IAE 6KNH 7PHO 9NGA, Ks 2BT 4QMO, WAs 6AHF 6HIT 7GQA, WBS 2TSL 4QKE and F6AUS. Any we missed? . . . Atp! Parenthesized colleagues need nudging toward the pasteboards of targets specified: (W1BWS) HP1LYV, OX30A, VP9HY; (K3NPC) FG7TI/FS '69, IS11V '69, UP2KNP '69; (K4MZE) VP2s DAC EE; (K9GMT) P29GW; (WA2WBE) A2CCY '75, FP8DA '73, KG4FS '73; (WA4PSL) FG7AS, K2OYQ/C6, PJs 2FR 9IT, ZE2JE, 5Z4NH, 6YSDI; (WA8TDY) KL7s AWR '70, GRF '70, 3D6AD '72, 5V7GE '72; (WB4TDH) CE9AR '72, FL8LU '75, ZC4RH '75, 3D6BH '75, 3V8BE '74, 2Q5QR '73, 9U5RB '72; (WB5HYV) FL8NR, OD5HQ, 7X4MD; (WB9CGL) FO0DK '74, OD5FIU '72, P29JM '75, WAsCYO/KW6 '72. Any hints? . . . W7HPI, WBS 9DWF 9DWF 0BAL and DF2RG offer clerical assistance as QSL managers for ops overseas, the rarer the better. . . Among newer prefixes being bandied about, AX=VK, AY=LU, DV-DX=DU, EJ=EI, G-GE, HW=F, JK=JA, OF-OG-OI=OH, VB-VC=VE, YT=YU, ZZ=PY, 4A=XE, 4T=OA, 80S=A2. . .

*c/o ARRL, 225 Main St., Newington, CT 06111

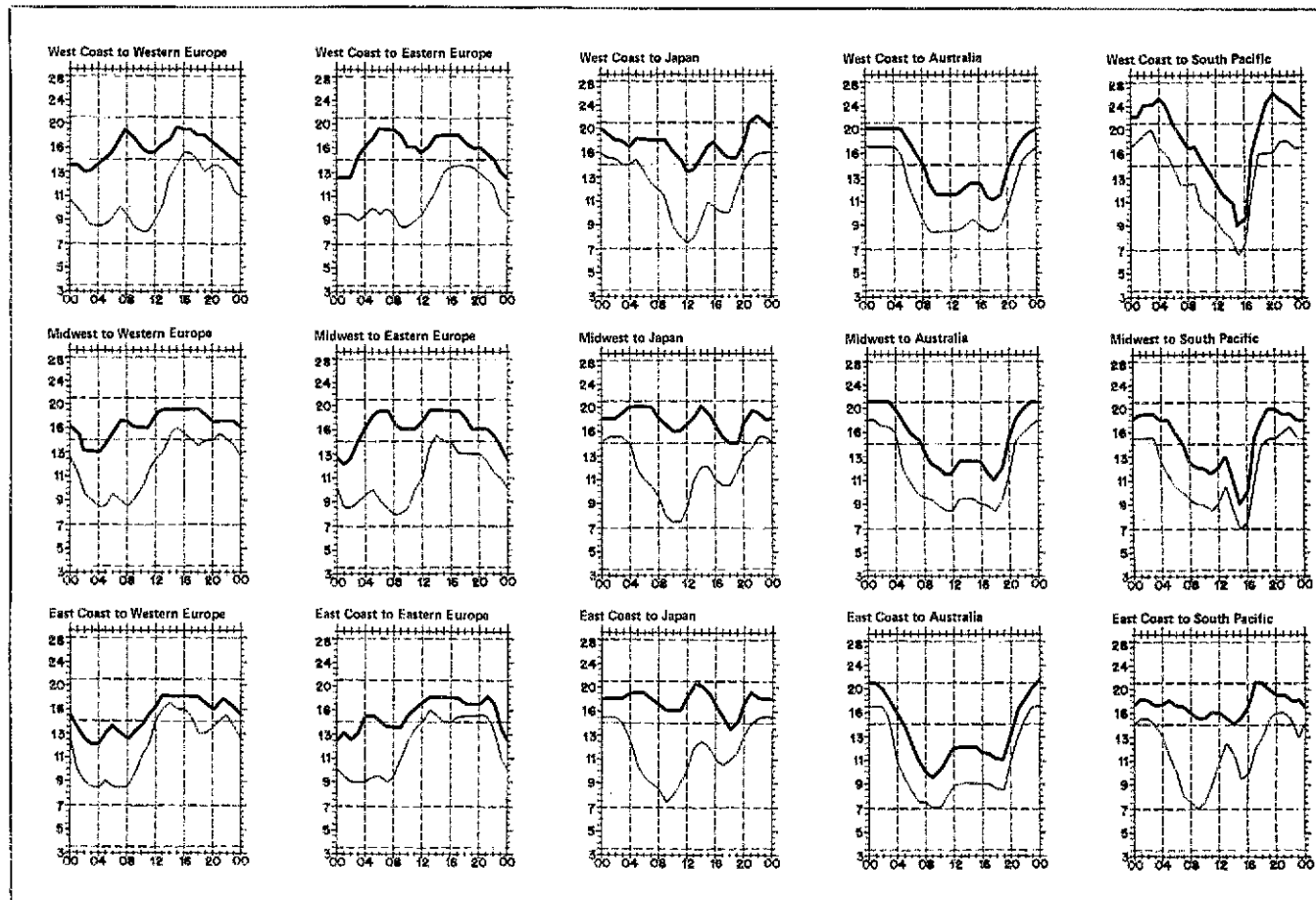
Yes, wall displays in sunny hamshacks are especially vulnerable. (W9BRD) . . . S9 is Sao Thome and Principe's new prefix block, courtesy International Telecommunications Union. (DXNS) . . . It's reported that WB6KHF lost his September-October '76 San Andres WB6KHF/HK0 logs in a sailing mishap. (WCDXB) . . . VP2KN contacts on March 19-23, 1977, may be confirmed via W7OK. (WCDXB) . . . Eight S8s are said to possess Transkei tickets but emanations remain minimal. (VERON) . . . ZL5AC operation from October 12, 1966, to the same date in '67 is QSLable through ZL1BON. (DXNS) . . . D2ASW logs for contacts from December 10, 1975, to March 6, 1977, are held by K4UTE with the exception of QSOs on October 30th. (WCDXB) . . . H5IALE's XW8CO logs include only contacts made from March, 1974, to May of '75. (DXNS) . . . Supplementary to the listings hereafter, note that the following accept QSLs via their home addresses: DJ2CW/HB0, DKs 1YG/HB0 5XN/OH0 6JO/OY 6XR/OH0 8CK/HB0, DL7UF/OY, OHs 2BGM/OH0 7FB/SU 9TH/SU, OZ3SK/CT3, SMs 1FPE/4U 4ATE/SU 4HGH/OH0, VK4AAU-AX4AAU/1h, W4YHK/VQ9 and WA6YOU/DU2 . . . Now to other individual specifications but be mindful that each suggestion is not necessarily accurate, complete or "official". . . . A35CR, P. O. Box 147, Nukualofa, Tonga Islands
 A4s XGP XYM (via DL8CS)
 A51RG, P. O. Box 1, Thimpu, Bhutan
 A6XP, B. Schmidt, German School, P. O. Box 1465, Sharjah, U.A.E.
 AP2P, Khurshid Alam, Box 526, Rawalpindi, Pakistan
 AP2ZR, Z. Ahmad, P. O. Box 479, Rawalpindi, Pakistan
 AY8CW, c/o P. Morton, LU1BAR/W3, 10473 Harding Rd., Laurel, Maryland, 20810
 C211B, P. O. Box 384, Republic of Nauru
 C21PS, P. O. Box 38, Republic of Nauru



TA1MB treats the 14-MHz crowd to juicy Turkey with an HW32A and dipole. This photo comes courtesy WA1EUO, Kadri's QSL manager.

C31s NK NL NM NN NO (via PA@s ERA or GIN)
 CSAAM, Box 86, Banjul, Gambia
 CE2BSA, J. Barba, Canopus 5, Salinas, Vina del Mar, Chile
 DF2RG, G. Jaeger, Ruhseugstr. 6a, D-8460 Schwandorf, W. Germany
 DJ1TC, O. Blankenhorn, Dreisamstr. 13, D-7530 Pforzheim, W. Germany
 ET3PG/p, P. O. Box 2961, Addis Ababa, Ethiopia
 FB8s XQ XR (via F5VU)
 FB8s ZK ZL (via F8US)
 FH8CJ, M. Orthion, P. O. Box 50, Dzaoudzi, Mayotte

FL8AL, P. O. Box 758, Djibouti, T.F.A.I.
 FL8CB, P. O. Box 758, Djibouti, T.F.A.I.
 FM7WS, P. O. Box 632, Fort-de-France, Martinique
 FR7ZL, Guy Petit de la Rhodiere, Les Alizes, 97417 Montagne, Reunion Island
 HH2MC, D. Craan, P. O. Box 501, Port-au-Prince, Haiti
 H18QRV, P. O. Box 1722, Santo Domingo, D.R.
 HK1ASH, P. O. Box 50188, Barranquilla, Colombia
 HK0s LE LF, Apdo. Aereo 225, San Andres Island, Colombia
 HK0WJ, Apdo. Aereo 270, San Andres Island, Colombia
 HL9TG, G. Kohtala (WA7NTF), 335th ASA Co. (JSC), Box 53, Fort Lewis, WN, 98433
 HP11E, P. O. Box 4707, Panama, Panama
 HR1RU, P. O. Box 842, Tegucigalpa, Honduras
 HW6FIT, P. O. Box 4128, F-31030 Toulouse, France
 I0SPQR, P. O. Box 621, I-00100 Rome, Italy
 1L7s KUT SRP (via 1BYRK)
 IS0s AEW LYN (via WB6TZQ)
 JT0ICB (to UB5ICB via CRC)
 JY5AR, P. O. Box 2482, Amman, Jordan
 K9PNT/DU2, P. Hunsberger, PSC 1, Box 1864, APO, San Francisco, CA, 96286
 K0WJQ/DU2, D. Looney, PSC 2, Box 11186, APO, San Francisco, CA 96334
 KG4s DX TS (via WB0QWW)
 KG4SC, Box 73, FPO, New York, New York, 09593
 PZ5AA, Box 1881, Paramaribo, Surinam
 S79s AB OM (via DJ1TC)
 S79EA, P. O. Box 7388, Victoria, Mahe, Seychelles
 TI21VA, Box 200, Guadalupe, Costa Rica
 VE7DIY/SU (via VE1APY)
 VE8MA, Weather Station, Eureka, N.W.T.
 X0A, 0G0, Canada



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. On 50 percent of the days of the

month, the highest frequency propagated will be at least as high as the upper curve. On 90 percent of the days of the month, it will be at least as high as the lower curve. See January 1977

VP111, Box 826, Belize, Belize
 VP1PG, via his stateside address, WB9TOU.
 VP2GAH, D. Atkinson, P. O. Box 312, St.
 Georges, Grenada, W.I.
 VRs 1AP 8N (via K2BYB or to 4X4TT)
 VR1X, D. Davies, P. O. Box 457, Betio,
 Tarawa, Gilbert Islands (or via RSGB)
 VSSDX, P. O. Box 737, Bandar Seri Begawan,
 Brunei
 W6QL/VP2A (via WA6AHF)
 W6YO/VR6 (via W6BVM)
 WA5THM/KG6, R. Helms, 1727-B Polynesian
 Dr., APO, San Francisco, CA 96334
 WA7VVU/KW6 (via K7SFN)
 WA0JRZ/KG6, D. Schmidt, 1429 Tinian Ln.,
 APO, San Francisco, CA 96334
 WB2SPO/H18, W. Vargas, P. O. Box 277, New
 York, New York, 10032
 WB3BKR/HK4, L. Diaz, P. O. Box 877,
 Medellin, Colombia
 WB5LBJ/DU6, C. Green, 190 R. Mapa,
 Tabacan Mandurriao, Iloilo, P.I.
 WB5SGZ/DU2, M. Burke, PSC 1, Box 812,
 APO, San Francisco, CA, 96286
 Ex-WB8HPN/YV4, W. Knight, WB3GDI, RD
 10, Box 259, Carlisle, PA, 17013
 YS1s GMV JWD (via W3HNK)
 YV4OW/7, P. Lecuna, P. O. Box 78, Isla de
 Margarita, Venezuela
 YV7PF, P. O. Box 499, Portlamar, Isla de
 Margarita, Venezuela
 ZC4IO, I. Shaw, Civilian Wing, 9th Sig.
 Regt., BFPO 58, London, England
 Ex-ZD9GF, L. Heinouers, 80 Sixth St., Park-
 hurst, Johannesburg, So. Africa
 ZK1DR, P. O. Box 127, Rarotonga, Cook
 Islands
 3B8DS, P. O. Box 44, Port Louis, Mauritius
 4W7KM, Box 551, Sanaa, Yemen
 5N2ESH, E. Sherlock, PMB 5502, Port
 Harcourt, Nigeria
 5Z4LW, O. Hope, Box 47872, Nairobi, Kenya
 6V8DF/TZ/SA/SU (via 5TSCJ)
 7X5AH, A. Berchi, Box 10, Hassi Messaoud,
 Algeria
 9DSs D F (to EP2s DC US)

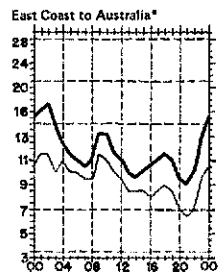
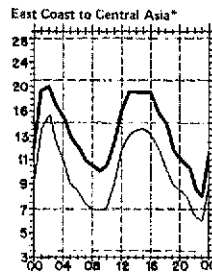
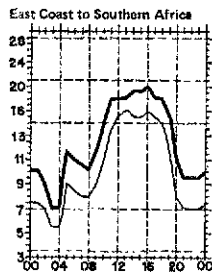
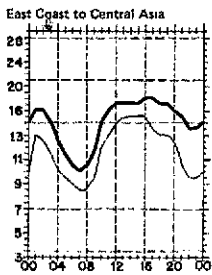
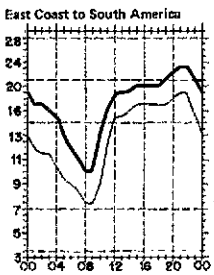
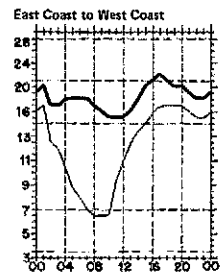
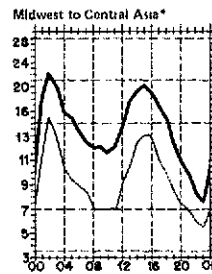
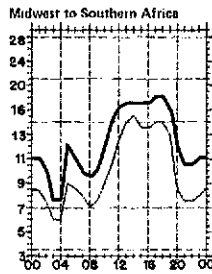
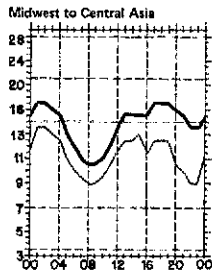
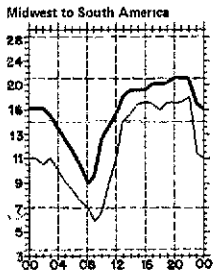
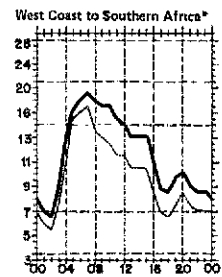
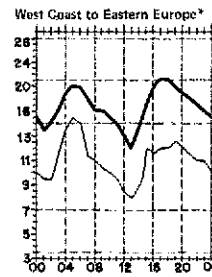
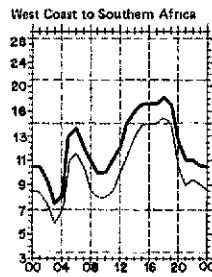
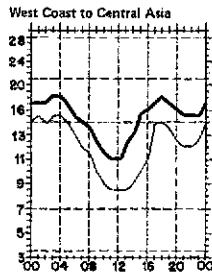
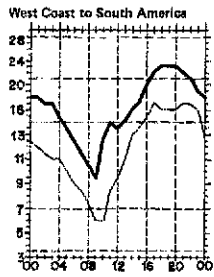


G2DX and G6CJ, left and right, are prominent among British pioneer amateurs. In 1912 2DX was among the first group of English hams ever licensed. Mr. Alford enjoys recalling a momentous QSO in '24 when he, 2OD and 2SZ participated in working Australian 3BQ. G2DX holds the jug that did the job. G6CJ, past president of RSGB, has always been avidly active in many facets of the game, especially antenna theory and DX. Here Dud inspects an "R" type receiving tube used for long-distance reception in the early 1920s. (WQJF photo)

9G1JU, P. O. Box 1855, Kumasi, Ghana
 9H1EL, G. Morris, Stratege Farmhouse,
 Ta'Clamtra Ln., Bur Marrad, Malta

9I1GA, Catholic Mission, Box 7, Kambia,
 Sierra Leone
 9M6MA, P. O. Box 113, Kota Kinabatu,
 East Malaysia
 9Q5BG, P. O. Box 9824, Kinshasa, Zaire
 9U5s CB CR DL RN TA (via ON5TO; see
 text)
 9X5JB, 105 rue van der Velde, 6418 Gozee,
 Belgium

A2CCY (K4CDZ) H18XRG (W3HNC)
 A4XGX (ROARS) HK1KM (LCRA)
 A9XCA (W2GHX) HM11J (WA5ZWC)
 A9XCC (WB4BQX) HM21N (JA1HBC)
 Ex-A9XU (G3LKZ) HR6SWA (see text)
 C21NW (ZL1BON) HSSAKU (K6SDR)
 C31FK (G3NNY) HW6ADB (F6EEM)
 CE9BSA (CE2BSA) IA5AT (I2LPA)
 CP0EL (CP6EL) JA6GDO/S2 (JA0CUV)
 CR3AGD (SM3CXS) JR3DCC/JD (JARL)
 CT4IK (W8CNL) JW1SO (LA4DM)
 CT9BK (CT3BK) JY9HW (DJ9ZB)
 CW3BR (W3HNC) K3MBF/ZF (W4BAA)
 D2AFW (W8CNL) KAI1WO (W7BUN)
 D6AC (F6BBJ) KA6DX (N1DX)
 DF4GV/HB (DB2GC) KC6KO (WA2EOQ)
 DU9ZB (DJ9ZB) KG6JFZ (W6LZV)
 EA8JJ (W3HNC) KM6FC (K5YMY)
 EJA (E1S BX) KV4JY (WA6AHF)
 EL2AR (WA5ZWC) Ex-MP4BBL (G4CTU)
 FL2EB (K8D1U) NP4A (KP4BDL)
 EL2EV (W3HNC) OA4SS (WA6DVE)
 EP2LA (WB8DKQ) OD5HQ (DJ9ZB)
 EP2RP (WB5PFB) OD5LX (SM0GMG)
 FG7AR/FS (see text) ON7FF (ON5YK)
 FG7AS/VP (W7RUK) P29BB (W2VIA)
 FK8CP (FK0TX) PA9TK (DJ6TK)
 FL8GP (I8JN) PJ7VL (W2BBK)
 FM0DEL (WB6UAG) PJ8JOC (WA2JOC)
 FO0JPM (W6FWX) PJ8RT (K4GKD)
 FO0RS (see text) S21AB (JA0ZG)
 FY7AQ (WD8CDU) SM2HLS/4U (SSA)
 HD0EE (WA8TDY) ST0RK (DL7FT)
 HG5A (HA5KQ) TF2KJ (WA8TDY)
 Ex-HH2EL (9H1EL) TF3TP (DJ9ZB)



QST, page 58, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the

Institute for Telecommunication Sciences, Boulder, Colorado. These predictions for July, 1977, assume a sunspot number of 18, which corresponds to a 2800-MHz solar flux of 77.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 1977. An a.s.a.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

K6AQV/314	PA0ATY/130	JA2ACR/110	K9HSP/105	F6CXJ/101
F9OE/274	WBJO/130	WA1TA/110	WA5RGI/105	K4YKZ/101
HB0LL/265	W2RJU/123	JH1NHV/109	K1ZMY/104	VE4VV/101
YU4VFC/223	JH3LCU/122	W7HEO/6/109	5M3CGE/104	WA2HBM/101
W2FVS/161	W6LGI/122	JA1HSJ/108	W2SS/104	WA2BHQ/101
WB2LNY/157	CT4BD/120	DK6OZ/107	I0OGT/103	WA0IDK/101
F9FF/154	W1BFK/118	DK6XO/107	WA4MAV/103	JA8MXC/100
WA8YEE/138	WB3BKD/117	JA2BHQ/107	JA7AS/102	JH4RCD/100

Radiotelephone

11GEA/286	SP3HDB/162	WA4EWW/110	W5HEZ/105	I2SYG/101
F9OE/219	F9FF/133	W6LOI/108	KL7IEU/105	WB25FF/101
W5LQN/201	4X4AT/123	WA4JVG/107	VE7AFY/104	W3FAE/101
WB9CGL/180	WA8YEE/112	I3PVD/106	K4KKJ/104	WB6LYN/101
WB0HAD/177	I0PNH/111	OE1SIW/106	K1PKT/102	W5CPL/100
IS0PJP/172	EA3AFZ/110	VE3HFK/106	WA5RGI/102	K0IET/100

CW

DL7AA/154	K9QXY/110	JA1FQA/103	K0DEQ/101	VE2EGC/100
G3TXF/127	JA3CWL/109	K4UEE/103	K0KES/101	WA5VUW/100
JG1ESQ/122	PA0ATY/105	WA8QY/103	SM7EF/101	W9IT/100
YO3AC/111	ZP5AL/105	WB7DKV/102	WN2YTY/101	
W2REH/110	W8VW/104	G3YRM/101	JA1BLM/100	

Enorsements

Mixed

W5QK/345	WA5RTG/306	PY2BW/266	SM5BFC/223	WA5VUW/141
K4EZ/340	W2BXC/304	W4EX/261	OZ4FF/222	K4ZVS/140
W5HJA/340	OH2XF/301	WA4HPF/260	WIJR/222	WA4HDD/140
F9RM/339	WA1ABW/300	WB4VUP/260	WB4RUA/221	WB2FKF/140
W4NNH/334	W4JD/300	WB0HA1/260	W6PHN/221	WB2ZRQ/140
SM7QY/333	WB9EBO/300	K4LR/259	DK6NN/220	XE1PF/140
K5AAD/332	K2GMO/291	YU2OB/258	K4WVT/220	K4KKJ/132
JA4ZA/330	K8LJG/290	WA0CGS/256	WB5OXC/3/220	WA2JOC/132
K5GOT/330	K1ZSI/283	G3TXF/250	W7BCV/216	W6TJI/129
WA4WIP/330	W25JM/280	WA4LPX/250	W2JKN/201	K0KES/127
K1RQE/329	W4KNW/280	K4CDZ/249	WA9MOF/201	W5PP/126
K5LIL/324	ZP5AL/279	PY2BBO/249	VE2AFU/200	W3HDX/124
K1DRN/322	W5HIC/273	WB8JEY/247	W4KFB/194	K2RN/122
PY3APH/322	JH1VRQ/272	WA4DCP/244	VK2BC/180	WB9FGN/122
W9ABA/320	W1EHT/272	JA1QXY/241	YU2CAL/174	W1CDC/121
SM6CX/316	WA4LDM/271	G4BUE/240	W4MWT/171	K4BIY/120
SM5WI/315	OE1GHC/270	H16LC/240	K4YOE/164	K4NV/120
K5JW/314	W2YX/269	W8NJC/240	K9KGA/162	WA1SCV/120
ZE4JS/310	W4HY/269	WA3VQP/225	K4SE/144	WB8JW/120
DJ4AX/307	W1GDQ/267	WB0HAD/224	W4TYE/141	A2CEW/119

Radiotelephone

W4EX/359	K5JW/303	K1ZSI/263	K4NJS/178	WA4HDD/140
F9RM/339	WB9EBO/291	W2SSC/260	W4MWT/166	W6ORD/140
EA7ID/337	W2OVC/290	WB4VUP/227	JA1LFR/165	WA6JKO/140
WA4WIP/330	WB5DJ/283	K0IUC/220	K7ICW/164	I8SRP/137
K5GOT/330	WA2EJS/281	WA3VQP/215	W2CKR/162	GM3EDZ/133
JA4ZA/326	W4BQY/280	SM5BFC/213	PY2BW/161	DL6WO/123
K1DRN/322	W2YX/269	YU2OB/205	HB9AKQ/160	6Y5HJ/122
K6AQV/312	WA5RTG/268	K7UT/200	K2GAT/160	W5HIC/120
PY3APH/320	JH1VRQ/266	W5SAA/182	W6PHN/143	

CW

K4LRO/223	W1JR/168	K6CBL/140	W7WN/130	K4NV/120
F6CRT/180	DL1HH/150	G4BUE/137	K4SE/127	K8LJG/120
W1AB/176	WB2ZRQ/140	JA1QXY/135	WA4EWW/123	WA9MOE/120

5BDXCC

YB0ABV	DK6NN	YU2OB	F5LQ	YU3EU
DL1PM	I5FCK	W8CNL	K2AAC	W4WWG
W9DL	WA5UCT	W1FXD	SP3BQD	

The following should have appeared in the last DXCC Honor Roll listing. Mixed: W4ML 350/316. Phone: PY2CK 355/319, W8GMK 320/312, K8IKB 327/314. CW: K6GA 247.

TI9AEL (TI2AEL)	VP2DJI (W2BJI)
TR8MG (REF)	VP2GJI (W2BII)
TT8SM (WB5OOE)	VP2GLE (K4GKD)
U60A (CRC)	VP2LDE (K4MZE)
TK0FAJ (WA6FIT)	VP2LDI (W3HMK)
VK3AD/mm (ZL2AQQ)	VP2MAQ (WA6AHF)
VK4F/1h (W7OK)	VP2VCN (KP4EBO)
VP1CK (W2BKG)	VP2VDO (W3HMK)
VP2AYL (WA8TDY)	VP2VJ (VE3MJ)
VP2AZB (W1RF)	VP5M (WA4ORU)
VP8NX (GM3JTN)	VR3AK (KH6AHZ)
VR1AP (K2BYB)	VR4DB (C21PS)
VR3AH (K2BT)	VS6AF (VK6WO)
VU2LQA (DK6TU)	3A0FC (G6ZO)
W4BGO/1I (W4AUP)	3D2DM (W4UL)
W9MR/DU (K3RLY)	4A1X (XE1X)
WB5SGZ/DU (K3GBZ)	4Js 6A 9R (CRC)
XT2AS (PE0SWL)	4X10GA (4X4GA)
Ex-XW8CN (I2YDX)	Ex-5A4TE (WA2ISD)
Ex-XW8CO (HS1ALE)	5B4DJ (VE3FXV)
Ex-XW8CR (EP2VW)	5B4EC (OE3OHA)
Ex-XW8FD (EP2JM)	5T5CW (K6ZDL)
YB0AAG (DJ2JB)	Ex-SW1AN (ZL1BKE)
YB0ACT (SM0GGMG)	5W1BC (WB4ZNH)
YB0PG (WA2DWE)	5Z4PG (WB9MFC)
Ex-YJ8AN (ZL1BKE)	5Z0TXE (G3TXE)
YT3M (YU3TFB)	6W8FZ (DJ7BG)
YV4NB/mm (I0CEP)	6W8HO (OH2HO)
ZD7PV (G3SHD)	6Y5RK (VE3EWY)
ZF1GC (VE4KN)	7P8BE (VE3FXT)
ZF2AC (ZF1SB)	7X2DG (ARA)
ZF2AL (WA0OZC)	805ME (A2CMF)
ZK1AY (ZL2ALP)	9G1JN (W3HMK)
ZL3LN/c (ZL4DF)	9I2WS (W4FL)
ZM7AT (WB6DXL)	9M2GV (K6LAE)
ZZ6AM (PY6AA)	9X5TM (ON4ER)

Nice assortment thanks to the postal generosity of Ws 1BWS ICW 1GWM 1XZ 4LVP 4PZV 4RHZ 5BZK 6KG 6LFB 6MAI 7HPI, Ks 1MC 4MZE 6NA 7CQ 7ZLO, WA 1PYK 4PSL 8FIO, Wbs 1AUD 4OP 4WHI 8ZRL 9YSP, F6CRT and LA5NM plus periodicals to be credited subsequently. Keep that rf flyin'!

DXAC NOTES

The ARRL DX Advisory Committee welcomes comments from DXers on the following agenda item, a proposed addition to ARRL DXCC rules. "Valid contacts for all single mode DXCC awards (phone, cw, RTTY, and others yet to come) require that the applicant both transmit and receive in that mode with the confirming station."

Please direct your comments to ARRL HQ for distribution to the DXAC.

Strays

Attention, ARRL National convention goers: ARRL Hudson Division Director Stan Zak, K2SJO, would appreciate one or two slides or photos from every ARRL National Convention. Please identify them as to year and location and send them to Stan at 13 Jennifer Lane, Port Chester, NY 10573.

I would like to get in touch with . . .

WWII graduates of Gallops Island Merchant Marine School interested in a reunion in Boston or Washington, DC. Please contact Ed Hayden (R-20), K3OKL, 16 Decatur Avenue Annapolis, MD 21403.

amateurs who have operated legally from Revilla Gigedo, XF4-land. Jim Joyce XE1UFA, American Embassy - Mexico P. O. Box 1471, Laredo, TX 78040.

DX amateurs, especially YLs, who are 15 years old, to correspond with me in English Wesley A. Andersen, WB9PMI, 820 South 97th St., West Allis, WI 53214 USA.

QST Congratulates . . .

Rick Niswander, WA7WXY, recently elected 1977 district body president at Idaho State University.

50 Years Ago

July, 1927

□ GE's Chester Rice starts a series on radio propagation fundamentals, commencing with such basics as the chemical composition of gases surrounding the earth.

□ Eastern Massachusetts amateurs worked with the military on practice maneuvers, both to learn more of Army-Navy techniques and to demonstrate the worth of our volunteer communication.

□ New staff member Ross A. Hull has contrived a monitor entirely built into a metal lunch can, so we can check on what our signals really sound like, and won't have too much false confidence from the "FB" comments of our QSOs.

□ Alexander Nyman of Dubilier measures very high r.f. voltages by their "sparking distances," but with a correction factor for the frequency in use.

□ 3ACF has a novel method of amplifier keying: an old telegraph sounder has been modified to raise and lower 2-inch diameter plates constituting the capacity feeding drive to the grid of a high-power stage. (Bet that is mighty soft keying!)

□ Canadian 3GG expounds on the value of

the radio amateur in the public interest, and his thoughts on self-training, emergency communications reserve, support of a manufacturing industry, and advancement of international understanding, are cornerstones of later League official positions in government representation of our cause.

□ Technical Editor Kruse speculates further on whether a high-power amplifier is actually controlled in frequency by a crystal oscillator driver, or whether it really oscillates by itself on the same frequency.

□ The cover shows a ham rig "maritime mobile" in a canoe, but must be wishful thinking since the storage batteries alone would sink the craft!

25 Years Ago

July, 1952

□ While directed at the Novice, we can all learn from W1FTX's treatise on antenna fundamentals, and how to get the most power into that skywire. Also in the antenna line are G6XN's description of 2-element driven arrays, and W2VQU's statistics on wind loading of masts — and when guys are necessary.

□ The League's 1923 constitution has served well but has now been streamlined, after

extensive Board committee study and recommendations, into a new Charter and By-Laws.

□ And the League has a new president in the person of Goodwin L. Dosland, W9TSN, former chairman of the Chicago Area Radio Club Council and more recently the director from the Central and the Dakota divisions.

□ W1HDQ shows us a 2-meter amplifier using a pair of 4-125As, which can really put out a hefty as well as a clean signal.

□ Don't cannibalize that bug to make a control for your electronic keyer; W9FKC does the job with two ordinary straight keys, back-to-back, mounted on edge.

□ If you need variable frequency control for

only the 75-meter phone band, W4JXX's design is both simple and compact.

□ Amateurs in Arkansas and Tennessee — "Tornado Alley" — have performed meritoriously in another series of twisters, as reported in detail by National Emergency Coordinator W1NJM.

□ Fifty watts under the dashboard are produced by W6QLV's design of a four-band mobile rig.

□ "You Can Be There" is the title of a new promotional brochure hoping to interest more citizens in the Novice license stepping stone.

□ A handsome face above the picture caption "W4GE" belongs to the new chief of the amateur branch at FCC. — W1RW

Silent Keys

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

W1BYU, Edward Safrine, Chelmsford, MA
W1DPH, Frank C. Dean, La Mesa, CA
W1LHT, Lester R. Shearer, Haverhill, MA
W1WUJ, Leonel A. Copp, Wolfeboro, NH
WA1SKW, Frank Chin, East Haddam, CT
K1TRL, Harvey V. Fitzgerald, Tewksbury, MA

Ex-W1WW, Philip A. Bailey, Middletown, CT
WB2ACH, Charles D. Ahrens, Tenafly, NJ
WA2AQD, Raymond C. White, Glens Falls, NY

WA2AXG, Andrew W. Smyth, Salem, NJ
W2DCD, Harold A. Holmes, Jackson, NJ
W2LJR, Herbert C. Hawkins, Fair Haven, NJ
W3BRH, Edwin K. Afflerbach, Coopersburg, PA

WB3DME, Leonard J. Tybursky, Monessen, PA

W3PEO, James C. Williams, Philadelphia, PA
WA3FGC, Walter J. Cable, St. Thomas, PA
W3GQA, William J. Michaels, Bradford, PA
W3HRL, Leon C. Bunkin, Philadelphia, PA
W3KHM, Caldwell Baker, Greenbelt, MD
W3LSI, Frank M. Gager, Hyattsville, MD
W3NKZ, Vincent C. Paoletto, Philadelphia, PA

W3NRD, Walter R. McGuire, Coraopolis, PA
W3QZ, Francis H. "Buns" Garrahan, Forty Fort, PA

WA3RGE, Guy W. Yount, Reynoldsville, PA
W4USG, Gerel E. Croft, Bedford, PA
W4AG, Hyman J. Siegel, Surfside, FL
WB4BRJ, Robert W. Costanzo, Annandale, VA

WA4DKK, William A. Steed, College Park, GA
W4HRZ, Nelson A. Oser, Hollywood, FL
K4IOO, Joseph H. Brewer, Naples, FL
W4JUX, Robert B. Somers, Oak Ridge, TN
K4MS, George R. Woody, Miami, FL
W4NJO, Dr. Charles L. Liberali, Asheville, NC
WB5JZJ, Elizabeth S. Whitley, Fort Worth, TX

WA5QFJ, Alexander H. Sheffield, Channelview, TX

W5RAB, Bloss A. Houston, Brownwood, TX
K5RJC, Noel M. Pittman, Weatherford, TX
WA5UDG, Richard Ghergich, Metairie, LA
W5UJK, George C. Lucas, Alexandria, LA
WB6A00, Wilmer P. "Blacky" Blacketer, Redondo Beach, CA

K6BKW, Norman H. Holbrook, Sun Valley, CA

W6EDJ, Kenneth M. Curtis, National City, CA
W6HGW, Thomas O. Crow, Sacramento, CA
WA61BQ, Melvin L. Stenberg, Los Angeles, CA

W6IT, William D. Wineteer, San Diego, CA
K6JUK, Harold R. "Joe" Harlan, Sr., San Francisco, CA

WA6LOJ, Kenneth G. Poore, Los Angeles, CA
K6MIS, Richard W. Roberts, Vallejo, CA
W6RN, Lynwood Bradshaw, Vineburg, CA
K6SRH, James E. Milton, Roseville, CA

WA7ACI, Liahona A. Thomas, Sequim, WA
K7BG, Alfred H. Hall, Mesa, AZ
W7DBP, Farris W. Stuart, Boise, ID

W7EMT, Horace C. Eichelberger, Star, ID
W7GTB, Adrian A. Liljequist, Salem, OR
W7SEZ, James A. Strickland, Hillsboro, OR
W7YRJ, Frank Copson, Tucson, AZ

W7ZN, Bird B. Bliss, Jr., Boise, ID
K8AH, William E. Wylie, Massillon, OH
W8AXT, Earl Hanson, Cuyahoga Falls, OH
W8CYM, Kenneth S. Gross, Columbiana, OH

W8DFU, Noble F. Brunson, Atwater, OH
W8DZU, Don M. Adams, Highland, MI
WA8EGP, Hugo A. Deis, Dayton, OH
WA8FFU, Harold C. Haar, Fairview Park, OH

W8GLE, Walter Wessman, Livonia, MI
W8IOW, John H. St. John, Birmingham, MI
W8LAC, Walter Sanfield, Conneaut, OH
W8NAN, Walter W. E. Enz, Kalamazoo, MI

WB8PAR, Michael H. Hovance, Rootstown, OH

WA8TMW, Robert E. Robinson, Vienna, WV
W8YAC, John P. Armstrong, Springfield, OH
W8ZMI, Roy E. Browne, Escanaba, MI
WB9GCS, David S. Miller, Peoria, IL
K9KZB, John L. O'Connor, Moline, IL
Ex-K9KZN, Irene Macconelli, Panama, IL
WB9MIX, Kryn D. Hamelink, Wisconsin Rapids, WI

WA9SJC, Edward J. Klecka, La Grange, IL
Ex-W9WTF, Roy L. Switzer, DeKalb, IL
Ex-WB9BFC, Wayne S. Riser, Udall, KS

WA9ETB, Robert B. McClellan, St. Louis, MO

K9EYW, Lindell Pinegar, Fredericktown, MO
WB9GWU, Clarence G. Stadler, Minden, NE
Ex-WN9KCT, Charles A. Robbin, Storm Lake, IA

K9KKO, Vernon S. Nelson, St. Paul, MN
K9RDO, John P. Haag, Monona, IA
W9UUV, Donald E. Johnson, Council Bluffs, IA

K9UYF, Vincent K. Streck, Greeley, CO
WA9YDR, Werner C. Schwarz, Des Moines, IA

W0ZLZ, Harold V. Nordstrom, St. Paul, MN
VE1AEB, E. T. "Al" Geldart, Tide Head, NB

VE1EI, Thomas B. Lacey, St. John West, NB
VE1VO, F. M. MacLeod, Sydney River, NS

VE3RU, Albert J. Bickerton, Sebricht, ON
VE3ZI, F. Campbell Rutherford, St. Catharines, ON

DL1A, Dr. Karl-Heinz Birr, Osnabrueck, West Germany

HB9CK, Ulysse Passera, Cremenaga, Switzerland

HC2AQ, Alejandro Quinteros, Guayaquil, Ecuador
G6FO, Austin Forsyth, Buckingham, England
VP9DC, Al Jones, Smiths, Bermuda

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO



The Polarization Question

A guest editorial by Bob Lucas, WA0DXZ: For the last few years, fm has enjoyed the most active role in 2-meter communications. Recently, however, we have seen rapid growth in 2-meter ssb activity. The patience of the ssber has been rewarded finally, as more and more amateurs previously active on fm are now capable of both fm and ssb operation. This is mainly due to the growing popularity of the 10-watt all-mode commercial transceivers. As with many new technological developments (in this case the advent of commercially available high-stability 2-meter equipment), the rewards are often complicated with problems of overcoming older, established amateur traditions.

Such a complication is beginning to crop up in 2-meter work, as well as elsewhere in whf. The problem is one of antenna polarization. Fm has long used vertical polarization, due to its convenience for mobile work, HTs, etc. Like a-m and cw, ssb for years has employed horizontal polarization. Today, both modes still cling to long-held traditions.

The time has come, hopefully it is not too late already, for an agreement regarding antenna polarization on 2 meters. Many amateurs now use one vertical array for fm, and often a near duplicate horizontal array for ssb and cw. This entails added time, tower space, and of course, expense. Why not standardize polarization for both fm and ssb? If we all use the same polarization, we could avoid a major dilemma faced by the ssb newcomer: to purchase and install an additional set of beams or forgetting about ssb, to use his new multimode rig for fm only.

For those who already have two sets of antennas, what to do with the old horizontal array? With a little tinkering, one can simply tilt it over and add it to the present vertical array. By so doing one can, in theory, double the size of the present antenna, thus, gaining an increase in talk power of nearly 3 dB, as well as a 3-dB increase in received signal. Who can't use another 3 dB? But, to obtain this benefit, we must decide on a common polarization.

The plea must be to the ssbers, with horizontal arrays. Consider the merits of switching to vertical. It would be easier for all in the long run. Those new stations you now hear down in the mud, while waiting for their new horizontal beams to arrive, would have whopping signals. If you are like most hams and have but one tower, you probably now have the vertical on top, the horizontal lower, detracting from your ssb signal. If we standardize, you can use the topmost foot of tower, and not settle for that lower set of beams.

I realize that there will be considerable resistance from some of the ssb boys faced with climbing their towers and changing their arrays from horizontal to vertical. Nonetheless, everyone will benefit from rethinking on polarization traditions. Let's consider a nationwide plan to revamp our traditional ideas. Now is the time, because the longer we wait, the more difficult it will be to accomplish. [That's one man's opinion. What's yours? - W3XO]

MOONBOUNCE ANNALS UPDATES

The Moonbounce Annals box, appearing last in the March column, will be presented again in October. Stations involved in EME on any band are requested to submit their information by August 10. Please list the total number of stations worked by EME on each band as well as the number of U.S. states and countries contacted. If you were listed in the March edition of the Annals and your totals are now out of date, please send an update. If you were not listed and you feel that you should be, please forward your information. The Moonbounce Annals is intended to show what can be done with EME. It may be just the nudge that will encourage new activity, possibly from an elusive state or country.

ON THE BANDS

6 Meters - It is difficult to write about 6 meters this time of year. As the column is being compiled in mid-May, reports of band openings are beginning to come in and they do indicate a great season ahead. But I know that by the time this appears, the 1977 Es season will be in full swing. Whether or not it lives up to its early signs, only time will tell. In any case, here is a sampling of what has been received to date. WB4PXW writes from Naples, FL, that he experienced openings to the south on April 23/24 and 25/26. On the first evening Bob worked XE1RCP, XE1GE and T12HL as well as K5CM (backscatter) and heard the T12NA beacon over S-9. On the second night he again heard the T12NA beacon along with T12HL's beacon which operates for about an hour per evening on 50.103. He then hooked up with PJ2DW and had another QSO with XE1GE. Incidentally, Bob says that he can be QSLed for contacts under his various calls - WB2RLK/C6A, JVE1, VO1, FP0LK, ZF1XW and this year's

June 8 through 15 DXpedition to 6YS - at 555 14 Avenue So., Naples, FL 33940.

This year's Es season really got off to a start the first full weekend in May. By the second weekend, particularly Sunday the 15th, 6 meters sounded like mid-June. Virtually all parts of the country took part during one time of the day or other. In Texas, the band was open to one area or another all day long.

Much of the news received concerns DX, particularly the Pacific. There were numerous contacts during April between KG6DX, KG6JH and KG6JDX on Guam and the Japanese mainland. After having heard the beacon for about two weeks, KG6DX worked KH6EQI on the 25th. On April 18 VK4RO was heard. From Japan, JA1VOK writes that TE conditions were better this spring than they have been in the last two or three years. ZL, VK and P29 stations were in on a number of evenings during March and the first half of April. As to Es, Hatsuo reports that conditions have been lively. In addition to a great number of JA stations, there have been such interesting tidbits as the KG6s on Guam, WA6YOU/DU2, K9PNT/DU2 and KH6IMH/DU2. K9PNT is using an IC-502 but still puts in a 5X9 signal into Japan. Hatsuo has also heard the KH6EQI beacon but no luck to date on making a contact. Through K5ZMS comes word that on April 17 at 0530 UTC KH6GRU worked VK4RO on 52.010. Incidentally, VK4RO is another station running low power, about 3 watts. Nevertheless, he worked HI and is reported extensively in Japan.

Beacons seem to be coming to the fore these days. Word has reached me of another that should be on about the time you see this. The call will be 6YSRC and according to WA1UAT/6YS who furnished the information, it will operate on 50.050. The Kingston group also hopes to be available for two-way work, limited to cw and a-m for a while.

Back in the Pacific, the cruise of WA4MMP/MM in Alaskan waters should be concluded about the time this appears but

Bill, an officer in the U.S. Navy, expects to be on during most of the remaining season while sailing the eastern Pacific.

VV5ZZ writes that he will be active again this year. He now has his Tempo 100-watt solid-state amplifier so he expects to do even better than last summer when he was running 20 watts. Ed says that he has been hearing fm repeaters from Colombia. K5ZMS fills us in on this. Apparently, the Colombian amateurs - not commercials - operate a network of fm repeaters with inputs and outputs on 50.375, 50.425, 50.850, 51.375 and 51.425. These signals should make fine band-opening warnings when conditions are right into HK.

2 Meters - The Atlantic seaboard was treated to fine spring tropo the week of April 17, but the really big night was the evening of the 20th. One of those reporting 2-meter doings was WA3HGX/2 in Camden, NJ. Vince hooked up with some 40 stations in just a few hours using fm, ssb and cw. The fm work, all on 146.52, was done with 10 watts to a pair of 11-element beams at 125 feet. On ssb, 20 watts to a similar horizontal beam did the trick. Vince's best DX was K1GAO in Stoneham, MA, to the north and K4PUV, NC, to the south. Both were on ssb. Vince is thankful for the repeaters which he uses as a band-opening warning. Another Jersey resident making good work of the April 20 bash was WA2AEH of North Bergen. Using only 3 watts from an ICOM IC-202 feeding four 5-element beams at 25 feet, Bill managed to work a number of stations including a new state in the form of K4PUV, NC. When signals from WA4SBC in Virginia Beach, VA, became particularly loud, Bill disconnected the rig from the outside antenna and pulled out the built-in whip. Sure enough, with just the whip and internal batteries, he was able to contact WA4SBC from inside his cinder-block garage. I know what you mean, Bill. Using my 202 out in front of my house, I had a similar thrill last summer working K2RTH on Long Island.

Indicative that we are witnessing an increase in solar activity, we have received some reports of aurora. WB9QBU of Libertyville,

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonville, MD 20730 or call 301-384-6736 and record your message.

IL, says that it was good on April 6. On that occasion, Bill worked 15 stations in eight sections. On the 19th at 0600 UTC he received a call from WB9SEG informing him of another buzz session. This ended in a five-way round table between himself, WB9SEG, W0RLI, W0MJS and W0KRX. Apparently no one else received the word and got on. WB9QBU is available for skeds. Others desirous of skeds are Rich, WB2TCC, of Whitestone, NY, who is interested in m.s. during major showers and can be reached at 212-352-1214, and W4SMU of Erlanger, KY. The latter can work all modes fm, ssb and cw. Cy, who spends a lot of his time on fm, complains about those who test on 146.52, "because they don't want to QRM a repeater." Astutely, he points out that they can do a fine job of QRMing well-equipped stations looking for DX on the frequency, even at considerable distances.

Things have been hopping down in the Caribbean. On April 23 between 1600 and 1800 local time, there is reported to have been QSOs involving KP4AST, HI8XRG, and YV5s LW, BKU and ZZ as well as DL2GG/YV5. Speaking of DX, here's a real challenge. Word has reached us that UK9IAB located in Magadan City (59° 34'N 150° 48' E) is on ssb and a-m on 144.300 and cw on 144.050 daily between 1100 to 1200 UTC. Igor is also reported to be active on OSCAR 2 to 10. Maybe some of those DX-minded Russian 2-meter hams can be persuaded to try EME.

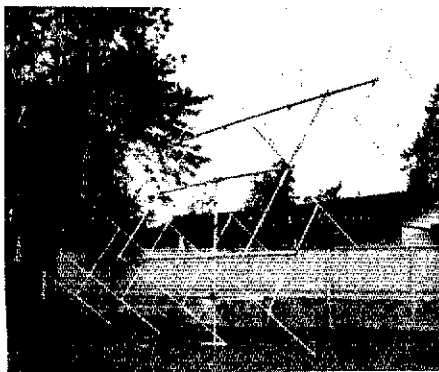
Early in May, I had the pleasure of attending the Baton Rouge, LA, hamfest. It was a great opportunity to renew many old friendships and make a lot of new ones. It was particularly nice to meet so many SWOT members. I have firsthand knowledge of the popularity of 2-meter ssb in that area of the country. Special thanks go to WB5LBT, K5EOA, W5DC and K5ASZ for the help and courtesy extended to me. K5ASZ came all the way from Fort Worth and was especially helpful in the time and effort he contributed to manning the AMSAT booth.

As we go to press, we hear sketchy reports of a 2-meter E-skip opening affecting Texas and some of the western states. More on this next month.

1-1/4 Meters — Activity on 223.5-MHz fm seems to be on the increase all across the country. From Houston, TX, N5AF formerly K5LZJ writes that there now are some 18 stations in the area on the band. Up in Battle Creek, MI, WA8ULG writes to tell us of a very good tropo session affecting the 1-1/4-meter band. On the evening of 2 May, a strong tropospheric opening brought contacts with Chicago stations K9SP, WB9RWL, W9ISE, W9CYT, WB9JFO, WA9TMC, WA9GDH, WA9ELV and WA9NSO as well as WA9SKA Kenosha, WI and WB9FHD Fremont, IN. The most distant station was WA9SKA, 135 miles away. Most stations were running just 10 watts but WB9RWL switched to a one-watt Handie-Talkie and was still Q-5 copy in Battle Creek. Ted says that the opening followed a quick cold front.

In addition to simplex activity, 1-1/4-fm repeaters are cropping up rapidly across the country, particularly in the larger cities where 2-meter channels are about exhausted. In his

The 2-meter EME array at W7FN in Seattle, WA. Don uses 16 7-element Yagis.



70-Cm Standing

Figures are states, call areas and best DX in miles.

WIJR	20	9	10110	K4VOW	5	4	2000
K1PXE	19	8	2600	W4AWS	4	2	750
K1HTY	17	5	610	W5RCI	19	6	880
WIJR	16	5	680	K5JL	17	6	1200
WA1FFO	15	7	2600	WB5LUA	14	8	8597
W1SL	15	7	2600	W5HNV	12	5	1467
WA1MUG*	15	5	740	W5WV	9	3	915
K3EAV/1	14	6	700	K5LIL	7	3	1612
K1BFA	13	5	710	W5GVE	7	3	963
K1JIX	13	5	620	W5LPV	7	2	950
WA1JTK	11	4	715	W5UQK	6	2	590
W1HDG	11	4	380	K5UGM	5	2	956
K2UYH	35	11	1000	W5SXO	5	2	850
K2ACQ	24	8	925	WA5HMK	4	3	1625
K2LJG	22	8	2300	WA6HXW	6	4	7900
W2AZA	21	7	1000	W6DQJ	4	2	360
K2CBL	20	8	2670	K7ICW	4	2	225
W2ELV	20	6	812	W7JRG	3	2	420
W2GLL	20	6	790	K8UGA	29	8	9600
K2RIW	20	10	2600	K8DEQ	24	8	775
W2OMS	19	6	725	W8VIO	22	7	650
K2VDK	18	6	750	W8HVX	19	7	660
WA2EMB	18	6	720	W8VQJ	13	7	625
WA2FGK	17	6	745	W8MNT	13	7	600
K2ARO	17	6	740	W8RQJ	10	6	425
W2DWJ	16	5	734	WA8VHG	10	6	625
K2OVS	15	5	734	W8QBG	10	5	635
K2KYC	15	6	675	W8WOB	8	5	500
W2CNS	14	6	525	W8WFW	8	5	450
K2BF	12	4	325	W9WCD	22	9	1725
WA2EUS	11	4	380	K9HMB	21	8	836
W2RUE	22	7	850	WA9HUV	19	7	780
K3LUV	18	5	750	K9UIF	16	7	695
W3HMV	16	5	700	W9UIJ	15	6	550
W3TMZ	16	6	2410	W9AAJ	12	5	800
K3WHC	13	6	2450	K9AAJ	12	5	425
W3OMY	11	7	850	W0YZS	29	10	8840
W3CJX	10	6	450	K0FLM	24	10	8840
K3ASZ	10	6	2422	W0RLI	24	9	1425
W3JUF	9	4	400	W0LER	18	6	1000
W3UJG	9	4	400	W0PW	15	5	1700
W4FJ	25	8	2430	W0LCN	13	4	700
K4QIF	23	7	1065	K0DAS	7	4	654
W4NUS	22	8	2400	VE2HW	6	3	750
K4EJQ	20	7	800	VE3DKW	19	7	940
W4HJZ	15	5	560	VE3EVT	12	6	520
K4SJM	15	5	462	VE3ONI*	11	7	390
W4VHH	15	4	750	VE3AIB	9	5	600
K4GL	12	3	720	VE3EJC	7	5	510
WA4GPM	14	4	—	VE7BBG	12	—	—
K4NTD	9	2	963	VK2AMW	9	8	—
K1FJM/4	9	4	560	—	—	—	—
K4IXC	5	2	800	—	—	—	—
W4ISS	7	3	473	—	—	—	—

*Club station

OVS report WB6JNN lists four in the Bay area. The new *ARRL Repeater Directory* is the best overall source of information on these and all repeaters.

Remember to keep an ear peeled to 220.05 and 223.5 MHz for possible E skip this summer.

70 Cm — "The best opening since I came east." What WIJR is referring to is the excellent tropo session of April 20 mentioned in the 2-meter section. Joe goes on to provide details. "A steady high-pressure system along the eastern USA coast (Bermuda High) fed by humid air from the Gulf treated vhf/ufhers to one the earliest and strongest tropo openings in many years. Numerous contacts were reported on 2 meters, 70 and 23 cm. Activity was high in the W1 through W4 call areas with many stations using only 10 watts. However the opening apparently did not extend more than 50 miles inland." [Stations here in the Washington/Baltimore area participated and we are 75 to 100 miles inland but nearby Martinsburg, WV, was apparently not favored. — Ed.]

Beginning at 0200 UTC April 21, 1977, WIJR worked the following stations, all on 432 MHz before going QRT at 0400: VE2LI, WA4GPM VA, K1FJM/4 NC, WA3KPS PA, W3HQT PA, W3UN MD, WA2KOK NJ, W3OUX MD, WA3VVI MD, K3WHC PA, WA4SBC VA, K2ZRJ NJ, K1PXE CT, K4QIF VA, W3HMU PA, W4FJ VA, W2OMS NJ, WA3JUF PA, K3HZO MD, WA1NGR/2 NJ, WB2YZV NY, W2DWJ NJ, W2UWC NY, W2EIF NJ, W3TMZ MD and K2DZM NJ. The contact with K1FJM/4 on the NC coast shows the strength of the opening. Although Pete was running only 10 watts and a single Yagi, he was able nevertheless to make it to the Boston area on ssb. K1FJM notes that the opening did not appear to extend to the south. Checking the weather map he observed that, although the high-pressure ridge extended well to the south, there was a low-pressure trough cutting across it at about central NC.


The next evening, the trough moved over his Elizabeth City, NC, QTH and by 2000 local time it was over southern NJ. That night the band was closed for him and the WIs reported working nothing south of NJ. A Coast Guard pilot, K1FJM, has pretty good access to weather data and tends to analyze it carefully. We are always looking for interesting propagation reports such as this. Keep them coming.

The moonbounce project of K3NSS, a joint venture of the Southern Maryland Amateur Radio Club and the Naval Communications Center Amateur Radio Club, is off to a good start. On their first serious attempt at making contacts, the evening of April 29/30, they hooked up with LX1DB, W3CCX/3, WA2WVL, K2UYH and K3PGP. The next night they added ZES1J and W4WD. In their contact with K2UYH both stations switched to ssb and made it two ways via that mode. Improvements are in the works. First is more power. The present 350 watts output will be raised to about 600 watts. Also, the present 1.3-dB Angle Linear preamp may be replaced with a better one, probably of the same manufacture, and the preamp will definitely be moved closer to the feed point of the 84-foot dish. We should be hearing a lot more from K3NSS and the station is destined to provide the first taste of moonbounce for many "average" stations.

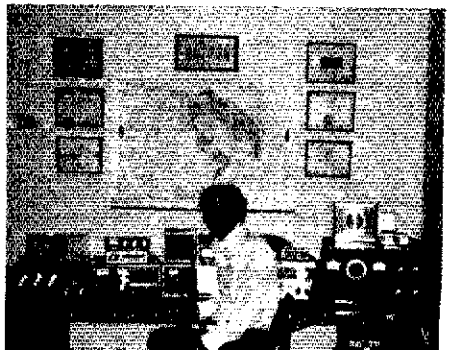
23 Cm and Down — Word has reached us of a new apparent world record for the 23-cm band. On February 25, 1977, VK5QR in Adelaide, Australia, worked VK6WG in Albany, a distance of 1882 km or 1170 miles. Rigs at both ends produced about 10 watts output at 1296 MHz and fed 3-foot dishes. Reports were about 5X4 with VK6WG on cw and VK5QR on ssb. This is another example of what can be done in those outstanding tropo areas of the world such as the southern coast of Australia, along our Gulf coast and across the Pacific from CA to HI. Good work fellows and congratulations.

In news from this part of the world, WB6JNN includes in his OVS report, design information on a 23-cm corner reflector. I am sure he would be glad to send copies to those providing him with an s.a.s.e. to his *callbook* address.

W4API points out that microwave components such as rf sources, horns, etc. are available at quite moderate prices from Racon Inc., Boeing Field International, 3490 Perimeter Road, South Seattle, WA 98108. Charlie also notes that John Meshna, Jr., P. O. Box 62, E. Lynn, MA 01904 is a good source for Amperex 1N4886 varactor diodes capable of good power output on 70 cm as well as operation on 23 cm. The firm also stocks the MA 4060A which will provide 20 watts at 70 cm.

The Gunnplexer demonstration staged by VHF Engineering at the Dayton Hamvention was apparently one of the big hits of the show. The firm is offering an i-f strip designed to operate with the Microwave Associates 3-cm rf assembly. Dana Atchley, W1CF, of Microwave Associates writes to tell us of a three IC i-f strip being used widely in Germany. He will provide information to anyone sending him an s.a.s.e. at Microwave Associates, Burlington, MA 01803. 

Former NJ resident WB2PBN, now WB5WJT of Spring, TX, near Houston.



Repeat That Message

All hams try to help in emergencies. But during crisis situations, some of the communications are garbled and incomplete. Standardized, written messages not only guard against inaccurate transmissions, but they are actually quicker and easier to send, once all hands learn the simple procedure. Ask the hams who were involved in the Big Thompson flood; they'll tell you that knowing how to handle formal traffic is an important operating skill on repeaters.

Emergency communications is the main, but not the only, reason for this activity. Handling routine messages for the public is a great way to increase ham visibility in the community. And 2 meters isn't hung up by the propagation problems that TKO low-frequency nets. And these nets don't have the outlets that are available on two.

The Northern California Net, a combined-section NTS net, meets twice an evening on 80 meters. In between, a session is held on WR6ADC (modulated cw as well as fm). Not only does this accomplish the previously stated objectives, but it gives hams a chance to send messages all over the country, providing more traffic for the system and perhaps even attracting these operators enough so that they become interested in low-band nets themselves. In Connecticut, plans are afoot to link two repeaters, thereby transforming the Nutmeg VHF Traffic Net into a full-fledged section net. This sort of thing is happening elsewhere in points between W1 and W6.

Since repeaters are everywhere, and their popularity continues unabated, why not use them for constructive purposes?

Many repeaters have ARES nets, weather/SKYWARN nets, club information nets, etc. These activities lend cohesiveness to the repeater group. A formal traffic net would be a good supplement to these activities or a good use of a repeater that's not involved with any "extra-curricular activities." If you are contemplating getting a net started on your favorite repeater, try to coordinate it with your Section Communications Manager, along with the SEC and RM/PAM.

And speaking of coordination, you must seek the approval of the repeater club whose machine you want to use. This will most likely involve some politicking on your part, with the club honchos. You may have to make a presentation at a club meeting. The only opposition you should get will be from those who think in very narrow terms. After all, you'll only be using the repeater for about a half hour a night. But the only way you'll ever find out if the net will see the light of day is by trying.

Sometimes beggars can't be choosers, but the right repeater should be chosen with respect to coverage area and participation. The net won't be very successful unless it has a decent amount of check-ins.

The second consideration is traffic. There has to be traffic for the net to grow.

Otherwise, it's going to go out not with a bang, but a whimper. Trying to revive it later on is going to be extremely difficult. Perhaps, while the jury is still out on the initial decision, you and a few traffic types can casually handle some traffic on the machine, to subtly expose the gang to something completely different and fun.

Having experienced traffic handlers around is a vital factor. They're the ones who will provide the net with 99 percent of its business at the beginning. They also must be on the scene to receive long-haul traffic from the others. If you're the prime mover behind the new net, make sure you have commitments from traffic veterans to be there for each net session.

A good time to hold the net is between sessions of the section cw net, or perhaps even prior to the region net. That way, long-haul traffic can be dispatched in the same evening. The net certainly shouldn't be scheduled during rush hour, when the repeater very likely gets the most use.

Sometime soon, workload permitting, we will be producing a special bulletin about getting an fm repeater net going, similar to our February NTS Newsletter on slow nets. This writer is definitely not an expert on the world above 144 MHz, so your input on this subject would be appreciated. In the meantime, just imagine that someday a whole cycle of the National Traffic System can be carried out on 2 meters, or 220 or 450 or . . .

PUBLIC SERVICE DIARY

□ Hamilton, OH — January 31-February 1. The Butler Co. ARES supplied communications between National Guard vehicles and Red Cross headquarters during deliveries of emergency supplies of fuel oil to families who ran out, due to cold weather. (WB8CLF, EC Butler Co.)

□ Pacific Ocean — March 24. VR4CQ/MM3 was enroute to Honolulu when the steering system of her 47-foot sailboat broke down. She checked into the Cocktail Net, 14,328 kHz, and KH6s EXB HHN and GJN notified the Coast Guard. They maintained contact until March 28, when the boat reached the safety of Wake Island. JR1YYQ also assisted with communications. (VR4CQ)

□ Winchester, VA — March 25. Members of the Shenandoah Valley ARC provided emergency communications for the elderly residents of a hotel, when an adjacent building was engulfed by flames, causing the loss of electricity and telephone service in the hotel. (W4ACC, EC Winchester)

□ Pima Co., AZ — March 26. When the Boy Scouts of America campfire was beset by a sudden severe storm, several local amateurs handled health-and-welfare traffic for the isolated Scouts. (K7CC)

□ Pima Co., AZ — March 28. While handling communications for the Sabbar Shrine Circus, K7OFR summoned an ambulance via autopatch when one of the participants suffered a heart attack. (K7CC)

□ Milwaukee, WI — April 2. Over 100 members of the Milwaukee ARES went into action when a tornado touched down in the area. Communications were provided for the National Weather Service, the Milwaukee Co. Sheriff's Department and the city and county government. (WB9NNJ, EC Milwaukee Co.)

□ Pacific Ocean — April 22. WB0SQT, WB9HAK and ZL2NY combined forces to provide W6YO/MM3 with information from the National Weather Service, in order to change course and avoid a severe storm. (WB0SQT)

□ Pacific Ocean — April 26. WA6MUY broke in on the WR7ABE repeater to report that his sailboat's rudder had broken loose and that his vessel was dead in the water, helpless. W7BCJ patched him directly into the Coast Guard, and W7FBM and W7RDR triangulated his position with their 2-meter beams, thereby enabling the Coast Guard to rescue the boat. (WA7RQS)

□ Repeater Log. According to reports received to date, repeaters were used to report 50 automobile accidents and related occurrences, seven disturbances, three searches and two fires. Repeaters involved were WR1AAC,

WR4AKH, WR5s ABA ABE ABS ABY ADP, WR6AAK, WR7s ABH AIM, WR8s AFK AFY, WR9s ABT AFS, WR0AGT.

□ SEC reports received in April total 36, the same number received this time last year. Reported ARES membership totaled 14,408 as compared to 12,765 in April, 1976. Sections reporting were Ala, Alta, Ariz, Ark, Colo, Conn, Del, ENY, EMass, Ga, Ind, Me, Mich, Mont, Nev, NLI, NC, NFla, NTex, Ohio, Okla, Ont, Org, Oreg, SV, SDgo, SF, Sask, SHa, SNJ, Utah, Va, Wash, WV, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

W7KZ has filed his final report for RN7, after nearly five years as manager. Our congratulations for a job well done. W7VSE has been appointed as his replacement. The (most likely) last report for the Continental Traffic Net has been submitted, as daytime transcontinental skeds move toward reality. The first CTN session convened on April 1, 1973. Certificates — 2RN (1st annual) W2IT, WA2LUF, WB2QOH, WA2BAW, WA2UYL, WA2YIM, WA2ZJP; (2nd annual) WB2ASD, WB2EMU, WA2WKH, WA2RMZ, WA2DIW, W2SWE, WB2TGL, WB2KUZ; (3rd annual) K2AV, W2BIW, WB2QIX, WA2ELD; (4th annual) W2MLC, WA2ICB. Got any pet peeves about traffic handlers? Send 'em in so that we can share them with the whole gang.

*Asst. Communications Mgr., ARRL

April Reports

(evening sessions)
(daytime sessions)

1	2	3	4	5	6	7
EAN 30	1908	63.6	1.445	99.4		
EAN 60	690	11.3	.615	85.8		
CAN 30	1339	44.6	1.061	99.0		
CAN 60	330	5.5	.222	97.2		
PAN 30	1112	37.1	1.071	98.3		
PAN 60	166	2.7	.188	86.0		
1RN 51	624	12.2	.520	94.1	100.0	
1RN 26	128	4.9	.329	73.3	91.6	
2RN 88	606	6.8	.465	95.4	100.0	
2RN 49	245	5.0	.451	67.0	83.3	
3RN 61	410	6.7	.427	99.4	96.6	
3RN 30	69	2.3	.405	97.8	95.0	
4RN 60	696	11.6	.470	73.1	100.0	
4RN 59	512	8.6	.336	67.9	100.0	
RN5					98.3	
RN5 30	363	12.1	.361	93.7	100.0	
RN6 60	593	9.8	.428	100.0	98.3	
RN6 30	199	6.6	.238	86.6	91.6	
RN7 60	458	7.6	.521	89.3	100.0	
RN7					88.3	
8RN 55	568	8.5	.382	84.4	100.0	
8RN 29	151	5.2	.656	77.7	93.3	
9RN 58	745	12.8	.642	87.5	100.0	
9RN 30	120	4.0	.281	74.1	93.3	
TEN 60	462	7.7	.390	85.7	98.3	
TEN 22	25	1.1	.094	22.9	98.3	
ECN 56	305	5.4	.464	88.8	100.0	
TWN 60	486	8.1	.375	99.3	96.6	
TWN 17	41	2.4	.128	35.3	76.6	
CTN 30	316	10.5	.416	100.0		
TCC 111 ¹	676					
Eastern ¹						
TCC 83 ¹	620					
Central ¹						
TCC 110 ¹	803					
Pacific ¹						
Sections ²						
4187	20854	4.9				
Summary	5478	36620	6.7			
Record	6256	36367	19.1			

¹ TCC functions not counted as net sessions.
² Section and local nets reporting (128):
BCEN (BC), APN (Mar, NFid), OPN (ON),
WGV/UHF (PQ), AENB AEND AENM AENR
AENW (AL), ASN (AK), ATEN HARC (AZ),
AMBN APN ARN (AR), NCN NEN SCN
(CA), CWN (CO, WY), CN CPN VHF-2 (CT),
DTN (DE), EAST FMTN FPTN GN NFPN
QFN QFNS SPARC TPTN (FL), CVEN
GARES GGSN (GA), IMN MTN (ID, MT), ILLN
ISN (IL), 175MN TFCN (IA), KPN KSBIN
KWN QKS QKS-SS (KS), MKPN (KY), LAN
LRN LSN LTN (LA), MSSN PTN SGN (ME),
MDCTN MDD (MD), EMRI EMRIPN NENN
WMM WMPN (MA), HEN KCEN MACS M16m
MNN QMN WSN (MI), MSN MSPN MWX
PAW (MN), MSBN MSN MTN (MS), MOSSBN
MSN (MO), NHVTN (NH, VT); BARTEN NJN
NJPN PVTN (NJ), SWN (NM), NLI NLIPN
NLS NYS (NY), NCSSBN PX SCSSBN THEN
(NC, SC), BNR COAREC-10 ONN OSSBN
06mN OSN (OH), OAN OFON OLZ OPEN
OTWm STN (OK), WCN (OR, WA), PTN (Pac)
EPA PTTN WPA WPAP&TN (PA), ETTMN
TN TNN TPN (TN), TEX TTN (TX), UCN
(UT), VFN VN VSN VSN (VA), WVN
WVNN WVPN (WV), BEN BWN WIN WNN
WSBN (WI).

1 - NET
2 - SESSIONS
3 - TRAFFIC
4 - AVG.
5 - RATE
6 - % REP.
7 - % REP. TO
AREA NET

Transcontinental Corps

1	2	3	4	5
Eastern	120	94.1	2027	676
Central	90	92.2	1204	620
Pacific	120	91.7	1615	803
Summary	330	92.6	4846	2099

1 - AREA
2 - FUNCTIONS
3 - % SUCCESSFUL
4 - TRAFFIC
5 - OUT-OF-NET
TRAFFIC

TCC Roster

The TCC Roster (April): Eastern Area
(W2FR, Dir.) - W1s NJM QYY, K1s EIR GN
PAD SSH XA, WA1s FCM MSK, W2s CS FR
GKZ, K2H1V/E2, WA2FCB, WB2ASD, WA3s
SXU VBM, W4s UQ YE, K4KNP, W8s LTA
PMJ, K8KMQ, W8s ITT KKI, VE1AAO,
VE3s GOL SB. Central Area (W5GHP, Dir.) -
W4RQS, WB4SKI, W5s GHP MI RB, K5s GM
RG, WA5s IQU ZZA, W9s CXY DND LF

NXG, WB9s NOZ TWT, W0s AM HI QMY,
K0s CVD CW, WA0TNM, Pacific Area
(K5MAT, Dir.) - W5s KH RE, K5MAT, W6s
BGF EOT MLF OA VZT YBV ZRJ, K6HW,
W7s DZX GB QGT KWT KZ VSE, K7s HLR
IWD NHL QFG, W0s ETT IW KLE LQ, K0s
ORL TER, WB0s DJY QOT, VE7ZK.

Independent Nets (April)

1	2	3	4
Clearing House	30	374	634
Early Bird	29	194	299
Hit & Bounce	60	1086	463
Hit & Bounce Slow	18	59	124
IMRA	26	425	1054
Mike Farad		54	301
North American SSB	24	225	388
North American Traffic and Awards	30	137	1021
Washington Region PON	18	72	334
20 Meter ISSB	26	501	481
75 Meter ISSB	30	609	1259
7290 Traffic	42	456	1992

1 - NET
2 - SESSIONS
3 - TRAFFIC
4 - CHECK-INS

62	WB91CH	WA6UAZ	43
WB5NND	W0RFF	WB8WTS	WA2UJL
WB5NUM	54	WB0QOT	WB4OXT
	WA4EPJ		WA4TXM
61	WA1FCM	46	WB5MTQ
K1PAD	53	WB8DQX	WA68FL
WA1TEH	WB6PVH	45	WA6RMV
WA1VEI	K8DL	W2CS	WB8TEE
WA2ECO		K4BKK	WB0TAQ
W2MTA	52	WB5GVO	42
WB4EKJ	WB2CST	WA9QCF	WA4SRD
K4ZN	W9GGW	44	K4YRL
WA5YEA	50	WA1UWF	WA5JYH
WA6TVA	W1BVR	WA1VKB	WA5VBM
W7OCX	WA1MJE	WA1YUZ	WA6LBO
WB8JGW	K1RAW	WA2AYY	VE3GOL
	WB4FDT	WA2VEN/0	
59	WB4ARJ	W2YJR	41
WB4DBK	WA4PSL	WA2ZJP	W1KYO
		K3KAJ	WA2SLF
58	49	WB4DJU	WB3CQT
K8LGA	W1RWG	K4EY	WB4WQL
	WB2EMU	WA4KVR/5	W6JXK
57	WB2LZN	WB4NUJ	W7DAN
WA0YVT	WA3PRW	WA4OEM	WB9PR
	K3YHR	WB4QBB	VE4VV
56	WA51QU	WB4SK1	40
K1BA	WA5ZZA	N4SS	WA1TBY
WA1VGP	W7GHT	WA4UUX	W4LXB
WB2ASD	WA7KQE	W6AUC	K5GM
WA2BAW	WA7MEL	W7VSE	WA9GBW
WA3ERT/J	WB8VLR	WD8AVY	K0EVH
W2MLC	W0FT	N8CW	
N4WA	VE1ACU	WB8YVI	22
W5GHP	VO1GW	W9JWC	WB4DHC/N
WB6JIK	VE3DPO	K9ZTV	WA4PFK/T
W6RNL		W0OTH	WA4QGV/T
55	47	W0OYH	WD8COS/N
WA1ZAZ	WA3VBM	VE1AAO	20
K5MAT	K4YFC	VE1ZH	WB3EDX/T

Public Service Honor Roll April 1977

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. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

126	66	64	
W8HZA	WA2BMI	WA3YJG	63
67	65	W6RFF	W4OGG
WB8YDZ	W5KLV	WB0VNC	WB5NEZ

Brass Pounders League April 1977

BPL Medallions (see December 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings: WA1VGP, W2EC, K4ZN, W7VSE.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	635	1059	1501	39	3234
W0VYX	55	1132	399	733	2319
W3VR	365	211	501	9	1086
W4MEE	5	524	440	11	980
K0 YFK		465	1	464	930
K3NSN	60	345	405	10	820
WA3YJG	14	305	356	109	784
WA4JDH	2	391	360	3	756
WB4ARJ	1	355	379	2	737
K0 ONK	7	558	149	19	733
W9ZGQ		468		256	724
WA4TXM	300	60	336	21	717
WB6EIG	29	321	355		705
W4ILE	246	116	302	35	699
K0ZSQ		313	1	312	626
WA0RWM	38	268	36	258	600
W5KLV	11	309	247	21	588
WB4DBK	36	239	244	50	569
W4RGS	1	291	227	2	521
K4TH	25	229	147	114	515
K4BKK	3	263	232	4	502

BPL for 100 or more originations-plus-deliveries

W9IOH	243	W7SQT	117
WB8DQX	238	VE3CDK	117
WA3ATQ	226	WA9GBW	112
W7FZK	195	W6NL	111
K7VWA	188	K7GXZ	111
WB8TEE	184	WA4WBM	108
W6FJR	181	WA2BM1	106
W9JWC	132	WA4EYW	104

More-than-one operator station

W9YB	109
K1NAN (Jan.)	199

1 - CALL
2 - ORIG.
3 - RECD.
4 - SENT
5 - DEL.
6 - TOTAL



This distinguished-looking gentleman is WA4PFK, the first Technician to qualify for the Public Service Honor Roll. Dick is active on QFNS - the All-Florida Slow CW Traffic Net.

Results, 1977 Simulated Emergency Test

By Robert Halprin,* K1XA

A few days before the official SET weekend, we received a prophetic telephone call from WA4LCZ, emergency coordinator for Greenville County, South Carolina. He took us to task for scheduling SET at a time of year so cold that nobody wants to participate. Well, for parts of W2, W8, W9 and elsewhere, the rest is history. Portions of these areas were struck by a vicious blizzard on January 28 and affected ARES groups had to forego their SET activities to handle the real thing. Some of their reports in the following pages are based on combined real and simulated activities, while other groups held their SETs on alternate weekends, taking advantage of our two-month leeway plan. (The blizzard emergency is reported elsewhere in this issue). For the rest of the ARRL field organization, SET went just ducky.

The overall picture is that SET 1977 was a tremendous success. It broke records in both local (again!) and net classifications. Last year's ARES/RACES activities were exceeded by more than 15,000 points! Net activity, which sort of floundered on the higher echelons of NTS last time, exceeded it by over 45,000 points! This is despite the fact that some NTS devotees were less than pleased with our 1977 SET net schedule.

We obviously can't please everybody. But take a look at the tabulation boxes. Virtually every category is up considerably. We must be doing something right!

What it really reflects is the fantastic efforts of all the hams who took part. One thing that statistics don't show, but the reports do, is that amateur radio is becoming much more prominent in the local community. This is what we all should be striving for.

Meanwhile, give some thought to the suggestion by WA4LCZ, but before you come to a firm conclusion, see the soapbox comment by WAØPXF.

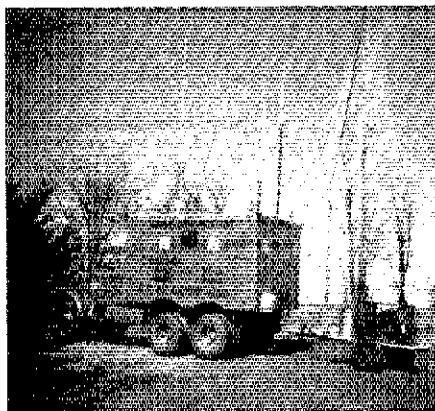
*Asst. Communications Mgr., ARRL



Paul, N1LL, sent SET traffic via OSCAR 6 from the Norwalk, Connecticut, Civil-Preparedness headquarters. (WB1AMQ photo)



EC WA4LCZ is shown here operating from a chilly emergency field location. See text.



This emergency communications van is used by Buena Vista County (Iowa) ARES. (WBØAVW photo)

For the uninitiated, the objectives of the Simulated Emergency Test are as follows:

1) To test the capability of the local amateur communications organizations (primarily ARES and RACES) under emergency conditions.

2) To test the ability of nets (primarily NTS) to function under overload conditions.

3) To demonstrate to served agencies (Red Cross, c.d., Salvation Army, etc.) to the public and to the mass media, amateur radio's value as an emergency communications service.

4) To provide operator training and experience in emergency communications practices.

Reporting to Headquarters is on the rise, as 340 reports of local activity were received (last year 305) and 256 net reports were submitted (last year 202). As the saying goes, what you see is what we got (by our deadline).

Many net managers indicate that it's an impossible dream to have a complete low-band net session on emergency power (K4ZN refers to it as dead silence). So what if we credit individual stations checking in on emergency power? On the net report form, suppose we change *number nine, part e*, from "number of different stations reporting into emergency-power-only sessions" to "number of different stations reporting in on emergency power." Your thoughts on this and any other SET matters are invited.

This year's *good guys* are SCMs VE1OC and VE3GT and SECs VE5CU and W1XX who provided us with a *complete* report of their section's performance. Thanks.

For comparison purposes, the "average" local group had 38 registered ARES/RACES members, with 22 participating in the local test. Last year, it was 36 and 24 respectively.

The following sections (14) managed more than 2,000 total points: Alabama, Connecticut, Georgia, Indiana, Ken-

tucky, Michigan (top score), North Carolina, Northern Florida, Ohio, Southern Florida, Tennessee, Virginia, Washington and Western Pennsylvania. Last year, 11 sections reached this goal.

Total scores of participating groups are listed with scores based on the sum of the following: 1 point for each ARES or RACES member; 2 points for each participating member; 1 point for each message from an ARES/RACES member to the SEC; 1 point for each message sent by participants to friends (limit one per amateur); 5 points for each mobile, self-powered portable or fixed station using emergency power; 5 points for each agency for whom messages were originated; 10 points for each community in which agencies were contacted; 10 points for a release to the news media; 10 points for submitting an emergency plan; 5 points for each emergency-powered repeater used and a quality point ranking from 1 to 10 based on how the local group performed overall. Last year's points are listed in parentheses.

The average section or local net handled 70 messages in 267 minutes with 22 participants (seven in emergency-power-only sessions), had four different net-control stations and three liaison stations. Last year, it went this way: 73 - 240 - 21 - 5 - 4 - 3.

Net totals in the following states (17) surpassed 2000 points: Alabama, California, Connecticut, Florida, Georgia, Indiana (top score), Kansas, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia and Wisconsin; one more than last year.

Total points for nets are based on the following: 1 point for each message handled; 1 point for each minute the net was in useful directed session; 2 points for each different station participating by handling traffic; 3 points for each different station reporting into emergency-powered-only sessions; 5 points for each different net control station; and 5 points for each different station performing liaison to a higher level NTS net.

Since everyone contributed to a most successful SET, from here we'll let you tell your own story.

Local-Activity Soapbox

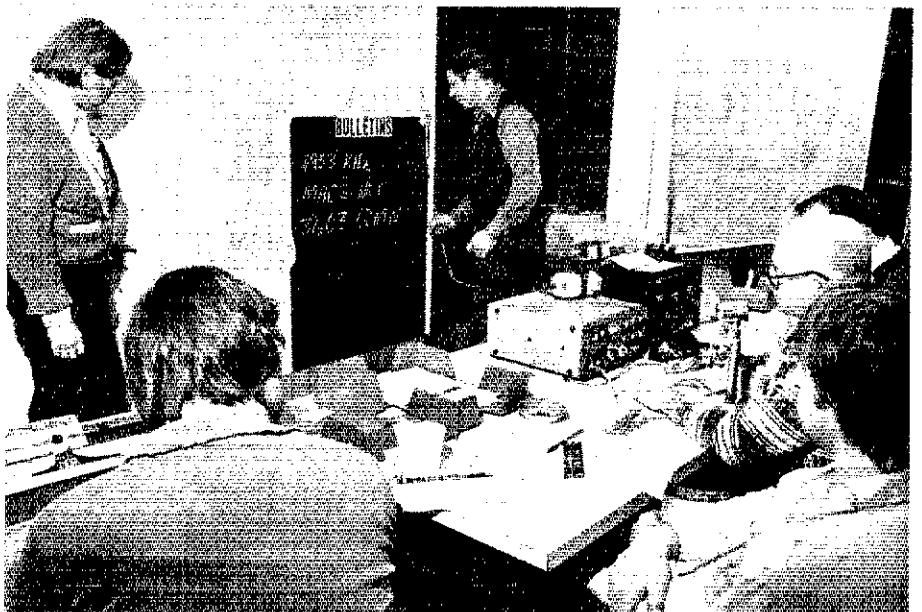
Review of prior SETs shows that amount of organizing effort has very little influence on participation — if weather is good, there are more important things to do — if weather is bad, it's just too much trouble for just an exercise. (WAØPXF) Our SET used a computerized war game designed by three local high-school students. Every fifteen minutes throughout the two days, a random number was calculated and this resulted in the temporary destruction of

a gridded area. (KL7CFX) We solicited cooperation of local REACT group; their cooperation was very good! (KL7HIX) We are concentrating on developing procedures for setting up Red Cross-oriented message centers and communications services, with liaison to other helping agencies according to stated Red Cross needs. (K6FS) Both

the Hawaiian Telephone Company and the Oahu Civil Defense Agency were quite pleased with the efficient manner in which ARES set up and carried out their mission. (KH6CKJ) The 1977 SET was, in a word, *pathetic!* The entire metro area showed no interest . . . cooperation by Red Cross and c.d. was zero. (WA5WUJ) I feel that our drill was



Scott Lieberman, N1EE, one of the Boston Univ. ARC gang, presents Massachusetts Governor Dukakis with a SET radiogram from the Governor of Maine. (WA1UZE photo)



Michigan Section Emergency Coordinator W8MPD (standing at left) watches as WB8FLK chalks up the appropriate frequencies for the benefit of operators and observers at the Wayne County Emergency Operations Center, where the "key station" was established. (WB8FLK photo)

Net Activity

RESULTS ARE TABULATED AS FOLLOWS:

	1977	1976
Nets reporting	256	202
States/provinces reporting	50	46
Number of messages handled	23,320	14,639
Minutes in useful directed session	74,870	74,477
Different stations participating	6,562	4,329
Stations reporting into emergency-power-only sessions	1,845	1,004
Number of different NCS	1,088	713
Number of different liaisons to higher level of NTS	1,023	646
Total number of points	126,746	80,520

all of Central Florida. (W4UJL) We are happy with the SET outcome, avoided our mistakes of last year and plan on having our own SETs on a semi-annual basis. (W4BX) I propose that all members of ARES be *bona fide* members of the NTS nets . . . in this fashion, NTS and ARES become synonymous. (W4ESH) This was Dade County's best SET ever! (W4IYT) The SET was monitored by the County Director for the

NATIONAL TRAFFIC SYSTEM

AREA/REGION NETS

(evening sessions)
(daytime sessions)

A - Messages handled
B - Minutes in directed session
C - Stations participating
D - Stations in emergency-power-only sessions
E - Net control stations
F - Liaison stations

Net Name, manager

A	B	C	D	E	F	TOTAL
Eastern Area, W2JJ	846	335	92	5	11	1,445
Eastern Area, WB2MCR	132	225	33	3	6	468
Central Area, W9HI	630	320	66	6	10	1,162
Central Area, WB4EKJ	60	221	29	3	4	374
Pacific Area, K7NH	673	383	36	4	11	1,203
Pacific Area, W4VNP						
First Region, W1QYY						
First Region, WA1PGY	294	404	49	4	7	713
Second Region, W2MTA	189	243	37	7	15	616
Second Region, WB2EMU	214	395	42	6	9	807
Third Region, W3NEM	126	209	20	5	10	441
Third Region, WB2FWW/3	59	108	25	4	4	253
Fourth Region, W4SH	208	450	34	3	12	820
Fourth Region, K4ZN	102	208	24	1	3	391
Fifth Region, WA5IGU	32	227	6	6	17	948
Fifth Region, W5KLV	125	246	53	5	4	522
Sixth Region, W6INH	180	28	5	1	6	251
Sixth Region, WB6PVH	59	244	37	3	2	496
Seventh Region, W7KZ	226	261	23	6	7	586
Eighth Region, W8PMJ	41	285	7	6	7	455
Eighth Region, K8LGA	54	90	21	1	5	254
Ninth Region, WB9KTH	147	230	15	2	5	478
Ninth Region, WB9FOT	2	65	6	3	2	130
Tenth Region, W10CVD	146	275	67	2	10	615
Tenth Region, WB9HX						
Eastern Canada, VE2WT						
Twelfth Region, W12HXB	258	474	36	6	15	879
Twelfth Region, W5PNY						
Continental Net, W4MCR	128	130	22	2	-	312

SECTION/LOCAL NETS

State/Province Reported By Total Points

MARITIMES/NF

Atlantic Provinces	VE1HJ	690
Cape Breton Emerg.	VE1IG	399
Madawaska ARC	VE1QJ	130

ONTARIO

Champlain Mininet	VE3AGN	309
Grey Bruce	VE3DPO	337
Ontario Daytime	VE3DV	126
Ontario Phone	VE3EWD	182
Ontario Southern	VE3GFN	154

SASKATCHEWAN

Saskatchewan Amateur Traffic	VE5WM	298
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BRITISH COLUMBIA

British Columbia ARPS	VE7FB	-
British Columbia Emerg.	VE7FB	-

ALABAMA

Alabama Emerg. Net B	WB4EKJ	297
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*Reported by radiograms or letter only.

Alabama Emerg. Net D	WA4RND	530	
Alabama Emerg. Net J	WA4EEC	267	
Alabama Emerg. Net M	WA4JYU	1,372	
Alabama Emerg. Net N	WA4GQD	542	
Alabama Emerg. Net R	W4QAU	238	
Alabama Emerg. Net W	WA4MQL	293	
DeKalb County	WA4SNU	148	
Towson County Training	WA4QOW	357	
Sand Mountain Emerg.	K4VZN	623	
ALASKA	Alaska SF Net	KL7CFX	274
ARKANSAS	Arkansas CW Traffic (OZK)	WSMYZ	156
Craighead County Emerg. Weather	WB5QUH	355	
Emerg. Weather	WB5QOR	445	
Mocking Bird	WA5ZWZ	90	
CALIFORNIA	Indian Wells	WA6KZV	280
Valley Emerg.	WA6KZV	280	
Northern California	WB6RF	876	
Novice Emerg.	WA6YWS	444	
Santa Clara County Amateur Radio Ass'n	W6OTH	623	
Southern California	WA6TVA	911	
Southern San Joaquin Valley FM	WB6MGG	78	
Ventura County	W6RIC	-	
COLORADO/WYOMING	Boulder & Gilpin Co. ARES	W9ONF	553
Colorado/Wyoming	WB9QOT	724	
Larimer Co. ARES	W9GOW	357	
CONNECTICUT	Bristol Emerg. Civil Preparedness Hd. RACES	W41LRO	709
Civil Preparedness RACES Area 1	K1QGC	274	
Civil Preparedness RACES Area 2	W1BGT	243	
Civil Preparedness RACES Area 3	W1EZG	330	
Civil Preparedness RACES Area 4	WA1SAY	318	
Civil Preparedness RACES Area 5	K1VGF	300	
Civil Preparedness RACES Area 6	W1DND	179	
Conn. CW (CN) Conn. Phone (CPN)	K1EJR	559	
Meriden Emerg. Net via VHF Traffic	WA1NGL	229	
Wallingford ARES	WA1EJA	614	
	WA1SJV	84	
DELAWARE	Delaware Emerg. Phone	K3YHR	736
FLORIDA	Alachua County SET	WA4DXW	251
All Florida Slow CW Traffic (QFN5)	W4MEE	328	
Beaches ARES	W45ME	222	
Florida Midday Traffic	WB4AID	677	
Northern Florida Phone	W4WNY	844	
Georgia County Emerg.	WB4VJP	418	
Pinellas Emerg.	K4SCL	589	
GEORGIA	CSC VHF Emerg.	WB4CBT	334
Cobb/Douglas ARES	K4VHC	95	
Coosa Valley Emerg.	K4YRL	709	
Georgia Single Sideband	WA4AKU	4,021	
Griffin ARES	WB4KXW	88	
NEGAR ARES	WB4GVY	364	
Oconee Area	K4JFY	75	
IDAHO	Boise County ARES	WA7MXN	218
Pocatello A.R.C. 2-meter	WA7ACG	306	
ILLINOIS	OuPage County ARC	K9GHR	362
Illinois Section (ILN)	K9ZTV	289	
Knox County Emerg.	WB9NEH	161	
Wabash Co. Emerg.	K9DEE	296	
INDIANA	AREC Test	WB9UMH	139
ARES of Lake County	WB9HCH	517	
Clark County ARES	WA9JUS	1,456	
Delaware Co. ARES	W9EHY	213	
Indiana CW (QIN)	W9LTU	882	
Kosciusko Co. Emerg.	K9DCX	2,789	
Shelby County	W9ENU	64	
Tippecanoe Amateur Emerg.	WB9NAQ	1,295	
Wayne Co. ARES	W9NQW	6,038	
	WB9KGR	370	
IOWA	ARPS	K9EVC	159
Zone 8 ARES	K9CNM	101	
KANSAS	Chippewa	W9JXA	542
Kansas CW Section (QKS)	K9MR	446	
Kansas 75 Meter Phone	WB9JB	52	
Kansas Sideband 2-meter	WA9SEV	1,310	
	WB9JX	144	
KENTUCKY	PAREN District (QKS)	WA4ZVL	318
18th District ARES	WA4AQH	257	
	K4AVX	283	
LOUISIANA	Louisiana Net (LAN)	WA5ZZA	448
Louisiana Traffic (LTN)	WA5IGU	394	
MAINE	Down East Maine Slow Speed	WA1UYZ	401
Sag Gulf	WA1FCM	156	
	K1GUP	677	
MARYLAND - DC	Maryland-DC-DE CW (MDD)	W3FZV	583
Maryland Emerg. (MEN)	K3ORW	674	
MASSACHUSETTS	Bellingham	W1XA	240
Eastern MA/Rhode Island Greater New Bedford Emerg.	WA1MSK	413	
WILE	W1LE	187	
Norward ARC Emerg.	WA1OLV	187	
Western MA Phone	WA1MJE	313	
Western MA Section CW	W1DQV	306	
MICHIGAN	ARROW	WB1MT	607
Berrien County ARES	WB8DNQ	483	
Calhoun County ARES	W8ZEJ	88	
Cadogan County Disaster Preparedness	WB8BN	744	
Holland Emerg.	WB8PWZ	361	
Kent County ARES	WB8SK	1,166	
Michigan Thumb	WB8CJP	414	
Grand Haven	WB8JVA	806	
TDM	WB8IAC	816	
Two-Meter Intercom	K8UPE	575	
Wayne County ARPS	WB8FOK	626	
Wolverine SSB	WB8JX	680	
MINNESOTA	Minnesota Section (M5N)	K8CVD	177
Minnesota Slow Speed (M55N)	WB9QFQ	100	
North St. Louis County ARES	K9GNI	269	
Piconet All-Day Watch	WA9YVT	1,156	
Rochester ARES	WB9OXN	429	
Sky Blue Waters 10X Chapter	WB9MEB	285	
MISSISSIPPI	MS Sideband (ARV)	WA5ZLX	789
MS Traffic (MTN)	WB5FHA	450	
MISSOURI	Adair County Emerg.	W9OTF	187
Cedar-Vernon County ARES	WA9FKD	341	
Indian Foothills ARES	W9VZK	74	
Missouri CW (MCN)	W9RV	122	
Missouri SSB	WB9FND	266	
Missouri Slow Speed	K9ONK	431	
Springfield Area Disaster Services	WB9IV	173	
Vernon County ARES	WA9FKD	82	
MONTANA	Missoula Area Emerg.	K7IMZ	184
RACES	W7LR	-	
Montana Traffic	W7DEO	842	
NEBRASKA	Nebraska Storm	WA9JOY	174
NEW HAMPSHIRE	Medicare	W1JB	121
Emerg. Phone	K1RSC	725	
NEW JERSEY	Bayonne ARES/RACES Traffic & Emerg.	WA2FUI	271
ELBCC	K2QJQ	696	
New Jersey CW (NJN)	WB2CST	360	
New Jersey Phone (NJPN)	WA2SLF	1,252	
Northern Bergen County ARES	WB2ELF	541	
Salem County RACES	W2UNI	135	
NEW MEXICO	Southwest CW Traffic (SWN)	K5KPS	405
NEW YORK	Albany ARES	WB2ZCM	235
Babylon Town ARES	WA2JZX	163	
Columbia/Greene County ARES	W2KHQ	380	
Huntington ARES	W2GLE	705	
N.Y.C./L.I. Section CW	WB2LZN	403	
New York State CW	WA2PRL	624	
Westchester County ARES	WA2OMT	629	
NORTH CAROLINA	Cape Fear Amateur Society	WB4TRW	1,331
Metrolina 2-meter Emerg.	WB4CE5	1,060	
Tarheel Emerg.	W4OFD	1,050	
Union County E.C.	WA4YMW	1,834	
NORTH DAKOTA	D.A.T.A.	WA9WLP	1,719
OHIO	Adams & Brown Cos. ARES	WB8CFX	761
Ashtabula Co. Emerg.	K8LXA	92	
Belmont/Monroe Cos. Emerg.	K8JP	3,310	
Buckeye	WB8KKI	444	
Clark Co. Emerg.	WB8VZE	339	
Guernsey, Noble, Morgan, Muskingum Cos. ARES	WB8GC	366	
MASER	WB8GGR	1,116	
Ohio Novice	WB8VLR	291	
Ohio Single Sideband	WB8IL	2,128	
Ohio 6 Meter	WB8SI	201	
Ohio Slow	WB8JGV	162	
Ottawa Co. ARES	WA8HGH	184	
Williams Co. Two Meter	WA8WMW	80	
OKLAHOMA	North West OK Service	WA5OUB	141
OK Five O'Clock	WB5KGP	-	
OK Phone Emerg.	WA5MLT	284	
Ottawa Co. ARES	WA5FLV	77	
Portawatonie Co. ARES	K5KXL	171	
Stephens Co. ARES Emerg.	WB5EQR	286	
OREGON	So. OR FM	WA7HRG	129
PACIFIC	Friendly Net Western Pacific Traffic	KH6HOU	407
	KH6JAC	710	
PENNSYLVANIA	Beaver Co. Emerg.	K3VYY	2,588
Central Cos. ARES/RACES	WA8LJW	360	
Eastern PA CW	WA3SXU	543	
Fay-West ARES	WB3YR	2,474	
Foothills Novice	WB3BTX	194	
Montgomery Co. WA3ID	34 Training & Traffic	WA3SXU	184
Uniontown ARC Novice	WB3YR	218	
Westmoreland County Aux.	WB3HTH	290	
Western PA CW	W2KAT/3	210	
Western PA Phone Traffic	K3SMH	991	
RHODE ISLAND	Aquidnick Is. Communications	W1JFF	416
SOUTH CAROLINA	Anderson ARC	W4FVV	524
2 Meter Blue Ridge	WA4LCZ	542	
2 Meter SC Single Sideband	W4MTK	206	
Tennessee	TN-ARES	WA4NIF	243
Campbell Co. ARES	WB4ENN	278	
CARC	WB4BK	430	
E. TN VHF	W4SCL	39	
Middle TN VHF	W4YU	303	
Pitman Co. ARES	WB4DDV	169	
Shelby Co. ARES	W4JEA	715	
TEXAS	Bell Emerg.	K5SOH	518
Brazoria Co. Emerg.	WA5RVT	305	
S. Texas Emerg.	K5BDO	108	
Texas CW TFC	W5UJJ	493	
UTAH	Beehive Utah	W7DFX	163
Code	W7MEL	295	
Utah Co. ARES	WB7BEG	377	
Weber Co. E.C.	W7GPN	171	
VIRGINIA	Alexandria ARC	K4BAV	34
City of Hampton	WB4ODZ	418	
City of Newport News ARES	WB4ODZ	201	
*Northern VA ARC	K4FD	-	
Petersburg ARES	WB4MUH	517	
Shenandoah Valley Service	VA Beach/Norfolk ARES	WB4NYZ	410
VA Sideband (V5BN)	WB4BRC	826	
	K4VVK	1,844	
WASHINGTON	Aniradio Ops. of Skagit	WA7MSQ	93
ARC Puget Sound	WA7EBH	390	
Clark Co. ARES	WA7DKA	119	
Thurston Co. ARES	K7KXF	158	
Washington Sec. ARES	WA7KGT	80	
WEST VIRGINIA	Berkeley Co. ARES	WB8EKG	225
WB8AAK RACES	K8QEW	137	
WC Novice	WB8TDA	207	
WISCONSIN	Badger Emergency	W9IEM	605
Dane Co. ARES	W9JZ	618	
Wisconsin Intra-state/early	WBOT	347	
Wisconsin Intra-State/late	K9LGU	236	
Wisconsin sideband	K9UTQ	418	

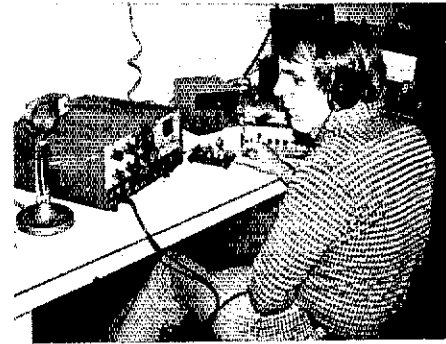
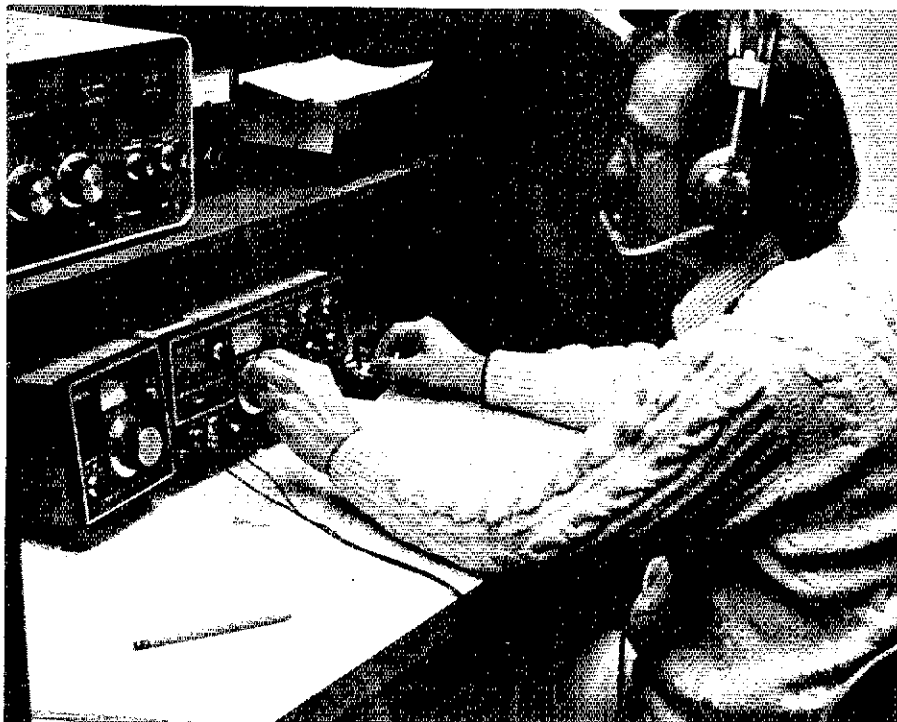


The Milwaukee ARES received excellent local television coverage during their simulated tornado disaster. (WB90DO photo)

American Red Cross and the duty supervisor of the County Fire and Rescue Services. . . . Their reaction was very favorable. (WA4GPS) This year's SET had a very interesting wrinkle in it for us in the St. Catherine's area. A real emergency overlapped the designated SET period. (VE3DVE) This year, the SET in Passaic County, NJ, concentrated on a drill of the newly established Ramapo Valley Emergency Net - RAVEN. (WA2DIW) During this last

year, we have had two actual flooding emergencies in the area and have interfaced well between the CB group and civil agencies. (K2PIT) K1RSC/VE1 directed SET from portable location in Nova Scotia. (K1RSC) In the final wrapup here, I can honestly say I was very surprised with the results. I was, and still am, very, very pleased. (WA1YUZ) A terrorist armed with stolen radioactive material and explosives passed through several areas of

Connecticut Section Emergency Coordinator W1XX led SET activities from the Connecticut Red Cross headquarters station. WA1UNE.



Seventeen members of the Northern Virginia Radio Club, among them WB4IIT, operated W4PAY at the Fairfax County Red Cross Chapter House, and handled over 200 pieces of traffic. (K4FD photo)

DuPage County: It was a contrived emergency to test the effectiveness of ARES. (K9GHR) Many participants used "Test Routine" precedence which was technically incorrect. (WB8ESK) [It's incorrect period! - Ed.] Considering the job of EC was dumped in my lap two weeks previous to the SET, I think we did a damn good job. (K8LUY) Our Hancock County RACES unit has been written into the County Emergency Medical Services Disaster Plan and I serve as chairman of the communications committee. (K8QEW)

Net Soapbox

The basic test emergency had King Kong escaping and threatening Owens Valley, CA. (WA6HAD) Traffic via 2-meter repeater has proven its worth. (WA2VBJ) Fantastic participation and interest in GA. Best yet! (WA4AKU) First time active in 15 years, a long way to go, but it was fun. (K7ALA) We believe our Indiana Traffic net's participation in SET '77 was a success. (K9DCX) Blizzard conditions trapped over 600 drivers in the county. Worked with c.d., American Red Cross, National Guard and state police during 78 hours of emergency session. (W9NQW) Had



The Greene County (Missouri) ARES simulated a downed aircraft in the area and ARES members located it by use of radio direction-finding gear in mobile units. A beeper was used to simulate the emergency location transmitter on the aircraft. Here, assistant EC WB0MIX shows Patrolman Starks the position of the "plane." (WB00VA photo)

you listened to one of our SET sessions on 3610 kHz, you would have heard a lot of musical chatter spiced with excitement. (KØMRI) Western MA SEC EAIDNB did an outstanding job of coordinating the plans of all section and local (repeater) nets; traffic was handled expeditiously throughout the section via 2 meters. (W1DVW) Our Techs, Novices and SWLs monitored NTS and told us where traffic was. (W8CUP) How about

special HXs such as HXV to handle only above 50 MHz? (WBØMEB) How about a combined SET/Field Day exercise? (K5KPS) Was consideration ever made to move the SET to another month, perhaps in the spring or summer, to allow for more "field" types of activities in colder climates? (WA2JZX) It is impossible to get anyone to use emergency power at region/area levels; it is suggested that a greater incentive would

be to give points for individual stations checking-in on emergency power, with perhaps a greater multiplier if the NCS is on emergency power. (K7NHL) The New York Post Office Net did a terrific job handling the SET and the snow emergency in WNY also. (WB2EMU) We got tired of waiting for "them to come to us" and recruited active members to QNI ARES and local nets; traffic was double that of last year. (WØHXB)

Strays



□ An Elizabeth, NJ, bilingual newspaper, *Despertar*, publishes an amateur radio column written by José Armengol, WA2BNM. He hopes it will promote interest in the amateur service and provide a vehicle for an exchange of information among radio buffs.

□ Citing the work done during storm watches by amateurs in Tulsa and Oklahoma City, the city council of Pryor, OK, voted to furnish the Northeast Oklahoma Repeater Group with a 2-meter repeater, WR5ATN, to be operated on 147.06/66 MHz. The new system will be made up of vhf engineering equipment in the control link, repeater, duplexer and transceiver. The city may have been instrumental in providing the first repeater station funded through civil defense.

□ It must be admitted that citizens band jargon is not always complimentary to women. But in all fairness, *CB Radio Journal* seems to have come up with a term that could be put to good use by XYs who want a similar way of addressing hams of the opposite sex: XYM, for ex-young man, or husband. 10-4, ladies?

□ Who says there's a generation gap? Joe Battaglia, WB2QEH, recently hosted the amateur radio club of Maple Hill High School in Castleton, NY, for an afternoon in his shack. An operator for more than 50 years and originally licensed in 1922 as 2CPA, Battaglia demonstrated several rigs he rescued from junk piles, and told how over the years he has relayed many lifesaving communications.

□ Blind hams have problems that those of us who can see don't run into. Don, K7SJK, of Anaconda, MT, relates an example:

"For a long time, a friend of mine was helping me with my QSL cards. I would give her the cards that I received and she would fill out my return card

with the required information. For the comments, she would just use a standard, 'Tnx fer the QSO and QSL. Cu agn, 73s, Don.' I then had her help me figure out the lines and spacing on my typewriter so I could do them myself. It was then that I found that for 73s she had been putting 3 3 3 3 3 3 3. Count 'em - seven threes!" - W7LR

□ With the assistance of two local clubs, the patients at Houston's Texas Institute for Rehabilitation and Research will learn via amateur radio to overcome their handicaps. The Rice University Amateur Radio Club, W5YG, and the Houston Amateur Radio Club, W5DPA, would welcome assistance in the form of volunteer help, equipment donations or correspondence. The hospital already has an hf station, but outpatients will need their own gear as well as assistance in setting it up. Amateur radio classes at the Institute will be open to staff and the general public aside from patients.

QST Congratulates . . .

□ Leonard C. Silvern, K6RXU, who was recently appointed executive consultant with National Training Systems, Inc., of Los Angeles. He will be concerned with the development of curriculum materials and methods for the company's major clients.

□ Will Whalley, who was recognized by the *Journal of the American Medical Association* for his development of high-power rf energy to treat cancer. Will is a member of the South Peninsula (CA) Amateur Radio Club (SPARK).

I would like to get in touch with . . .

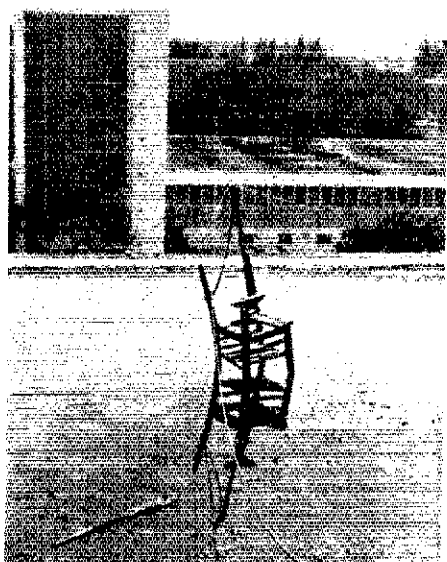
□ amateurs in Nevada and Alaska. I've been licensed since 1931, but still no WAS. Getting desperate. Please contact me for skeds. Frank Galvin, W1DMH, 665 E. Eighth St., South Boston, MA 02127.

□ Poughkeepsie and surrounding area Novices and Technicians to set up a net on 80 or 15 meters on Sunday, Monday or Tuesday at 2030 local time. Stu Ballinger, WA2BSS, 57 S. Clinton St., Poughkeepsie, NY 12601.

□ hams who have lived in Morgan County, AL, who could fill in some of the gaps in the Decatur Amateur Radio Club's history. Ed Boyle, WA4MGJ, P. O. Box 9, Decatur, AL 35602.

□ anyone wishing to form a traffic net for the central-eastern Nebraska and western Iowa areas. Mark Rogers, WBØSYV, Box 238, Clarkson, NE 68629.

□ any KL7 or Vermont station wishing to make a cw WAS schedule with me. Dan Reuland, WB9TBH, Rickwood Lane, Rockford, IL 61107.



After many hours of design work by the structural engineering and architecture students in the University of Miami ARS (K4HYE), this structural array was chosen for the transmit antenna of their new repeater, WR4ATM. Correspondence related to construction details should be forwarded to Mike, WA4ZIE, c/o the University.

Strays



It was sure cold in them thar hills! During the first weekend in March, amateurs from Manitoba stationed themselves along the trail for the 1977 Manitoba Provincial Cross Country Ski Championships. Most operated simplex using car-battery power with one watt and 5/8-wavelength whips magnetically mounted on metal card tables. Operation during the 25-kilometer marathon was through the Pinawa repeater, VE4PIN on 34/94. Nature was kind, with temperatures reaching a high of 39° F, but the marathon has been run in weather below zero. The ham participants are planning to build insulated battery boxes for next year - just in case!

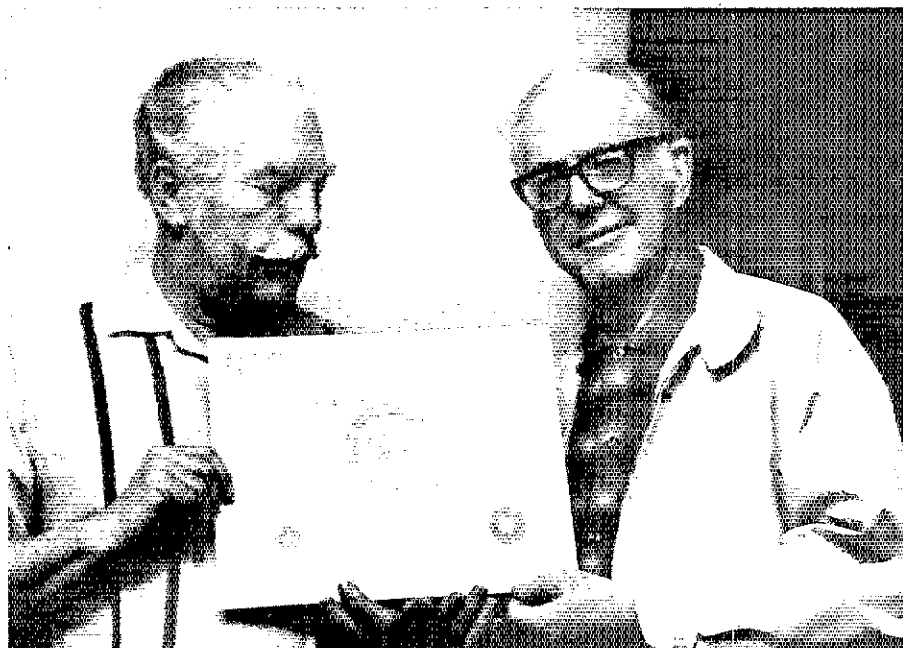
Had a nice surprise the other morning when I heard G3KQL talking with G2CWL while I was mobile and listening to 2-m fm. It turned out that John was mobile near Melbourne, FL and Ken was mobile near Clermont, FL. Both were here on holiday and I sure enjoyed chatting with them from up here near the Georgia border. Hope they'll QSL to P. O. Box 9, Yulee, FL 32097. - Richard Ralston, K4LFF

CO all amateurs submitting material to QST for strays, etc.: Please type or print your name, call and address on all correspondence. You would not believe the letters on file at HQ, with no return address or even a call to look up! Makes it hard to do business!

STOLEN EQUIPMENT

Genave GTX-10, serial no. 1339. Stolen from locked auto on February 21 in Rochester, NY. Tom Krieger, WA2YTX, 19 Kent Drive, Victor, NY 14564. Reward.

ICOM 22S, serial no. 6206287. Stolen from locked auto parked in driveway on April 14. Don J. Rio, K1LLH, 163 Fairview Street, New Britain, CT.



K8TXR, Bill Vette (left) and W6CFK, Dick Barrett, display a copy of the San Jose Bicentennial Award Certificate, to be awarded to amateurs working a certain number of stations in that city during its bicentennial year. Bill designed it, and Dick, 2nd vice chairman of the San Jose Bicentennial Commission, sug-

gested it to the Santa Clara County Amateur Radio Association as a way of letting amateurs around the world join in the celebration of San Jose's 200th birthday. For further information, contact SCCARA at P. O. Box 6, San Jose, CA 95103.

April Open CD Party High-Claimed Scores

The following are high-claimed (unchecked) scores. They read, from left to right, call, score, number of QSOs, number of sections, and hours of operation. Final scores appear in the July CD Bulletin. Asterisks denote stations using member appointments.

<p> W2GD 429,240-1169-73-20 W6RGG(WA6VEF,opr.) 416,250-922-74-20 N4ZZ 402,840-1112-72-20 W6XR(WA6TLV,opr.) 394,930-1074-73-20 W3LPL(WB4SIS,opr.) 380,690-1079-72-20 K6LL 383,250-1045-73-20 W5AC(WB5UZA,opr.) 381,470-1024-74-20 W1ARR/6 374,910-1006-74-20 W1NI 361,800-1003-72-20 N6DE(WA6UT,opr.) 359,160-978-73-20 K6PU(N6OP,opr.) 353,320-964-73-20 K9UKM* 343,320-931-74-20 WB4YF(WB4PCR,opr.) 343,360-924-74-20 K4BAI 343,100-923-73-20 W6BVM 340,545-927-73-20 K1IR 336,600-930-72-20 W6JOS(N6DE,opr.) 336,165-911-73-20 W5ZFLF 335,520-925-72-18 K8MR 310,480-913-72-20 K0MM 307,240-909-72-20 W5SAQF 319,010-870-73-20 W6AQ(WB6KJ,opr.) 312,480-863-72-18 K3OWN/5 297,960-843-69-19 K1XA 290,880-800-72-17 W8ZLN(WA8CWW,opr.) 285,480-789-72-18 WB1P 284,040-782-72-17 W4SHNN 284,040-782-72-17 W4PJ 282,225-730-71-19 WB9DUT 272,650-772-70-16 W9UM(VE4V,opr.) 267,345-728-73-20 W8EO 262,700-736-71-20 W2CS 262,080-720-72-15 N4AA 250,630-700-71-11 K3NA 249,920-697-71-14 </p>	<p> K4XJ 244,940-682-74-10 K6XT 241,045-674-71-17 WB4AIN 239,750-679-70-17 W0HT 234,700-641-73-15 K6WI 233,945-659-71-20 W7HAD 225,720-627-72-19 WA35WF 224,715-626-71-10 WA35XU 222,020-646-68-18 W591R 221,165-616-71-11 K5LUR 215,980-637-68-17 WA42HU 214,800-608-70-15 W6ZAGD 210,200-636-68-20 K9UI 210,240-572-73-16 W7HC 206,280-567-72-19 WA4WHK 206,255-573-71-10 W2JL 201,825-605-68-12 W1GNC 200,375-561-71-12 W4UWR 199,030-548-72-18 WB9NME 195,840-538-72-18 W0LQ 184,985-532-71-15 WA10GD 184,420-570-66-12 K2JOC/KV4 184,405-542-69-17 WB2SJK 187,250-539-70-18 W9JOO 187,250-539-70-18 W2HG 181,220-533-68-15 W5RQF 178,840-526-68-16 W9RW 178,500-518-68-6 N6AA 178,020-512-69-7 W4IGNF 172,190-508-67-12 K6GPH 171,855-506-67-20 W3HQU 168,300-491-68-11 K4LAN 166,250-470-70-9 W2VVS 165,075-460-71-12 N5AW* 162,235-451-71-9 N4IN/3 157,320-452-69-13 K3HXS 157,320-452-69-13 K4QAA 155,750-468-66-17 W6YX(WB4SA,opr.) 152,635-436-69-8 W2UP 152,600-429-70-6 K2CW 150,800-461-69-19 N6VY 149,450-427-70-16 N88M 147,660-423-69-11 W4TXX 143,850-405-70-11 W4ARH 141,570-429-66-13 N7XK 140,700-396-70-6 W7IC 140,420-405-68-18 NS1L 139,380-400-69-14 </p>	<p> W2TPV/4 136,010-399-67-11 WB6AKR 131,670-397-66-11 K5RAM 128,540-374-68-5 N4DW 127,680-394-64-8 W4GVB5 127,650-364-69-11 K9RS 127,160-374-68-11 WB6GVT 124,075-388-65-8 K8EKL 126,299-371-67-10 W4UAV 125,550-400-62-14 W4WHK 122,945-362-67-8 WA8XZH 122,760-332-62-8 K7NVW 121,280-374-64-20 N6Z 121,110-362-66-4 W44WYN 121,040-350-64-14 W4JESK 119,715-41-69-10 W1NNC 119,070-373-63-7 W9E 118,300-367-69-17 W41LQ 117,920-347-67-18 K5VAH 117,920-324-61-3 K1ZZ 117,760-360-64-5 N7JUS 117,250-345-67-10 WB2XK 116,678-352-66-13 W3ADE 116,245-339-67-14 W4GBFL 114,840-344-66-15 W5KI 113,190-338-60-15 W4AWF* 112,000-346-64-15 K4BAM 111,940-332-66-14 W9WH 111,240-303-72-20 W4LAH 110,825-336-67-10 N6MW 110,400-341-64-7 W9BY 108,875-329-63-13 W4RRXI 108,800-336-64-14 W3CB 108,260-339-63-16 N8TM 107,575-326-65-7 W90PV* 107,200-331-64-12 W41UAX 107,100-310-64-15 K4JNR 105,920-326-64-11 N8AA 105,860-309-67-14 W5GECN 104,880-300-69-18 W2RQ 104,135-349-59-5 K4EZH 103,680-317-64-10 W5RE 103,675-312-65-5 W42UJL 103,500-370-60-10 KFRJA/3 103,300-291-71-1 W4KFC 103,180-301-67-14 W4UAZ 102,700-312-65-14 W1AX 102,510-299-67-6 W3FRP/4 101,990-325-62-13 </p>	<p> K8KV 101,760-311-64-10 W6RZJ 101,170-294-67-15 K1TN 100,485-313-63-4 W1MX(WA1RJK SHO,opr.) 77,360-709-68-20 W6JF D*(W6KPPWA6BZ,opr.) 434,380-1174-74-20 WB6KWJ 159,120-464-68-20 </p>	<p> PHONE W6XR 597,750-1594-75-20 K5RC(K5WA,opr.) 374,25-1363-75-20 W9RE* 473,625-1260-75-20 W7N1(WB7CJ,opr.) 334,625-1174-74-20 K6L 419,385-1144-73-20 W44KKP* 411,445-1154-71-20 W9QBF 390,750-1042-75-20 W6AQ(WB6KJ,opr.) 389,015-1006-73-20 W8ZLN*(WA8CWW,opr.) 365,560-984-74-18 K0MM 364,960-1011-72-20 W3LPL*(WA3ZAS,opr.) 324,000-900-72-20 WB9SHK 311,760-863-72-20 W2CS 304,590-850-71-16 W4RWWM 297,500-846-70-20 K5LUR 284,360-801-72-10 K3NA 254,375-718-71-12 K4CX 257,375-712-71-10 W4ZNP(WB2JVN,opr.) 235,245-719-71-18 W2FLF* 248,500-694-71-9 W8LQ(WB8JXS,opr.) 236,785-662-71-10 W4BYJV(WB8OGR,opr.) 223,225-625-71-8 W5UQH* 212,840-626-68-16 W4ZYF* 212,290-654-71-10 N6AA* 206,350-84-70-6 W2RQ 205,160-596-68-6 N7JUS 203,415-568-71-11 K8PV1 199,850-568-70-15 </p>	<p> N4AA 194,600-550-70-10 K4BAI 191,450-540-70-10 N4B* 186,300-523-70-9 W4IGNF 183,960-500-73-10 W2GL 176,220-527-66-6 N1EC 175,730-525-66-18 W442HU 170,810-543-69-13 K4HXS 169,000-496-66-12 K6XO 162,300-454-71-13 W4YFF 162,030-488-68-10 W1VW 159,075-501-63-15 W84KTR 156,585-429-73-18 K8MK 152,460-457-66-8 K4OWN/5 151,200-427-70-6 W43YR 146,970-410-71-10 K3ORW 141,370-418-67-15 W8YB*(WB9PUM,opr.) 234,000-400-67-15 VE6AIT* 132,415-369-71-14 W5HNRK 130,550-368-70-15 N6DF 130,200-414-62-5 K2JW 127,840-427-60-20 N4ZZ* 127,210-432-69-4 W47LQ 125,125-380-65-17 W9RW* 124,745-409-61-5 W8ZJW/1 123,605-418-69-4 N311 122,150-369-69-11 W4NCZ/4 118,290-389-60-14 N4DW 117,975-358-65-9 N4KG 115,560-315-12-5 W4HP 111,000-365-60-14 K2H1(VF2) 109,150-364-59-16 W4JHK 108,225-327-65-10 W1XX 108,080-381-66-8 W86AKR 106,640-342-62-10 W4PCPI 106,470-335-63-12 N4AA 105,090-432-62-5 W4WHK 104,650-294-70-10 K3HBP* 104,185-311-67-13 W41AH 102,510-301-67-12 W6BIP 102,175-298-67-1 W4KMW 101,640-305-66-15 W4YTB 101,075-404-66-11 W4CWB(W4EPG PBZ UZA,opr.) 99,200-353-63-12 W5BQI,opr.) 99,000-1048-75-20 W9KX(K9HDE, WB9JUD,opr.) 79,745-571-67-10 </p>
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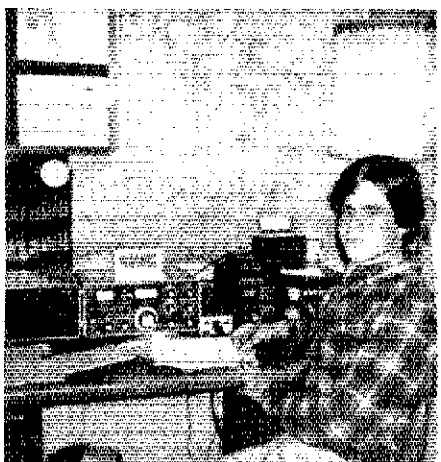
Results, Fourth Annual ARRL Ten-Meter Contest

A few propagation bright spots and the promise of increased solar activity offer a cure for the wait-'til-next-year syndrome.

By Jim Cain,* K1TN and Bill Jennings,** WA1AHI



Andy, AB1ALW, who received his Novice ticket just five days before the start of the 10-Meter Contest, made his presence known from the Connecticut section.



Paul, WA4SCL, Novice, utilized his FT-101EE and a quad at 35 feet to rack up 116 QSOs for 11.6k points in the Tennessee section.

Hardly seems possible, but this report documents the *fourth* annual ARRL 10-Meter Contest. One of the writers started to work at the Newington headquarters in August, 1973, and in the short span of time from then to December the 10-Meter Contest was invented, rules hashed out with the Contest Advisory Committee, and an announcement printed in November *QST*. Those rules have not changed in four years and seem highly satisfactory.

In many respects, the 10-M Contest has remained in a state of suspended animation these last few years; conditions were bad in 1973 and haven't really gotten any better since. Scores keep increasing through station design improvements, operator experience with the contest, and maybe a little luck. The 10-Meter Contest is a sleeping dragon, awaiting a bolt of lightning from the ionosphere to erupt into a horrendously big activity. Perhaps all the contacts the past four years on a dead band have been just dreams, but who's going to question a dragon?

Although propagation conditions showed a little more promise than in 1975, with good north to south (to Central and South America) and fair but short East Coast to West Coast U.S. openings both days, the fact is that the number of entries (612) received for the 1976 10-M Contest is slightly below the 628 figure of 1975. The rather large jump in the average scores, especially the top ten, seems also to contradict the fact of declining numbers of valid entries.

Despite the large average score increase in the 1976 top ten over the

average scores of the 1975 top ten, the all-time top single-operator scores of W6RR at 189k and T12BEV at 228k, both set in 1974 still stand.

At the age of four, the 10-Meter Contest has come sufficiently into its own to warrant a set of all-time record-holder boxes, one for the U.S.-Canada, in both the single and multi-operator categories, and another all-time top-ten box for DX stations. Although the top-ten box for DX will suffice for now, with the coming (we hope) of better propagation conditions, this might very well be replaced by a more appropriate listing such as continental leaders.

Division records were set this year by single operators; W3RJ, WA8ZDF, K9EGA/2, WA1LNQ, AD4BAI, and by multiops; W9LXU, WB0MCI, WB4ASA, AB8OFR, W0EEE, AB1AEE, WA4YBV and WB4EDD.

Five stations appeared this year as "repeaters" to the top-ten single-op listings from the U.S. and Canada, those stations being W3RJ (ex-K3OIO), WA8ZDF, W4WSF, K9EGA/2 and WA3WIK. On the DX side of the ledger, each of the stations making the top-ten single-op listings is new to the top ten with the exception of KZ5JM, who was top ten in 1974.

Much of the credit for the computation and tabulation of the scores and analytical data goes to Contest Aide, Dan Street, WA1QNF, whose many hours of work should not go unrecorded.

Soapbox

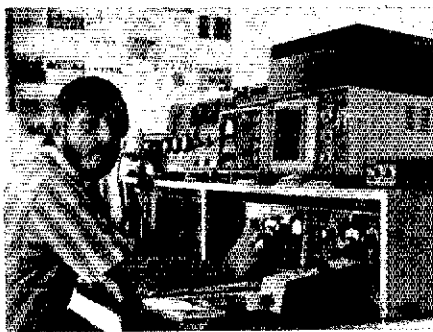
Night after night, day after day, weekend after weekend, I call CQ on 10. Nothing! Then have a contest and it's QRM-5. (WA6HAD) The Novices were conspicuous by their absence. Why

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

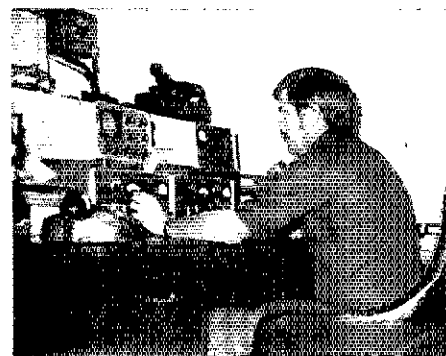
were so many higher class amateurs operating below 28.100??? (WB2DQP) Highlights of the contest for me were being able to work stations on scatter with a small, low antenna and low power (it seems to be easier than on 6 meters). Also two new states and two new countries on OSCAR. (K9HDE) There's not much here, but I wanted to show my support for 10 meters! (WB5WWU) After listening to a dead band for most of the 36 hours, I think that it's time to consider moving the contest into the summer E-skip season. (WB0QHV) When it's hot, it's hot; when it's not, it's not and not a whole lot in between. (WB7CBA) How about some more "a-m" activity next year? Perhaps these contacts should count double, as do Novice contacts. A lot of "a-m" stations would like to participate, but don't feel wanted! Ten meters has plenty of room for "a-m" activity. Let's spread out and use the band. (WA2SUH) Am I the only California station who couldn't find a W6 multiplier? (WB6IHU) Occasional runs of 80 contacts per hour made it all worthwhile. (WB2FUN) I could hear all kinds of juicy DX stations down 50 kHz, but none in the Novice bands. (WB3BCF) Not a very high score, but I tried with my old dipole. (AB0PTB) Confining all cw operation to the Novice band segment would be an asset to the contest. (WB4DHC) It's 2000Z Sunday, the band's wide open and I hear a W4 at 28.1 calling CQ. Sounds like a Novice. A quick four points, and maybe a new multiplier. I call him. Doesn't say he's a Novice. After RST, QTH and name, I decide that he's not in the contest. Leave him! But six months ago, I was a Novice too. Don't want to give him an inferiority complex. I explain and apologize at two words per minute. QSY. Band is gone and I feel guilty. (WB3ALX) Being a Novice contestor is nice, if you like sitting around half the time. Again the versatility of propagation modes available on 10 meters was proven during this contest, as the following were used in accomplishing my score: tropo scatter, sporadic E, F2, and last but not least the Geminids meteor shower, which provided the ionized reflecting patches that made a good portion of my contacts possible. (W0EKB) The entire weekend was nothing but a series of options. Should I seriously compete in the ARRL 10-Meter Contest, or should I watch the Washington Redskins wipe out the Dallas Cowboys? Or better yet, maybe I should take time off from hamming to enjoy the St. Louis Cardinals as they toy with the New York Giants in the last game of the NFL regular season? Decisions, decisions, decisions. My score tells the tale. (WB5IBA) Ten was open, but where was everyone? We should all



Luis, CX1EK, operated CW3BR to 192k points, capturing the top spot among the single-operator DX entries. In fact, Luis' score was the highest of all the entries in the 1976 10-Meter Contest.



Single-operator section winner in the Alabama section, WB4OXX. 502 QSOs and 64 multipliers accounted for Herb's section high score of 64k.



Missouri section high scorer, Perry, W0LGW, is shown here making one of his 249 total QSOs.

All-Time Division Leaders

Single Op	Score	Year	Division	Multi-Op	Score	Year
W3RJ	171,396	76	Atlantic	WA3UTA	175,056	74
W9YT	108,000	74	Central	W9LXU	46,748	76
WA0CPX	53,720	74	Dakota	WB0MCJ	12,616	76
W5WMU	98,280	74	Delta	WB4ASA	58,212	76
WA8ZDF	119,328	76	Great Lakes	AB8OFR	73,458	76
K9EGA/2	82,290	76	Hudson	W2SKE	104,680	75
W0LGW	58,098	74	Midwest	W0EEE	42,448	76
WA1LNQ	126,008	76	New England	AB1AEE	75,052	76
W7SFA	140,432	74	Northwestern	K7IDX	76,002	74
WA6PGB	119,140	74	Pacific	W6BIP	86,400	74
W4WSF	103,340	75	Roanoke	WA4YBV	61,504	76
W0MS	84,534	74	Rocky Mt.	WA5FLG	14,000	74
AD4BAI	87,492	76	Southeastern	WB4EDD	92,820	76
W6RR	188,760	74	Southwestern	W6YRA	121,824	74
WA5LES	153,000	74	West Gulf	WB5IQG	68,556	74
VE3BMV	64,500	74	Canadian	VE3MCH	69,948	74

WB4UYD	17,836-182-49-	WB8WDZ/6	5684- 98-24- 3	WA7TBP(multip)	14,640-241-30-29	WA6LJB	27,440-275-49-26	Kazakh	
WAASCL	11,592-116-42-30	WA6JCH	2080- 56-16- 7	W7YH(multip)	13,888-224-31-	WB0TA	17,830-182-38-19	UKR/UA	100- 10- 5-
WAZWZ	770-11-38-9	WA6COX	1876- 50-19- 9	WB7BPK(+WA7NKN,WB7BPM)	2860- 61-22- 5	KRPPV	5400-105-40-20	EUROPE	
AA4MK	6320- 93-28- 9	WA6CQ	1000- 39-10-19	WB7CQU(+WA3PW,)	1890- 63-15-	WB5BG	7750-121-31- 9	Fed. Rep. of Germany	
AB4WHY	884- 34-13- 4	WA6KRR	36- 14- 1-15	Wyoming		WA6VW	3344- 75-22-12	UK7MG	136- 17- 4-
WB4ASA(+WA4NIV,WB4AGS)	58,212-440-66-28	Santa Barbara		W7JAL	1056- 34-16- 8	WB8CQ(+WA3PW,)	18,900-220-43-	DL/WG	136- 17- 4-
WA4ZGK)	11,972-146-41-0	AD6QPH	31,050-342-45-13	8		WB7TKH(multip)	18,900-210-45-25		136- 17- 4-
Virginia		Santa Clara Valley		Michigan		Kansas		German Dem. Republic	
W4W5F	82,946-619-67-26	B6KLY	30,118-407-37-16	AC8CON	44,652-366-61-17	WA2VI N/g	18,720-193-48-18	DM2FDO	152- 38- 2-
K4VX	75,776-591-64-16	AA6MQS	25,384-334-38-10	KBMOA	38,054-358-53-18	WA6PCB	340- 82-30-	England	
WA9JGN/4	70,432-566-62-31	W6EYV	15,022-203-37-12	KBNWD	29,500-295-50-21	WBDDOZ	2352- 56-21- 7	G4FAM	172- 86- 1-
K4VY(W4UKA,opr.)	6,384-549-58-	WB8HBL	13,258-214-31-17	WBDSO	10,296-143-36-14	WB8PWF	1530- 45-17-18	G4CQA,PI+G3YTW,G4DLB	392- 32- 3-
W0YVA/4	20,816-223-46-12	WB6JSS	11,820-197-30-7	KRMJZ	10,132-148-34- 6	K8PFC	504- 21-12-	Czechoslovakia	
AA45HL	16,848-216-39-	WB6BYH	2304- 61-18-14	WB5SK	7656-116-33-	WB8NHZ	224- 16- 7- 6	NORTH AMERICA	
K4D1D	15,436-227-34-	WB6MSJ	9072-166-27-14	WB8SK	6440-114-28-	WB8HGG	8- 4- 1-1	Dominican Republic	
AA4CGX	12,640-158-40-24	WB6SWH	5700-117-25-10	WB8ME	456- 14-12- 1	WA6UCU	14,268-167-41-17	HIMGG	14,784-224-33-
W3IYL/4	12,558-161-39-23	WB6WZ	2924-123-12-	WB8K	294- 7- 6- 1	WB7YA	7280-102-35- 9	Panama	
K4BIV	10,730-144-37-14	WB6BYH	2304- 61-18-14	WB8KME	84- 7- 6- 1	WB8MB	972- 76- 6-16	HP1YV	7630-109-35-
WA6FK	4200-100-21- 4	WB6KSD	1290- 43-12- 2	WB8KXA(multip)	10- 3- 1-10	WB8SYT	900- 34-10-18	Puerto Rico	
K4KCI	3744- 72-26-	WB6JW	576- 33- 8- 8	Ohio		K8MPH	806- 31-13-	KP4DMZ	47,008-452-52-17
WA4PNS	3612- 86-21-11	WB6EDW	264- 19- 6- 3	WARZDF	119,328-892-66-28	WB8TD	416- 16-13- 2	Canal Zone	
WB4LZA	3552- 73-24-14	WA6HAD	238- 15- 7- 7	WB8ZFR	17,640-210-42-	WB8TDB	80- 14- 2- 4	KZ5JM	54,230-460-50- 8
K4JIM	3444- 82-21-	WA6JZA(+W6NUT)	84,448-752-56-22	K8JFC	16,344-224-36-29	WB8TDB	84- 14- 2- 4	KZ5BAN	1120- 40-16- 5-
WA4RL	1700- 50-17- 9	W6OKK(multip)	2592- 72-18-	K8JFM	8820-146-30- 7	WB8CQ(+WB8QVA)	12,616-159-38-36	Greenland	
W4KMS	1596- 42-19-	K600K(multip)	42- 21- 1- 1	K8JRM	7896-139-28-	Missouri		Netherlands Antilles	
WB4WDM	800- 31-10-19	San Diego		WB8RH	5054-125-20-28	WBLGW	30,478-249-61-28	Guatemala	
WA4DLY	336- 24- 7- 3	W6TZV(WA6CXK,opr.)	46,060-470-49-20	WB8TJS	2632- 82-14-27	W8QX	17,600-220-40-26	VE2AGS/TG9	95,368-691-69-
WA4YBV(multip)	61,804-493-62-	K6NA	10,820-153-33- 2	WB8TJL	2460- 82-15-15	W8QZ	4560-112-40-16	Belize	
Arkansas		AA60FY	1560- 38-20- 6	WB8TJL	1760- 44-20- 6	W8RZ	3850- 73-53- 4	VP1MPW	17,892-213-42-
WB5YEM	31,416-308-61-20	San Francisco		WB8TJL	1600- 50-16- 2	W8SC	3036- 66-23- 4	Dominica	
W8DHW	27,624-223-54-21	W6KQC	80,560-758-63-	W6KBE	1560- 57-13- 2	W8UQ	2040- 52-20-	OCEANIA	
AA5WMC	12,760-145-44-14	WB6NH	45,792-432-63-3	W6KBY	1272- 50-12- 4	W8UR	2640- 52-20-	Guam	
WB5D1	11,304-157-36-36	W6KNS	19,726-173-31-30	W6KSI	812- 47- 1-14	WB8TL	980- 42-10-10	Guatemala	
WAS5YON	1634- 43-19- 4	AA6VFB	5000-100-25-14	K8RMK	38- 31- 6-	W8TFE(multip)	42,448-374-66-	NEBRASKA	
Louisiana		W6KHI	2644- 74-18-	WB8UF	360- 33- 6-	W8MHP(+WB8GJL)	27,900-279-50-36	Netherlands Antilles	
K5KLA	28,090-265-53-14	W6KHI	9064-101-32-18	AC8LMD(WD8CRT,opr.)	320- 17- 8-13	Nebraska		Netherlands Antilles	
W5WML	18,630-207-45- 5	San Joaquin Valley		WB8MC	252- 17- 7- 4	W8EKB	12,390-176-35-24	Greenland	
K4CHE/5	5658-123-23-	W6PKZ	47,594-449-53-22	WB8TP	174- 26- 3- 5	WA8HAL	360- 15-12- 2	OX3AB	540- 17-10-
WB5FE	1868- 14- 6-12	K6EKH	9492-113-42-14	W8SFI	80- 6- 3- 5	North Dakota		Netherlands Antilles	
WB5VZQ	140- 10- 5-18	WA6ALA	8964-166-27-	WB8ZRL	80- 6- 3- 5	W8EKL	12,390-176-35-24	NEBRASKA	
Mississippi		WA6JXA	6464-101-32-18	WB8ZRL	80- 6- 3- 5	WA8HAL	360- 15-12- 2	NEBRASKA	
W5AQ	21,150-245-43-25	WA6JXA	1156- 34-12- 4	AB80FR(+WB8S QVC,RDO)	73,458-583-63-36	North Dakota		NEBRASKA	
W5NCB	15,048-184-41-27	WB6IT	16- 4- 2- 1	WB8WPC(+WA8TGK)	59,972-511-58-	W8EKL	12,390-176-35-24	NEBRASKA	
W5RHV	4340- 68-31- 4	Sacramento Valley		WB8JBM(WB8S DQ,PI,HD,ops)	35,972-511-58-	WA8CSL	3072- 64-24-	NEBRASKA	
K5RRG	480- 24-10- 4	AA6EHM	18,944-255-37-28	K8OCL(multip)	11,440-141-40-31	K8FRP	1020- 30-17-15	NEBRASKA	
New Mexico		W7R8	4129- 84-21- 3	West Virginia		North Dakota		NEBRASKA	
W5HI	9758-119-41-20	AC6KYA	3570- 80-21-	WB8CGC	14,852-158-47-	WA8CPX	33,936-303-56-12	NEBRASKA	
VA5YTX	9316-147-34-	WB6IHU	1380- 46-15-	W8PZS	255- 75-23- 5	AB8MWJ	6528-102-32-	NEBRASKA	
Northern Texas		WAS5ZD	136- 17- 4- 4	W8ZGS	2756- 53-26- 5	WB8TUJ	2300- 50-23- 6	NEBRASKA	
W5TMN	40,680-335-60-	Pacific		WB8HQ(+WB8S EKG,IJW)	29,952-311-48-30	CANADA		NEBRASKA	
WKLB	8446-710-38-24	KH6IJ	8854-233-19-	Illinois		Ontario		NEBRASKA	
AB5HJ	5664-118-24- 6	7		K8BGL	70,817-562-63-27	VE8HM(VE8BVD,opr.)	28,620-318-45-	NEBRASKA	
K5EIS	2990- 60-23-16	Arizona		K8VX(WA9PBK,opr.)	64,080-529-60-19	VE8KZ	20,178-194-52-12	NEBRASKA	
WB5DUQ	1736- 50-17- 6	WA7YRP	56,916-524-54-24	W8AIX	23,536-250-42- 9	VE8JK	6892-103-32-19	NEBRASKA	
W5GYP	1564- 45-17-10	K7NKH	39,284-425-46-18	WB5BV	20,250-220-45-	VE8JY	5612-122-23-	NEBRASKA	
W5SD	1224- 35-17- 3	K7QO	36,714-391-47-17	WB5ZS	16,008-173-46-21	VE8FEA	2920- 73-20-	NEBRASKA	
W5CF	1020- 30-17- 3	K7RDH	9780-163-30-17	W9NIN	15,200-184-40-23	VE8JK	1584- 44-18-	NEBRASKA	
WBATMH	40- 7- 2-14	W7KPL	4564- 99-23- 7	WB9PU	12,600-150-42-	VE8XL	418- 19-11- 6	NEBRASKA	
AB8PJI	2- 1- 1- 4	W7JOP	3916- 89-22-	W9NIN	7410- 95-38-13	VE8BV	18- 3- 3- 6	NEBRASKA	
Oklahoma		W7JOP	1036- 33-14- 5	W9NIN	4448-121-26-	VE8JCT(VE8S EFD,H,ops)	28,512-324-44-32	NEBRASKA	
K2GKK/5	21,010-191-55-32	W7JOP	1036- 33-14- 5	W9NIN	2396- 73-14-	Manitoba		NEBRASKA	
WB5GK	11,040-137-40-	W7JOP	1036- 33-14- 5	W9NIN	2396- 73-14-	VE4V	2832- 57-24-	NEBRASKA	
WASOB1	1440- 35-20-14	W7JOP	1036- 33-14- 5	W9NIN	2396- 73-14-	Alberta		NEBRASKA	
WB5VUD	80- 5- 8- 5	W7JOP	1036- 33-14- 5	W9NIN	2396- 73-14-	VE8VC	1482- 39-19-	NEBRASKA	
WB5WU	16- 2- 2- 1	W7JOP	1036- 33-14- 5	W9NIN	2396- 73-14-	VE8BCC	1260- 45-14-10	NEBRASKA	
Southern Texas		W7R8	4129- 84-21- 3	W9NIN	2396- 73-14-	British Columbia		NEBRASKA	
AA5LES	76,176-552-69-	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K5AK	36,420-320-85-	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB5QIT	22,800-228-50-28	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB5IQ	2560-255-40- 9	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB5RRH(W5LS7,opr.)	19,200-192-50-18	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K5EJL	18,580-225-40-16	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K5ODU	18,580-225-40-16	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
AA6KJL	3212- 73-22- 8	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W5OP	2112- 48-22- 6	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB5JYH	1700- 50-17- 6	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K5RYV	620- 31-10- 4	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W5HNS	580- 29-10- 9	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W5FOE	520- 26-10-15	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
AA5TPO	506- 23-11- 2	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W5NYQ	301- 16- 2-14	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W5A1X	110- 9- 5-18	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
AB2UFG/5	6- 3- 1- 1	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
6		Oregon		W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
East Bay		W7A8K	27,262-317-43-	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WA6JUD	17,476-257-34-	AA7IHN	18,000-225-40-22	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
AA6ZPL	9504-144-33-20	WA7PEZ	11,544-156-37-12	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WA6UAV/6	4680-151-15-14	W7R8	4830-105-23-14	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB6ION(WA6VEF,opr.)	4880- 39- 8- 5	WA7JBE	9582-105-27- 2	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W6GJW	4352-136-16- 5	WB7CBA	5382-114-23-	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W6GJW	1320- 33-20- 1	K7DA	946- 17-11-13	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
W6PHN	462- 21-11- 2	WA7WVX	2- 1- 1- 1	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB80HC(+WA6S QGY,ORH)	1,200- 43-11-24	Utah		W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
Los Angeles		WA75HW	24- 4- 3-	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB6PXP	102,168-767-66-29	Washington		W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
AB6PKA	34,132-362-46-	W7FUI(K7JCA,opr.)	62,894-532-59-	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K6SE	31,900-319-50- 8	KJMMNT/7	35,424-432-41-17	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
K6VNX	31,900-319-50- 8	W7EZ/W7	18,204-246-37-10	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB6KOU	13,070-210-30-22	W7ETZ	16,434-248-33-20	W9NIN	2396- 73-14-	VE8WJ	1482- 39-19-	NEBRASKA	
WB6VPI(W6CN,opr.)	10,184-335-44-10	W7BNP	11,715-201-79						

Operating News

Conducted By George Hart,* W1NJM

What Do We Talk About?

This column has discussed just about all kinds of operating activities in the past, but it has been a long time since we discussed just plain old ragchewing. Yet, chewing the rag is an on-the-air pastime and preoccupation as old as amateur radio itself, and is still the topmost activity in hamming. It merits more discussion than it gets, from a topical standpoint.

But what is there to discuss? Ragchewing is just a lot of idle chitchat, two or more amateurs talking with each other, exchanging views, relating their respective experiences, describing their stations, the weather, exchanging reports and "handles," discussing family affairs and — well, just about everything there is to talk about. No subject is forbidden, as long as we "keep it clean" (97.119).

Ah, but *that's* what there is to discuss — keeping it clean! Sometimes, you run across a conversation or communication on the air that doesn't meet that definition according to some people's standards; occasionally, *anybody's* standards — for decency, that is. You and I and just about everybody else, male and female, have engaged in conversations that we wouldn't want repeated over our favorite radio or television station, but once in a while some of us seem to forget that when we are ragchewing on the air we aren't just having a private conversation with a friend, a member of our "peer group." What we are saying is something that anybody with the facilities to receive can hear, listen to, react to. And if the conversation isn't "decent," the reaction can be very negative.

Sure, there is always that great invention by that ingenious Russian, Vladimir Turnon-anoff, or the other one by David Dial, to remedy the situation, but it isn't always this simple. Children can be listening. Old ladies can be listening. Critics of amateur radio can be (are) listening, perhaps taping and gleefully rubbing their hands together in anticipation of playing the recording at WARC-79 to show what amateurs are doing with the valuable frequencies they occupy.

So, is your conversation on the air befit-

ting the dignity and prestige that should belong to amateur radio? If it is less than that, it shouldn't be transmitted. The language you use may consist of parlor words to you and your friends, but how would it sound to your mother-in-law, or your children, or your minister? When you are on the air, such people might be listening. You are not in private conversation.

Or, for that matter, what *subjects* are you discussing? Perhaps your language is perfectly decent, but perhaps the subject matter is inappropriate to a public medium like amateur radio. Or perhaps just the tenor of the discussion is on the obscene side. Last time this matter was broached, several years ago, *QST* came in for some severe criticism for allegedly advocating suppression of our precious right to freedom of speech. In a day when anybody can observe and hear porno for a relatively small price (or for free, in some cases), in a day when things considered obscene and profane 20 years ago are now everyday conversation and experience — in such a time it is hard to determine what is out of bounds and what is in bounds. As long as it makes money, it is excusable, or at least permissible. Or so it seems.

But we like to think of amateur radio as somewhat above the commonplace in communications content. Not only that, but it is necessary for us, as a service whose spectrum occupancy will be under scrutiny in 1979, to make the best possible impression. One foreign delegate to the conference playing a tape of two or more amateurs in obscene, profane, indecent conversation can do a world of harm to a cause your ARRL is spending a great deal of time and money to defend — time paid for with your membership dues and money spent out of the League's treasury.

Okay, enough of that. No need for specific examples insofar as language is concerned. The question of subject matter is not quite so easy. Certain subjects are prone to become controversial and often erupt into inappropriate language. Such as? Well, examples might

be race or sex, politics or religion. The first two are fairly obvious, but we know we'll get an argument regarding the latter. Freedom of speech? You've got it, but sometimes too zealous exercise of it can have dire results — like yelling "fire!" in a crowded theater, not to mention the laws for libel and slander. We amateurs ought not get mixed up in such matters. We are communicators and experimenters, and while it is perfectly all right to use our privileges for conducting conversations with each other having no relation to amateur radio, we ought to try to exercise judgment on what we talk about and what we say about it or about whom.

The next question that arises is suppose one hears a conversation on the air that he decides is highly improper, immoral, obscene, etc.; what does one do about it? Report it to FCC? Call ARRL? Give the perpetrator(s) a call and chew him out? No, not any of these. You might, if the opportunity affords, join the conversation and try to tone it down, or even remonstrate with the parties concerned. The latter is ticklish and has to be done with tact; otherwise, it can backfire. In general, about all you can do is sit and gnash your teeth and hope that nobody is listening who shouldn't be listening. The purpose of this piece is not to ask that you do something about others who are misusing our bands to our own disadvantage, but to ask that you make sure *you* are not guilty of indiscretion on such matters.

Our Official Observer corps is active in this field. While admittedly much of the ill-advised content of our ragchews is not illegal, OOs are nevertheless sending out notices to those whose conversations *seem* to be inappropriate. Such notices are on a 8-1/2 X 11-inch form (CD-22) and are mailed in an envelope via Headquarters. In most cases, especially where the discrepancy is not legally a violation, they represent the observer's own opinion. Should you get such a notice, please accept it in the spirit offered, and give it some thought — for the good of our beloved Amateur Radio.

SCM ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least

five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)
Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . Zip . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must have been received at Headquarters on or before 5:30 P.M. Eastern Local Time, September 10, 1977.

Wherever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1977, returns counted November 22, 1977 and SCMs elected as a result of the above procedures

will take office January 1, 1978.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning January 1, 1978.

If no petitions are received for a section by the specified closing date, such section will be resolicited in January QST, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and

file a nominating petition immediately.
George Hart, WINJM
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Nevada section as a result of notices in January and February QST, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

BALLOTING RESULTS

In the New Hampshire Section, Robert C. Mitchell, W1NH/W1SWX, defeated J. Langdon Prescott, K1BCS, 222-96.

In the Rhode Island Section, John Titterington, W1EOF, defeated John E. Johnson, K1AAV, 140-83.

In the San Joaquin Valley Section, Charles P. McConnell, W6DPD, defeated Donald V. Moran, WB6NON, 343-70.

In the Utah Section, Carl R. Ruthstrom, W7GPN, defeated John H. Sampson, Jr., W7OCK, 145-95.

W1AW Operating Schedule (April 24-October 30, 1977)

POST	CDST	EDST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	
6 A.M.	8 A.M.	9 A.M.	1300	Slow ¹	Fast ²	Slow ¹	Fast ²	Slow ¹			
7 A.M.	9 A.M.	10 A.M.	1400	← Cw Bulletins ³ →							
8 A.M.	10 A.M.	11 A.M.	1500	← RTTY Bulletins ⁴ →							
1 P.M.	3 P.M.	4 P.M.	2000	Fast ²	Slow ¹	Fast ²	Slow ¹	Fast ²	Slow ¹	Slow ¹	
2 P.M.	4 P.M.	5 P.M.	2100	← Cw Bulletins ³ →							
3 P.M.	5 P.M.	6 P.M.	2200	← RTTY Bulletins ⁴ →							
4 P.M.	6 P.M.	7 P.M.	2300	Slow ¹	Fast ²	Slow ¹	Fast ²	Slow ¹	Fast ²	Fast ²	
5 P.M.	7 P.M.	8 P.M.	0000	← Cw Bulletins ³ →							
6 P.M.	8 P.M.	9 P.M.	0100	← RTTY Bulletins ⁴ →							
6:30 P.M.	8:30 P.M.	9:30 P.M.	0130	← Phone Bulletins ⁵ →							
7 P.M.	9 P.M.	10 P.M.	0200	Fast ²	Slow ¹	Fast ²	Slow ¹	Fast ²	Slow ¹	Slow ¹	
8 P.M.	10 P.M.	11 P.M.	0300	← Cw Bulletins ³ →							
9 P.M.	11 P.M.	12 P.M.	0400	← RTTY Bulletins ⁴ →							
9:30 P.M.	11:30 P.M.	12:30	0430	← Phone Bulletins ⁵ →							

¹ Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.

² Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.

³ Cw bulletins, 18 wpm, on: 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz.

⁴ RTTY bulletins 60 wpm/170-Hz shift on 3.625 7.095 14.095 21.095 28.095 MHz.

⁵ Phone bulletins on 1.835 3.99 7.29 14.29 21.39 28.59 50.19 147.555 MHz.

Operating-visiting hours are Monday through Friday 7:30 A.M. to 1 A.M. and Saturday and Sunday 3:30 P.M. to 1 A.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 detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work W1AW.) The station will be closed July 4 and Sept. 5. Staff: Chief operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, WA0OKV.

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.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and QST text to be sent in the 0200 practice from the issue of QST two calendar months past: July 6, It Seems to Us; July 12, Correspondence; July 22, League Lines; July 28, Public Service; Aug. 1, World Above; Aug. 3, Operating News.

Operating Events

JULY

- 4: Straight Key Night*
- 6: West Coast Qualifying Run**
- 9-10: IARU Radiosport Championship (p. 85, May QST)
- SEANET Contest cw**
- 14: W1AW Qualifying Run**
- 16-17: HK, Apollo, 10-10 Contests*
- 23-25: CW County Hunters Contest**
- 26: W1AW Qualifying Run**

AUGUST

- 4: West Coast Qualifying Run
- 6-7: YO DX Contest, Illinois QSO Party**
- 13: Wonderful Wisconsin Rapids Week**
- 13-14: WAE cw**
- 19: W1AW Qualifying Run
- 20-22: New Jersey QSO Party**
- SEANET Contest phone**
- CAN-AM Championship**
- 25: W1AW Qualifying Run

*Detailed last month
**Details this issue
***Details next issue

- 27-28: All-Asian Contest cw (p. 102, May)
- 9Y4 First Anniversary QSO Party**
- Ohio QSO Party**

SEPTEMBER

- 3-4: Savaria CCS (HA) Contest
- 4: LZ DX Contest
- 7: West Coast Qualifying Run (+40 wpm)
- 10-11: VHF QSO Party, Washington QSO Party, Worked All Europe Contest phone
- 13: W1AW Qualifying Run
- 14-16: YL Howdy Days
- 17-18: Scandinavian Activity Contest cw, VE/W
- 18: FMT
- 20: W1AW Morning Qualifying Run
- 24-25: Delta QSO Party, SAC phone
- 26: CWA High-Speed Code Test

JULY

- 6: West Coast Qualifying Run (W6OWP prime, W6ZRI alternate), 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC with Z shown as a time designator). The run will take place at 2100 PDST (9 P.M. PDST the night of July 5) on approximately 3590/7090 kHz. Dates are always

shown several months in advance and times are always the same local Pacific time of 9 P.M. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large stamped addressed envelope will help to expedite your award/endorsements.

9-10: SEANET Contest cw, sponsored by RAST, the Radio Amateur Society of Thailand, the full 48-hour period UTC. (Phone, the weekend of August 20-21.) Operate 160-10 in any of the following classifications: single band single op., multiband single op., and multi-multi. Exchange RS(T) plus consecutive serial starting with 001. Contacts between stations in one's own country will not count. Ten points for each contact on 160 and 20 points with each: HS YB DU 9V1 9M2 9M6 and 9M8; 5 points for each contact on 80 and 40 and 10 points with each of the above; 2 points for each contact on 20, 15 and 10, and 4 points for each of the above; 3 points for each country multiplier. Final score equals sum of points times the sum of country multipliers. Log separately for each band, in UTC. No crossmode or crossband. Only one signal at a time on a band. Usual disqualification rules. Awards. Send to reach the following before October 31: Ismail "Eshee" Razak, 9M2FK, 281-C Jalan Pekeliling, Bukit Glugor, Penang, Malaysia.

14: WIAW Qualifying Run, 10-35 wpm at 0200 UTC, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EDST, 10 P.M. local Eastern time, the night of July 13. Underline one minute of the highest speed copied, certify that the copy was made without aid and send it to ARRL per the instructions under the July 6 listing.

23-25: CW County Hunters Contest from 0000Z July 23 through 0600Z July 25. Exchange QSO no., category (portable or mobile P or M), RST, state (province/country), and county (U.S. stations). Stations may be worked once on each band and again if the station changes counties. Portables/mobiles changing counties during the contest may repeat contacts for QSO points. Stations on county lines exchange only one number per QSO but count for two multipliers. QSOs with fixed stations count 1 point, with portables or mobiles 3 points. Multiply number of points times the number of U.S. counties worked. Mobiles and portables calculate their score on the basis of total contacts within a state. Suggested frequencies: 3575 7055 14070 21070 and 28070 kHz. Awards. Logs must show category, date/time(Z), stations, exchanges, bands, points, location and claimed score. All entries with 100 or more QSOs must include a check sheet of counties worked or be disqualified from awards consideration. Enclose large s.a.s.e. if results are desired. Postmark entries no later than September 1 and send to CW County Hunters Net, c/o Jeffrey P. Bechner, W9MSE, 673 Bruce St., Fond du Lac, WI 54935.

26: WIAW Qualifying Run at 2300Z (7 P.M. EDST). Other details under the July 14 listing.

AUGUST

6-7: YO DX Contest, sponsored by the Romanian Amateur Radio Federation, 24 hours starting 1800Z August 6; 80-10 (no crossband); cw, phone (no crossmode). Entries single op, single band, single op, multi-band, multiop, single band, multiop, multi-band. The object is to contact as many YO stations in as many YO "counties" as possible. EU stations may also be worked by the W/VE contingent. One may contact the same stations on other bands/modes but only after at least a one-hour lapse. Exchange RS(T) and QSO no. starting with 001, regardless of band or mode. Non-EU stations earn 2 points for each EU QSO, 10 points for each YO station. Each YO county and each country is a multiplier. Abbreviations of counties in each YO call area as follows: YO2 AR CS HD TM, YO3 BU, YO4 BR CT GL TL VN, YO5 AB BH BN CJ MM SJ SM, YO6 BV CV HR SB MS, YO7 AG DJ GJ MH OT VL, YO8 BC BT IS NT SV VS, YO9 BZ DB IF IL TR PH. Score equals QSO points times multiplier. Logs must include band/mode, time(Z), stations, serials, multiplier column (filled in if new multiplier), QSO points. Include a summary with computations, name, address, equipment description plus usual declaration. Awards. Logs must be postmarked no later than Sept. 1 and addressed to Romanian Amateur Radio Federation, Box 1395, 7000 Bucharest 5, Romania. Decisions of the contest commission are final. Illinois QSO Party, 15th annual, sponsored by the Radio Amateur Megacycle Society (RAMS), from 1800Z Aug. 6 to 2300Z Aug. 7, with a rest period from 0500-1200Z Aug. 7. All bands, cw and phone. The same station may be worked on each band and each mode. No repeater contacts. Suggested frequencies: about 60 kHz from the low end on cw; about 3975, 7275, 14725, 21375 and 28675 phone; approximately 25 kHz from the low end of each Novice band, particularly look on the half hour. IL stations send serial, RS(T) and county. Others send state, province or country in lieu of county. One point per QSO (Novice contacts count 2 points, ditto Tech. contacts in a Novice band). IL stations multiply QSO points by the total number of states (max. 50), VE/VO call areas (max. 10) and no more than one non-W/K/VE/VO DX country worked. Additional DX contacts count for QSO points but only one DX multiplier overall allowed. IL mobiles/portables away from normal QTH may add 200 to their final score for each county of operation from

which 10 or more contacts were made. Non-IL stations multiply QSO points by the no. of IL counties worked. They may also take extra bonus multipliers for each group if eight QSOs with the same county. Awards. Legible logs, with summary listing claimed multipliers and score, plus operator(s) name, address, call and category of operation should be postmarked by Sept. 15. Send to RAMS, K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634. Send a large business size s.a.s.e. along for a copy of results/critique to be returned.

13: Wonderful Wisconsin Rapids Week will be celebrated by the Wisconsin Rapids Amateur Radio Club, W9DQA, as follows: 75/80, 1400-1800Z; 20, 1800-2200Z; Novices 3725, 1400-1800Z and 7125, 1800-2200Z; 2 meters, 146.94. A certificate to all contacted who send an s.a.s.e. Send to Gene Santoski, K9UTQ, 1220 18th S., Wisconsin Rapids, WI 54494.

13-14: European DX Contest cw (WAEDC), sponsored by the Deutscher Amateur Radio Club, full UTC period, 80-10 meters. At press time no late info. had been received. The following data/dates follow traditional scheduling. (Note: Phone Sept. 10-11, RTTY Nov. 12-13.) Single op, all band; multiop, single transmitter. Only 30 hours of operation out of the 48 are permitted for single ops. The 12 hours of nonoperation may be taken in one, but not more than three periods any time during the contest. Non-EUs work EU stations only. Exchange RS(T) plus serial number starting with 001. Each QSO worth 1 point. Stations may be worked only once per band. Each confirmed QTC (given or received) counts 1 point. The mult. for non-EUs is determined by the no. of EU countries worked on each band. The multiplier on 80 may be multiplied by 4, the mult. on 40 by 3, the mult. on 20-15-10 by 2. Score is the total QSO points plus QTC points multiplied by the sum total of multipliers from all bands. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to a EU station. It can only be sent by a non-EU to an EU. A QTC contains the time, call and QSO no. of the station being reported. A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to the same station on all bands is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value. Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported. Certificates. Usual disqualification criteria. Contest Committee decisions final. Log 40 QTCs or QSOs per sheet (sheets are available from the DARC). Separate logs per band. Deadline for cw logs Sept. 15; for phone entries Oct. 15, RTTY Dec. 1. WAEDC committee address is Box 262, D-895 Kaufbeuren, Germany.

20-22: SEANET Contest phone, full details under the July 9-10 listing. CAN-AM Championship Contest sponsored by the Canadian DX Assn., designed to increase communication and friendship between VE and W amateurs, and to provide the means of measuring the performance of their operating skills and equipment. Phone, Aug. 20 from 0200-2400Z; cw, Aug. 21 0400Z to Aug. 22 0200Z, all bands 160 through 10 meters (the general portion of the bands is recommended for both phone and cw use). Categories: single op (stations operated by the license holder of the station); multiop, single transmitter (stations operated by one or more operators other than the licensee), club competition. Exchange consists of signal report, plus sequential serial starting with 001, and multiplier area abbreviation. (For the 50 states the multiplier area is the two-letter state postal abbreviation.) Others: CN (Caribbean, KC4 KG4 KP4 KS4 KV4 KZ5); PC (Pacific, rest of U.S. possessions). Canadians will use NL (VO1, VO2); NB (VE1 New Brunswick); NS (Nova Scotia); PE (Prince Edward Is.); SI (Sable and St. Paul); PQ (VE2); ON (VE3); MB (VE4); SK (VE5); AT (VE6); BC (VE7); NW (VE8NWT); YU (Yukon). Multipliers are the 50 states, 2 possessions (Caribbean, Pacific); 10 VE provinces, 2 territories (NWT, Yukon), 1 island (Sable, St. Paul); a total of 65 multipliers per band (maximum possible all bands is 390). American to American

QSOs count 2 points, likewise VE to VE. Contacts between the 2 countries count for 2 points. The same station may be worked once on each band and mode. If operating outside your own call area, you must sign portable and the area of operation. The final score is the total of points from all bands multiplied by the sum of multipliers of all bands. Phone and cw sections of the contest are considered "separate"; however, combined phone and cw will be used for an overall competition score. First-place certificates will be awarded in each multiplier area on both modes in single operator category. The top five multipliers will also receive certificates. All scores will be published. The top five stations overall will receive a one-year subscription to the CANADX Bulletin. Trophies and plaques. A plaque to the club with the highest aggregate score (same rules as CQWW). Log in UTC. Indicate multipliers the first time only on each band. Check for dupes, correct QSO points and multipliers. Do not use separate logs for each band. Attach a summary with all scoring information, competition category, operator's name/call, address of the station and the usual signed declaration. If more than 200 contacts are made a check sheet for each band must be included. A large s.a.s.e. will bring appropriate forms from CANADX. Disqualification: violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive dupes; unverifiable QSOs or multipliers (incorrectly logged calls will be counted as unverifiable contacts). Actions and decisions of the committee are official and final. All entries must be postmarked no later than Sept. 30 and sent to CANADX CC, Box 717, Station Q, Toronto, Ontario M4T 2N7, Canada.

New Jersey QSO Party, 18th annual, sponsored by the Englewood Amateur Radio Association. Open to all, from 2000Z Sat. Aug. 20 to 0700Z Sun. Aug. 21 and from 1300Z Aug. 21 to 0200Z Aug. 22. Phone and cw are considered to be the same contest. Station may be contacted once on each band, phone and cw are considered separate bands. (Cw contacts may not be made in phone-band segments.) NJ stations may work other NJ stations. Suggested freqs.: 1810-3535 3900-7035 7135 7235 14035 14280 21100 21355 28100 28600 50-50.5 144-146. Phone activity is suggested on the even hours, 15 meters on the odd hours from 1500-2100Z, 16 meters at 0500Z. Exchange QSO no., RS(T) QTH (ARRL section or country - NJ station will send their county). Contacts times no. of counties (21 max.) equals score. NJ station score 1 point for W-K/VE/VO contacts. DX contacts count 3 points with multiplier the no. of ARRL sections (including NNJ and SNJ, maximum of 75). KP4, KH6, KI7, KZ5, etc., count as 3-point DX contacts and a section multipliers. Awards. Logs must show date/time(Z), band, emission. They must be received no later than Sept. 17. Indicate number the first contact for each claimed multiplier and include a checklist of contact and multipliers. Make note of participant stations and include calls of all participants. Logs and comments should be sent promptly to EARA, 303 Tenally Rd., Englewood, NJ 07631. A size 10 s.a.s.e. should be included for results. Stations planning active participation in NJ are requested to advise EARA by Aug. 6 to aid planning for full county coverage.

27-28: 9Y4 QSO Party, commemorating the first anniversary of the Republic of Trinidad and Tobago, the full 48-hour period UTC 0610 through 1600 ssb and cw (OSCAR on ssb also). Exchange the usual five- or six-figure serial (RS(T) plus number starting with 001). A certificate will be awarded to any station working five or more 9Y4 stations. Contact may be made on different bands but must all be on the same mode. A certificate will be awarded for working a 9Y4 on five bands, a same mode. Log date/time(Z), numbers exchanged. For the five-station award, log only required. For the five-band award, the log plus QSLs required. It is requested that a remittance of \$1 or IRC equivalent be included with your log if you are eligible for an award. Entries must be postmarked no later than Oct. 15. Send to the T.F.A.R.S., Box 1167, Port of Spain, Trinidad, West Indies.

Station Activities

SCM X AREC X QRS X OVS X SEC X OBS X TCC X OO X NTS X WAC X
CP X A-1 OPR X EC X DXCC X CLUBS X RM X OPS X RCC X PAM X WAS

CANADIAN DIVISION

ALBERTA: SCM Sydney T. Jones, VE6MJ — SEC: VE5XC. It is with regret that I must report the passing of VE6WW. Walter was well known and highly respected. VE6WQ is new OO. It was my pleasure to have met with the Calgary Club at their Apr. meeting and was pleased to have been able to attend the latest addition to the ARRL film library "Moving up the Amateur Radio" which was well received. VE6AAT is back at his lookout post for the summer months while his XYL works in the city. VE6LQ has been visiting in G-Land and also VP9-Land and made contact with VE6MJ from the latter. VE6AQZ and XYL are presently in 6-Land on a visit. VE6AKX gave an interesting talk on micro computerized equipment at the Apr. meeting of the CARRA. Steve Guerin, ex-VE6SS is reported as a Silent Key. Traffic: VE6FS 140, VE6AV 15, VE6HO 14, VE6YW 6, VE6AFO 6, VE6VW 5, VE6CAA 2, VE6VM 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Net Manager, BCEN, is moving to Victoria so VE7GY will be missed for a while. The BCEN Net Manager reports that he will take over where needed. VE7FM reports his house was destroyed by fire with all contents. VE7TT been busy playing the bagpipes and trailering so not much OO activities of late. The BCFM gang is busy building a shed out back for auto-patch link to the repeater. This QTH is going to look like a communication center with APR, meeting of the CARRA, VE7ZK 91, VE7DFY 60, VE7FB 39, VE7MW 18, VE7CDF 14, VE7BLS 9.

MANITOBA: SCM, Steve Fink, VE4FQ — Asst. SCM: Peter Guenther, VE4PG. RM: VE4UL. PAM: VE4JP. Several of the Brandon gang provided communications at an air rally Apr. 16. The QTH sponsored a successful auction Apr. 24. The VE4 Worked and several mobiles award has become quite popular and several mobiles have been heard travelling around providing rare RMs and LGDs. A new repeater is up at Flyn Flon. The call is VE4FR, 146.34/146.94. New Wpg. Repeater Soc. exec: VL4MP, pres.; VE4PL, vice-pres.; VE4FH, secy.; VE4CF, treas.; VE4RE, tech. chmn.; VE4LU, past pres.; MEPN 30, VE4GQ 2, VE4QK 2, VE4TR 2. Don't forget the Peace Garden Hamfest, July 9-10 Traffic: VE4PG 150, VE4RO 99, VE4UL 91, VE4VW 43, VE4JP 16, VE4LU 7, VE4ID 6, VE4HA 4, VE4NE 4, VE4QJ 4, VE4AAD 2, VE4CR 2.

MARITIME & NLFD: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: Maurice Gladden, VO1FG. SEC: VE1DI. PAM: VO1JN. RM and APN Mgr.: VE1AMR. Net Mgr.: VO1GW. Hospitalizations incl. VE1CJ VE1DI. VE1DC broadcasting activities in '83 featured in MARC Bulletin. Back from Sunny Climes: VE1ACX VE1ABW VE1NQ VE1XG. HI-flying with R.C. aircraft are VE1BB and VE1TV. Sporting new equip. VE1DI VE1RV VE1AIN VE1GD is SARL Chmn. 777 Int. 634. Camp ARC. CRRL editor VE1SH has in editorial on RFL. A list of Merit presented to VE1CX. New Ex. I.R.G. WIOCU, pres.: VE1CL, 1st vice-pres.: KI1HC, 2nd vice-pres.: VE1HU, tech. dir.: VE1IN, secy.: VE1AIN, treas.: VE1AUW & VE1AMC gave talks to HARC on Micro-Processors and Safety in Am. Radio. VE1AGH VE1FQ & VE1QZ received press coverage for Armed Forces phone patch traffic. VE1MX demonstration Programable Keyer to HARC. VE1BKB working lots of DX. Last call for "All Saints Hamfest," St. Andrews, N.B. Sept. 3-5. VE1AOT & VE1AKL had articles on "Oscar" in their Bulletins. Fied Ezekiel & VO1AA Awards: VO-1 Contests for May. SONRA had VE1DM & VE1BB as recent visitors. APN Sess. 27, QNI 18/25, QTC 13, QTC 13. QTC 13, QTC 91, QTC 39. Traffic: (Apr.) VE1AAO 21, VE1JN 164, VE1AAC 138, VO1GW 56, VE1HJ 37, VE1EJ 21, VE1AUL 20, VE1BU 17, VE1AMR 5, VE1AMB 4, (Mar.) VO1KE 12, VE1KL 8.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: Norbert Nimmans, VE3GOL. Because of the many club bulletins I receive, a good portion of this column is devoted to club news and activities and, at this time I would like to invite all clubs to investigate the advantages of club affiliation with the League. A club applying for affiliation must have a voting membership that is 75% or higher of ARRL members (full or associate) and at least 51% of all members licensed radio amateurs of any grade. The procedures are fairly simple, a little paper work but, zero cost to your club. Check and see if your club is affiliated, if not, VE3GOL can supply all the necessary details. Newly affiliated clubs are, Algoma, London and Skywide Arcs. Welcome new members VE3TV, IO, IOB, IIZ, IY and IOT. XYL of VE3DQJ. The VE3MRT repeater committee's summer project is to increase power and relocate the antenna to provide better coverage northward from Bracebridge. Barrie ARC had a good turnout for their annual breakfast. VE3FN has taken up bicycling while VE3GEG is active on the QTH. VE3ZQZ is active on receiving the ARRL Certificate of Merit. VE3DV new Asst. Dir. Our sympathies to the families of Silent Keys VE3FES and ex-VE3AO. A new 6-meter award is available with a point structure based on both countries and ARRL Sections. Special applications available from ARRL or CRRL. Hqs. VE3FVN now VE3FN. Special thanks to VE3GT HFY and FZS for the loan of their equipment recently. VE3QE, with slides supplied by VE3BFM addressed the Gulph ARC on Oscar. KWARC held a successful demonstration at the Fairview Mall. Operations included traffic handling and SSTV. VE3CDK has earned another SPL. Burlington ARC sponsoring Hamfest '77 on July 8, 9 and 10 at the Milton Fair Grounds. Winners of the Northtown Homebrew Contest were VE3s FDX EIP and IBM and trophies for the CQ Northtown Contest were presented by VE3AQJ to VE3s EES FIS and GYM. VE3BMC transferred from Ottawa to Toronto. There are 1,026 call sign licence plates issued, about 17% of the Ont. amateur population. Have a safe, happy and enjoyable summer. Traffic: (Apr.) VE3CDK 284, VE3SB 258, VE3GOL 254,

VE3DPO 178, VE3HJ 153, VE3ISW 149, VE3GFN 148, VE3DV 74, VE3GT 62, VE3GNW 57, VE3ATR 51, VE3EWD 51, VE3BDM 44, VE3DVE 41, VE3JG 29, VE3CYR 27, VE3JG 17, VE3DH 13, VE3GCE 6, VE3GCC 4, VE3GEQ 3. (Mar.) VE3DZK 48, VE3GCC 2.

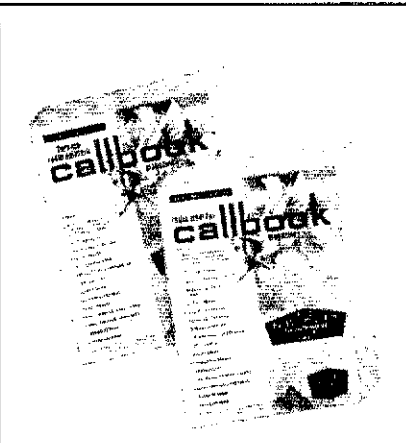
SASKATCHEWAN: SCM, Ron Nagel, VE5RN — SATN now on summer hours at 0400Z until Aug. 30. Hopefully it can continue to operate during the summer. Thanks to VE5VM for a fine SATN season. Plan to attend Hamfest '77. New license plates look great. Thanks go to VE5HP for his efforts. Congrats to VE5HI, Regina's new pres. With the holiday season upon us we hope our repeaters can be monitored diligently to aid travellers. Its a nice feeling to QSO in strange territory. Special thanks to all who helped out with the class throughout the province. Its obvious you did a good job by the ever increasing number of new calls cropping up all over the place. Traffic: VE5LO 82, VE5AAE 54, VE5HP 41, VE5WM 30, VE5BO 28, VE5NJ 16, VE5QV 11, VE5RN 11, VE5RP 10, VE5OL 9, VE5UP 4, VE5BD 3, VE5UX 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: WA3DUM. RM: W3EEB. PSHR: K3YHR 49, K3KAJ 44. W3EEB is now Net Mgr. of the MDD with K3KAJ as QTC Recorder. IDARC Novice classes listed 61 graduates on Apr. 1st. The final Novice Class of the spring as well as a General Class under the direction of WA3QLS is now in progress. An effective training program can lead to increased membership in any club while ARRL material aids in conducting these classes. More station activity reports are needed by the SCM. In 1976, four more reports would have placed Delaware 3rd in the National TFC standing (Apr.) DEPN: QTC 9, QNI 80, (Mar.) DEPN: QNI 66, QTC 5, DTN: QNI 331, QTC 38, Traffic: K3KAJ 219, W3EEB 59, W3DKX 33, WA3WY 26, W3WD 21, K3YHR 16, K3HBP 11.

EASTERN PENNSYLVANIA: SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: WA3OGM WA3XU WA3YJG. PAMS: W3AVJ WA3PZO. Net reports PTTN QNI 154, QTC 102, AREC (2) QNI 5 AREC (10) QNI 2. What happened to the other net reports? OO reports: W3CL W3KEK. OBS reports W3CL W3ID. OVS reports WA3NDQ WA3BJQ W3CL W3GJ. WA3GJ reports WA3GJ WA3GJ WA3GJ WA3GJ WA3ATQ WA3YJG K3NSN. PSHR: WA3YJG. Looks like the summer doldrums have already set in. WA3ATQ says gonna start garden in snow. WA3CFU's XYL now WB3GOZ! WA3BSV busy showing "Moving up to Amateur Radio." WA3NRU RACES station active on 106 & 2 meters. W3ID says it isn't his receiver, stations just don't check in any more. QTC report traffic is down. Maybe we should originate some! New OVS WA3AZE. W3WRE says antenna is about to go up and she will be back on CW nets. WA3ZBR renovating shack, says a bulldozer might be best tool to use. W3EU is still trying to be active on intruder watch. OO reports have been lean, guess we have been behaving. New officers for Frankford Radio Club: W2BGN, pres.; W2HMH, vice-pres.; K3NL, secy.; W2RHE, treas. PTTN has a nice new newsletter. Summer is here so lets get all those antenna repairs and modifications done before the first snow. Looks like I gotta build a fire under the RMs to get those reports, remember you hurt EPA when you fail to report. Don't forget to General Classes at WA3GCD WB3FQH WB3FQI. Traffic: W3CL 3234, W3GJ 1086, K3NSN 820, WA3YJG 784, WA3ATQ 317, WA3THT 302, WA3ZRY 262, WA3ZXI 204, W3IPK 189, K3KW 151, WA3WQP 91, WA3NDQ 77, WA3TJ 82, N3KZ 33, W3CFU 18, W3AE 16, WA3BSV 15, W3XA 14, W3ID 14, WA3NRU 10, W3CL 9, WA3JDF 6, W3YHR 7, WA3YHR 7, WA3YHR 6, WA3YDQ 6, WA3VDQ 4, W3HK 3, WA3BJQ 3, WA3GJ 3, W3GOA 1, W3WRE 1, WA3ZBR 1, W3EU 1, W3KEK 1. (Mar.) WA3BSV 6.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC N3II needs your monthly EC reports. WB3ETD teamed up with WA3UJH to put the Apr. Fredericksburg, VA Boat Show on the map. WB3AON WB3AWK and WA3PAA upgraded to Extra. WB3BKJ W3HFA WA3VPL and WA3WKC to Advanced. WA3OIB K3STM WA3UJE and K3WUR to General, and WB3EDX to Tech. Congrats to each of you. The training program of the Goddard ARC is so popular with the school system that the club has run out of instructors! Active OOs WA3RSZ and WA3KVC for Apr. W3WV changes QTH but not county. W3UJH does a lot of traveling. WB3Y/3 has his final fling before transferring to W6-Land. WB3EPN/WB2TJR is picking his law school. W3CDQ made it to the FB Balto GCWA dinner along with W3ABC W3IN and W3QDI from W DC. WA3KVC awaits a new TS-820. W3WBY took advantage of the summer package as well as completing his 40-meter beam. WA3JVF is making code tapes for his club as his other activities. W3IKA is loud with his new 80-meter antenna. W3FZV made 23K in the CW CD party. WB3BUA keeps Glen Burnie alive. K3QRW logged 418 QSOs in the Fone CD fray. W3COT is scheming new 80-meter antennas to go with the tower. W3PRW/26122 Toppack (3RI). Others W3ADQ W3PAA W3YHR W3YHR W3YHR W3YHR W3YHR W3YHR W3FA WA3BFQ W3LDU MDCTN/K3QRW/16/54/16 WR PON/W3DFW/18/72/18.5. MDC PON/W3OY/4/22/23. Coming events: MDD/MEPN/MDCTN picnic McKeldin Area No. 501, Patapsco State Park, Sat. Aug. 29. Shelter rented. Bring the family for the day. MDC QSO party Sept. 17 and 18. Traffic: (Apr.) WB3ETD/4 416,



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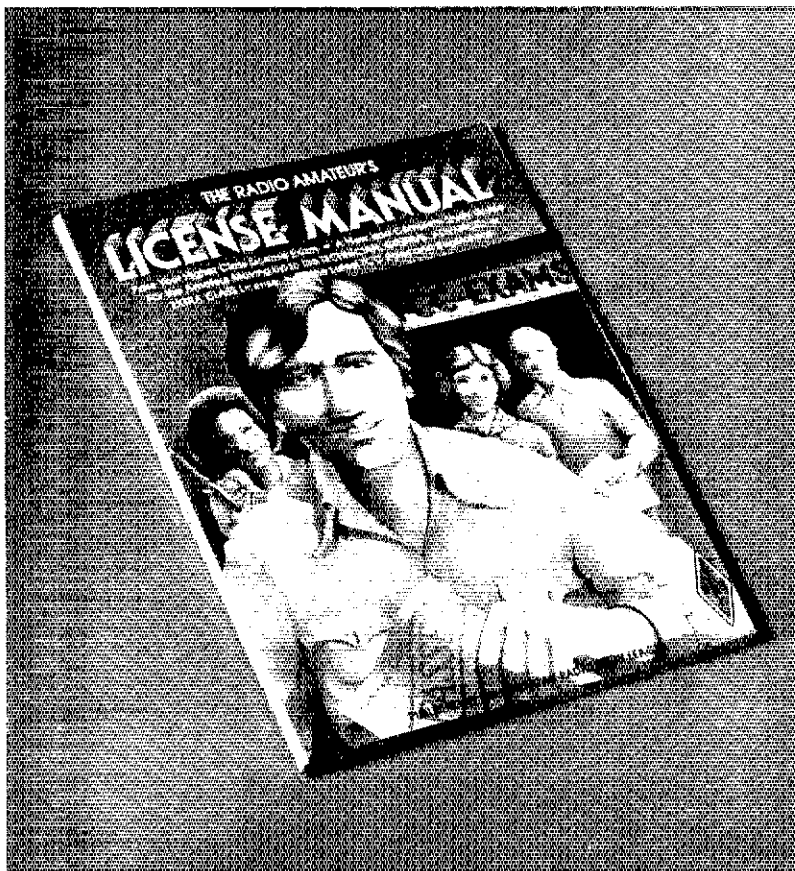
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W3HKA 116, W3FA 110, WB3ETD 70, WB3CQT 44, WA3UYF 38, WA3PRW 26, W3FZY 22, WB3BUA 10, WB3EDX 8, K3ORW 4, W3ZNV 2. (Mar.) W8BZY/3 138, WB3ETD 77. (Feb.) WB3ETD 18. (Jan.) WB3ETD 41.

SOUTHERN NEW JERSEY: SCM, Raymond F. Ciancy, WB2GTE — SEC: W2HOB, PAM, WB2LCC attended Red Cross disaster communication meeting in Phila. WA3HGX/2 is QVS. Tnx to WB2LNR for Crosstalk. W2FBF N2CQ W2SUA had nice scores in DX competition. WB2AYA reports hearing 8 stations 2nd harmonic out-of-band, WA3LMY/2 now N2JUT. W2PJU active with repaired ant. K2AI has T22. W2JL returned from FL and resumes skeds. W2YMT now Advanced. WB2LPT WA2AMU passed 2nd Class Commercial. WB2LCC passed 1st Class Commercial. WB2WKK now K2ADJ. West Jersey ARC sponsors Amateur exhibit in the Willingboro Public Library for one month. W3PTQ busy with spring chores. Eastern Area VHF society had FD plans. WB2LAU made audio osc. W2EA visited CO. SJRA Novice class of 24 took FCC exams. Tri-City ARC reorganized under W2AZ guidance and look forward to ARRL affiliation. WB2LFB works at RCA and on 2M. WA2VYA upgraded to Advanced. K2M2P now K2CR and XY1 passed Novice exam. WA2LMZ new Tech. SJRA members scored 962994 CW and 493731 phone in DX competition. Delaware Valley RAC had successful flea market/auction sez K2AAR. Salem County RC reactivated after years of inactivity and 18 new Novices and 17 attending General course. Congrats! Traffic: W2Q 282, WB2LCC 70, N2JUT 23, K2BG 16, WA2VP 12, W2JL 11, WA3HGX/2 11, W2FFY 8, WA2PTQ 6, W2IU 4.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YA — Asst. SCM: William W. Thompson, W2MTA. SEC: WB2EDT. Registrations for FCC examination at the Rochester Hamfest are over 450 and there are still 3 weeks to go with 6308 arriving at 20 to 30 per day. K3CT will be a very busy examiner this year. Speaking of exams, a warm welcome to these new WNY Novices: WA2LJI, WB2KGE, WA2MMC, WB2MMU, WB2LBG, WB2LBF, WB2LBN, WA2LBG, WA2LBI, WA2CBD, WA2LBC, WA2LBD, WA2LBE and WB2JTE. Also approximately 180 upgraded during a recent FCC visit to Elmira. Evidently May was a good month for auctions with ARATS and the combined RRAA/Rochester VHF group auctions turning in best ever performances. The ARATS affair was chaired by WB2CJL and auctioneered by WB2QZL. W2MPPM turned in a premiere performance as RRAA/Rochester VHF group auctioneer. The Hamburg International Hamfest being planned for Sept. 17 at the Erie County Fairgrounds. For details contact ARATS. New RARA officers for the '77, '78 season are: W2MPPM, pres.; WA2ZNC, vice-pres.; WB2RJB, secy.; K2RJ, treas.; WB2EDT, W2NVZ, WA2EKR, WA2UEB, WB2ZFM, WA2BQA, WA2KND, dir. Regret to report that WA2CCI became a Silent Key, WA2EKR without an approximate 20 WNY ops and 8 W3s are providing public service communication for a two day 375 mile road rally in Wellsboro, PA in May. WA2EKR promises many good war stories following this one. Clubs scheduling me as a speaker should not assume I am available unless a definite and preferably written commitment is obtained at least one month prior to the meeting. Traffic: W2RUF 189, WA2ELD 146, W2OE 138, W2MTA 129, W2PZL 112, WA2JIP 77, WA2LUF 68, W2RDF 37, W2T7 39, WA2AIV 24, K2RV 24, WB2QIX 21, WA2UAR 13, WA2ECA 7.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP; Asst. SECs: K3SMB, WA3LJW, PAM; K3SMB, RMs: K3A1, W3NEM, W3LOS, W3KUN.

Net	Freq.	Time(Days)	Time/Days
WPA CW Traffic	3885.0		7:00 PM Dy
WPA Phone Traffic	3983.0		6:30 PM Dy
PTTN	3610.0		6:30 PM M-F
WPA RACES	3990.5		9:00 AM Su

New appointments: WA3JUP as EC for Bedford County and WA3YXJ as EC for Crawford County. A reminder to all appointment holders to report monthly via Form 1. Special thanks to all the Section clubs who conducted Novice classes in the past months and keep up the good work. Get well wishes for K3AN, K3VCI and K3YB. Communications for the Bushy Run Lions Club walkathon was handled by WA3VNF. K3YEB, K3JZD, K3PIR, WA3ZBA, WB3DD5 upgraded to General Class. WA3FWA received his WAS certificate. The PA Traffic & Training Net (PTTN) is active again on 3610.0 kHz. Contact WA3YJG or K3KW for details. This is an excellent net for traffic handling procedures and increasing code speed. The WPA CW Traffic Net had 30 sessions in April, handled 196 messages with 417 check-ins. The WPA Phone & Traffic Net had 29 sessions, handled 15 messages with 300 check-ins. P5HR credits WA3VBM. Traffic: WA3VBM 380, K3AT 270, WA3AHP 181, W3GJ 67, W3KUN 51, K3VCI 49, K3CHD 42, W3LOS 30, K3SMB 13, WA3ZBA 18, W3ATE 18, W3UT 14, W3AS 13, W3SN 10, K3CR 4, W3IDO 4, W3VO 4, WA3QNT 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PNN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES, PAM: WA9KFK. RM: W9NJU. Cook County EC: W9HPG.

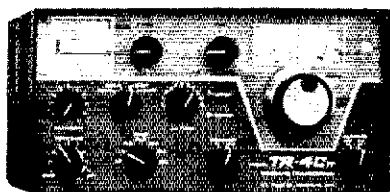
Net	Freq.	Time(Days)	Tr	Sess
ILLN	3690	2330/0300 Dy	502	60
ILL Phone	3915	2245 Dy	253	30
NCPN	3915	1200/1700 M-S	318	21
IEN	3940	1400 Su		No report
Ill Slo	3712	0100 Dy		No report
Speed	3712	0100 Dy		

K9AR is the new call of former WB9DED. RM, W9NJU's new QTH is 504 Lyons Avenue, Wheaton, IL 60817. New officers of the Knox County ARC are: WB9DDF, WB9QJY, W9KRT and WB9NEH. W9NOR is a graduate of Hamfesters Radio Club's code and theory class and received the call WD9DMK. WD9DCX is a new call in west Chicago suburb. Rav Lane of Clinton, ex-W9KXN is back on the air after many years with the call WD9AIA. WB4EKJ net manager of the Central Area daytime net needs contact and liaison assistants. Contact him for particulars. Two new Chicago Novices are WD9CTD and WD9CUH. I would like to thank the many letters and radiograms from the gang who sent their condolences to me upon the death of my wife Mary. They were appreciated by me and my family. WB9ZNK is new call in Bloomington. This column's sympathy to the family and friends of W9BJJ who recently joined the ranks of Silent Keys. WB9ZNK upgraded to Tech.

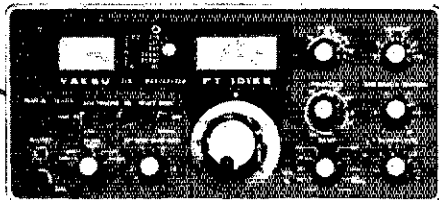
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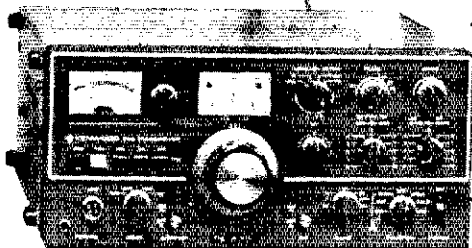


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TR-4C W SSB transceiver

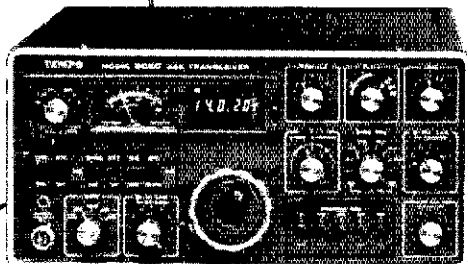


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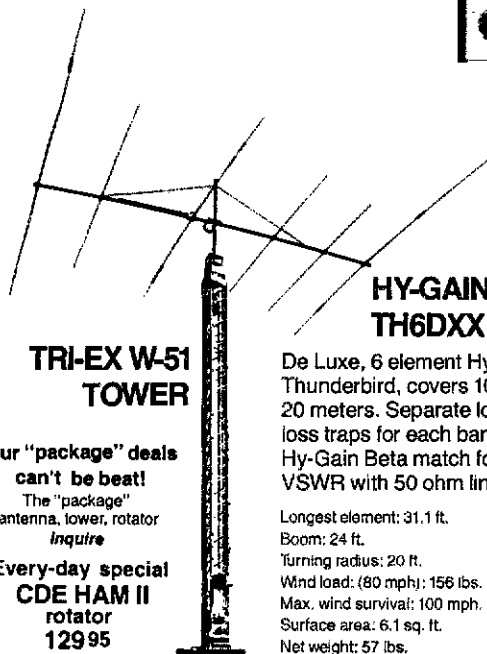
KENWOOD
TS-520 SSB transceiver



TEMPO
2020 SSB transceiver



TEN-TEC
Triton IV Digital SSB transceiver



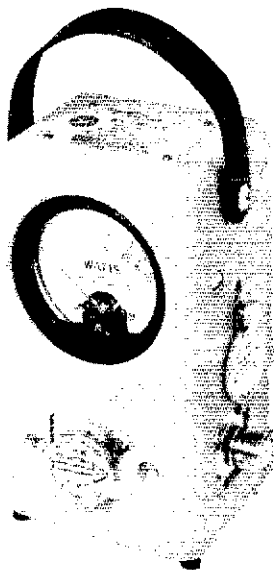
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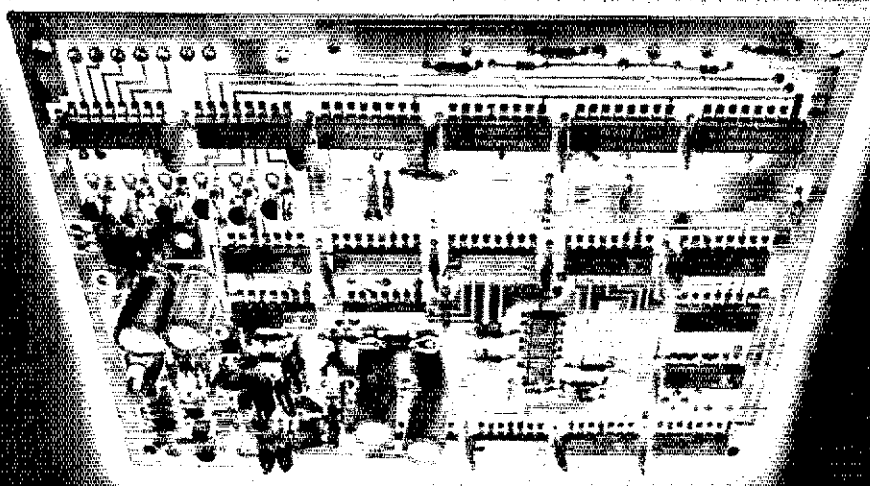
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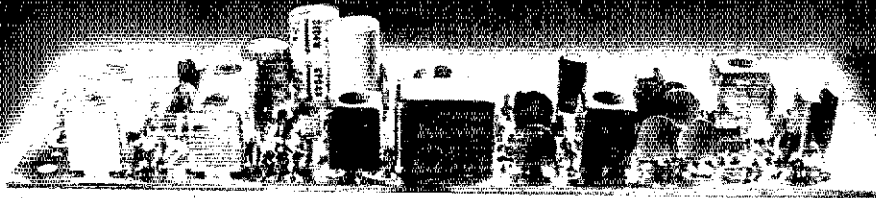
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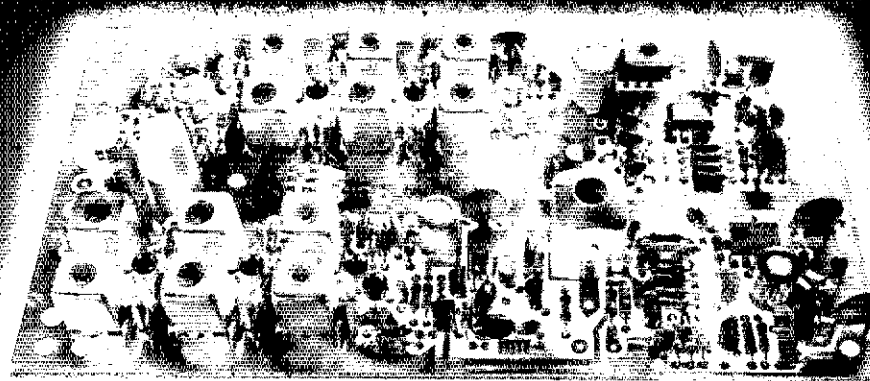
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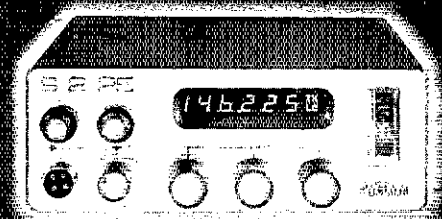
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class. WB6UPV, ex-WA9OVN, was back in W9-Land holding the reins of command. The Lakeview Amateur Radio Club of Chicago held its spring get-together on Apr. 1st with W9QQG in charge of the affair. New appointments are: WB9VVF WA9GBX WA9GBW and WB9JSR as GRSS and W9IL and WB9PHM as OOs. The Sangamon Valley Radio Club will hold its 2nd annual Hamfest on Sun. Sept. 25 at the New Berlin, Ill. fairgrounds. In case of rain it will be held in the gymnasium of the New Berlin, Ill. Circle Amateur Radio Club. WA9GBW and WB9JWC are BPL recipients for Apr. Traffic: (Apr.) WA9GBW 309, W9NJP 305, W9JWC 284, K9KHI 256, W8SNOZ 210, WB9JSR 165, K9ZIV 142, WA9VGW 123, W9OK 115, WA9EBT 113, WA9JE 112, WA9YZR 91, WA9RF 73, WA9BB 71, WB9RSW 66, W9NKG 50, W9LNG 37, W9JJ 40, WB9NA 29, W9OYL 24, WB9RGZ 22, W9PE 15, W9PN 15, W9NNG 14, WD9ARL 14, WB9UAR 11, W9HPG 9, WB9PHM 8, K9AR 8, K9UIY 6, W9LFH 5, W9ZAU 5, WB9EDP 2. (Mar.) WA9JE 90.

INDIANA: SCM, M. P. Hunter, W9LF 5-EC; W9LHM, Emeritus to WA9WKA on completion of his WAZ award. W9LHO and W9LIS were guests at the spring banquet of FWRC. An effort is being put forward to establish a new traffic training net with NTS affiliation. The net is called the Indiana Code Net (ICN) and meets on 3/37 kHz at 2315Z daily with WB9OZW assuming control. WB9AIE is now on the air from Lawrence Co. on 13/73. WB9CDH reports the air from Porter Co. A 2 1/2 hour on the first Fri. of the month at Valpo Tech. Preparations are nearly complete for the Indy Hamfest on July 10 at Marion Co. fairgrounds. Contact WA9FUD for details. WB9SLV advises a new 24/84 repeater is under construction. WD9ADW is ready for Cycle 21 DXing. The bands continue up and down with good DX still available to those who can persist. Anyone ambitious enough to compile a cross reference of two letter calls? Lake Co. ARES provided communications for N.W. Ind. March of Dimes on Apr. 30. Net Tfr: QIN 130, INN 34, ITN 518, INTN 92, IPON 1, Hoos. VHF 69, Traffic: W9IOH 479, WB9KTR 410, W9GLW 325, WA9RF 233, WB9PBR 191, W9QLW 155, W9HUF 145, WB9CF 138, WB9CF 138, W9EL 94, WB9CKA 62, WB9NAQ 62, WB9QEZ 56, K9TKB 38, WB9YXN 54, WA9TJS 52, K9YBM 44, W9JBC 38, WB9SOY 31, WA9QCF 30, K9WWJ 30, WA9ITB 29, WB9DIX 28, WB9IHR 28, WA9OHX 26, K9RPZ 24, WB9ORM 22, W9PM 21, W9ENU 19, WA9BV 12, K9FOV 12, K9RWG 12, K9IN 11, WB9HCH 8, W9RTH 6, WB9SLV 4, K9BEH 1, W9BDP.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI -5-EC; K9Z2, PAMS: W9AYK K9UTQ W9IEM, RMS: WB9ICH K9KSA W9OT K9LGI K9EN, Nets, Freq. Time, QNT, QTC, Mgr.: BWN, 3985 kHz, 1248Z M-S, 43, 435, W9AVK, BEN, 3985 kHz, 300Z Dv, 516, 90, W9IEM, W9BN 3985 kHz, 2310Z, 1001, 133, K9UTQ: WNN, 3925 kHz, 2315Z Dv, 74, 8, WB9ICH: WIN-E, 3662 kHz, 0100Z Dv, 125, 198, W9OT: WIN-L, 3662 kHz, 0400Z Dv, 157, 94, K9LGI: WSSN, 3662 kHz, 0045Z, K9KSA: RTTY, 3662 kHz, 5, 0130Z, 13, 0, K9FN: Wis. ExPO net, 3925 kHz, 1301, M-F, 540, 27, WA9NIX, W9IHM, has Life Membership ARRL New Novice Wa9NIX has Life WD9CTJ. K9KGA now K9GA, WB9FKL is N9XX, WA9QAM is W9QA, WB9UIR is K9AZ, WB9BPM now W9NT (this rather held the call NT back in 1923). WB9HWD is K9EE, FLARC holding General class. WA9ZS is W9WZ, The Tommy Rockford Books have been donated to the Portage Public Library and Baraboo Public Library by YIARC. WA9PKM is K9EP, New Novice in Baraboo WD9CYR and quite active. Milwaukee and Waukesha County Ham Radio operators had a good workout on Apr. 2 during the severe weather. Understand the weather bureau was greatly appreciative of the work done by the amateurs (from Kettle Drums and Milwaukee County E.C.). WB9UCR has sold all his gear and house, will be working in Boston area then back to sea, where? (Kettle Drums). The Oshkosh ARC is giving certificates to those new Novices, or one who upgrades or those who achieve special honors (intercom). J-E 5-EC Northeastern swapeset July 24, K9CPM back. W9ZGQ made BPL Traffic: (Apr.) W9ZG 724, W9SFL 204, WB9ND 178, K9MZD 133, WB9ICL 120, K9FHI 88, W9IEM 69, W9DT 67, W9AYK 50, W9IHW 44, K9JPS 32, K9UTQ 31, WA9VKT 22, WB9JW 21, WB9QXD 15, K9ANV 14, WB9PYG 13, W9MFG 11, WB9LKC 10, WA9NLV 10, K9CPM 7, WB9RRU 7, WB9RRV 2, WB9OFC 2. (Mar.) WA9NDV 11, K9ASC 2.

DAKOTA DIVISION

MINNESOTA: SCM, Gordon Olson, WA9GL1 -5-EC; WA9CF 2 PAMS: WA9VY 1, WB9SJM MSN1 Nono; WB9HOX MSPN Evening, RMS: WB9QWH M5SN, K9CVD MSN 1, WB9LDW MSN 2. When you read this one of you will already know that K9II has resigned as SCM for the MN Sect. His resignation was effective Apr. 20th. I (WA9GL1) will be Acting SCM until the election this fall. I wish to thank K9II for all the hard work he has done for the MN section during his term as SCM. His Minn. slow speed net has come from a three night a week start to a full fledged seven-night a week NTS net. Good Job Frank! More new 2-letter calls: W9KE is now K9GA, WA9JUK is K9ET, WB9QWH is the new RM for MASN, a job well done goes to WB9OFR who resigned May 1st. W9MD and WA9QIT both had letters to the editor published in the Diluth News paper advising the Jack Anderson article. Jack old boy it's obvious you just didn't know what you were talking about! WA9LIS is the new EC for north St. Louis County. WA9FRA has a Triton IV. More new call-letters -- K9ZG WB9NAA WB9NCP WB9UTV. New acct-memory for WB9KTH. New Brown Bros. key for WB9QM. Hear them all down on the radio. K9I and WB9ICL have teamed up with a new list of MN ARCS, 38 on this new list. If your club has a club news letter I would appreciate one copy when they are sent out. WB9JYT is DXing on a 32-ft sloping dipole! He has several new countries as does WA9ERW with a new beam. WB9VNC and WA9VVT made PSNR. WB9QER spent several hours operating as NTS during the floods emergencies in WVA and KY. Traffic: WB9QEU 1/5, WB9LDW 145, WA9VVT 138, K9CVD 134, WB9OFR 127, WB9PKG 98, W9QMY 98, K9II 82, W9DUW 78, WB9HZ 66, K9PZ 64, WB9VNC 63, WB9QPO 54, W9HIZ 57, K9RMX 48, WA9L 47, WA9FC 41, WB9NZE 40, K9CSE 34, WB9L 29, WB9S 29, WB9DLU 28, W9QBR 21, W9PET 21, W9OPX 18, WA9WV 18, WA9JPR 12, WA9EZQ 10, K9BD 8, K9ZBI 6, WB9JYT 6, W9FLT 4, K9SXQ 3.

NORTH DAKOTA: SCM, Mark J. Worcester, WA9WLP - The YL with Net closed for the summer on Apr. 15. Fine job again this year. WB9PDP is planning to take a new position out of state. Thanks for the good job with the Weather Nets and SEC. The new SEC will be W9RIB of Bismarck. The EC net will still meet on the first Sat. of the month at 0900 CDST. Three Rivers Radio Club sponsored Wth. work shop with CD of Richland County in attendance. K9PYZ home from the hospital suffering from a virus. International Hamfest scheduled for July 9 and 10 at the Peace Gardens - See You There.

Nets - kHz CDT/days Sess. QNI QTC
 Manager
 Data-3996.5 1800 S-S 38 264 94
 WA9SUF
 YL Wth-3996.5 None 15 74 317
 WA9RWM
 Goose River-1990 0900 Su 4 33
 WCDO
 Traffic: WA9RWM 600, WA9SUF 40, WCDO 38.

SOUTH DAKOTA: SCM: Ed Gray, W9SD - WC9Y is a silent key. New two letter calls are K9HJ-D now W9UD. WA9VF as K9AC. W9NWK as K9AS. W9DDGA as K9RA. WA9CP as K9GF. WA9WMMG is W9WH. New Amateur Extra Class licensees are K9GZZ, W9JUA, W9PHW; new Advanced are W9RRHJ and W9QYMR; new Generals are W9DQMF, W9QVEV and W9QTPQ; new Techs are W9TJL, W9WZLN, and Bob Ellis (previously no call); new Novices are W9DPAE and W9DQJH. K9ZTT/9 W9VH WA9NRE W9SD and Novice Fred Fletcher attended the Dayton Hamvention. The Rapid City Two meter Autopatch is on the air. It is a special repeater for that use only. Net reports: Total QNI-2852 and QTC-116. Traffic: WA9VEW 212, W9HOJ 96, W9DVB 82, W9IG 29, W9M21 23.

DELTA DIVISION

ARKANSAS: SCM: S. M. Parkorny, W5UAU - SEC: W5AVNY. Traffic: W5PAC, W5GZW, K5MEA. RM: W5MYZ. Nets, kHz Times/Day QNI, QTC: Mgr: QZK, 3760, 0000/DV, W5MYZ: APN, 3937, 1100/MS, 870,37,W5POH; M-Bird, 3928, 2130/M-F, 582, 17, W5SZWZ; ARN, 3995, 2330, 606, 12, K5MEA. W5FMK now Extra. W5AFK Jasper now all solid state on 146.01-61. K5MEA new Mgr. for ARN. Jonesboro-Ridge picnic at Crowley's Ridge Park Sun. Aug. 21. New ham in AR: W558BH BI BIQ BIV BIZ BJD BJE BJF BJH BKA BKM BKP BMC BMD BME BMF BMG BMH BMI BMJ BMK BML BMM BMN BPM BPQ BPR BPT BPU BPV BPW BPX BPY BRZ BQV BQW BSB BTI BTM BTT BWG BWS BWT BWU BWW BWX BWX. Traffic: K5MEA 41, W5POH 29, W5SMF 21, W5BLD 22, K5DW 16, W5UAU 15, W5KL 2, W5SHY 2.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP - Asst. SCM: John Meyer, W5JFB. SEC: W5C1Q, RM: WA5ZZA. PAM: W5NEZ. VHF PAM: W5VBC. The new Asst. SCM is John Meyer, W5JFB. John is very active on the bands. He is the former Traffic Editor Delta DX Club. I know he will be a great help to the Section. The Stan Preston Award was given to W5NVB at the Baton Rouge Hamfest. The BR award went to K5AHH. New Assist. Directors are WA5IBT and WA5LH. New officers of the Delta DX Club are K5TV, pres.; K5KR, vice-Pres.; W5CB, treas.; WA5AWX, secy.; W5RTH, very active as CO. W55RTW active on LAN as well as LSN. Many thanks to W5NVB, WA5TQA and W5FHH for all the arrangements for the traffic handlers meeting at the BR Hamfest. It was attended by 25 members of our four nets, WA5ZZA, RM had another meeting Sun. at RR, mainly for NCS and liaison stations. K5CRK long time traffic YL also at the Hamfest. New members of SELARC of Hammond are W5FBO and W5BEM. WA5VQE now K5MC. New OBS spot. WA5IBT.

Net-Freq. Time/Days QNI QTC Manager
 LAN-3615 7 & 10 PM Dy 493 256 WA5ZZA
 LTN-3910 6:30 PM DV 390 58 W5NEZ
 LSN-3703 8:30 PM M-F 86 21 W5AVNY
 LRN-3587.5 7:00 PM Su 12 4 W5RHU
 Traffic: WA5ZZA 389, W5GHP 316, W5RTH 159, WA51QU 144, K5MC 119, W5NEZ 75, W5NVB 73, W5SCDX 65, W5SOOM 40, W5QCJ 30, W55AMN 26, WA5ANV 25, W5FHH 25, W5LBR 24, W5YN 12, K5BLV 8.

MISSISSIPPI: SCM, E. Ed Robinson, W5YTN - SEC: W5PFXA. Enjoyed an FB visit with the Ms. Coast ARC. Also, fine time at MSBN picnic Westpoint, MS. Delta ARA reports good activity including new Novice classes. W5CAR, Shanon A RC repeater 147.84/24 now operating from 198 feet AGL Shanon, MS. Note: Most nets have changed times with onset of daylight saving; MSBN, 3987.5 kHz, 1815 CDST; Gulf Coast Side Band Net, 3925 kHz, 1830 CDST; MTN, 3665 kHz, 1845 CDST; MSN, 3733 kHz, 1800 CDST and Central Gulf Coast Hurricane Net, 3935 kHz, 1900 CDST. Congrats and welcome to new MS ham: W558 BHQ BIT BIG BHT BIU BHH BHW BIF BJL BLQ BMW BMZ BMX BOO BOE BOF BOI BSK BSJ BSN BRY BSN BSQ BQV BSO BTK BRC BUI BSI BWD BVB BUS BWJ BVI BVI BWK BWO BZI CDA CDM CBQ CDB BXZ BYL CCW WDL CCE CCA CBC. DRG, session 30, QTC 263, MS Rep. 93.9%; C9C9N, QNI 2931, QTC 124, MSN QNI 1249, QTC 59; N. E. MS FM Net, QNI 390, QTC 24; MTN, QNI 205, QTC 83; Miss-Lou Weather Net, QNI 117, QTC 9; MSN, QNI 35, QTC 10. Traffic: W5FHA 143, W5LXX 124, W5EDT 75, W5LSG 63, W5WZ 56, W5YTN 34, W5MTG 25, WA4KRV 5 22, W5VHR 20, W5SMN 14, W5NFB 12, W55QCA 12, W5WB 11, W5SWZ 9, W5NCF 5, K5RRG 5, W5LL 4, W5RUB 4, W5HAS 2, N5XZ 2.

TENNESSEE: SCM, O. D. Keaton, WA4GLS -
Net - Freq. Time/Days Sess QNI QTC
 Manager
 IPN - 3.980 1140 M-F 85 4832 319
 WA4EWW
 WA4PH 1245 M-F
 WB4YPO 0130 M-Su
 1400 SSUW
 TN - 3.635 0130 Dy 28 281 112
 K4YFC
 TNN - 3.710 2300 M&Th 9 69 26
 WA4CNY
 ETVHFN - 50.4 0200 MWF 12 116 4
 WA4WZJ
 ETVHFN - 145.2 0200 TTh 10 40 0
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 WTVHFN - 146.372330 Dy 33 979 507
 WA4VVX
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- TV-300-HP High-pass filter 10.60
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- SSR-1 General coverage rcvr 350.00
- HS-1 Headphones 10.00
- SPR-4 Programmable rcvr 629.00
- 5NB Noise blanker 70.00
- AL-4 Loop antenna 29.00
- AN-5 S.W. antenna kit 8.80
- DC-PC DC cig. lighter cord 5.00
- RY-4 Teletype adaptor 20.00
- SCC-4 Crystal calibrator 20.00
- TA-4 Transceiver adaptor 35.00
- Plain crystal selector dial 3.00
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- Citizens band xtal kit 5.25
- Marine bands xtal kit 57.20
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- Commercial teletype xtal kit 20.80
- Time & freq std, WWV xtal kit 26.00
- Tropical broadcast xtal kit 15.60
- FS-4 Frequency Synthesizer 250.00
- Interface kit for SPR-4 9.50
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- AC-10 AC supply 49.95
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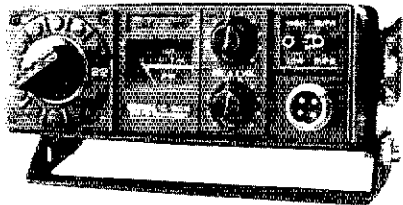
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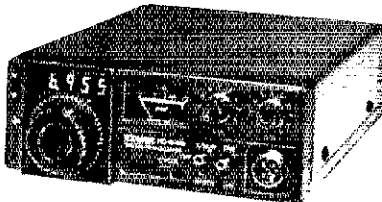
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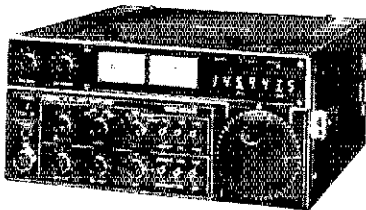
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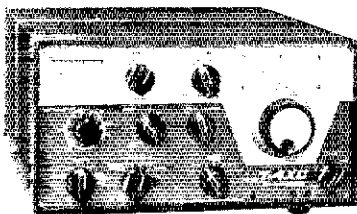


ICOM Transceiver 2M FM
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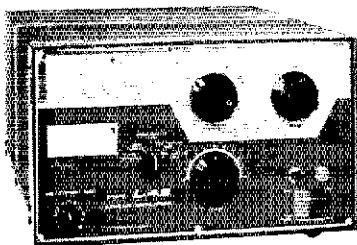


ICOM Transceiver 2M FM SSB
IC 211 \$749.

DRAKE

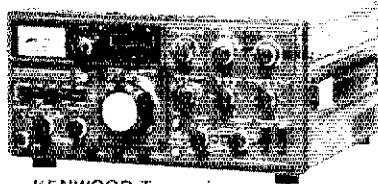


DRAKE TX T-4XC \$599. RX R4C \$599
160 thru 10M

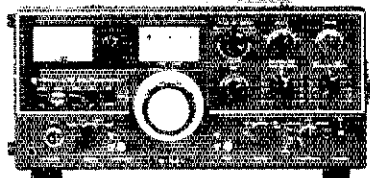


DRAKE Linear Amplifier
L-4B 80 thru 10M \$895.

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TS-820 160 thru 10M \$830.



KENWOOD Transceiver TS-520
80 thru 10M \$629.

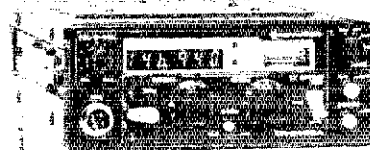


KENWOOD
TX T-599D \$479.

RX R-599D \$459.



KENWOOD FM/SSB
TS-700A \$599.



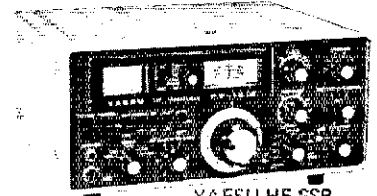
KENWOOD 2M FM
TR-7400A \$399.

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2M FM
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\$229.

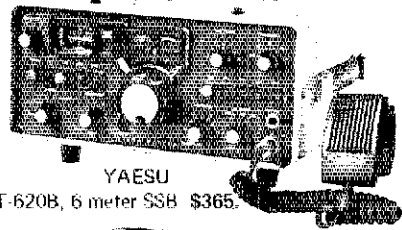
YAESU



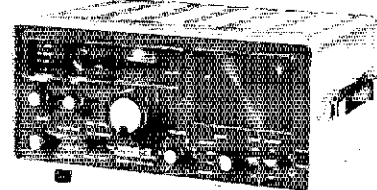
YAESU HF SSB
FT-101E, 160 thru 10M \$729.



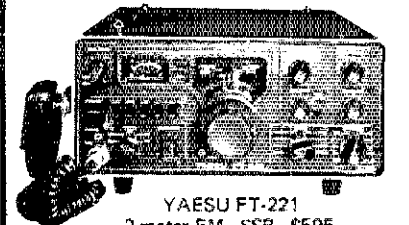
YAESU
HF Transceiver FT-301D, Solid State
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YAESU
FT-620B, 6 meter SSB \$365.



YAESU Receiver
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YAESU FT-221
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144 MHz, 220 MHz, 432 MHz

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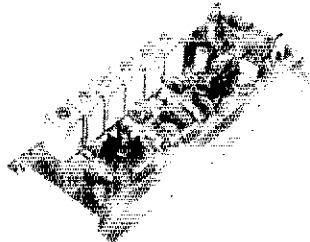
WHY SIX METERS?

1. Consistent coverage of over 100 miles is not unusual with use of modern equipment.
2. The variety of propagation affords an opportunity of working lots of DX-Stations from 400-2,000 miles away on multi-hop sporadic E, F₂ Skip during the upcoming peak sunspot cycle of over 2,000 miles. Plus transequatorial propagation is good up to several thousand miles.

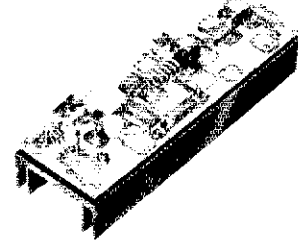
Vhf engineering offers a complete line of six meter FM kits and equipment.



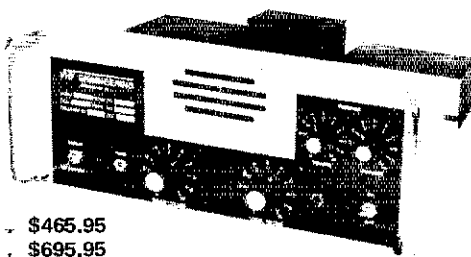
The RX50 is a NBFM 30-60 MHz Receiver Kit. Sensitivity is .3uV for 20 db squelch threshold .2uV Audio output, 2 watts.
Kit \$59.95



TX50 1 watt true fm 6 meter transmitter
Kit \$39.95



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1 watt in, 25 watt out
Kit \$49.95



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NBFM
REPEATER
Kit \$465.95
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THE NEW RPT 50 IS A COMPLETELY SELF-CONTAINED ALL SOLID STATE REPEATER. It is conservatively rated, and built of high quality components. Much care and attention to make this repeater versatile as well as reliable.

The Model RPT 50 is supplied as complete repeater system. The receiver, transmitter, control circuitry, C.W. Identifier & 115/230 Volt AC power supply are all contained on a standard relay-rack panel and chassis unit. For most installations a user supplies AC



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25 watt out, 10 channel scan.
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Kit \$229.95

power and suitable antennas with 50 OHM coaxial feed (PL 259 fittings). External connections for autopatch, tone control, etc. are provided. Built-in identifier programmed with up to 159 bits. Automatic emergency battery power changeover capability.

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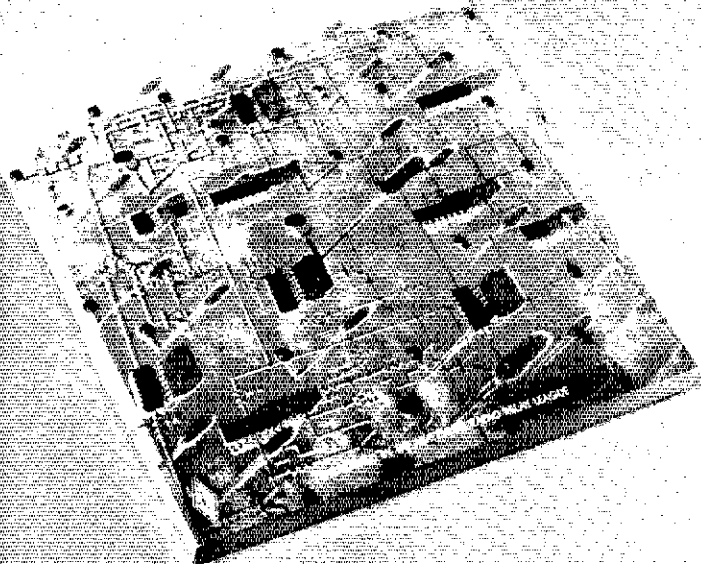
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FOR THE RADIO AMATEUR



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THE AMERICAN RADIO RELAY LEAGUE
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Novice class. Nashville ARC is conducting a Novice class of 10 students. Memphis ARC graduated 115 from their recent Novice class. Remember the Crossville Harvest on July 23 & 24. WB4GSI was awarded the Certificate of Merit for his very able work with area I CIVIL Defense EOC during the Sneadville flood. The following have been issued section net certificates as net control stations: WA4TWL W4TYV WA4EWW WB4ANX & WB4ZOY. Traffic: K4CNY 294, WB4PRF 132, WB4ZS2 95, WB4DUJ 88, WA4DKC 83, W4CGG 31, K4VCF 71, K4J5F 64, WB4BKF 59, W4QD 48, WB4RRK 47, WB4QVI 46, WA4GL 32, K4VM 32, WA4YSJ 30, W4TYV 29, K4FSK 21, WB4YPO 20, W4RUW 15, W4VJW 15, WB4HOI 14, WB4MPJ 11, W4SGI 11, W4CYL 8, W4PSN 8, WA4BDL 5, W4AOSH 5, W4VS 4, W4ATYN 3, WB4WHE 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID - SEC: WB4ZML.

Net	QNI	QTC	Net	QNI	QTC
KRN	353	71	KYN	200	118
RIN	733	80	8DAREC	82	36
KPON	81	3	8DAREC	72	13
SEKEN	61	215			

The SE KY floods provided hams with another opportunity to prove their value. Millions of dollars of damage and countless relief messages were the order of the day. Of particular note are WA4NDG, K4KJQ, K4CSH, W4IAW, K4HDE, W4YQD, W4SM, W4DSD and K4HY (group) all who worked hard in the flooded area. The Owensboro group moved in to help with some staying a week! In this group were: WA4EGQ, WA4KPE, WA4RDS, WA4SFR, WB4NHO, WB4ANL, K4LDZ and WB4R11. A job well done, fellows! K4FUM resigns as RM of KYN and is replaced by WA4IG5. Harvest dates: Lexington Aug. 14, Louisville Sept. 25. Traffic: (Apr.) W4RHZ 184, K4HRF 139, K4HOE 132, WB4ZML 112, K4AVX 105, WA4AVV 63, WA4IG5 51, W4CID 40, WB4KLC 38, WA4JAV 34, K4UNW 32, W4CDA 30, WB4EOR 25, WA4RCD 17, WA4FAF 15, WB4AUN 11, WA4NAR 10, WA4AGH 3, WB4FLB 2. (Mar.) WA4AGH 7.

MICHIGAN: SCM, A. L. Baker, W8TZZ - SEC: WA8FFK. HMs: WB1YA WB8NCD. PAMS: W8SOP K8LNE. VHF PAM: W8WVV.

Net - Freq.	Time/Dav	QNI	QTC	Sess.
MACS - 3953	1500 Dy	866	380	34
QMN - 3663	2300/0200 Dy	956	385	34
W5SRN - 3935	2301 Dy	760	101	21
LIPEN - 3922	2130 Dy	493	58	34
GI FTN - 3930	0130 Dy	516	42	29
BR/MEN - 3930	2130 Dy	620	30	30
M6M - 50.7	2301 Dy	232	27	25
A RES - 3932	2200 Su	93	16	23
VHF PAM Report		345	4	25

I wish to take this opportunity to thank W8MPD for his faithful service as MI SEC. And to welcome his replacement WA8FFK. Detroit Area Council of Radio Clubs met with 23 clubs represented. W8RC was elected pres. WB8PMT now living in Monserate; active as VP2MC. Selected their initials as call letters: WA8OJ now K8NJ, WB8MI R W8GA, WB8KA R WBWS, WB8OGR is N8RF, K8HKM is K8JP. I am advised that the OD program is having a good effect on Metro area VHF. Section Novice programs have produced the following: WB8 DCK DJJG DEN ENV IAD IAF IAG IAJ IAK IAL IAN IAO IAP IAR IAS IAT IAV IAW IAX IAY IAZ IBA IBB IBC IBD IBE IBF IBG IBH IBJ IBK IBL IBL IUM JGI. Regrettably I report K8TFY and W8FYZ are Silent Keys. Traffic: (Apr.) WB8DKQ 480, WB8YDZ 211, WB8ITT 187, WB8VW 187, WB8LC 144, WB8POL 136, WA8OIE 115, K8LNE 101, WB8YQ 94, WB8DFB 81, WB8CP 77, WB8SO 75, WB8YA 73, WB8OH 71, K8DYI 60, WB8CIN 50, WB8HX 48, WB8UF 48, WB8WZ 46, WB8TZ 37, WB8OW 36, WB8DJS 34, WB8TBL 31, K8ZIU 31, WB8IUC 23, WB8WWS 21, WB8JUP 20, K8WRJ 18, WB8ZYC 16, K8JED 14, WB8LDS 14, WB8TR 15, K8GXV 12, K8JTG 11, K8CIP 10, WB8CIN 10, WB8UQ 10, WB8LJ 9, WB8KME 9, WB8MTO 9, WB8CUJ 8, WB8ICU 8, K8JHA 8, WB8DB 8, WB8CUP 7, WB8XM 7, WB8WL 7, K8BZL 6, WB8QE 5, WB8WVV 5, WB8EZ 4, WB8KL 4, WB8SD 4, WB8JF 3, WB8JX 3, WB8JIX 3, WB8RQ 3, WB8OU 2, WB8RC 2. (Mar.) WB8WWS 50, WB8TBL 31, WB8SYA 17, WB8VOM 13, K8BZL 6.

OHIO: SCM, Hank Greub, WB8CHT/N8XX - Asst. SCM: William K. Schaefer, W8MRC. SEC: WA8KPN. PAMS: WA8SS1 WB8U W8DIL. HMs: WB8VLR W8LTA WB8KKI WB8JGW. Ohio Section Nets picnic, July 31, High Bank Metro Park, north of Worthington on Highway 23. Short business meeting about 1:30 P.M. For details and map contact WB8JGW. Ohio Interstate QSO Party, Aug. 27 & 28, details in Operating Events Section. Net Reports (Apr.)

Net - Freq.	Time(Z)	Sess.	QNI	QTC
QNN - 3.708	2230	70	126	21
QSN - 3.77	2210	29	168	59
O8MN - 50.16	0100	30	273	41
BN - 3.577	2245/0200	57	419	234
QSSBN - 3.9725	1430/2000/2245	90	2806	814

BNR - 3.605 2200 30 118 230
QNN is now on a 7 day per week schedule, so please check in American Cancer Society, or help by Central Ohio AREC (Columbus), and Queen City Emergency Net (Cincinnati). Apricot Net members aided Cleveland's Loyalty Day Parade. Northwest Ohio ARC (Lima) has formed a net on 146.0767, 2nd & 4th Mon. 7:30 P.M. Buckeye Balloons held their annual banquet meeting in Columbus, with over 70 YLs and OMs present. Ohio Area Repeater Council met in Delaware, with over 50 representatives attending on a very rainy day. Traffic: W8PMJ 436, W8LTA 322, W8MCR 305, WB8WTS 286, WB8KKI 248, N8CV 215, W8DII 183, WB8KWD 159, K8BYR 139, N8TH 139, W8THM 123, WB8JGW 117, K8BNL 111, WB8AVY 110, WB8MRL 110, WB8LS 109, WB8YVI 105, WB8CJU 82, WB8VLR 78, WB8PIY 73, WA8SS1 66, WB8ACM 56, W8STRK 52, W8QZK 45, W8TP 45, WB8D 44, W8LZE 42, WB8Q 41, K8LXA 40, WB8QE 37, K8LGA 36, K8DL 32, WB8RX 30, K8MZA 28, N8XX 27, W8DCCS 23, WB8VEC 23, WB8YJ 23, WB8KPN 22, WB8JGW 18, WB8EG 18, WB8UJ 14, K8CKY 9, K8HF 10, N8JR 10, K8MR 10, W8RG 10, K8CKY 9, K8BHL 7, WB8TSX 7, W8DPW 6, N8AA 4, W8DYF 1.

HUDSON DIVISION

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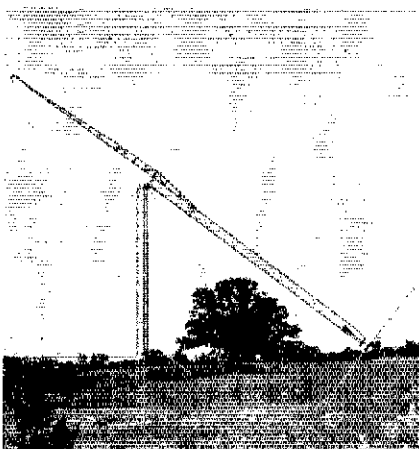
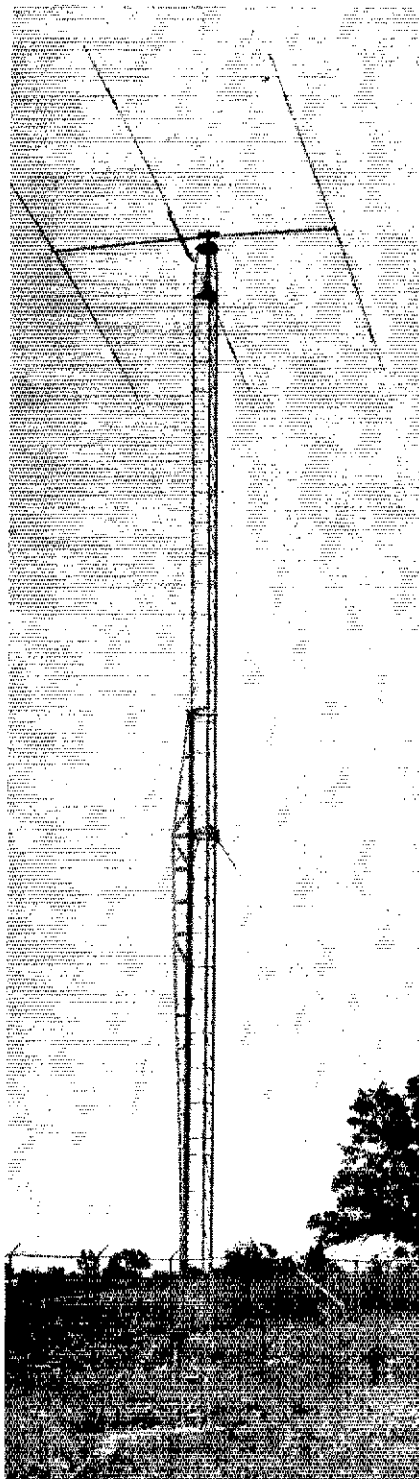
Rohn Fold-overs allow you to work completely on the ground when installing or servicing antennas or rotors. This eliminates the fear of climbing and working at heights. Use the tower that reduces the need to climb. When you need to "get at" your antenna . . . just turn the handle and there it is. Rohn Fold-overs offer unbeatable utility.

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Do not attempt to raise antenna or antenna support near power lines— You can be KILLED.

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W2CS - Asst. SCM: Guy Olinger, K2AV. SEC: WB2VUK. Asst. SEC: K2AFC. RMs: WB2JXW, K2OYG. PAMS: WB2GFI, WB2EMU. During the five months WB2MKZ had to wait for his new General, XYL WA2KQG received both her Novice and Technician. Congratulations to WA2MEO WA2MOC WA2MNW WB2MJW and WA2MRL, new Novice graduates of the Albany Amateur Radio Club class. The club is considering both Novice and General classes for the fall. Congratulations also to WB2CKO for upgrading to Extra Class, and to WA2EBV for becoming Technician class. OBS station W2QFR transmits RTTY bulletins on 3620 kHz every Mon., Wed., and Friday at 2100 EDT so he has for the past 12 years. WB2TGL is off to Calif. Institute of Technology in Sept. Look for him operating W6VE. The following stations helped maintain communications for the annual Wappingers Creek white water derby: WB2YQU K2DNR W2CS WB2EUL K2UKE K2VNV W2CXC WB2WAC W2HCQ W2KBH WB2NKN WB2NCT WB2NZE WB2GXF W2AWX WB2SUH WB2PAU reports new Novices in the Saratoga Springs area: WB2MCS, WB2MGX. The Glens Falls ARES has changed its name to CARES, which stands for Coordinated Amateur Radio Emergency Service. PSHR to W2YJR WA2UYL, WB2EMU, W2CS. Traffic: (Apr.) W2YJR 38h, W2CS 15h, WA2YYM 13h, WB2EMU 12h, WA2UYL 11h, WB2TGL 7h, WB2QOH 7h, WA2PAU 19h, WA2CJY 14h, K2HNV 9h, K2OJA 4h, WB2CCM 4h, K2DWW 1h (Mar.) WB2TGL 101, WB2QOH 50. (Feb.) WB2QOH 58.

NEW YORK CITY-LONG ISLAND: - SCM, John H. Smale, WB2CHY. Asst. SCM: Art Malatzky, WB2WFI. SEC: K2HTX. HM: WB2LZN. PAM: WA2ECO. The following are major AREC/RACES Nets, join one, please.

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	28.5 MHz		146.88 fm
Queens	28.5 MHz	50.52	145.62 am/fm
Nassau	28.73 MHz		145.68 am
W. Suffolk	28.73 MHz		145.59 am
(Hunt.)	28.65 MHz		147.21 fm
(Smith.)	28.61 MHz		.085/645 fm
(Babylon)	28.65 MHz		
(Islip)			

E. Suffolk 146.82 fm
Brookhaven 16776 fm
Riverhead 3730 kHz cw

Note: Net times between 2000 and 2100 local, Mon. WA2ECO reports that there is a new city wide Emergency Net, Tue. at 1930 local on WR2AHU (147.96/36), this is not an AREC net, but it should be supported. WB2EHM is now N2EM. WA2ROD had a nice vacation in VO1-Land, WA2TAP reports that the Suffolk County ARES 220 MHz rpt is nearing completion. Congratulations to WB2IWX who passed his Advanced, he's 14 years old. Congratulations also to K2RPZ who passed his General after hold a Tech. for 19 years. WA2YEL reports that he received air time at his college radio station, WQCC, for the ARRL Public Service/Educational Radio Shows. WA2YJ is enjoying his retirement. It's still nice to get reports from W2PHJ. Dave reports he rec'd his 60 year cert. from QCWA; he was first licensed in April 1917. Officers for Radio Central ARC are WB2FZE, pres.; K2RPZ, vice-pres.; WB2ANT, conr. secy.; WA2NOD, treas.; W2GLB K2KJ WB2IMX WA2SNQ W2GXA, dir. WA2BML now has the Centron "Super Tuner." Congratulates to WB2BXQ who upgraded to Gen. and WA2APT to Advanced. K2JP now has WAC on 80. WA2VOS finally made WAS with a Q50 and QSL with a KL7. Kings County RA provided communications for the UJA walk a thon in Brooklyn. Congratulations to WA2EUB who after being a ham for 20 years got his Extra. WA2BKJ reports the Flushing Radio Amateur Technical Society is sponsoring Free licensing classes in the Flushing area. Inquiries are to be sent to FRATS, 62-26 Bnelsen Crescent, Rego Park, NY 11374. Congratulations to WA2BML on making BPL. Traffic: (Apr.) W2EC 34h, WA2BML 30h, WB2IDP 23h, WB2LZN 16h, WA2ECO 13h, W2MLC 13h, WB2IWX 11h, W2GKZ 9h, W2HXT 9h, W2DBQ 9h, K2FF 16h, K2FC 1h, WA2YEL 11h, WB2HZQ 6h, WA2YJ 3h. (Mar.) W2GKZ 12h.

NORTHERN NEW JERSEY: SCM, Louis J. Amoroso, W2ZZ -

Net - Freq.	Time(PM)/Days	5ess.	QNI	QSP
Manager				
NJN - 3695	7:00 Dy		30	356 124
WB2CSJ				
NJN - 3695	10:00 Dy		30	150 66
WB2CST				
NJSN - 3730	8:15 Dy			
WA2WIW				
NJPN - 3950	6:00 Dy		30	516 224
WA2SLF				
NJPN - 3950	9:00 AM Su		4	56 16
WA2SLF				
PVTN - 145.7	8:00 Dy		30	180 20
WA2OPY				

PAMS: WA2SLF and WA2OPY (VHF), RMs: WB2CST and WA2WIW. Congratulations to WA2BAW WB2ASD WB2PCS WA2AY. WA2SLF, all making PSHR this month. Rcvd QQ reports from W2TPJ W2NR and WB2CST. New officers for the RARC are WB2JVN, pres.; WA2NOD, vice-pres.; WA2SHR, secy. WA2RMZ passed the Extra. WB2JRC is ex-WB2QNT. Our Director K2SJO gave a talk on ARRL. Board meetings at a recent NJDXA gathering. WA2AY's up in 80 for DXCC. WA2GMO chasing DX with an HW 101 and new vertical. WB2CNF joining NJSN. Our new SCM WA2MVQ graduated 21 students from his class to the Novice ranks. The graduates include WB2LCF WB2LGB WA2LNL WB2LNL WA2LNO WA2LNP WA2LNG WB2LNL WB2LNP WA2LWU WB2LND WA2LNM WB2LQA WA2LWV and WB2LWV. WA2LNP has since passed the General and WB2LNL and WA2LNM passed the Tech. WA2LRB and WA2MNT graduated 6 students to the Novice ranks. K2WT had 8 grads. Some old and new signs include WB2PBO is now N2NS. WB2AEH is W2PA, WB2RKK is W2RQ, WA2UDD is W2GD, K2IEF is K2WT, WA2LJC is W2VY, W2FJL is W2KB, WB2LVP is W2LA, WB2ZBI is K2TM, W2EGR is W2CQ and has a new FT-101E. Please keep your SCM posted on future Novice or code classes. Try to give him a couple of months notice. This will get the info to the press on time. Traffic: (Apr.) WB2ASD 47h, WA2BAW 33h, WA2NP 18h, WA2AY 15h, W2RQ 8h, W2SVE 5h, WB2DFO 5h, WA2SLF 4h, W2LNP 4h, W2LNP 4h, WB2CST 3h, WA2DSA 3h, WA2FZJ 3h, WB2HSQ 2h, K2ZFI 2h, WA2OPY 2h, W2ZZ 1h, WA2WXM 1h, WB2VTT 1h, W2CC 1h, WA2DIW 1h, W2CVW 1h, WB2JRC 1h, WA2MVQ 8h, W2GD 7h, WA2DLZ 6h.

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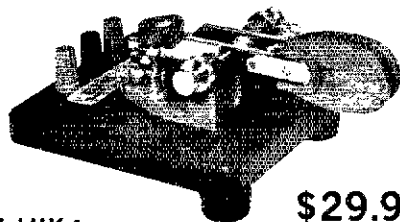
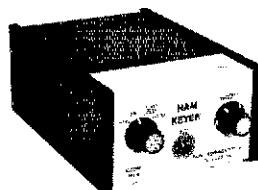
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NOW 5 MODELS

- Iambic circuit for squeeze keying.
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- Dot memory.
- Battery operated with provisions for external power
- Built-in side-tone monitor.
- Speed, Volume, tone & weight controls.
- Grid-block or direct keying.
- Use with external paddle such as HK-1.

NEW
MODEL HK-5
ELECTRONIC KEYS
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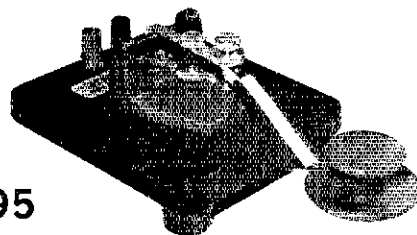


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Model HK-1

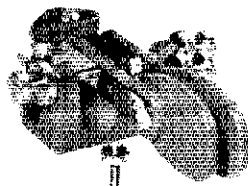
- Dual lever squeeze paddle.
- Use with HK-5 or any electronic keyer.
- Heavy base with non-slip rubber feet.
- Paddles reversible for wide or close finger spacing.

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Model HK-3

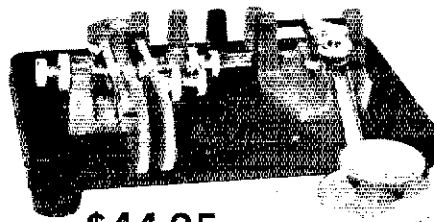
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Model HK-2

- Same as HK-1, less base for those who wish to incorporate in their own Keyer.



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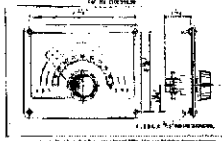
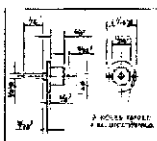
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Size	Price	Size	Price	Size	Price
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T130-2	1.15	T68-6	.35	T37-10	.25
T106-2	.75	T50-2	.30	T37-12	.25
T106-3	.75	T50-3	.30	T25-2	.20
T94-2	.50	T50-6	.30	T25-12	.20
T94-6	.50	T50-10	.30	T12-2	.15
T80-2	.40	T50-12	.30	T12-6	.15
T80-3	.40	T44-2	.25		
T68-2	.35	T37-2	.25		

Ferrite Shielding Beads

Size	Price
FB-73-101	\$1.00 Doz.
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FB-43-801	1.50 Doz.

Ferrite Toroidal Cores

Size	Price
FT-50-61	\$.35
FT-50-72	.35
FT-82-61	.40

SIMPLE ELECTRONIC KEYS, Ham Radio Horizons, May 1977 PC Board only \$4.00. (Note: Board shown in article is oversized in drawings.)

WAVEMETER, Ham Radio Horizons, June 1977. PC Board only \$4.00. PC Board, Capacitor, 5-pin socket, 6 coil forms \$18.15.

RX NOISE BRIDGE, Ham Radio Magazine, Feb. 1977. PC Board only \$4.00. PC Board plus all components in Fig. 9 except variable capacitor and battery \$15.00 ppd.

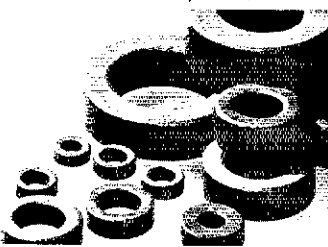
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WA2QJU 5, W2KP 4, WA2GMO 2, WA2CNF 2. (Mar.) K2CYX 47, WA2MVQ 11.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — The mini convention staged at Sioux City by the 3900 Club, 500 Land ARC and Repeater Assn. was a huge success. Iowa City Net has K6GUF and W9SRR as new directors, K0BW, K0BD and W4MTI new NCS. W4JHF sec/treas.; W9RJA, chmn. of board and W9BUA and K0JVD are mtrs. K0EVH, K0FLY, W4BLK, W4OMV, W4OPYD, W4SS and W4YI 5 gave IA 100% on NTS-TEN. New calls: W4FDM is KUGP, W4GSRM is KUMR and W4VCM is W4WC. Congrats to K0GVB for Advanced; W4SRI and W4BTJC for General. New Hams: F. Dodge/Humbolt W405 AXA AXH AXE AXF AXJ AXH AQM AQN BBE BJW BBA and BBB, Iowa City: W4D9N, Mv. Avr: W4UBAW, W4VZVH was busy with Ft. Dodge's May 4th tornado traffic. Easter Seal Pony Express riders received an assist by the following: W4S ASM 1YW 1FF 3WY YKR YDM K4S BAX EVC LZ LKH TVB; W4GS BRS EYG KLD KVB LVE MIZ NSH VZH YGY ZNN; W405 ENL NGT OXK TCH and W4KCM/W4W0C(Q) has "Amsat OSCAR Users Net" Mon. 9 PM on 145.110/USB. W40AEH/CR much improved at new location. K4VQM K4LUM and W4PZK gave MARS program to Iowa City ARC. W4W0CH and W4HE made QSO DXCC. QSO truly had FB eyeball with Burlington Club. W4DFF has a shiny alloy Club is a duly affiliated society. Have a safe 4th so you can CQ on the 5th. Iowa 75M 1730Z QNI 1768, QTC 155; 2300Z QNI 1162, QTC 70. FLCN 2330/300Z QNI 409, QTC 108, Sess. 61. Traffic: (Apr.) W4BAUX 435, W4YLS 174, W4SS 108, K4E H 91, W4MUM 61, W4GJX 30, W4GJYF 23, W4BKH 30, W4LFF 16, W4LTK 1, W4W 6, W40MCX 6, W4BX 3. (Mar.) W40MCX 3.

KANSAS: SCM, Robert M. Summers, K0BFX — SEC: W4KLC, PAMS: W4SEV, W40BCL, RM: W4FT/K0MRI. Congrats to many new amateurs on the air, also to those who are upgrading such as W40RYT and W40WLA. W4PB Staff group in Pawlatha are awaiting the FCC tests to come. A fine representation of Hams from all over the state of KS graced Dayton with their presence. Many storm alert sessions by the various AREC zones reported. Newspaper publicity such as the Hams in Lawrence received, is the much needed aid of our hobby. Don't forget also to let your EC and SEC know of the activity and filling out the proper report form would be of great help. Make sure your group has these forms on hand. Late Mar. report — K5BN QNI 1186, QTC 75 and KPN QNI 152, QTC 1. Net activity for Apr.: KWN QNI 773, QTC 332, QKS QNI 481, QTC 206. K5SN QNI 1032, QTC 90, KPN QNI 166, QTC 8, QKSSS QNI 81, QTC 54 and late Apr. report QNI 23, QTC 40. A note on Public Service Awards: These awards are issued by League HQ usually after an article appears in QST noting some type of PUBLIC SERVICE due to some type of emergency situation. Be sure you tout your horn when it is laudable. Traffic: (Apr.) W40FIF 188, W4ZVEN 139, W40H 129, W40AM 19, W4BLKA 109, W40RF 32, W40CH 92, K4BXE 69, W40LBB 68, W40T 65, K4EME 62, N4IN 46, W405Y 44, W40H 41, W40SEV 37, W40RB 32, W40HGG 30, W40VEZ 26, W40BIB 20, W4IX 17, W40FDJ 14, K40PC 14, W40RF 14, W4BLI 13, W40LJN 12, W40KVE 12, W40W 7, W40E 7, W40KDE 5, W40KWI 5, W400WH 4, K40K 2. (Mar.) W40SLV 36, W40VEZ 32.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM: Joe Flowers, W40TF Sec: W40FKY. A big thank goes out to W40BW, our previous SEC who resigned due to a new QTH, a new job and added responsibilities. Congratulations on a job well done. Welcome to our new SEC W40FKY, R. Steve Mufford who will serve the remainder of the term. His address is 514 W. Ivy, Lee's Summit, Missouri, 64063. He has a background in Civil Defense and has good ideas and a lot of initiative. Let all give him a hand. The Lebanon LARK Club has started a Newcomer class with 9 members. For information contact W40GL. The Heart of America ARC joined 3800 young persons in the March of Dimes Walk-A-Thon and helped raise \$120,000.00. One overweight W40MZZ walked the full 20 miles at \$11 per mile for a total of \$220. Congratulations on an outstanding job during the past week to those involved with emergency communications and traffic handling in the four areas devastated by tornadoes, the Sedalia ARC, Warrensburg ARC, W40COMO ARC, PHD ARC and the Heart of American ARC and numerous individuals.

Nets QNI Net QTC Net QNI QTC
MSN 104 35 HMEN 733 199
MOSSRN 134 19 SCEN 74 6

Congratulations to the following new licensees — W40UXB W40AAT W40ABL W40ACU W40ACY W40ADD W40ADO W40AEN W40AEW through W40AEZ W40AFA through W40AFG W40AFI W40AFB W40AFG W40AFS W40AFU W40AFW W40AGB W40AGF W40AGH W40AII through W40AHU, W40AIA W40AII W40AIIK W40AIIQ W40AJC W40AJZ W40AKF W40AKK W40AKL W40ALB W40ALE and W40ALN. Traffic: K40NC 735, W40FKY 173, W40H 120, W40NUB 108, W40NXX 76, W40ALJ 70, W40FND 69, W40K 65, K40RWL 60, W40W 52, W40LFL 49, W40GDD 46, W40TF 46, K40EM 31, W40DST 30, W40V 25, W40MEO 21, W40LCV 11, W40MDF 11, W40SJP 7, W40EPI 5, K40AHL 2.

NEBRASKA: SCM, Claire Richard Dyas, W4JCP — W40ISL will graduate from nurses training in mid-March and return to her home in Nebraska. Congratulations, Marion, and to all the hams who have graduated this spring. Nebr. Hams should plan to attend the Victoria Springs Hamfest the last Sun. in July. Q4WA membership over 65. Lincoln ARC did a fine job of handling the communications for the April MARCHODIMES Walk-a-thon. Net reports: Q4W, QNI 81; ARCL, QNI 65; QTC 104. Net Morning QTC Net, QNI 1327, QTC 46; West Nebr. Net, QNI 535, QTC 7; PM net, QNI 264, QTC 21; Sandhills WX net, QNI 334, QTC 14; Platte Valley 2 mtr Net, QNI 10; Nebr. Storm Net, QNI 1061, QTC 27; Cornhusker Net, QNI 998, QTC 35. Traffic: W40VA 86, W40HOP 31, W40PCC 30, W40GQ 29, W40XX 21, W400W 20, W40MW 20, W40FB 19, W40CP 15, W40E 15, K40ER 11, W40GMO 10, K40TUH 10, W40QEX 9, W40FA 9, W40FOW 8, W40WPK 4, W40ZU 4, W40LOY 3, W40DJ 2, W40EEI 2, W40GCE 2, W40NIK 2, K40KF 2, W40JA 2, W40XB 1, W40LZ 1, W40YF 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassar, W1GVT —

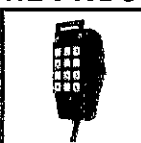
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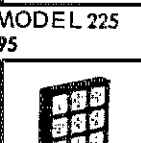
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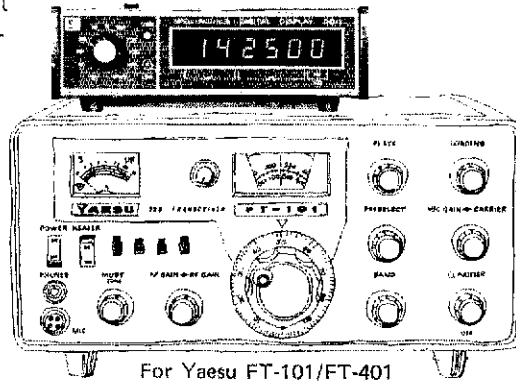
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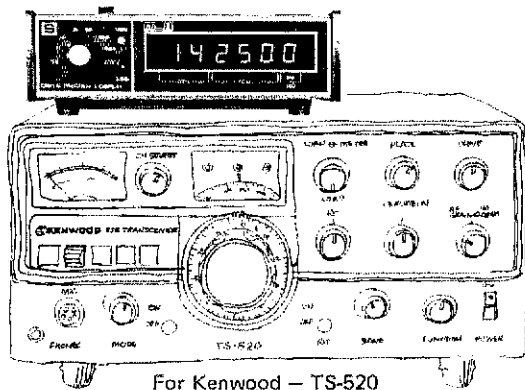
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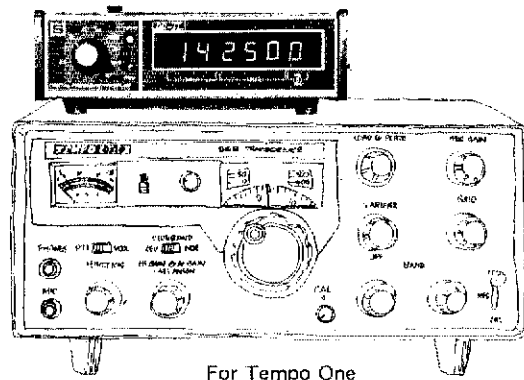
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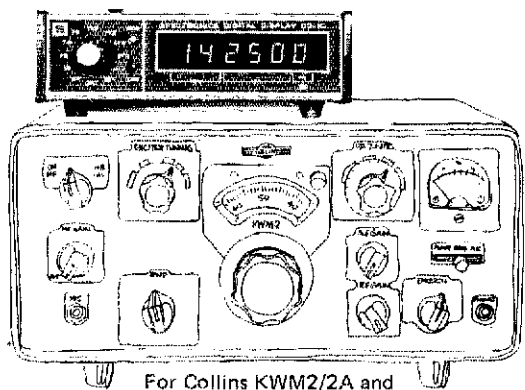
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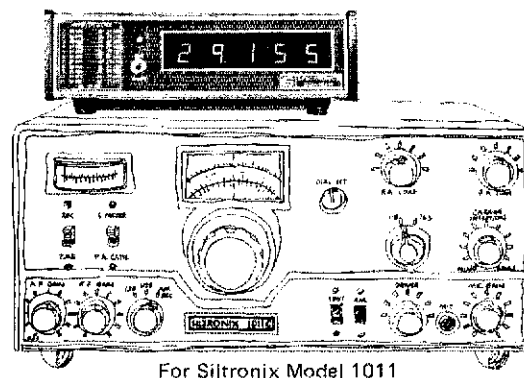
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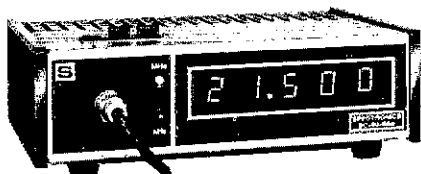
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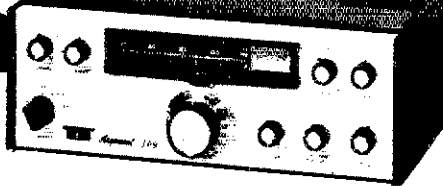
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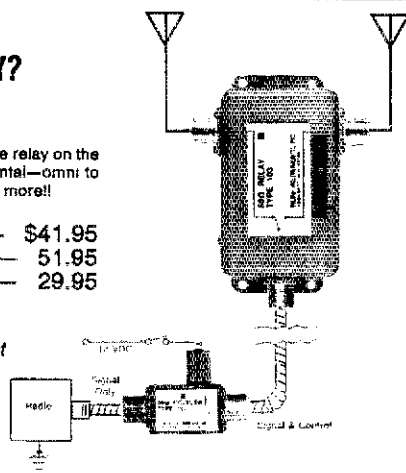
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High QNI: CPN - K1DPS. CN - WA1UAX W1EWF & K1E1R. SEC W1XX is readily available to all ECs via the Traffic Nets - try CPN or VHF-2 most any night. Director W1HHR would appreciate knowing how many of the new Novice operators have upgraded their status. ARRL "News Hotline" operational at (203) 667-0138! Other commitments prevent W1CDC from continuing his fine job as Editor/Publisher of Manchester Road "Sport Skip". Meriden Club auction another big success! Stamford "Sidelight" supports the "Buddy System" for assisting new Novice members. Southington ARA enjoyed Tour (w/refreshments) of Reynolds Sunbeam Bakery thanks to W1IOB. Shoreline ARC Repeater almost ready to go - will also be used for CD Communications. Danbury Canebody ARA enjoyed Milton as Guest Speaker. Tri-City "Feedback" notes Radio at the Mystic Fair. Instructors Newsletter is mailed to all Registered Instructors - very informative - be sure your Class Registration Card is completed and sent in to ARRL. 510 Speed Traffic Net in Novice Band should be going in the Fall - your help is needed - too. W1JRW is now using new stacked 20M and full-size 40M beams! Congratulations to: WA1FCM & WA1RYL for Extra Class; WA1VUG for Advanced; and to WA1VGP WA1UWT & K1PLR for General! Happy vacation to all! Traffic: (Apr.) WA1UAX 286, WA1VGP 286, K1GF 228, W1EWF 213, K1XA 198, WA1RA 139, W1CWT 126, W1LDT 77, W1KY 17, W1BDI 16, W1BDN 13, W1CLAB 6, W1QV 6, W1VS 6, W1CUH 4, W1TXM 2. (Mar.) W1EWF 283, K1GF 272. (Feb.) WA1UAX 78.

EASTERN MASSACHUSETTS: SCM, Frank Baker, WA1ALP. SEC: WA1QD received reports from these ECs: WA1S HJ, W1G, W1S BBS BND EGH III BB BK, K1S NFW PAD PNB. Malden CD test Mon, at 7:30 PM. Medford, Malden Everett Lynnfield, Melrose freq. used 31/91 WR1AAA. W1BIO's had their 50th anniversary. K1HJQ an eye operation. WA1VMU, B.U. Club will be on Oscar. W1XA says Bellingham AHES on Walk-Thru, Massachusetts ARC repeater also was on one. South Shore ARC had flea market. Auction with W1SM, W1QJM in a nursing home. New officers of the T-9 Club: K1MIB; pres.; W1KGH, vice-pres.; W1IIB, secy.; W1ISX, treas. WA1AKS new 28 MHz six-element Yagi, up. WA1YNO has General. WA1FAD in Holbrook. K4VH, ex-W1GM, in Dundee, FL. W1BQAN, ex-W1AJI, in Hanover, NH. W1BPMZ, in Hanover. EMRPN had 367 QNI, 226 QTC. K1OBL, ex-W1WGS, has old call back. W1LZL active on cw. W1RZO W1NC have TS-820s. WA1TTC on 2 FM. W1NAD was in hospital. W1ADRS now N1EA. W1JNV 350 QSLs for DXCC. W1PL now retired. K4JPN, ex-K1VKW, now in GA. Lx-W1MIR in Wash. NE bus at 6:00. Billings RC helped out in Bike-a-Thon. W1NL had 40-meter loop to work Japan. Chelmsford ARA held an exhibit in their Mall. WA1DPX now General. WA1SHO new DRS. W1PNH & WA1RTR endorsed as ECs. W1S: HHR AN ALP attended annual meeting of Norfolk County RA; new officers: W1WTF, pres.; W1PNH, vice-pres.; W1CQN, secy.; W1LDT, treas. WA1LHA son of W1LH now General. K1NZQ has Advanced. W1CAN WBICL have HW-2036s. WA1UWF operated 4U1TU while in Europe. WB1CAI is the brother of ex-W1DQG now out in L.A., CA. W1SKP a Silent Key. WA1APT has an HW-2036. K1IR was WA1QJU, went to Dayton Hamfest. HHTN had QNI 217, QTC 140. W1VKB got UT for his W1S. W1EMG had to fix his NC-100. W1EYU was in big trouble. W1AT had to be on as W1CZB during the summer in Mattapoisett. WA7ETN moving to Newport, then on to CA in Dec. HHTN had 227 QNI, 156 QTC in Mar. New officers of MIT ARS, W1MX: WA7YNJ, pres.; WR2CWQ, treas.; WA1RJX, station mgr.; WA2EYC, secy.; WA1LNF, activities. K1PJ was WA1KA. WA1KNA spoke at the Massachusetts ARA on his Home Computer. W1EIE home from FL. W1DW on trip to CA. W1UW & K1GEX now Advanced. W1FRX has new beams. W1EL better after a hospital visit. So. Eastern Mass. ARA helped out in a Walkathon in the New Bedford area, writes W1LE. Framingham RC having Novice classes with K1AEZ. WA1EHR teaching. W1CF spoke at the Middlesex ARC on 360 degree switchable phase array antennas. EM2MN had 142 QNI, 65 QTC. EMRIN QNI 570, QTC 354. W1AAR on 2 FM, also W1TQZ. W1UQ & WA1UW had twins, a boy and a girl, FB. WA1ST of ARRL was on air. W1RZ channel 4, "Wombat" 17" she did vice job. WB1L new QVS. Traffic: (Apr.) WA1VEI 458, K1BA 110, WA1AZZ 314, K1PAD 274, WA1TEH 246, WA1TBY 168, W1PEX 166, WA1UWF 162, WA1VGM 120, WA1VKB 114, WA1YWK 99, W1DMS 88, WA9NEW 84, W1EMG 76, WA1EYU 51, K1PAW 32, W1FJ 30, W1MX 28, W1BARK 22, W1LDT 12, W1DMG 12, WA1QA 11, WA1FE 9, K1LAX 9, W1CQ 7, WA1PQY 6, W1LE 5, WA1OAM 5, W1ALP 2. (Mar.) WA7ETN 44, WA1PGY 22, WA1VGM 13, WA1QA 11, W1MX 8, W1ATX 4.

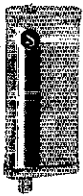
MAINE: SCM, Bill Mann, WA1FCM - Asst. SCM/PAM; K1GUP. SEC: WA1YUZ. RM: W1RWG. Thanks to W1MUX for fine job in getting Novice operators EC: WA2ERT/1; OO: WA2MEQ/1. AARA active in getting FCC to Presque Isle to give exams. PAWA's 146.13/73 repeater found its final home in Portland. Good coverage of Maine repeaters in the new ARRL Repeater Directory. Got yours yet? Some 15 Lewis/Lebanon area hams did line job communicating for March of hams. Walkathon for W1RZ. Radio's swappet, May 7, smashing success. BYN (3960, 12002 M-S) Sess. 26, Tfc. 29, QNI 868, PTN (3596, 23002 Liv.) Sess. 31, Tfc. 258, QNI 278. SGN (3940, 21002 M-S) Sess. 26, Tfc. 149, QNI 1108. MSSN Sess. 24, Tfc. 10, QNI 51. MSSN closed Apr. 30 for summer. B1N certificates to WA1GF & WA1Z2H. WA2ERT/1. Coming events: Kezar Lake Gatherings, July 17; Abbot WA1GRA, Aug. 14. Traffic: WA1FCM 336, WA1YUZ 194, WA2ERT/1 164, W1RWG 145, W1ERW 133, W1KYD 84, WA1UT 77, K1T2H 38, WA1MUX 35, W1ISO 30, WA1QFX 28, W1CEV 23, W1CTR 9, K1NAN 7, WB3BOK/1 7, WA1JCN 1.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, WINH/W1SWX - SEC: K1RSC. RM: WA1GCE. PAM: Open. K1RR & K1RX are new QOs. Notice: as of July 1, 1977 the NHVT Net moves from 3685 to 3702 at 6:30 PM local time to increase participation and train Novices in traffic work. Welcome to new hams, WB1BW & WB1BW. K1HJ has new HW 2036. W1LY has been holding ssp between QSOs. K1PQV has a new 32V3. WA1RHA is now K1RR. The Friendly Amateur Radio Tech. Society meeting at the Manchester Airport was attended by W1AWZ W1BXM

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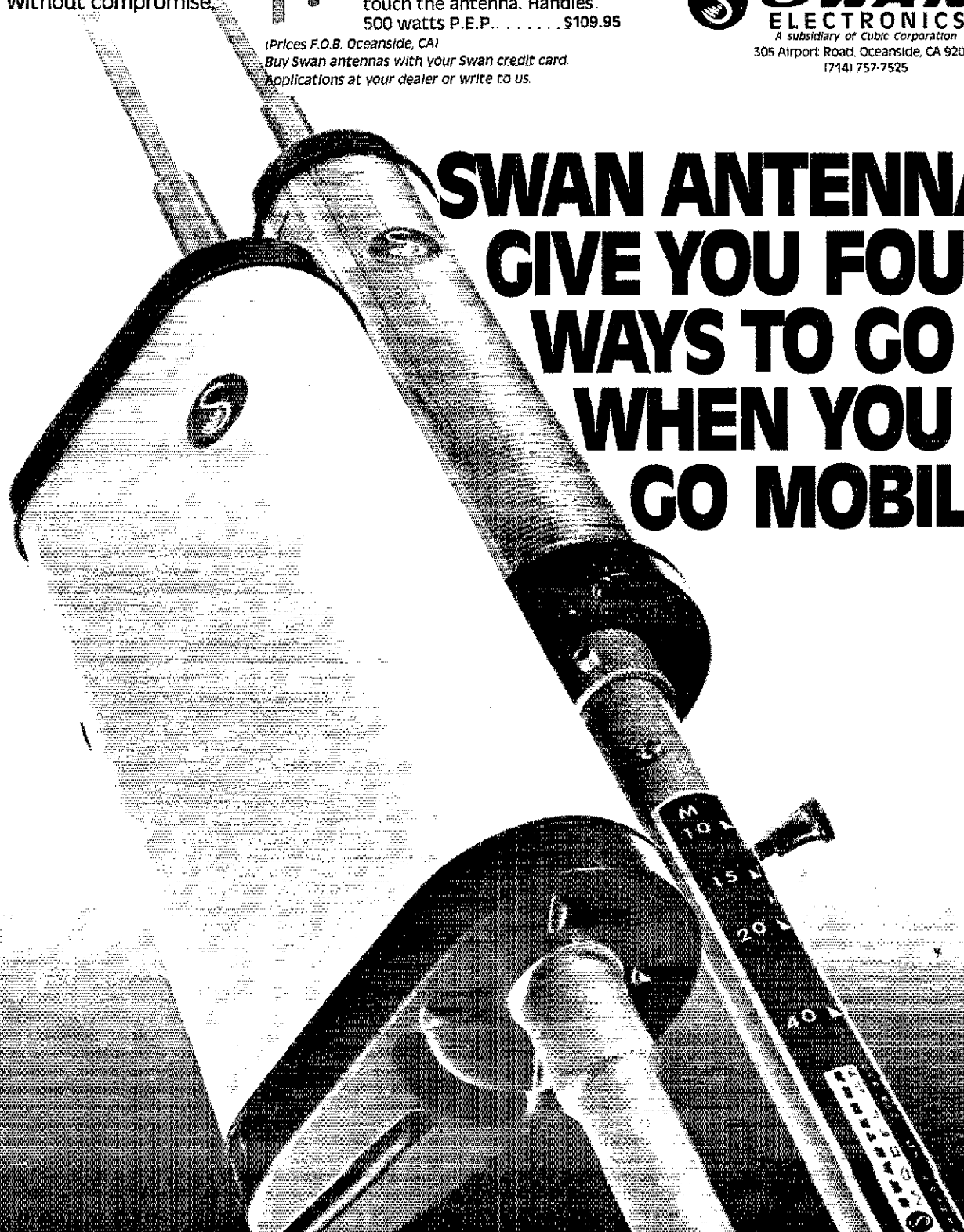


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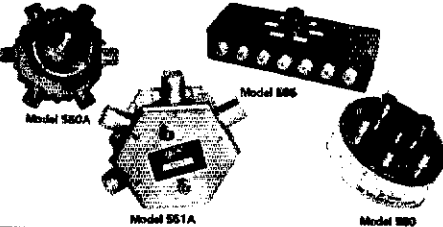
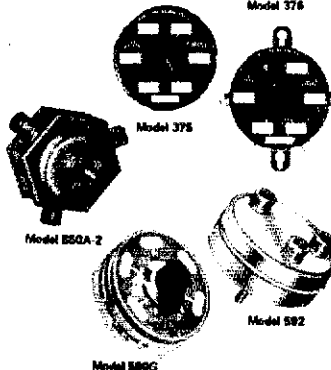
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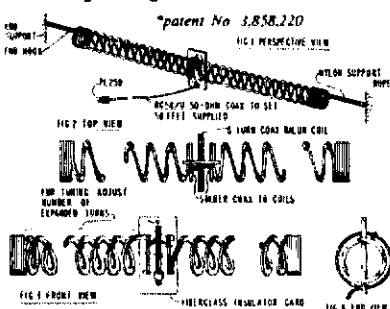
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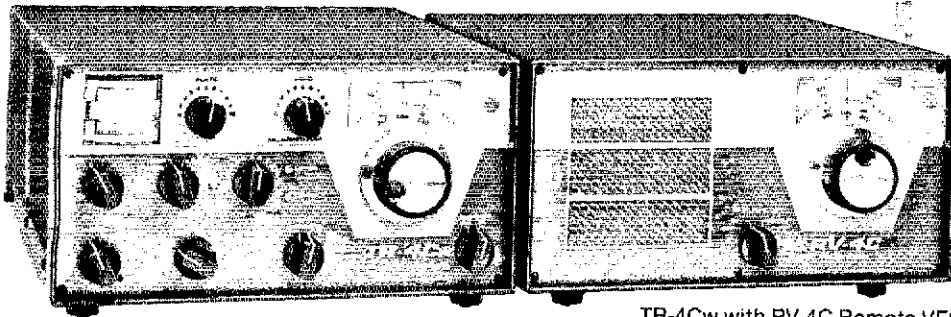
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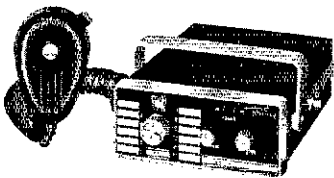
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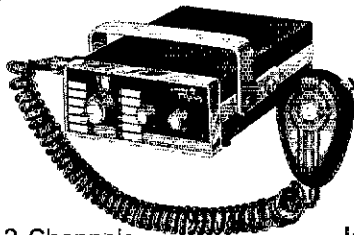
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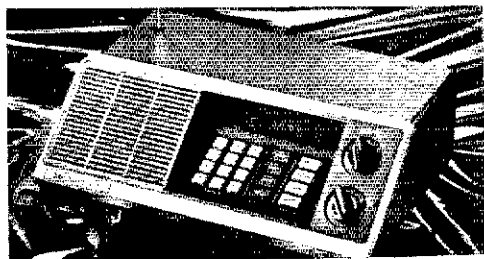


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W1CMV WA1FSZ K1HDO K1JXK W1LIM K1MFQ K1OZK & W1SWX. Keene RA new officers are WB6IPR/1, pres.; WA1ALM, vice-pres.; WA1TZT, secy.; WA1YTW, treas. K1OMC is teaching ham classes at Laconia Vc Tech. New OOs are K1RR & K1RX. The Pemigwasset Fish & Game Assn. presented WA1EL with its Membership. The NHVT Net had 26 sessions, 125 check-ins & 96 traffic. K15HR is converting a 850 facsimile unit and will be on soon. W1EHT reports the NHEPN had 42 check-ins & 21 traffic. W1BYS breakfasts weekly on Sat. with the St. Petersburg ARC. The GSPN had 469 check-ins & 107 traffic. Your SCM & K1BGS visited the sanders ARS in Nashua, W1GBS is collecting QST & QO magazines. Your SCM is back on the air. The NHVT had 102 check-ins, 81 traffic in 23 sessions. Happy 4th of July to all and a nice summer. Traffic: (Apr.) K1BGS 477, W1TN 74, K1NH 69, WA1GCE 50, K1ACL 39, W1NH 5, W1ETH 4, WA1PEL 2, WBKON/1 1. (Mar.) K1PQV 91.

VERMONT: SCM, R. L. Scott, W1RNA - BARC Field Day Aug. 13-14, Charlotte, VT; flea market outdoors Sat. & indoors Sun. Recent appointments: 2 FM repeater ECs; WA1SVR - W1IAEA; WA1UQY - W1IAAK. VT Century Club award for working 10 Vt amateurs; endorsements for 25, 50 and 100. Complete info, write VTC, Rte. 21, Burlington 05402. Few nibbles on 2-speed 80-mtr. CW net - how about more? WA1SVR organized about 25 2-Mtr. F1ers furnished communications May 1, 0800-1600, for the Burlington area Diabetes Assn. Bike-A-Thon, which had about 200 riders. GMN 26/601/57; VT55B 29/499/107; Carrier 26/427/61; VT Fone 4/78/4; VT RFD 4/66/23. Traffic: K1BGB 153, W1RNA 29.

WESTERN MASSACHUSETTS: Percy C. Noble, W1BVR - SEC; WA1DNB, PAM; WA1MJE, CW RM; W1DWW, W1STR now N1PF. E-x-W1WOG now N1ER. WA1FBE now W1PN, not W1BN reported in May issue. WA1WZT is moving to MD. WMEN Sun. 8:30 AM 3935; QNI 55B 59, thru liaison on repeaters 109 total 168. WMN daily 7:00 PM 3623; QNI 16L in 30 sessions, traffic 110, 18 different stations. WMPN Mon-Fri 4:30 PM 3935; 21 sessions, total QNI 234, traffic 32, 49 different stations. NOBAR Hamfest, Cummington, MA, July 9-10. ARRL meeting 2:00 PM July 9. Note to those holding following appointments - ORS OPS OC EC BS OVS. Burel appointment requires a report to the SCM by the 5th of each month. Report on what you say? Things of interest. Or, if you can't think of anything interesting, send me a card saying "Hello"! At least then I will know that you are still alive. Our regular traffic-handlers report always. Won't you join the active ones? Traffic: WA1MJE 206, W1DWW 107, W1DWW 79, W1D 64, W1TM 61, W1KK 49, K1LUV 47, WA1OUZ 32, W1ZPB 14, WA1IYY 10, K1RQZ 7, WB1AU 5, WA1PLS 5, W1DOY 4, WA1OPN 3.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK - The Electronics Flea Market held by the Anchorage Amateur Club was a huge success. More than 1400 people attended and saw the ARRL booth. KL7ILB is leaving AK for W4-Land, hurry back Tim. There are 7 ECs and 119 ARES members in AK. There is an ARES net on 148.32 MHz every Tue. at the SDC. This of course covers the Anchorage area; however, other areas can have similar nets on 2 meters. The Fairbanks club will furnish communications again this year for the Yukon River boat races. Soon we will be hearing KL7IS from his summer home at Lake Minchumina. KL7ALJ showed up on the AK Sprinter Net this other evening; welcome! Oh! yes the ASN had 812 ck-ins for this month, congrats gang. KL7IEN is the proud father of a new son, congrats to Jay and YVL. Don't forget the National QCWA and Northwest Division Convention in Seattle in July. Traffic: KL7HMH 6, KL7CUK 4.

IDAHO: SCM, Dale A. Brock, WA7EWV - SEC; W7JMH, PAM; WA7HOS, RM; WA9KKR/7. Net-Freq. Time QNI QTC Manager
FARM-3,935 0200 Dv 1079 48 W7TGU
RACES-3,99 1415 M-F 556 W7KDB
IMN-3,65 0300 M-F 188 65 W7GHT
WA7GSM in the hospital with a crushed leg, here's hoping he has a speedy recovery. W7KDB reports Canyon Co. is having an Emergency Services Fair and they're going to include amateur radio in their exhibits. WB7NSW was elected pres. of the Idaho Society of Radio Amateurs, Elmore. Chapter WA7FE sporting a new Tempo 2020 and a Yaesu FRG-7. W7GHT has been the acting mgr. on RN1. Another two letter call: N7AL, ex-WA7ERA. Traffic: W7GHT 353, W7GBO 31.

MONTANA: SCM, Robert Leo, W7LR - Asst. SCM; Ed. Bodenberger, WA7PZO, SEC; W7TYN, PAM; W7DEO, RM; K7CJ, W7GZ. W7TYN reports 20 new Novices from class of 24, with calls WB7QZD-QZW. SEC W7TYN reports good state EC response. WB7PNT WB7PMB new Bridger Novices. Clark Fork Valley ARC building Bridger HS club stn. Anaconda ARC showing ARRL films. W7TYN on Oscar. K7OEK visited Russia. W7CRC back in Mt. Suite ARC protests W7E 659 reply fees. WA7XMM age 18 new Extra. WB7QXG age 10 new Novice. WR7ABY plans new wind generator. WR7ANC progressing well. WA7OBH has 140 country DXCC sticker. W7DB reads bulletins on MTN. W7LR has WAZ No. 19 14 MHz cw. Please get info for this column to me by the 6th. I mail it on the 7th. My new call is W7GZ. Planning to move from 399.5 kHz. Traffic: W7DEO 54, WA7KMP 12, W7NEG 12, W7TYN 5, W7LR 4, K7SIK 4, W7DB 2, WA7OBH 2, WA7PZO 1.

OREGON: SCM, Dwight J. Albright, W7HFL - Asst. SCM; Leland McIntosh, WA7UJU, SEC; W7LZH, PAM; K7HQZ, RM; K7OLF, The LaGrande Area Radio amateurs became organized Apr. 1. The name is Grande Ronde Radio Amateurs. Officers are W7KVV, pres.; W7IES, vice-pres.; Lois Rogers, secy.; WB7FDB treas.; K7GNA, act. mgr. Rogue Valley Radio Club officers are W7LNG, pres.; WA7IHU, vice-pres.; WB7AWO, secy. Vic Seeburger Jackson county EC was elected head7. Mt. Suite ARC has 3910 kHz. K7CJQ new EC for Klamath Co. was burned badly in gasoline fire while repairing his Volkswagen. WB7DSK reports from Portland 220 MHz is now in full swing, 223.5 simplex and 222.34/223.94 repeater on the air another planned good use of two meters (100 mi) in delivering traffic. One OC notes many of you are not signing every 7th minute call. We should. 14 new Novices will soon have their calls in Medford area. The Intruder Watchers are reporting some weird sounds heard on the 75-meter band. Like Multitone RTTY etc. OSN 3585 160 QNI, 90 QTC (Mar.) 31 sessions;

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Will alternate time (8 seconds) and date (2 seconds) or may be wired for time or date display only, with other functions on demand. Has built-in oscillator for battery back-up. A loud 24 hour alarm with a repeatable 10 minute snooze alarm, alarm set & timer set indicators. Includes 110 VAC/60Hz power pack with cord and top quality components through-out.

KIT-7001B WITH 6-.5" DIGITS \$39.95
KIT-7001C WITH 4-.8" DIGITS & 2-.3" DIGITS FOR SECONDS \$42.95
KIT-7001X WITH 6-.8" DIGITS \$45.95

KITS ARE COMPLETE (LESS CABINET)
ALL 7001 KITS FIT CABINET I AND ACCEPT QUARTZ CRYSTAL TIME BASE KIT # TB-1



5-DIGIT LED CLOCK KIT #850-4 MOBILE LED CLOCK

12/24 HR. OPERATION BIG 4" DIGITS - 50/60 HZ OPERATION.

KIT INCLUDES
• INSTRUCTIONS
• QUALITY COMPONENTS
• 50 or 60 HZ OPERATION
• 12 or 24 HR OPERATION

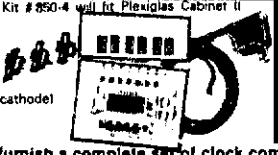
6 LED Redouts (FND-359 Red, com. cathode)
1 MM5314 Clock Chip (24 pin)
13 Transistors
2 Switches
6 Capacitors
5 Diodes
9 Resistors
24 Molex pins

*Kit #850-4 will fit Plexiglas Cabinet II

*Kit #850-4 will furnish a complete set of clock components as listed. The only additional items required are a 7-12 VAC transformer, a circuit board and a cabinet, if desired.

PRINTED CIRCUIT BOARD FOR KIT #850-4, SCREEN PRINTED
DRILLED AND SOLDER PLATED FIBERGLASS \$2.95
MINI-BRITE RED LED'S (FOR COLON IN CLOCK DISPLAY) Pkg. of 5-\$1.00
MOLDED PLUG TRANSFORMER 115/10 VAC (WITH CORD) \$2.50

NOTE: Entire Clock may be assembled on one PC Board or Board may be cut to remote display.



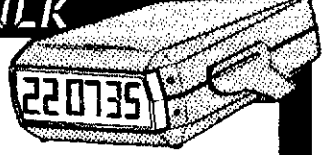
MOBILE LED CLOCK

12/24 HR. 4" DIGITS!
MODEL 12 VOLT AC or DC POWERED #2001

• 6 JUMBO 4" RED LED'S BEHIND RED FILTER LENS WITH CHROME RIM
• SET TIME FROM FRONT VIA HIDDEN SWITCHES • 12/24-Hr. TIME FORMAT
• STYLISH CHARCOAL GRAY CASE OF MOLDED HIGH TEMP. PLASTIC
• BRIDGE POWER INPUT CIRCUITRY - TWO WIRE NO POLARITY HOOK-UP
• OPTIONAL CONNECTION TO BLANK DISPLAY (Use When Key Off In Car, Etc.)
• TOP QUALITY PC BOARDS & COMPONENTS - EXCELLENT INSTRUCTIONS
• MOUNTING BRACKET INCLUDED

KIT #2001 COMPLETE KIT (Less 9V. Battery) 29⁹⁵ EA. 3 OR MORE \$27⁹⁵ EA. 115 VAC Power Pack #AC-1 \$2⁹⁵ EA.

ASSEMBLED UNITS WIRED & TESTED ORDER #2001 WT (LESS 9V. BATTERY) \$39⁹⁵ EA. 3 OR MORE \$37⁹⁵ EA. WIRED FOR 12 HR. OP. IF NOT SPECIFIED OTHERWISE



PLEXIGLAS CABINETS

Great for Clocks or any LED Digital project. Clear-Red Chassis serves as Bezel to increase contrast of digital displays.

CABINET I
3"H, 6 1/4"W, 5 1/2"D Black, White or Clear Cover
\$6.50 ea.

CABINET II
2 1/2"H, 5"W, 4"D \$6.50 ea.

RED OR GREY PLEXIGLAS FOR DIGITAL BEZELS
3"x6"x1/8" 95^{ea} 4/3

SEE THE WORKS Clock Kit
Clear Plexiglas Stand

• 6Big, 4" digits
• 12 or 24 hr. time
• 3 set switches
• Plug transformer
• All parts included

Plexiglas is Pre-cut & drilled
Kit #850-4 CP
Size: 6"H, 4 1/4"W, 3"D
\$23⁹⁵ ea. 2/45. A SUPER CLOCK!

JUMBO DIGIT CLOCK

A complete Kit (less Cabinet) featuring six .5" digits, MM5314 IC 12/24 Hr. time, 50/60 HZ., Plug Transformer, Line Cord, Switches, and all Parts. (Ideal Fit in Cabinet II) Kit # 5314-5 \$19⁹⁵ 2/38.

WITH PC Board's
JUMBO DIGIT CONVERSION KIT \$ 9.95 ea.
Convert small digit LED clock to large .5" displays. Kit includes 6-LED'S, Multiplex PC Board & easy hook-up info.
Kit # JD-1CC For common Cathode
Kit # JD-1CA for common Anode

TELEPHONE FORMAT KEYBOARD
BY Chometrics # EF-21360
2-1/4"x3"
\$13⁷⁵ Inck

60 HZ. XTAL TIME BASE
Will enable Digital Clock Kits or Clock-Calendar Kits to operate from 12V DC. 1"x2" PC Board
Power Req: 5-15V (2.5 MA. TYP)
Easy 3 wire hookup Accuracy: ± 2PPM
#TB-1 (Adjustable)
Complete Kit \$4⁹⁵ ea
Wir & Cal \$9.95

25 AMP BRIDGE
\$1.95 ea.
3/\$5.00

NEW LSI TECHNOLOGY
FREQUENCY COUNTER KIT
8 LARGE .4" RED LED DIGITS
Kit #FC-50 • 8 IC's • XTAL TIME BASE
A truly "State of the Art" counter using quality components throughout.
KIT INCLUDES: DETAILED INSTRUCTIONS, XTAL, TOP QUALITY FIBERGLASS DOUBLE SIDED PC BOARD, IC'S WITH SOCKETS AND ALL PARTS LESS POWER SUPPLY AND CABINET.

50 MHZ COUNTER KIT #FC-50 \$69⁹⁵

5 VOLT REGULATED 1 AMP POWER SUPPLY KIT #PS-02 \$9.95
350 MHZ PRESCALER KIT #PSL-350 23.95
650 MHZ PRESCALER KIT #PSL-650 \$29.95
CABINET & MTG HARDWARE #CAB III \$19.95
[CABINET WILL HOUSE #FC-50, #PS-02, AND A PRESCALER]

Fairchild Super Digit FND-359
4" Char. M. LED Red Com. Cath. Direct pin replacement for popular FND-70.
95^{ea} 10/\$8.50 100/\$79.00

SET OF 6 FND-359 WITH MULTIPLEX PC BOARD \$6.95

NYLON WIRE TIES
8" TIE WRAP 100/\$1.95
4" TIE WRAP 100/\$1.75

PLUG TRANSFORMERS
12VAC at 150MA \$ 2.50
12VAC at 500MA 3.50
7VAC at 1.75 VA \$3.50

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74S00 \$.35
74S01 .40
74S04 .55
74S05 .60
74S09 .55
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74S51 .55
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74S114 .95
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74S134 .75
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74S151 1.95
74S153 1.95
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74S156 1.95
74S158 2.50
74S159 2.50
74S175 2.50
74S181 2.85
74S182 1.95
74S251 2.75

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95H90 9.95

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LM 309 K TO-3 1.25
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7812 TAB 1.75
7815 TO-3 1.50
7815 TAB 1.25
7815 TO-6 .75
7824 TO-3 1.25
723 DIP .75
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5203 E Prom \$8.95

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7209 INTERSIL \$ 4.95
MC14553 MCT \$ 9.95
MC14410 MOT \$12.50
2513 SIG \$ 9.95

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8 25 22 \$ 20
16 28 25 \$ 23
18 31 28 26
24 50 45 40
28 44 35 50
42 75 70 85

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MM 5375 AB 3.95
CT 7001 1.95
CT 7002 13.95
MM 5369 2.50

LED DRIVERS
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7448 .95
75491 .65
75492 .65
5988 2.50

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2N2712 TO-98 5-8/81.00
2N3416 TO-9 5-8/81.00
2N3704 TO-92 6-5/81.00
2N4400 TO-92 5-21/81.00
2N4126 TO-22 5-8/81.00
2N4248 TO-92 8-8/81.00
2N4437 TO-92 5-8/81.00
2N5627 PLT 2-8/81.00
2N5457 1-Pin 2-8/81.00

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1A 600 PIV 11/81.00
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IN914 SIL SIGNAL 20-8/81.00
IN4148 SIL SIGNAL 20-8/81.00
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LINEAR
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556 DUAL TIMER 3/81.00
555 PUL 3/81.00
556 FUNCTION GEN. 1.75
567 TONE DECODER 1.75

TRANSISTOR SOCKET TO-5/18 GOLD PINS
5, 51.00

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COMMON CATHODE
COLOR BY DEL PT PR FA
FND 359 RED 4" RHDP \$ 3.95
FND 303 RED 5" RHDP \$ 5.95
XL 750 RED 6" LHDP \$2.95
XAN 654 GREEN 6" NDP \$1.95
XAN 664 RED 6" NDP \$1.95

COMMON ANODE
DL 747 RED 6" LHDP \$1.95
XAN 72 RED 3" LHDP \$1.25
MAN 72 RED 3" LHDP \$1.25
XAN 81 YELLOW 3" RHDP \$1.75
XAN 351 GREEN 3" RHDP \$1.50
XAN 362 ORANGE 3" LHDP \$1.50
XAN 662 RED 6" NDP \$1.95
XAN 692 RED 6" NDP \$1.95

OP AMPS
3/81.00
301 TO-5
709 DIP
709 TO 5
741 DIP
741 M-DIP
741 TO-5
747 TO-5

DISCRETE LED'S
JUMBO RED
10 FOR \$1.00
100 FOR \$9.50

PC TRIM POT
25K 6-8/81.00
4.7K 6-8/81.00

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95c
4/3 \$3.00

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4011 .20
4013 .40
4015 .95
4016 .40
4023 .20
4025 .20
4027 .40
4028 .65
4030 .35
4042 .75
4044 .80
4046 1.75
4049 .40
4050 .40

AUTO BURGLAR ALARM KIT
AN EASY TO ASSEMBLE AND EASY TO INSTALL ALARM PROVIDING MANY FEATURES NOT NORMALLY FOUND KEYLESS ALARM HAS PROVISION FOR PWS & GROUNDING SWITCHES OR SENSORS. WILL PULSE HIGH RELAY AT 1/2 RATE OR DRIVE SIREN. KIT PROVIDES PROGRAMMABLE TIME DELAYS FOR EXIT, ENTRY & ALARM PERIOD. UNIT MOUNTS UNDER DASH - REMOTE SWITCH CAN BE MOUNTED WHERE DESIRED. COMES RELIABILITY RESISTS FALSE ALARMS & PROVIDES FOR ULTRA DEPENDABLE ALARM. DO NOT BE FOOLED BY LOW PRICES! THIS IS A TOP QUALITY COMPLETE KIT WITH ALL PARTS INCLUDING DETAILED DRAWINGS AND INSTRUCTIONS OR AVAILABLE WIRED AND TESTED

KIT #ALR-1 \$9.95
#ALR-1WT WIRED & TESTED \$19.95

VARIABLE REGULATED 1 AMP POWER SUPPLY KIT
• VARIABLE FROM 4 TO 14V
• SHORT CIRCUIT PROOF
• 723 IC REGULATOR
• 2N3055 PNP TRANSISTOR
• CURRENT LIMITING AT 1 Amp
KIT IS COMPLETE INCLUDING DRILLED & SOLDER PLATED FIBERGLASS PC BOARD AND ALL PARTS (Less TRANSFORMER) KIT #PS-01 \$8.95
TRANSFORMER 24V CT will provide 300MA at 12V and 1 Amp at 5V. \$3.50

MOLEX PINS
\$9⁹⁵
Reel of 1000 100 for \$1.25

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Memorex computer boards with IC's, diodes, transistor, etc. 5 Boards containing 100 - 200 IC's
ONLY \$ 4.25

BRIDGE RECTIFIERS		
6 Amp	50V	1.10
10 Amp	50V	1.25
25 Amp	50V	1.39

RESISTORS

Over 50,000,000 in stock

*330 ohm	22K ohm
470 ohm	27K ohm
*560 ohm	33K ohm
1K ohm	39K ohm
1.2K ohm	43K ohm
2.2K ohm	47K ohm
3.3K ohm	52K ohm
4.7K ohm	100K ohm
6.8K ohm	150K ohm
10K ohm	200K ohm
20K ohm	

*1/8W only
**1/2W only

All resistors are P.C. Lead but are not pull outs
100 min. order for each value

NO MIX 100/99

MK 5005

4 digit counter/latch decoder; 7 segment output only. 24 pin dip with specs.

\$ 8.00 EACH

UNSCRAMBLER KIT for all Scanners

- Tunes easily
 - Full instructions included
 - Easy to install
 - 3 1/2" x 3 1/2" x 1 1/2"
- Only \$19.95**

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2513	10.00
MK4102-1	.99

PLASMA DISPLAY KIT

Kit Includes: 12 digit display .4" Character Power supply for display above Complete specs for hookup.

Line cord Not Included. **ONLY \$ 3.95**



PROJECT CASES

Small	Med.	Large
\$1.50	\$2.00	\$2.75
D-2-1/2"	D-2"	D-2-1/2"
W-4-3/4"	W-4-7/8"	W-7"
H-1-7/8"	H-3-1/2"	H-4"

All cases have a sloped front, white with black wrinkle finish.

REGULATORS

7805	7818
7806	7824
7808	7905
7812	7912
7815	7915

Your Choice \$.95

READOUTS

Best Value!

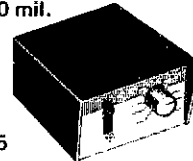
FND70 .4"C.C. .59
FND800 .8"C.C. 1.69
TI 6 digit array C.C. 3/1.00
MAN 8 .3"CA Yellow .89
LT767 .7" C.C. 4 digit stick **\$ 3.95**

WATERGATE SPECIAL

Telephone Relay automatically starts and stops tape recorder. No batteries required. Kit complete with drilled P.C. Board.
Parts and Case **ONLY \$ 10.95**

VARIABLE POWER SUPPLY KIT NO. 1

- *Continuously variable from 5V to 20V
 - *Excellent regulation up to 500 mil.
 - *4400 Mfd of filtering
 - *Drilled fiberglass PC Board
 - *One hour assembly
 - *Kit includes all components
 - *Case Included
- ONLY \$10.95**

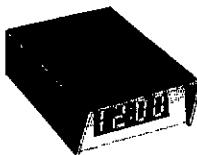


VARIABLE POWER SUPPLY KIT NO. 2

Same as above but with 1 amp output, also with case.
ONLY \$13.95

CLOCK KIT

Kit includes
- LT701 clock module
- Power Supply
- Punched Case
- 12 or 24 hour operation



ONLY \$ 14.95

Completes
except for line cord
LT701E 12 hour clock

BATTERY CLIPS

Standard 9V battery clip with 4-1/2" tinned leads. **25/\$1.00**

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7400	.17	7473	.21
7401	.17	7474	.35
7402	.17	7475	.56
7403	.17	7476	.35
7404	.25	7480	.45
7404	.17	7483	.76
7406	.25	7485	.89
7408	.17	7486	.35
7409	.17	7490	.71
7410	.17	7491	.71
7411	.25	7492	.71
7413	.45	7493	.67
7420	.17	7494	.90
7421	.17	7495	.71
7423	.35	7496	.85
7425	.27	74100	.96
7426	.25	74121	.31
7427	.17	74123	.61
7430	.35	74125	.44
7432	.30	74141	.71
7437	.35	74145	.97
7438	.35	74151	.71
7440	.17	74153	.81
7442	.60	74154	.97
7443	.60	74181	.91
7444	.65	74183	1.05
7446	.85	74184	1.05
7447	.81	74174	.91
7448	.81	74175	1.40
7450	.20	74180	.78
7451	.17	74181	2.25
7453	.17	74191	1.20
7454	.17	74192	1.20
7470	.35	74193	.85
7472	.21	74195	.85

TRANSISTORS DIODES

*MJE1103	3.10
MJ3001	1.39
2N2727	6.10
2N2904	6.10
2N2907	6.10
*2N2907	15.10
2N3408	6.10
2N4400	6.10
2N4443 SCR	37.00
1N4004	15.10
1N4007	10.10
1N4148 (1N914) 20/1.00	
1N2701 VHF Pre amp	.80

D40C1 Power Dart - 8/1.00

*House numbered and P.C. Lead

PC BOARDS

4 digit PCB for FND800 or 807	2.59
6 digit PCB for FND800 or 807	3.50
4 digit PCB for DL 707	1.50
6 digit PCB for DL 707	2.00
4 digit PCB for FND503 or 510	2.00
6 digit PCB for FND503 or 510	3.00
4 digit PCB for DL 747	2.50
6 digit PCB for DL 747	3.00
4 digit PCB for DL 727 or 738	2.60
6 digit PCB for DL 727 or 738	3.00
4 digit PCB for FND359 or 70	1.75

NOTE: All PC Boards are multiplexed for adding additional digits.

HARDWARE

New, includes 2-56, 4-40, 6-32 and 8-32 screws and nuts. A very usable selection.
1/2 pound \$1.50
1 pound \$2.60

L S

74LS00	.25
74LS02	.25
74LS04	.30
74LS08	.25
74LS10	.25
74LS11	.32
74LS20	.31
74LS21	.33
74LS22	.33
74LS27	.30
74LS30	.31
74LS32	.33
74LS37	.40
74LS38	.35
74LS74	.49
74LS90	.85
74LS132	.90
74LS138	.89
74LS139	.89
74LS155	.90
74LS157	1.00
74LS162	1.39
74LS163	1.39
74LS175	1.09
74LS193	1.09
74LS258	1.09
74LS367	.70
74LS368	.70

CMOS SALE

4020	.85	4046	.90
CD4000	.16	CD4040	1.00
CD4001	.16	CD4041	.69
CD4002	.16	CD4042	.59
CD4007	.16	CD4043	.60
CD4009	.45	CD4044	.59
CD4010	.45	CD4047	.59
CD4011	.16	CD4049	.35
CD4012	.16	CD4050	.35
CD4013	.29	CD4051	.90
CD4014	.75	CD4053	.90
CD4015	.75	CD4056	1.00
CD4016	.29	CD4058	.90
CD4017	.80	CD4060	1.00
CD4018	.80	CD4066	.69
CD4019	.39	CD4069	.30
CD4021	.90	CD4071	.16
CD4022	.90	CD4076	.99
CD4024	.70	74C04	.29
CD4025	.19	74C107	.29
CD4027	.39	CD4116	.39
CD4028	.75	CD4507	.40
CD4029	.99	CD4512	.50
CD4030	.16	CD4516	.85
CD4034	2.30	CD4518	.85
CD4035	.99	CD4520	.85

LINEARS

LM301	30
LM307	30
LM309K	95
LM311	85
LM317	1.85
LM380 (8 pin)	75
LM3900	30
LM710	75
LM711	75
LM723	40
LM741	25
LM748	25
NF553	1.95
NE555	.40
NE556	.95
NE565	.95
NE566	.95
NE567	1.10
1458	.44
PCA3043	.75
75491	.30
75492	.30

60 Hz L(•)(•)K

Crystal Time Base Kit - Kit enables a MOS clock circuit to operate from a DC power source. Ideal for car, camper, van, boat, etc. 60Hz output with an accuracy of .005% (typ.) Low power consumption 2.5 ma (typ.). Small size will fit most any enclosure. Single MOS IC oscillator/divider chip 5-15 volts DC operation.

ONLY \$ 5.95
2 for \$10.00

RADIO HUT GUARANTEE

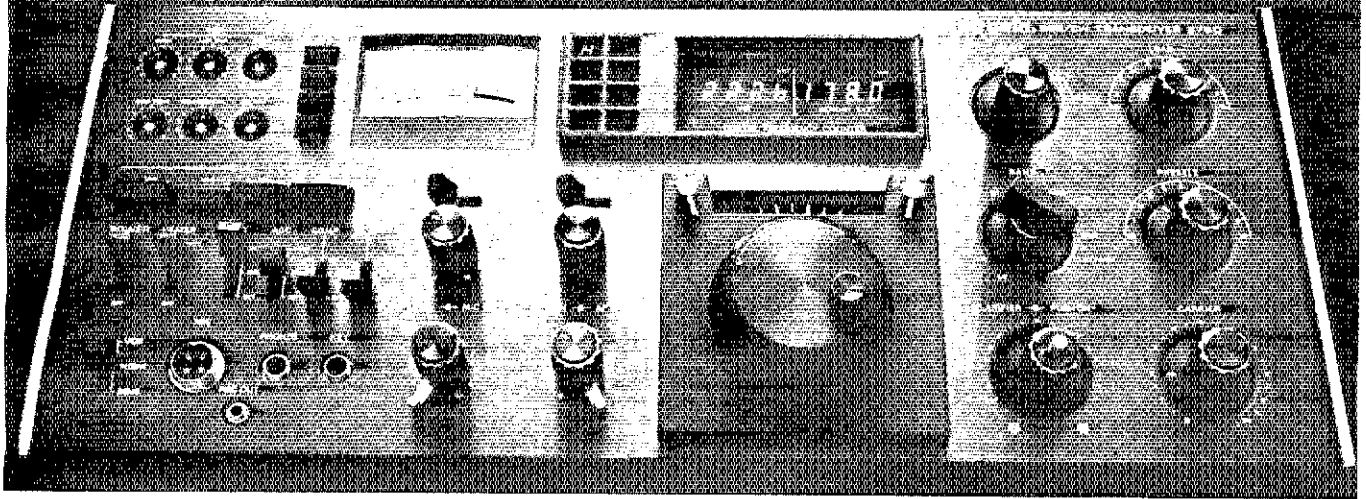
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There is no other amateur transceiver available in the United States today that can match the quality. The reliability. Or the performance of the Hy-Gain 3750.

It covers all amateur band 1.8-30MHz (160-10 meters) with uncanny accuracy. It has

advanced Phase-Lock-Loop circuitry. Dual gate MOS FET's at all critical RF amplifier and mixer stages. Electronic frequency counter with digital readout. Digital memory display. And stability that's truly remarkable by any standards.

The Hy-Gain is simply the finest amateur transceiver you can buy. There is nothing else like it.

Read our specs. Then see your amateur radio dealer or write for complete details on the features and performance of the incomparable 3750.

SPECIFICATIONS

FREQUENCY COVERAGE

1.8 MHz Band 1.8 - 2.0 MHz
3.5 MHz Band 3.5 - 4.0 MHz
7.0 MHz Band 7.0 - 7.5 MHz
14 MHz Band 14.0 - 14.5 MHz
21 MHz Band 21.0 - 21.5 MHz
28 MHz Band A 28.0 - 28.5 MHz
28 MHz Band B 28.5 - 29.0 MHz
28 MHz Band C 29.0 - 29.5 MHz
28 MHz Band D 29.5 - 30.0 MHz
WWV RX only 10.0 MHz

MIC. INPUT IMPEDANCE
50K Ω

AUDIO FREQUENCY CHARACTERISTICS

300 - 2700Hz (-6dB)

SENSITIVITY

SSB less than .25 μ v for
10 dB S/N+N ratio
CW less than .15 μ v for
10 dB S/N+N ratio

MODES OF OPERATION

SSB (LSB or USB)
CW

INPUT POWER

200 W PEP

ANT. IMPEDANCE

50 Ω - 75 Ω Unbalanced

CARRIER SUPPRESSION

More than 50dB

SIDE BAND SUPPRESSION

More than 50dB

SPURIOUS AND HARMONIC SUPPRESSION

Greater than 40dB

3RD ORDER DISTORTION PRODUCTS SUPPRESSION

Greater than 30dB

IF FREQUENCIES

1st IF 9MHz

2nd IF 50kHz

SELECTIVITY

SSB 2.4kHz (-6dB)

4.0kHz (-66dB)

CW 400Hz (-6dB)

1.8kHz (-66dB)

AUDIO OUTPUT into 8 Ω load

2.5W (10% distortion)

3.0W (MAX)

POWER SOURCE

AC 120V 50/60 Hz (can be re-wired for 240V)

POWER DRAIN

400VA TX

78VA RX

48VA RX (Power tube OFF)

SEMI-CONDUCTORS

Transistor 98

(including 23 FET)

IC 43

Diode 120

Tube 3

Digital Ind. 1

WEIGHT

44 lbs. 6 ozs. (23kg)

DIMENSIONS

16 $\frac{1}{2}$ " x 7" x 13 $\frac{1}{2}$ "
(420 x 172 x 340mm)

Matching speaker unit (Hy-Gain 3854) and complete external VFO (Hy-Gain 3855) available at extra cost.

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TEN-TEC ULTRAMATIC KEYSER

MODEL KR50

- SUPERLATIVE "FEEL" 5-50 GRMS PADDLE FORCE
- AUTOMATIC OR MANUAL WEIGHTING
- DIT AND DAH MEMORIES WITH SEPARATE DEFEATS
- "STRAIGHT KEY" DEFEATS FOR QRS OR TUNE-UP
- GUARANTEED FOR LIFE BEARING PIVOTS

A sparkling new keyer with a host of exciting features. A powerful aid to cleaner, more articulate CW that is relaxing to use and a joy to copy.

The paddle assembly will delight the CW purist as well as the recent graduate from a bug or hand key. The superlative "feel" is attained by a magnetic return force, instantly adjustable to exactly the right touch for you.

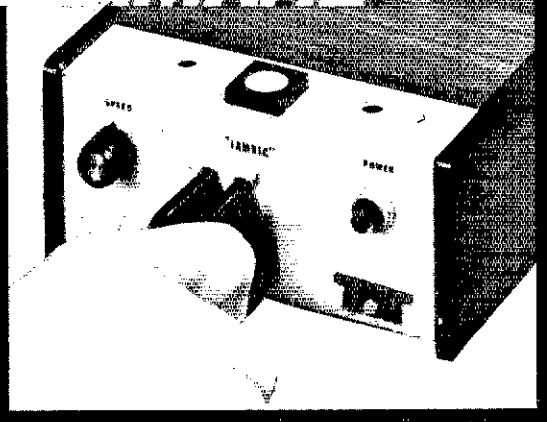
Weighting, the ratio of dit and dah (bits) lengths to the spacing between them, is either automatically or manually varied. In the automatic position, it is programmed to lengthen the bits at slow speed for enhanced smoothness and decrease them as you advance the speed, for highest articulation. Or, it can be adjusted to a constant value.

The KR50 is versatile. Dit and dah memories are provided for full iambic (squeeze) keying. Either dit or dah, or both, may be turned off for operation as a conventional type keyer. Self-completing characters at all times.

A convenient "Straight key" is built-in for QRS sending or tune-up. Also an internal side-tone and 115VAC/12VDC operation is provided.

The KR50 is designed to have a permanent place in your shack for the years, perhaps decades, ahead. An investment in the enjoyment of CW.

PRICE \$110.00



KR20-A

Paddle has unique principle with excellent feel for rhythmic CW. Characters are self-completing. Bit weighting is optimized for normal speeds. Manual key button conveniently located for hand sending. Side tone signal, Reed relay. Plug-in circuit boards. 115VAC or 6 to 14 VDC. HWD 2 1/2" x 4 1/2" x 8 1/4", Wt. 2 1/2 lbs.

PRICE \$69.50

KR5-A

Similar to the KR20A but without monitor signal and AC power supply. A great value. For 6-14 VDC operation. Size HWD 2" x 4" x 6". Weight: 1 1/2 lbs.

PRICE \$39.50

KR1-A

This is the paddle mechanism used in the KR50. Requires 6-14 VDC for adjustable electromagnetic paddle return force. Adjustable contact spacing. For iambic or conventional keyers. "Straight key" button. Housed in an attractive metal case with cream front panel, walnut vinyl top. Size: 2" x 4" x 6".

PRICE \$35.00

KR2-A

The paddle used in the KR20A. Single paddle for non-iambic keyers. "Straight key" button conveniently located. Cream aluminum case with walnut vinyl top. Size: 2" x 4" x 6". Weight: 1 1/2 lb.

PRICE \$17.00

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OSN 3585 130 QNI, 169 QTC (Apr.) K7IWD, Mgr.;
BSN 3908 591 QNI, 51 QTC WA7SSO Traffic;
K7IWD 192, K7NFS 173, W7VSE 165, K7GJF 127,
K7QGS 70, W7DAN 65, W7BLF 65, K7WWW 35,
WB7CBA 21, W7IWN 20, W7LT 12, WA7TXV 9,
WA7ZAP 2, W7LBH 1.

WASHINGTON: SCM, Mary E. Lewis, W7QGP —
SEC: K7VAS, RM: K7OZA, PAM: K7YR, VHF PAM:
K7TWE
Net — Freq. Time QNI QTC Sess.
Manager
WARTS — 3970 1800 2056 90 30
W7QGP
NTN — 3970 11:30 1432 108 30
W7PFD
WSN — 3590 1030 352 249 30
K7OZA
ARES — 3030 50900 66 1 4
K7VAS
NWSSB — 3945 18:30 789 49 30
WA7RCR
ESP — 3720 0100 510 56 30
3970

WA7MIF
WA7VLT reports the Diabetic Assn. Bike-A-Thon had 12 Amateur ops backed up by 15 REACT CE ops, W7GB, Moses Lake, was backed up by REACT ops also as were several other areas. This working together does not happen over night, it takes time and willingness to get acquainted and work as a team. Skagit Hamfest had the largest attendance in its 27 year history. Good weather, dinner and as usual lots of prizes. W7QGP and appr. 50 other amateurs attended the MBARC annual spring dinner at Victory Grange Hall. MBARC was well represented at the Skagit Hamfest and put on two fine Jimmy Huttis. WA7UE had a visit to Ferndale FCC monitoring station and reports he learned a lot. NW Slow Speed Net meets on 3701 KHZ daily at 0300 UTC. New EC Spokane Co. is WB7GC, a member of the Dial Twister Club. WA7AZO also is a new EC for area 6B. July 16 is the last day to pre-register for SEASIDE CONVENTION in Seattle, July 29-31. See U in Seattle. Traffic: K7GKZ 224, WA7BDJ 96, W7GB 94, WA7OJI 87, W7BAX 57, W7KWT 58, W7PWP 36, WA7LQV 34, WA7DKA 30, W7IEU 26, W7LG 23, W7BGA 17, W7BUN 10, W7AIB 9, K7VAS 4, WA7GV3, WB7FGC 1.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Ass't. SCMs: W6ZF, VE3AQV/W6 SEC: W6IHH. After several outstanding services, it has become necessary for W6BDS1 to resign as Ass't. SEC. For the entire Section I would like to thank him and wish him all the best. The South Bay ARA had a loaded program with two speakers, Hob Margolin, W2BUJ from League HQ and Emery Boring, W6IHF. For those who wrote to Jack Anderson in response to his editorial, please send a copy to League HQ. W6BFL has received his WAC. W6BJK has a new FM 76 on 220. W6GJZ has been heard on 220 working up a tower. W6IHF and T H 6 D X — WA 6 R M V reports WR6ARR, 223.22/224.82, is now on the air and needs users. VK2BQ1 was the speaker at the Apr. meeting of the Silverado ARA. W6ZF bought a mini-beam for \$2.00, can anyone beat that price? Our sympathies to Glenna and Russ McCabe, W6GIP, in the loss of their daughter in the Canary Island air disaster. Make plans now for the biggest and best Pacific Division Convention to be held at the Royal Coach Inn, San Mateo on Oct. 15 and 16. See you all there. Traffic: K6HW 375, K6OE 343, W6QA 210, W6BUIK 156, W6BMM 85, W6JXK 80, WA6BFL 10, K6PMM 7, WA6QQZ 2.

NEVADA: SCM, Leonard M. Norman, W7BPV — SEC: K7ZAU, WA7HHY/WA6LEA was host at the Lame Dog Mine; WB7DXL W7MRS W7MWF W7PRM WA7RPZ W7YV and XYLS took part in the geological tours. W7HOP WA7KKNK and K6MQX/7 active on 160. Las Vegas RAC 34/94 repeater activity is increasing with scheduled meetings at 5000 on Tue. K7YX1 is looking for more qualified instructors for the SNARS code and theory class. WA7NHJ W7GO and WA7UGJ Field Day persons for SNARS. W7MWF working for a Black Belt in Karate. Tahoe ARA repeater WR7AXA 25/85 is operating low level, with good local coverage around the lake. WB7DX was guest of the NW League at K6E. KH6SH was on trip on GM 232362 to 240331. K7ICS is active on 40M in the 1600 club. Traffic: W7LX 130.

PACIFIC: SCM, Pat Corrigan, KH6GQW — SEC: KH6CKJ, RM: KH6JAC, ORS: KH6IJE. The Kauai ARC is now in the process of developing a program with Kauai Civil Defense Adm. Each island now has better relationship. Congrats to KH6IJE on making PSHR. W6ZRJ has announced he will not run again for director, for this division. The 04/64 repeater on Oahu has been moved seeking a better site. Diamond-head repeater end of the state system has been upgraded with all new equip, both VHF/UHF. SARAC-Hawaii is supposed to take place the first week of Nov. this year. New amateur classes are being conducted at Guam (2) and Marshall Isl., in addition to the 4 conducted on Oahu. Kauai ARC is planning to have perhaps 2 classes, K1LPA, SCM, Rhode Island had nice week-long visit to KH6. KH6SH was on trip to W6 recently. W6RNF who used to be at KH6SP is now married and living in Santa Rosa. Traffic: (Apr.) KH6IJE 49, (Mar.) KH6IJE 122.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: W6SMU, Officers: North Hills RC: W6MT, WA6L, X.T. pres.; W6GNRR, vice pres. W6ANV, ser.; W6BWZ, treas.; W6SMU, W6CJ and W6BRDA, dirs. New calls in the Placerville area are WA6YSV, W6YUU and WA6YUW, while in Chico, W6BVLN is now active. N6JM is really W6KYA with a new stack of QSLs. The Tahoe Amateur Radio Assn. recently assisted the World Cup Ski Race in Heavenly Valley. 1977 Field Day Chairmen include WA6OIX for the GEARS, W6SMU of North Hills and W7QO for TARA. A demonstration of circuit board construction techniques was presented at the Mar. meeting of the GEARS by W6MRR. W6BRHC is ready to put up a new tower. The first weekend of Oct. will once again be the call. QSO Party. An announcement is being made in major publications including one that has been translated into Japanese. If you are planning operation, please let your SCM know so that maximum coverage will be obtained. Traffic: W6RSP 139, K6RPN 34, W6DEF 21.

SAN FRANCISCO: SCM, Rusty Epps, W6DAT — The Geo. Ladd Pioneer Radio Club assists in community activities for the Special Olympics for handicapped kids.

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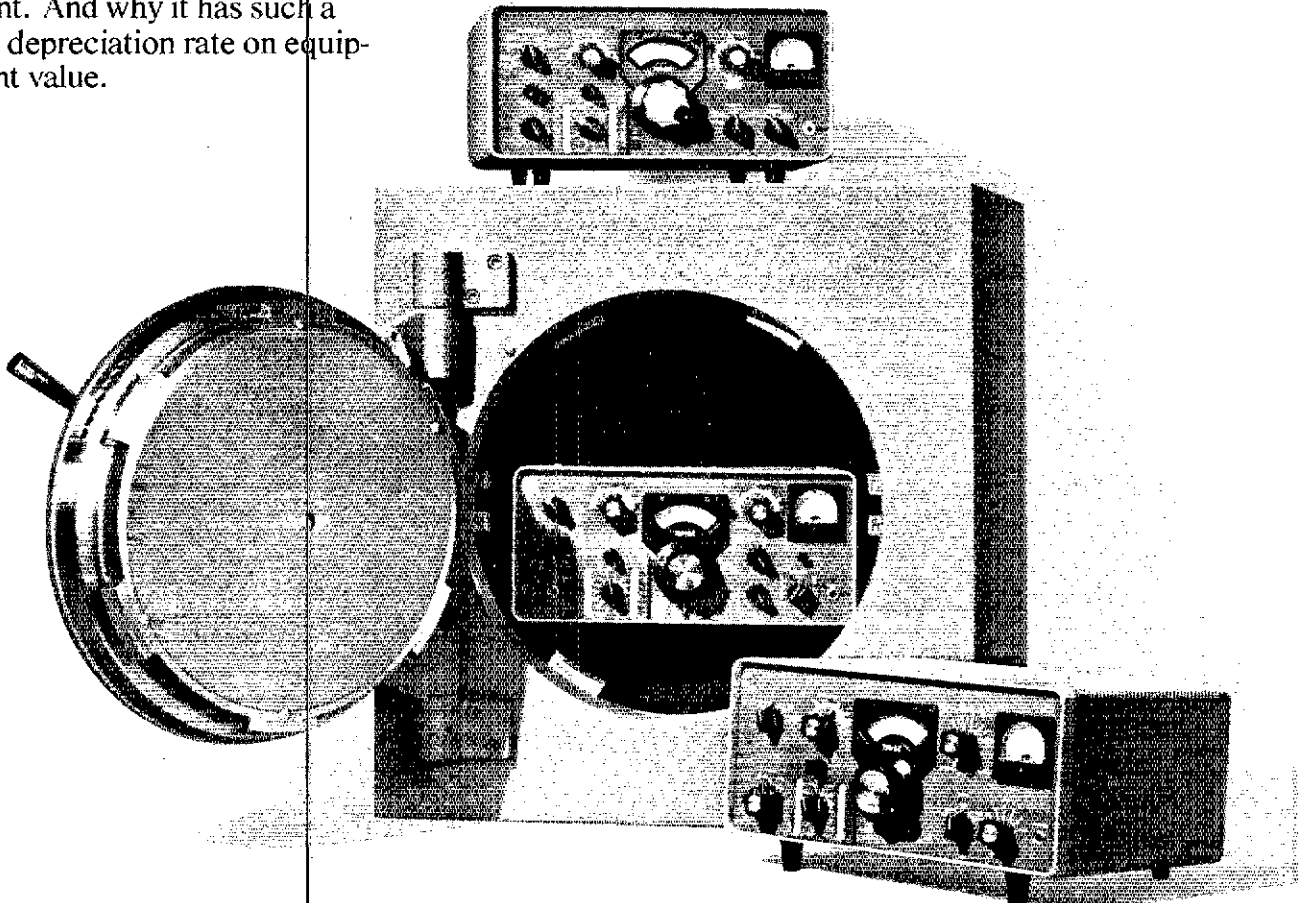
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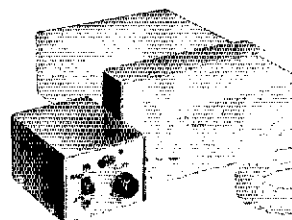
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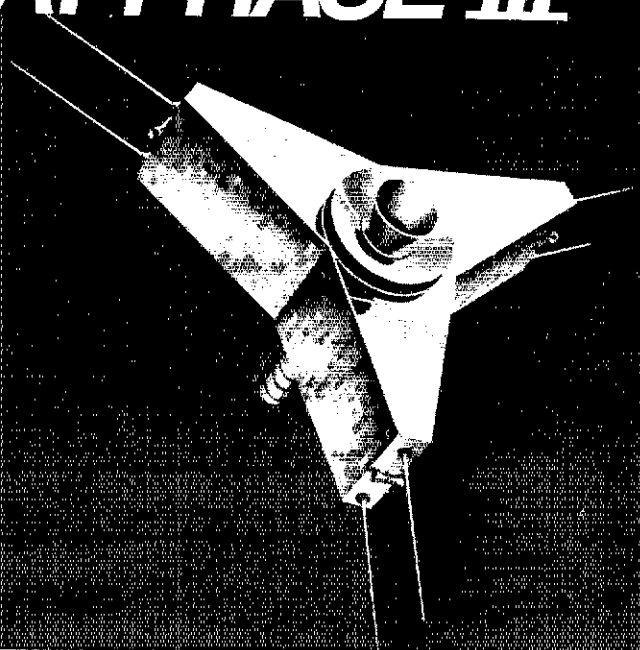
AMSAT, with members and contributing groups worldwide, and headquarters in Washington, D.C., has been responsible for our current satellite program. Many people feel that perhaps the greatest value of the amateur satellite program is the dramatic demonstration of amateur resourcefulness and technical capability to radio spectrum policy makers around the world.

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and then teamed up with the SFRC to provide communications for the March of Dimes "Superwalk '77." Congrats to the Northern Calif. Contest Club which took top spot in the club aggregate category of ARRL Sweepstakes for the second consecutive year. WB6JAA is spending his summer as a Park Ranger in NV; WB6UPV is spending his DXing on 2m from remote job sites in Humboldt and Mendocino Cties. We need ECs for SF and Sonoma Cties — please contact me if interested. The Redwood Coast ARC has been organized in the Gualala area with WB6MW2 elected as its first pres. K6SRM now N6KM; W6KHI is N6DR. Kudos to WA6MDS who passed his Advanced, and to WA6YTD who finally snagg'd Delaware to complete a CW WAS. Traffic: W6KXZ 146, W6KXZ 40, K6TF 128, W6PL 120, K6PB 64, WB6UPV 16, WB6ITN 11, W6GGR 6, WB6JEO 2.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6HNO. Appointments renewed. WA6BRX1 QRS: WA6KZY, EC; WA6CPC OPS. WA6IQZ New QRS. New officers of the San Joaquin Net are WA6QVE Net Mgr; W6CUIA secy.; N6AM asst. secy. The net meets at 6 PM local time on 3.9181MHz Mon. thru Sat. WB6RYG was on the NCN Honor Roll for Apr. K6KOL is now K6KX, WA6JMW now K6KR. Indian Wells ARC had a local FD on Apr. 25. W6LOC has a 1R7400A. WA6GND a Quad. WB6JDN WA6LJD have new towers. WA6YAB has an ICF-1. WB6NON a 1S920. WB6YUJ, a new Novice. W6XP K5XJ and WA6VFC are on 6m ssb. WB6VIN has WAS on 50 MHz. WA6YAB built a 2m beam. WA6CPP moved to Lodi, WB6UKB on 20 meters. Pacific Division Director Doc Ismetin, W6ZPJ, announced during the Fresno Hamfest that he will not run for reelection. The following members of the SJV won prizes at the Fresno Hamfest: WA6AGS (TS700A), XYL WB6TUR, WB6RUY, K6BLT, WA6CUZ, WA6REM, WA6YKR, K6CZD, W6GIN, K6SVE, WB6PZW, XYL W6DVL, WB6ICL, WA6RE, XYL W6LLR, XYL K6RPH, WB6YVJ, WA6MZA, and WB6RWG. The Fresno ARC to be congratulated for a very successful hamfest. Traffic: (Apr.) WA6RXI 29, WA6JDB 7, WA6GJV 2. (Mar.) WA6JDB 4, K6PSJ 4.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — SCCARA will start a new run of their popular licensing class on July 5. Contact W6ZM for further info. WB6WV and WB6YQ coming into the Bay Area area on 4.3.55/CW, so reports WB6JNN. Do you have antenna restriction problems? W6AJO has been operating for two years using an invisible antenna on his condominium — as yet undetected by the neighbors! Congrats to new Advanced Class licensee WA6ENC, Tech WA6OFN and Extra WB6GRZ. The newly formed NCDXCC ran up 48 million points in the recent ARRL DX Contest, nearly doubling the previous West Coast record. New stations have been showing on the Bay Area 220 repeaters almost daily, thanks in part to some new low-cost commercial gear now available. Those interested in more 220 scoop should query WB6TJO, the pres. of the Bay Area 220 Group, W6ZET and WA6TJG coming up for a European sabbatical in Aug./Sept. Oscar activity is planned, hopefully from exotic spots such as Andorra and Liechtenstein. As a demonstration of the utility of the little orbiters, WA6LUF recently used some doppler measurements from Oscar 7 to back out the speed of light for a physics class project. WB6PH, with his tiny 3 watt'er, has now worked 43 different countries. Only 11c's ticketudes him for his flea power WAC. The Northern Calif. DX club meets monthly on the second Fri. at a variable location. Pres. K6QX always has meeting info. W6QIE is now simulcasting his code practice Tues. thru Sun. at 8 PM local on 146.58, reports the Palo Alto PARAHgraphs. Traffic: W6YEV 139, W6RF 7, WB6AUC 73, W6KZI 42, W6WN 42, N6AU 16, WB6HT 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFO. VHF PAM: K4GHR. RM: K4MC. EC of the Month is WB4KZG covering Pitt County, so get in touch with Dan if you are in his area. Fun was had by all at 5th Annual Raleigh ARS Hamfest with a bunch taking exams and large flea market. K4JIN reports 23 novices in class in Asheville. W4WXZ N4RE and WB4UBA passed Red Cross tlc into W. Va. during recent flooding. Tarheel Emerg Net (Apr.) QNI 1399, QTC 174, Central NC 1 to Net (Apr.) QNI 1511, QTC 26. K4AIIH reports that WR4ALD Repeater Net had QNI 513, QTC 7. Mecklenburg ARS station W4BFB was manned by several members for several days during W. Va. flooding and the station is located at Red Cross bldg. Charlotte. W4DBT/Winston-Salem had all Techs and Generals from most recent Forsyth Tech classes. Also K4JO has Forsyth ARC Novice Class rolling again. Sympathy to the families and friends of Silent Keys, W4HBQ, W4FRH and W4QAZ. W4DAZ was killed in an airplane crash in SC in late Apr. and it was a loss to all traffic. (Apr.) W4EA1 175, W4P5L 123, W4OFO 117, K4MC 95, W4FTB 93, WB4MXG 86, K4VHO 55, WA4SRD 44, W4WXZ 37, W4ACY 28, W4FMN 26, WB4OXT 24, WA4KSO 22, W4WWR 20, N4RE 18, K4EZH 17, WB4UBA 14, W4EHF 11, W4I21 10, K4AIIH 9, WB4VOR 9, WB4CES 4. (Mar.) W4FMN 75. (Feb.) W4FMN 11.

SOUTH CAROLINA: SCM, Thomas Lufkin, W4DAX — Asst. SCM: Gary Barnette, WA4MDP. SEC: WB4TNS. PAM: W4MTK. RM: WB4CAK. Greenville Hamfest enjoyed by all. Sideband net supper had large attendance with Phil, Sideband net 25 guest speakers. Net was awarded Silverbander of the year. K4FRX made and presented several unique awards. Hope to see you at the Charlestown Hamfest July 10 and 11. New Sideband directory is another fine job by W4MTK and Son. K4PFC. If your club is not listed in net directory send info to Richard or me and it will be included in next directory. WB4GBZ and WB4KTY new K4ZM and N4RM respectively. With regret K4TZV is listed as a Silent Key. Net activity: SC55BN QNI 1394 QTC 160; PX QNI 218, QTC 55; Blue Ridge 2MTR QNI 1127, QTC 20; Anderson 2MTR QNI 628, QTC 24. (Mar.) PX QNI 187, QTC 56. Traffic: WB4ARJ 737, W4FRD 67, K4BKX 146, W4NT0 107, W4MTK 14, W4FMZ 6, WA4DAX 64, WB4UDK 50, W4OCX 21, WB4BZA 18, W4DRF 18, W4FVY 10, W44LTZ 4, WB4NBK 2.

VIRGINIA: SCM, Robert L. Folmar, N4RF — SEC: WB4ZNB. PAM: K4VWK. Asst. PAM: WA4YIU. RMs: VN: K4BKX; VSN WA4EPJ, 4RN W4SHJ. So long and thanks for a job well done as SEC to WB4DTG who is leaving VA for LA. Welcome to our new SEC WB4ZNB. Good news, WB4DBK & K4BKX both made BPL! That represents a lot of brasspounding, congrats fellas. K4BKX has new four-element 20-mfr.

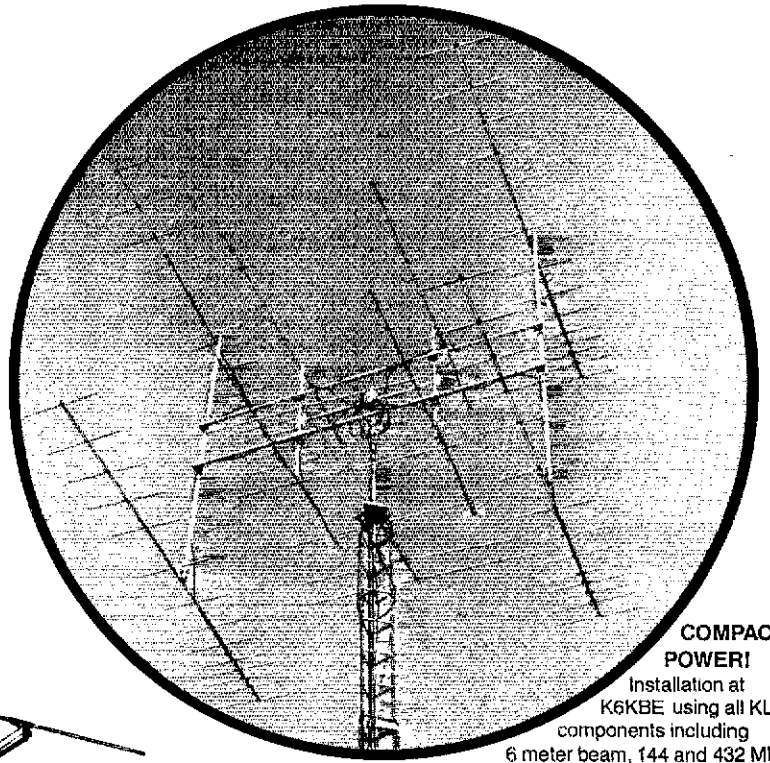
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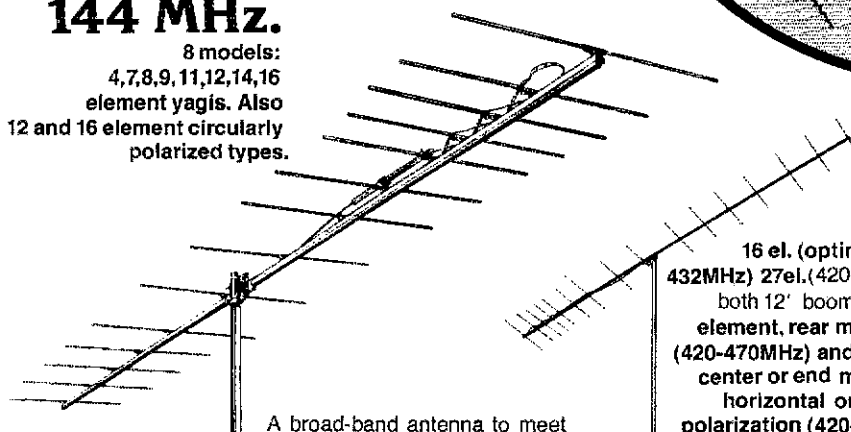


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Installation at K6KBE using all KLM components including 6 meter beam, 144 and 432 MHz arrays, KR-400 and KR-500 rotators.

144 MHz.

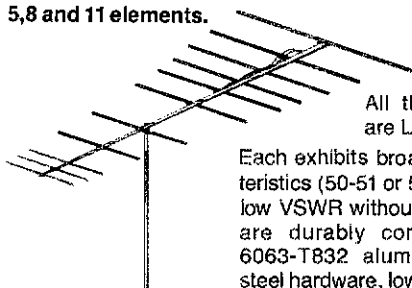
8 models:
4,7,8,9,11,12,14,16 element yagis. Also 12 and 16 element circularly polarized types.



A broad-band antenna to meet every need; each with contest winning gain and flat VSWR across entire amateur band. Use "singles" for full quieting on those distant repeaters . . . for bang through signals in DX contests. . . or just to have an enviable signal! For serious moon bounce (EME) and tropho work, "stack" 'em, using available KLM baluns and couplers. Built tough . . . with weather resistant 6063-T832 aluminum . . . stainless steel hardware.

50 MHz. 3 models:

5,8 and 11 elements.



All three antennas are L/P types. Each exhibits broad band characteristics (50-51 or 50-52 MHz) and low VSWR without tuning. Beams are durably constructed with 6063-T832 aluminum stainless steel hardware, low loss insulation.

70 CM 4 models:

16 el. (optimized for 432MHz) 27el. (420-450MHz) both 12' booms. Also 6 element, rear mountable (420-470MHz) and 14 el. for center or end mounting, horizontal or vertical polarization (420-470MHz)

One of the most versatile series available. Included are rear mount types that can be arranged for either horizontal or vertical polarization. A 16 element long boom type (optimized for 432MHz, ± 2 MHz), really pours out the power! Four or eight are often stacked for EME or DX using efficient KLM couplers.

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STACKING FRAMES.

"H" frames suitable for antenna stacking are available on special order. See top photograph for a typical installation.

ELEVATION ROTATOR KR-500



Provides 180° boom rotation. Heavy duty (used on array illustrated). Rotation, 180°/1 min. Motor disc brake holds to 1750 inch-pounds. Holds booms 1.25 to 1.625"D, masts to 1.5-2.5"D. Weather resistant. Attractive direction indicator. 115VAC.

AZIMUTH ROTATOR KR-400



Medium duty, supports 400 lbs. Ideal for long booms, HF tri-banders, used in array shown. Motor disc brake holds to 1750 inch-pounds. Has limit switches. Rotation, 360°/1 min. Accommodates 1.5-2.5"D masts. Direction indicator. 115VAC. 50/60 Hz.

HEAVY-DUTY ROTATOR HD-1500



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Frequency Coverage: 3.5 MHz through 29.7 MHz amateur bands, 15 MHz WWV receive only. **Frequency Stability:** Less than 100 Hz/hr drift after 30-min. warmup; less than 100 Hz drift for $\pm 10\%$ change in primary voltage. **Readout Accuracy:** Within ± 200 Hz ± 1 count. **Dial Backlash:** 50 Hz max. **Phone Patch Impedance:** 4 ohm output to speaker; high impedance to transmitter. **TRANSMITTER—RF Power Output: High Power:** (50-ohm non-reactive load), **SSB:** 100 watts PEP ± 1 dB; **CW:** 100 watts ± 1 dB. **Low Power SSB:** 1 watt PEP (minimum); **CW:** 1 watt (min.). **Output Impedance:** 50 ohms, less than 2:1 SWR. **Carrier Suppression and Unwanted Sideband Suppression:** -50 dB down from 100 watt single-tone output at 1000 Hz reference. **Harmonic Radiation:** 40 dB below 100 watt output. **Spurious Radiation:** -40 dB within ± 4 MHz of carrier; -60 dB farther than ± 4 MHz. **Microphone Input:** High impedance, -45 to -55 dB; approx. 22k ohms. **RECEIVER—Sensitivity:** $0.5\mu\text{V}$ for 10 dB S+N/N for SSB. **Selectivity:** 2.1 kHz minimum at -6 dB, 5 kHz max. at -60 dB, (2:1 nominal shape factor). **CW Selectivity:** (with accessory CW filter) selectable 2.1/4 kHz. **Audio Output:** 2.5 watts into 4 ohms, 1.25 watts into 8 ohms, less than 10% THD, 4-8 ohm headphones. **AGC:** Less than 1 millisecond attack time; switch selectable 100 msec and 1 sec. release, and OFF. **IM Distortion:** -65 dB min.; -57 dB typ. with noise blanker. **Image Rejection:** -60 dB min. **Dimensions:** $5\frac{3}{4}$ " H x $14\frac{1}{2}$ " W x $13\frac{3}{8}$ " D.

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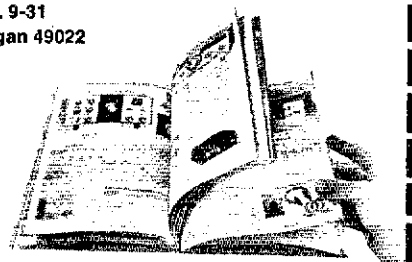
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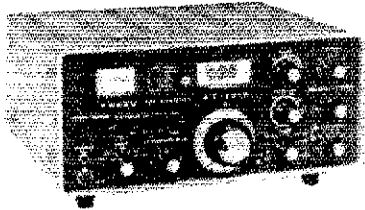


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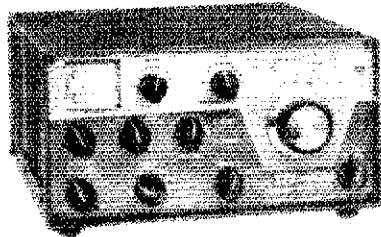
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Yagi & new delta loops on 80 & 40. K4MLC says DST not a satisfactory aid to tlc handling, hi. WB4FDT sez "wow" abt Dayton; also that WB4IT brought an Alpha Linear there. WA4UUX & WB4DBK our newest ORS, FBI WA4KKP passed his Extrial W4OOL starting work on new sky-hook. WA5JUS back from FL. WB4LEK now N4LE. Be sure when U chance calls to have it corrected on ARRL & other records officially. W4NWM attended MARS test in Richmond. WA4CLK secy. to NOVARC getting ready for State ARRL Conv. in Sept. WA4NYZ wishes more tlc for Northampton. WA4STJ sawed up local grammer school with HW22. W4FHE handled his first tlc in 20, or more yrs! K4LEF finally recd bicentennial WAS cert. in mail. New EC K4EJ rpts 15 AREC members. WB4FJK now N4FM. WB4EKY went mountain-topping with N4DR & wrked Oscar from car using FM144 & Triton IV. The Apr. floods in Western VA kept our nets and ref agencies busy for a number of days. Reported VA Apr. flood activity: WB4UUY handled msgs in the Richmond ARC qng to Grundy Havs; Pennington; Gap; Jonesville; Pikesville; William son & Guilnare KY. (WA4YIU) wrked floods via VSBN & W. VA Emergency Nets. (W4TMN) (WB4FDT) acted as NCS a number of times for VFN emergency operation. (WB4KIT) was set up in the Waynesboro News-Virginian and the local radio stations did a special program on the flood & ham radio. (K4NRR, WB4RBE, EC WB4HMX, K4CGF & Qtho Dixon) received a nice news write-up in the Bluefield W. VA newspaper where the above mentioned radio amateurs were given credit for handling hundreds of messages. K4NR was credited for operating his gear on emergency power for 35 hours during one stretch! EC WB4HMX was quoted by the press "It was a job we could do," he added, "and we did it as best we could." The above is just another outstanding job done by amateur radio that many people will never know about (unfortunately). There were a number of other amateurs and ref agencies who were operating on which there was no direct word and their efforts are appreciated. Club papers recd from: HARRA, VARA; Portsmouth ARC; VVARC; NOVARC and TARC. OO rpts -- W4HU (23 violations); WA4SBC. traffic: (Apr.) WB4DBK 569, K4BKX 502, K4KDJ 240, K4KNP 212, WA4EJ 153, N4RRT 141, K4MLC 131, WA4IQ 127, W4LXB 123, WB4FDT 100, WA4UUX 94, WB4PNY 89, WA4YIU 86, WB4KIT 86, K4GR 84, WA4RDI 74, WB4DQZ 73, WB4ZNB 68, W4TMN 66, WA4EAZ 62, WB4FJK 48, K4VVK 46, WB4EKY 43, WA4RBF 42, N4DW 37, WB4IT 36, K4ITV 32, W4YVG 28, WA4KKP 28, W4OOL 26, N4LE 25, W4SUS 25, W4NWM 24, WA4QQL 21, WB4DTG 21, W4SLA 17, K4KA 13, WA4CLR 11, WA4PBG 11, WA4NOB 10, W4MK 8, WB4UHC 7, WA4NY 7, W4ASTO 6, W4FHE 4, WA4WQG 3, K4LEF 2, WA4FDV 2. (Mar.) K4KDJ 155, WA4NOB 8, W4DM 1. (Feb.) WB4UUY 10.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM - It is with deep regret that the passing of WB8CT-K4ITZV and K8RPB. Amateurs in West VA provided outstanding services during flood emergency in the State and separate report will be written. WB8IJW moving to Washington area and WB8TDA to school in Tenn. Morgantown, Clarksburg and Charleston provided communications for Walk-A-Thons with good publicity. WB8DHQ, net on N8RD. WB8LC 131, WB8FG, WB8GQB is WB8X. WB8PQ is K8JQ. WB8EH is W8WX. WB8JF is K8JF and K8YB is K8RK. WB8KCJ reports regularly from Huntington.

Net - Freq.	Time(Z)/Days	Tfc	Sess.
CW - 3567	2300 Dy	129	25
Novice - 3730	2115 Dy	152	30
Phone - 1500	1600 Su	152	25
Phone - 3990	2200 Dy	275	25
Hilbilly-14290	1600 Su	26	4
Traffic: WB8TEE 420, WB8DQX 412, WB8IJW 272, WB8ZA 213, WB8TJN 187, WB8YMJ 186, WB8TDA 165, K8MHR 156, WB8SAW 144, K8HID 114, WB8IIL 104, N8RR 80, WB8NR 70, WB8JM 50, K8AVP 44, WB8KCJ 3, W8817P 56, W8817C 32, WB8CJ 22, WB8TFE 17, K8QEW 15, W8FZP 14, W88KK 14, K8BCC 14, K8ZDY 14, W8CXX 10, K8LSN 7, K8VNL 7, WB8LAI 6, W88FG 6, K8AKG 5, W88CGR 5, WB8DXF 5, K8AON 4, W8IJ 4, W88THX 4.			

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA9HLQ - SEC: K9FLQ. RM: K9TER. PAMS: K9CNV WA9YGO. Once again the Denver Metropolitan area March-of-Dimes Walkathon was an overwhelming success with well over 100 Amateurs providing communications throughout the day for the event. K9SPR continue to perform yeoman service in providing ARRL Bulletin services on two club nets in the Pueblo area. K9MJC, formerly WA9SIG, is active on 20 meters CW and 2 meters FM in Japan, operating as KA2MC and NNN9ENJ. Congratulations to WB9ZQG on receiving his General Class license, and also to K9WZLN on receiving her Extra Class license. Informal congratulations to W9CKW for receipt of a certificate from QCWA honoring him for holding the same three-letter call continuously for 50 years. Net Tfc, for Apr.: Columbine QNI 1497, QTC 145, informals 369, QNF 1727, CWN QNI 336, QTC 230, QNF 933. Hi-Noon Net: Tfc, for April: QNI 1352, QTC 27, informals, 173, QNF 1122, 30 sessions. Traffic: (Apr.) W9WY 2319, K9VJ 910, K9ZSQ 819, WB9GT 467, WB9IBS 350, W9EJD 252, W9GTAQ 185, K9TER 143, W9KLE 130, WA9CNA 122, WB9BAL 89, W9IWI 88, K9OTU 78, W9PVT 78, K9TIV 58, W9ETT 57, W9MCL 57, W9QPP 48, W9DAIT 44, W9RE 40, WA9LSB 37, W9LAE 33, W9PGX 33, W9OREX 27, WB9NHA 24, WB9UGY 22, WB9IZD 20, WA9DFM 15, W9AWO 13, WA9WVO 2. (Mar.) W9GW 18, WB9IBS 212, K9TER 106, WB9IZO 19, K9SPR 8. (Feb.) K9TER 130.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE - Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. PR: W5QNR. PAMS: W5PNY. K5KIL. REC: K5KPS. South-west Net (SWN) meets daily on 3580 kHz at 1915 local time. Handled 240 msgs and had 262 stations reporting in. Things have been a little slower this month, due probably to the nice warm weather. New Mexico Road Runner Net (NMRRN) meets daily on 3940 kHz at 1800 local time, handled 49 msgs and had 1001 check-ins. Breakfast club net meets daily on 3940 kHz at 0700 local time and had fee count of 49 with 603 check-ins. The bean feed at Las Cruces was a great success with 300 in attendance from as far away as Philadelphia. This will be the last report from W5RE and all members are urged to send future reports to Joe Knight, W5PDY, 16008 Snow-Heights, Albuquerque, NM 87112. (Mar.) W5LH 18, W5DAD 268, W5JOV 267, W5ENI 179, K5KPS 152,

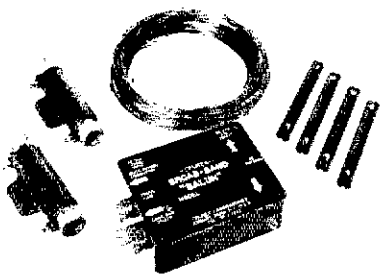
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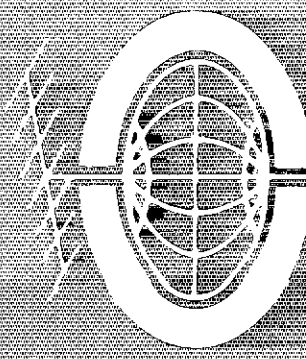


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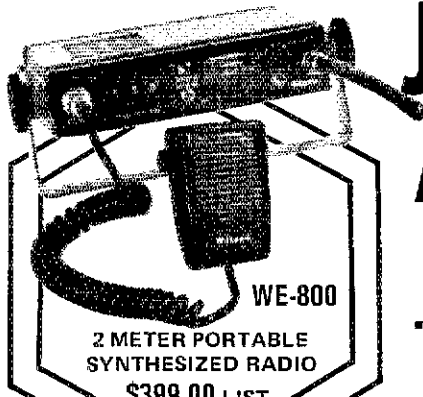
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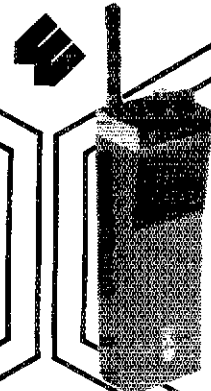
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• .3 Microvolt Sensitivity for 20 dB Quieting
• Weight: 1 lb. 4 oz. less Battery
• Battery Indicator
• Size: 8 7/8 x 1 3/4 x 2 7/8
• Switchable 1 & 2.5 Watts Output @ 12 VDC
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- Weight: 1 lb. 4 oz. less Battery
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• Weight: 1 lb. 5 oz. less Battery
• Battery Indicator
• Size: 8 7/8 x 1 3/4 x 2 7/8
• Switchable 1 & 5 Watts Output @ 12 VDC
• Current Drain: RX 25 MA, TX 500 MA
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• Uses same accessories as 1405.
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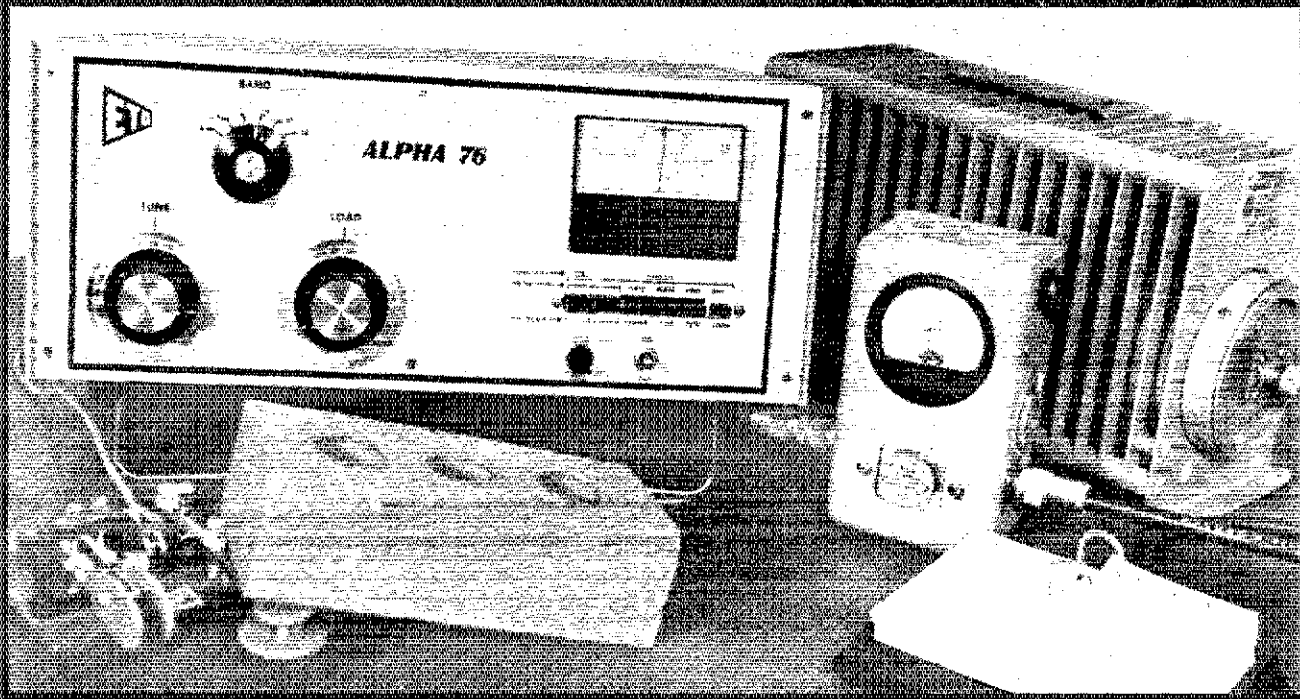


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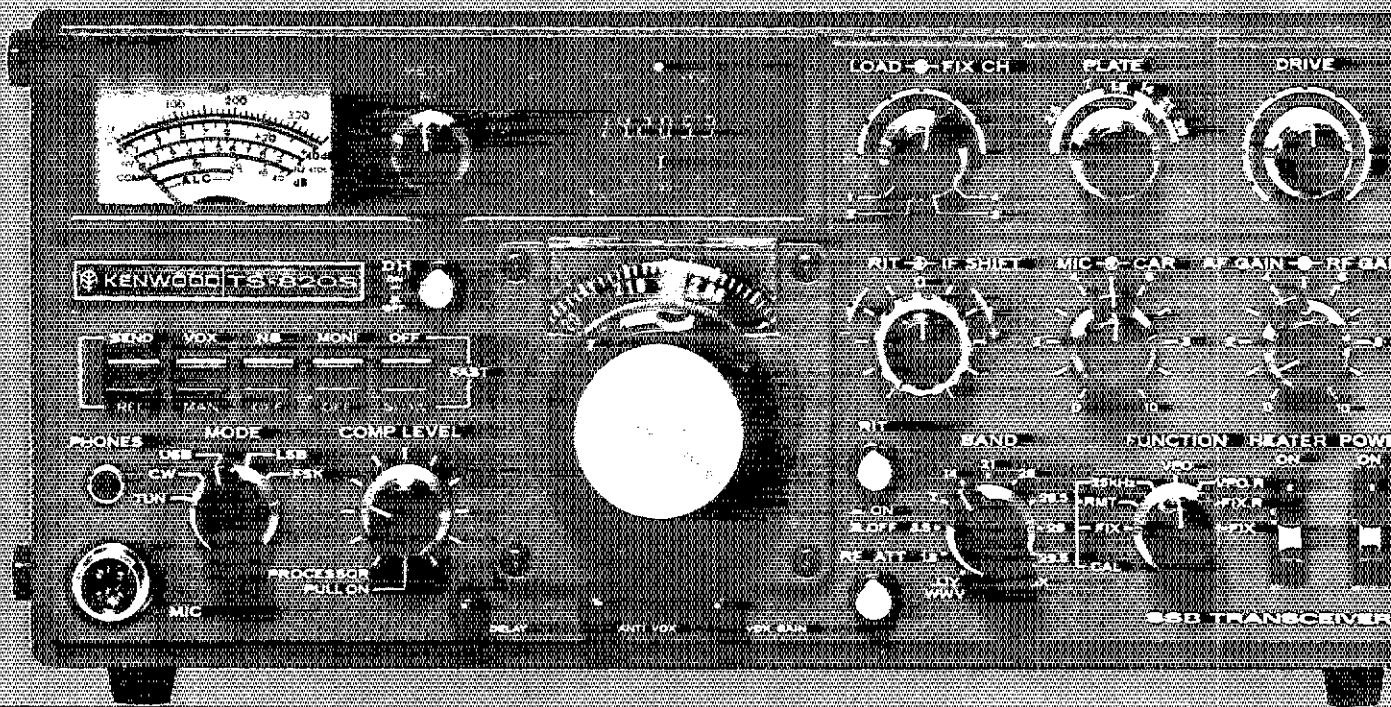
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TS-820S



We told you that the TS-820 would be the best. In little more than a year our promise has become a fact. Now, in response to hundreds of requests from amateurs, Kenwood offers the TS-820S*... the same superb transceiver, but with the digital readout factory installed. The worldwide demand for the TS-820 far exceeded our initial production plans. However, production capacity has been substantially increased and our objective is to make the TS-820S more readily available to you. As an owner of this beautiful rig, you will have at your fingertips the combination of controls and features that even under the toughest operating conditions make the *TS-820S the Pacesetter that it is.*

Features

Following are a few of the TS-820S' many exciting features.

SPEECH PROCESSOR • An RF circuit provides quick time constant

compression using a true RF compressor as opposed to an AF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

IF SHIFT • The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820S a pacesetter.



PLL • The TS-820S employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

DIGITAL READOUT • The digital counter display is employed as an integral part of the VFO readout system. Counter mixes the carrier, VFO, and first heterodyne frequencies to give *exact* frequency. Figures the frequency down to 10 Hz and digital display reads out to

100 Hz. Both receive and transmit frequencies are displayed in easy-to-read, Kenwood Blue digits.

Specifications

FREQUENCY RANGE: 1.8-29.7 MHz (180 - 10 meters)

MODES: USB, LSB, CW, FSK

INPUT POWER: 200W PEP on SSB
160 W DC on CW
100 W DC on FSK

ANTENNA IMPEDANCE: 50-75 ohms, unbalanced

CARRIER SUPPRESSION: Better than -40 dB

SIDEBAND SUPPRESSION: Better than -50 dB

SPURIOUS RADIATION: Greater than -60 dB (Harmonics more than -40 dB)

RECEIVER SENSITIVITY: Better than 0.25uv

RECEIVER SELECTIVITY:

SSB 2.4 kHz (-6 dB)

4.4 kHz (-60 dB)

CW* 0.5 kHz (-6 dB)

1.8 kHz (-60 dB)

*with optional CW filter installed

IMAGE RATIO: 160-15 meters: Better than 60 dB 10 meters: Better than 50 dB

IF REJECTION: Better than 80 dB

POWER REQUIREMENTS: 120/220 VAC

50/60 Hz, 15.8 VDC (with optional DS-1A DC-DC converter)

POWER CONSUMPTION: Transmit 280 Watts

Receive 26 Watts (heaters off)

DIMENSIONS: 13-1/8" W x 6" H x 13-3/16" D

WEIGHT: 35.2 lbs (16 kg)

VFO-820

Function switch provides any combination of transmit/receive/transceive with the TS-820S. Both are equipped with VFO indicators showing which VFO is in use.

SP-520

Although the TS-820S has a built-in speaker, the addition of the SP-520 provides improved tonal quality. A perfect match in both design and performance.

TV-502

The TV-502 transverter puts you on 2-meters the easy way. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz option. Completely compatible with the TS-820S, the TS-520S and most any HF transceiver.

TV-506

Similar to the TV-502 except that it opens up the 6-meter band (50.0-54.0 MHz) to your HF rig. *The TS-820S and DG-1 are still available separately.

WB5LZF 128, W5RE 73, K5MAT 67, W5TWZ 50, W5YQ 29, K5XL 22, W5VDH 20, W5GNQ 18, W5MIV 5.

UTAH: SCM, Ervin Greene, W7EU — Don't forget the Utah Hamfest scheduled for July 16 at Saratoga Resort. Contact WA7UUJ for details. On Apr. 16, WA7ZBO and WB7DOL set up a portable Oscar "B" mode operation at Ft. Bridger, WY. Several dozen contacts were made via the 422/442/432/434 on Oscar 7. This is the only B mode station to ever work from WY. Equipment used was a KLM-70CM 432 xcvr and KLM Multi-2700 xcvr and portable az-el antenna system designed after AMSAT's portable system. 220 MHz is starting to come alive in northern UT due to Clegg's line offer on their transceiver. A repeater is in the works to start RTTY satellite and data computer interfacing has people dragging their model 28s out and dickerling for newer machines. This upsurge of RTTY activity has surprised many newcomers. Much interest is building in UT around 2M SSB with all the multi-mode rigs showing up. Lots of new two letter calls showing up so that you have to ask or recognize the voice to know who you are talking to. Some of those are K7MQ, ex-WA7MGQ, K7JL, ex-WA7GWU and K7JT, ex-WA7HCQ. Sorry to hear of WA7ZBO losing his combination low band and Oscar antenna setup in the big wind recently. Traffic: WA7JRC 54, WA7MEL 53, W7OCX 26, WA7KHE 25, W7DKB 15, W7EU 11, W7BE 4.

WYOMING: SCM, Chester C. Stanwalley, W7SDA — SEC: WA7NHP. RM: K7KSA, W7KHH. Has accepted appointment as Asst. SCM for WY. The 1977 WY Hamfest will be held in Casper July 16 and 17 at the Casper Community College. New Novices WB7TTV Sundance, WB7QIL and WB7NV5 Sheridan, WB7QPA Newcastle, WB7PLU XYL of WB7CPC Lander, WB7NPI Tech. in Etna. WB7NVR new General in Sheridan, WB7EUT now Advanced Class. WA7PCZ moving to AR. WA0PZA is a teacher in Cody. Sheridan repeater 22/82 on from 10 AM to 10 PM daily. W7PT EC for Park and Big Horn Counties reports 7 full and 2 limited AREC members signed up in Apr. K7SLM reports WY Cowboy net held 20 sessions, 529 QNI and 13 QTC. Traffic: W7TZK 432, K7VWA 430, W75QT 327.

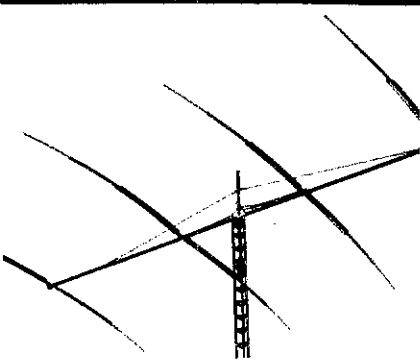
SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Congratulations to B'ham ARC for another real good hamfest. Was good to have W1UED in the fest. I understand there was a large crowd taking license exams at the hamfest. WA4ZDW and WB4BJO passed Advanced Class. W4RQS received his 35 wpm CPC from ARRL. WA4GTA is now N4AN and WB45XG is N4HP. Sorry to hear WA4WLG is leaving our Section for Texas. WA4HMO reports WA4QZF passed Technician and WA4QLB went from Tech. to Advanced. Don't forget your nominations for SCM — details elsewhere in this issue of QST. If you enjoy traffic handling and CW, why not QNI our CW Sections Nets — AEND 3.725 at 1730 local time and AENB 3.575 at 1900 local time. Liaison help is needed from AENB to RN5 and if you can help even one night per week, please do so. We also need stations in daytime for the Central Area Net. Daytime that can serve as NCS and/or provide liaison service to the 20-meter PAND. Regret to report WA4CNH is Silent Key. Traffic: (Apr.) WA4JDH 756, W4RQS 521, WB4EKJ 360, K4AOZ 142, WA4TMG 107, WB4AYO 33, W2TPV/4 31, WB4RCF 23, K4LYY 18, W4JMD 14, W4AXA 10, WA4RMP 10, WB4KSL 8, WB4TVY 6, W4MHO 4. (Mar.) WA4TMG 104, WB4KSL 25.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. PAM: K4JNC. RM: W4SHL. Congrats to K4EV, K4YRL, WB4WQL and WB4HDC on making PSHR. Sadly we report W4AMK a Silent Key. Cntrl. WA4VHF 110, QTC 4. GSPB report QNI 2200, QTC 226. GARES QNI 107, QTC 11. CVEN No. 1 QNI 32, QTC 3. CVEN No. 2 QNI 726, QTC 70. W4RTZ busy with ham club work but other activity limited. W4JM working on 160 M antenna. Thanks go to K4FLR who has been a great FM but due to personal business has had to let it go. W4SHL picks up the RM job. CO4NWB pres. of the Central Area Ham Radio Society and teaching code to class of 20. K4BAI liked the open CD party. Great hamfest by Kennehuochee ARC. WB4HDC keeping GTN going — check in on 3.718 MHz at 2330Z. W4SHL installed 32V? transmitter for 80 and 40 CW. WB4HDC has new homebrew 15-mtr. quad. Perimeter ARC has WA4IZY, pres. WA4BVS secy. WB4VEF ed. mgt. Traffic: (Apr.) W4FOE 380, WB4DHC 47, K4YRL 44, W4AOZ 1 43, WANWB 41, K4EV 20, W4SHL 11, K4HON 10, K4WV 10, W4JM 4, K4PIK 4. (Mar.) K4EV 20, W4SHL 11, W4HON 10, K4WC 10, W4JM 4, K4PIK 4. (Mar.) WB4WQL 99.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: N4WA. PAMS: WA4TNC/75; WA4TXM/40; WB4BSZ/VHF. New appts: WA4HOL as EC of Clay Co.; W4WHK as OVS. SNCS earned by WB4VDL on FMTN; WA4QEM and WA4TXM on TPTN. PPTN now holds Sun. session — 1100Z on 3940 KHz. Gov. Asker proclaimed June 19-26 "Amateur Radio Week." Sorry to report WB4JSE and K4ZJW Silent Keys. Congrats to WA4EYW W4ILE WA4WBM and WA4TXM on making SPL. N. FL. had 100% rep. on D-RN5 this month. WB4JCV now K4MV; WB4KXN is N4DY. Pensacola WREC frequency now 145.98 MHz. W4J5KJ has fm repeater going — 53.00/52.525. W4WNY runs full QSK. WA4FMA named PARC "Ham of the Year." Have traffic for Sopchoppy? Call WA4YDM on QFNS. WB4VDL assisted in "capture" of two bootleggers on 2m in Tallahassee. The new 31/91 repeater now on from temporary location. Upgrading this month: WA4WCG to Extra. WA4LGG Advanced. WA4VIO General. WA4IZY and WA4TXA Tech. K4M2K got 1st Class phone ticket. W4WHK planning Oscar activity. K4RFD presented program on solar energy at RANGE meeting. WR4AMR, 147.90/30, has all new equipment, K4OAC is the hono. WB4CTI WB4F5G WA4SGF and W4ZTW conducted forum on antennas at Mar. NCFARS meeting. WB4JMO served as page in FL legislature. WA4ZOW took over as Editor of DBARA Groundwave; WB4GHU will become NM of QFN. Hernando Co. ARA operated station K4ZC at Arts and Trade Show. Traffic: (Apr.) WA4TXM 717, W4ILE 699, N4WA 324, W4BQBB 306, WA4EYW 289, WB45KI 270, WA4WBM 229, WB4NMM 189, WA4OEM 140, W4JL 133, W4KXJ 119, WB4DTS 89, W4SS 88, W4LDM 75, W4HRG 69, WA4EY 63, WB4FKE 56, WB4TZR 54, W4MGO 50, W4MGO 50, WB4EXA 49, WB4VDL 47, K4OER 45, WA4CRI 44,

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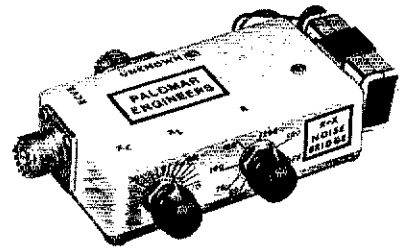
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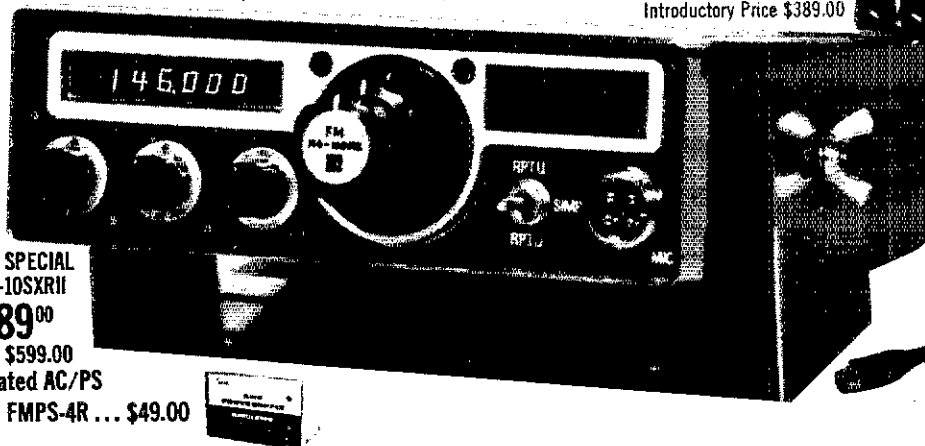
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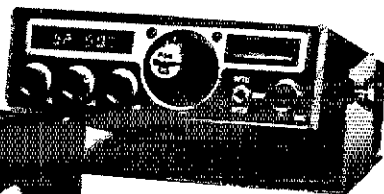


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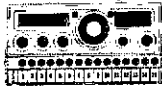
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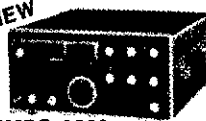
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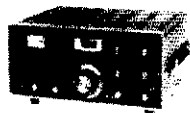


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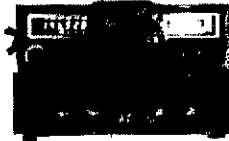
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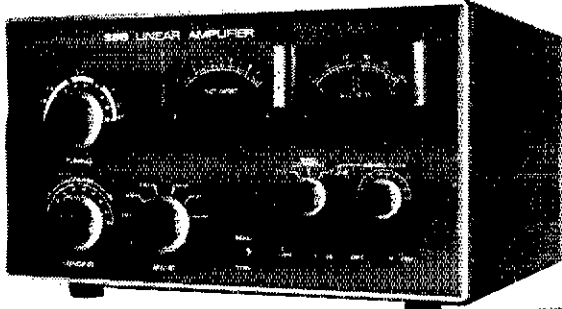


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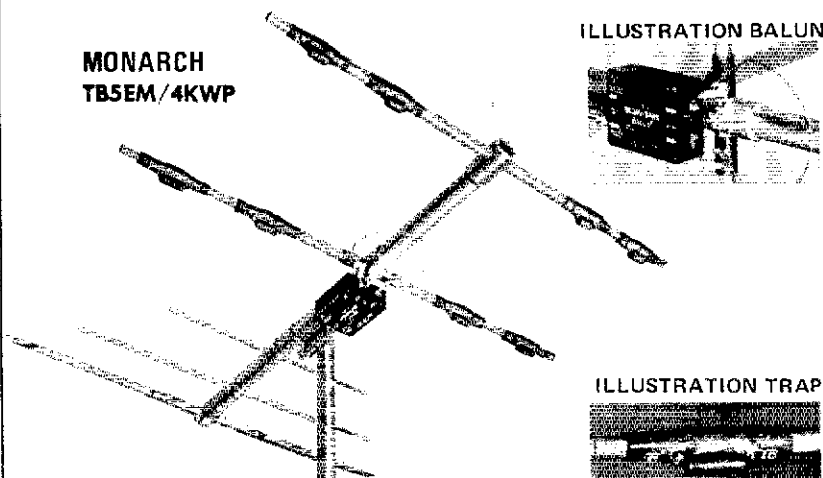
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(Mar.) WA4STZ 36, WA4HCS 2.

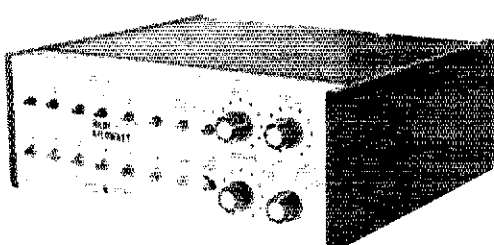
SOUTHERN FLORIDA: SCM, Woodrow Huddleston K4SCL - SEC: WB4ALH, Assl. SEC: W4WYR, RM W4MEE, PAMS: WB4AID WA4NBE, Nets: Time Freq./Manager: FPTN: 0700/3940/W4WYR, Gator 0830/3651/W4EH, MTN: 1200/7247/WB4AID F2: 2230/3940/W4WYR, SPARC: 1830/147067/W4KCR, QFN 1900/2200/3651/W4MEE, QFNS 2000/3715/WB4GHU, Endorsements: WA4JVP ORS Net certificates issued last 3 months: FAST: WB4IZ5, MTN: WB4AID WB4CBP WA4CGQ W4EFV W4ESH K4FGV K4GRM WB4IKX WB4IZ5 W4KMN WB4KS W4MML W4OPZ W4OPZ W4A4E1C WA4HWH WA4IAE K4KIC W4KMN WA4NBE WB4RVW K4SJA W4SWV K4TH, Gator: WB4SNX, NFPN: W4VZ W4YQQ QFN: WA4JVP W4MEE, GFNS: WA4LGR WA4PFK WA4QQS, SPARC: W4APV W4CSH W4BNM W4EGM WA4FNK K4GBR K4GBT W4GPL W4HKK WA4KCR K4KE W4MM, W4MKT, K4NAN WB4QA W4OIH WA4QGV K4SCL K4TH WB4TJG WB4TPG WA4TUM WA4VPG WA4WK WB4ZPU, K4NE has a new ham shack addition to his house, W4IRA recently repainted ham shack WA4GCH WA4QGV and W4GPL all sporting new beams, W4MML reports Belle Glade Repeater Assn now incorporated, WA4EDR WA4SDR and WB4RKY running a fine Radio Amateur licensing class, WA4PFK received into his was first Technician to make PSHR, W4BNE teaching electronics and FCC license, WA4GNI has good QSK with new TR switch, WD4BR5 is new novice, son of WB4IZ5, WA4ZHC demonstrated Amateur Radio at Scott Camporee Apr 23, WA4QGV reports 2 meter opening into Ms Assn, W4GPL reports plenty of 223 MHz activity, W4OPH has opened a new kind of store in Clearwater, AGL Electronics, strictly Amateur Radio sales and service, We needed that. Good luck! Traffic: (Apr) W4MEE 980, K4TH 515, K4SCL 436, WA4JVP 254, W4LH 239, WA4ZHU 202, WB4WYV 177, WB4AI 176, WA4NBE 175, WA4VMP 164, WA4K 153, W4VDO 146, W4NFB 136, W4NT 111, K4SJA 102, W4WYR 92, WB4KSJ 86, WA4QGV 78, WA4WDI 62, W4QM 61, WA4PFK 56, K4NAN 54, K4BLM 53, K4NE 50, WB4NJU 48, W4GDK 40, W4IRA 32, WB4IZ5 25, WA4GNI 19, W4GPL 18, W4BNE 11, W4SMK 14, W4TAS 13, WB4SK 9, K4EUK 5, WB4FLW 7. (Mar.) W4NFK 97, WB4FLW 4.

WEST INDIES: SCM, David Nova, KP4BDL - Operation of Special Event Station NP4A by KP4S DX and BDL during Amateur Radio Week ended with over 1150 QSOs in all continents and over 70 countries. If you need a QSL send me an SA5E. The Radio Club of Puerto Rico held its annual Hamfest at the Coloni Dispensary on July 14, a chance to shake man hands and had a lot of fun. KP4CLB is back doing KP4US active on 30 sb, KP4EH DXing on 75, KP4EAJ has a new 10-meter monoband, KP4EK moved to a new QTH, KP4CL is Awards Manager for the WPR-25 Certificate. Check with her for details PLEASE send your activities report.

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SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS - PAM W4JQK, W4KQ. RM: The big event this month will be the 51st Annual Hamfest at the county fairgrounds south of Flagstaff on July 29-31. Congratulations to WA7WXA, 17-yr-old YL and pres. of Explorer Post 599 in Phoenix upon receiving scholarship from the National Society of Professional Engineers. The AZ Repeater Assn. of Phoenix reports plans being made for a 28/88 repeater on Tower Mountain south of Prescott, eventually to be linked with the 28/88 repeater on Mt. Lemmon northeast of Tucson and possibly later with the Bill Williams Mountain repeater west of Flagstaff. Members of the Old Pueblo RC and Tucson Repeater Assn. assisted the Pima County sheriff's office with communications during the Pima County and Country Fair. W4WYR has been teaching a General class course at Flagstaff, and reports new calls there recently are WB7S GEG QD CDG and DGM and WB4DOU, K7KAX, pres. of the Hualapai ARC, has been selected local area commander of the Happy Flyers, public service group of amateur radio operators. HARC provided communications for a Mohave Museum of History and Arts hike and bikethon. Cactus Net 425, ATEN 62 SWN 240. (Mar.) Cactus slow speed net 6. ATEK certificates to K7MGL, K7JKM, K7PDY, W7HFF, K7GH. Traffic: (Apr) W7EP 166, K7LXB 60, W7HFR 50, WA7KQE 48, W7DQS 16, W7PDY 14, WB7CAG 10, WA7WEB 9, K7GH 6, K7BZL 5, K7NMQ 4, K7GLA 2. (Mar.) WB7CZL 5.

LOS ANGELES: SCM, Eugene H. Violino, W6INH RM: N6KA. Many events are upcoming now that summer is approaching - Field Day, vacations and QRN. The local clubs have been recruiting members for Field Day duties for some time, so get the location and rules for the contest. Contact W6SGZ for his activity on SCN and RN-6 also new ORS appointment. The Telco RC club project for the wire antenna is now officially under way, they are preparing kits for those interested, contact Al Falckick Pres WB6GLK. Locals checking into the DWV retirees are W6WBS, W6OAW, W6GNY, W6L, RM, K6MLX and K6VC, they are meeting on Wednesdays at 9 AM. United RCs secy. WB6JFD also known by members as "Jelly Filled Donut," and XYL just returned from week of vacation on the island of Kauai. The club also sponsored their usual booth at the LAARC this year. Also received a copy of the "comment of the R.L. Drake company regarding amendment of part 97 of the rules for the construction of transmitting apparatus and radio frequency devices. hope that most members will try and get a copy of this. One thing for sure the Drake people are on the Amateurs side. You Trafficfers who have PAN traffic which missed the regular skeds in the evening, possible get on 7060 plus or minus QRN and call W5UH in the morning and will QSP for you. The Hawaiian net is still holding up in good shape still coming through on 80 meters in the evening, we expect to QSY to 7 MHz and 14 soon as summer comes along. Traffic has been fairly good on this net so far this year, thanks to W6PNL and W6VBS. TI QCWA had their yearly get together with over 11 members attending in this must be get together month. W6WIS recently completed a frequency counter and is now working an interface board

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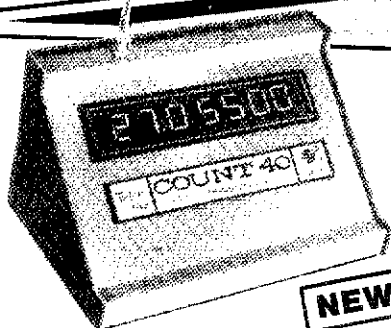
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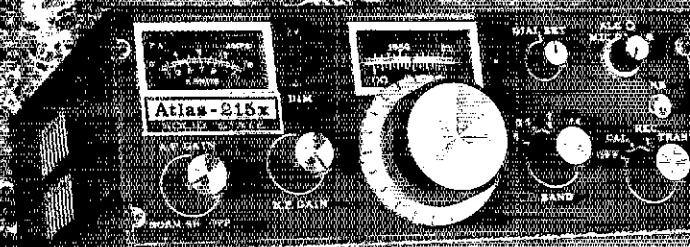
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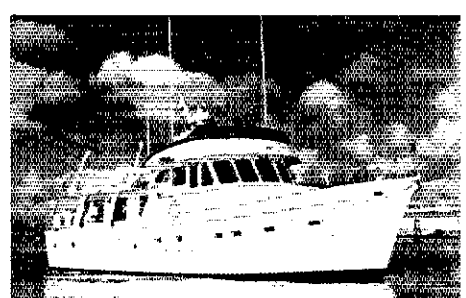
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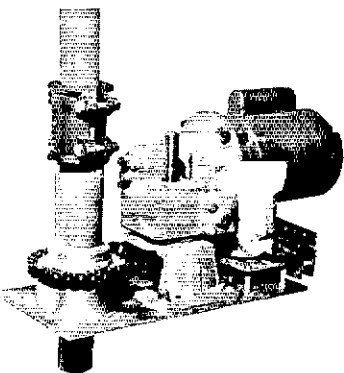
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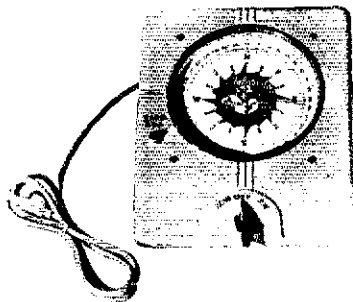
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to use with receiver. HE also turned in a good OO report. Congrats to Ave formerly WB6UXE for donating a 2m FM rig to the Braille institute. (That's a real help). WBRO QRL due to rig problems. W6SGZ recently gave a talk on NCS at Culver City nite school. W6CKC hosted the Morse Club banquet for the fifth consecutive year and has increased the membership during that period from 30 to 120. This was one of the area's classic get togethers with many local prominent hams attending, good prizes, speakers and food, congrats from us all Doc. W6NKE is proud owner of new Drake TR-6 CW. WB6CUD planning on new Quad. WB6BWG handling long haul traffic besides OXing. WBRO is QRL with rig troubles. Traffic: (Apr.) W6INH 226, WB6OUD 204, W6SGZ 185, W6OEO 166, W6HUJ 102, K6CL 58, WBRO 32, WB6BWG 25, K6EA 21, W6NKE 10, WB6AIT 2.

ORANGE: SCM, Wm. Heltritter, WB6AKR — Asst. SCM: K6KNC, SEC: W6AIGR, RMS: WA6TVA, WB6AKR, PAM: W6CPB, ECs: WB6ARK, K6GGS, W6LKN, K6KNC, WA6YWS. The following amateurs provided radio communications for the Riverside Air Race: K6AJP, W6AGB, K6ACQ, WA6EBB, WA6EDC, WA6FSN, WA6GGV, WB6FKX, WB6KER, W6KIJ, WA6KZB, W6LKN, WA6MOL, W6NSN, W6OLT, WA6QXW, WB6PLR, WA6RGH, WA6SVS, WA6UDR, K6UJZ, K6UPS, WA6UZX, WB6VKL, and K6WWG/6 in Riverside; WB6SAA, WB6JMW at Cocolito Dry Lake; WA6HUB, W6ORV in Thermal; WA6LKD, WA6RPT at Rice Field; WB6HIC, W6RJO at Innesett; ARRL Open CD score reported: 6LL: CW 7048, QSO 613 Sections 383,250 points; SSB: 1144 QSOs 73 Sections 419,385 points, WA6PTX: 216 QSOs 60 Sections 64,800 points, WB6AKR: CW: 397 QSOs 66 Sections 131,670 points; SSB: 342 QSOs 62 Sections 106,640 points. WA6YWS now on 2-meter fm with a Walkie Talkie. W6Y02 reports new slice-element 2-meter and four-element hf beam working WB6BAM new OBS Sksds: 3575 kHz 20:00 7075 kHz 20:30 (local) both on Mon., Wed., and Fri. A new 220 repeater WR6AUJ 222.96 in 222.56 out is located in Running Springs reported by WB6IVS. Orange County ARC net is being held on 146.5 on 9:00 P.M. Wed. Daytime FMS net has changed to 17:30 on 7/26 daily reports W6CPB. The Orange County Council of ARC will sponsor the Orange County Fair July 5 through 24 with W6RE Equipment Chmn. and WA6WZO Display Chmn. The following provided radio communication for the Great Bear Grand Prix: WB6YHC, WA6SKE, WB6SKE, WA6ODD, W6BYV, K6JVF, K6WS, WA6DVX, WB6JWD, K6TWK, WA6WAK, WA6HXD, WA7OWS, K6GPP, WA6OMN, WA6EFS, WB6EEZ, W6DRM, WA6YCG, WA6FOW, WA6HKW, WA6UKZ, WA6DPR, WA6DOR, WA6NVW, WB6SZL, WB6FJE, W6LKO, WB6K7K, WA6HQV, WB6AGD, N6BR, WA6OIS, WB6UXE, WB6RJJ, WA6WVS, WB6JG, WA6GWJ and WB6PH. Traffic: WB6IG 705, WA6TVL 87, W6RE 78, WA6WDJ 646, W6CPB 34, W6QBD 16, WA6YWS 8, WA6PTX 5.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — ECs San Diego County: Northern N6AT, Eastern WA6UFY, Southern WA6UAZ, Central W6INI. Only 14 months until the ARRL National Convention in San Diego, Sept 22-24, 1978. Make vacation plans now. New officers of San Diego County Amateur Radio Council: Chairman, K6BWT; vice-chmn. W6OTE; secy., N6LY; treas. W6TZV. Note: ARRL affiliated clubs may now keep \$1.50 of ARRL yearly dues paid by members. Good public relations for clubs is to provide libraries with ARRL manuals and QST subscriptions. W6NZN is chairman of the Orange County repeater committee. Palomar Mountain site has new block house for the new repeater. W6ODG has been appointed Amateur Sales Manager for SWAN Electronics. Entry to National Traffic System can be gained thru So. Calif. Net, 3598 kHz daily 1830 PT; Daytime Region Six Net, 7275 kHz daily, 1230 PT; and a 2-meter net, 146.5 kHz, on 7/26. Oceanside RACES has moved to Fire Station No.3. Call sign changes: WA6CXK to K6XT, W6HBP to N6AI, WB6IXC to N6BB, WB6JQJ to W6VI, WA6PDE to N6CL, K6PY to N6LY, K6ZB to N6IE. K6XT reports 249,000 points in Apr. CD Party (CW). Welcome to new ARES members WB6I2B and WA6SKU. Upgraded: WB6SHL to Advanced traffic; WB6VH 31, WA6UAZ 108, N6AT 80, W6BGF 75, W6DEY 32, WA6UFY 29, W6SIF 21.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — Many new calls are heard: WA6DEI is N6MA, W6DQJ is K6IT, WB6RDW is N6AG, W6PFA is N6MW, W6PHH is K6XK, N6EY is WB6CIC, N6DX is W6DX, WA6EJS, WA6EQT and W6DJM passed Advanced, WB6EDA passed Tech, W6IUZ passed General, WB6YKC is XYL of WB6VKR, WA6YCC XYL of WA6EPC. Section Net moved to Sun. at 1000 on 3935. DKNH meets on 7275 at 1230 local. W6RIC doing great job as EIC for Ventura Co. SARC. Old Times' nite was a success with K6AFX and W6KW present. The membership went over 200. WB6JMK has been elected pres. of the Ventura Co. Computer Club. W6JB gave a talk on Slow Scan to VCARC. N6NB presented a paper on his Quasi antenna design at the IEEE Electro '77 in NY. New MAKRAC officers are WA6DJS, pres.; WB6RHX, vice-pres.; WA6ATC, secy. WA6MBZ is after DX with new 20 mono and 15/10 duo at 70 ft. K6YHK, W6GMV and WA6DKY are using converted CB rigs on 10. W6KPS has rebuilt WR6AHZ to add many new capabilities. N6MA was in JA and DU-Land. N6MW has a new FT101. WB6KPL new Triton IV. K6TOD and W6SXV are building keyers. K6XD did well in both DX contests. W66MXM worked 5 new countries. PSHR: WA6VB5 34, WA6LBO 42, WB6MXM 29. Traffic: WA6MBZ 159, WA6VB5 91, WA6LBO 60, WB6MXM 40, WA6BVL 2.

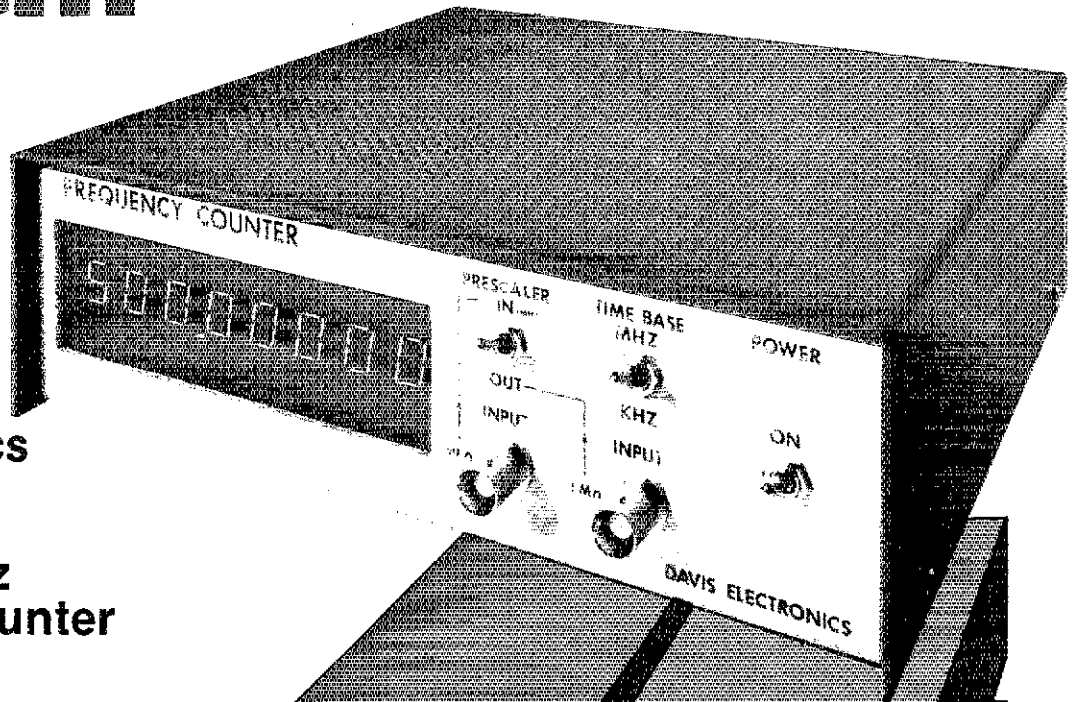
WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, W5EJ — Asst. SCM: Jim LaPorta, W5LA, SEC: W5DWL, EC: K5YL. North TX group ready for highest Field Day yet. Arlington group sponsored an Azalea Trail which turned out damp, but with much enjoyment to all (31) who made the trip. Quite a bunch of new calls showing up — Tom Chance with K5YM, Johnny Davis snared K5JD (Jack Daniels) and many others. Congrats to all who have made the trip for the Extra Class license. WA6TAD graduated and on air with HF rig. W5HMB graduated from Abilene Christian on May 8, looking forward to being on the air a bit more. Cooke County ARC, UTD ARC, Henderson County ARC and Hopkins County ARC all became affiliated with ARRL, congrats! W5DWL attended Temple ARC Mar. meeting as speaker on AREC. Skywarn, ARRL and Nets WB5MTN renew appointments in time for increased summer activity. Fort Worth's KC Club congratulates Ben Myers, honored by

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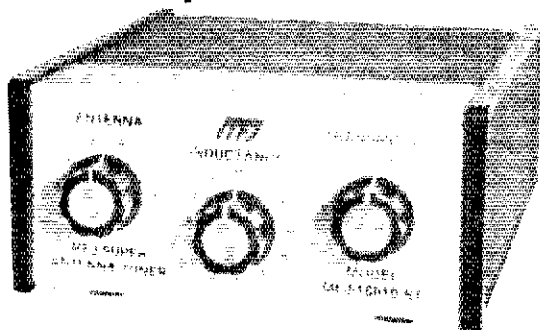
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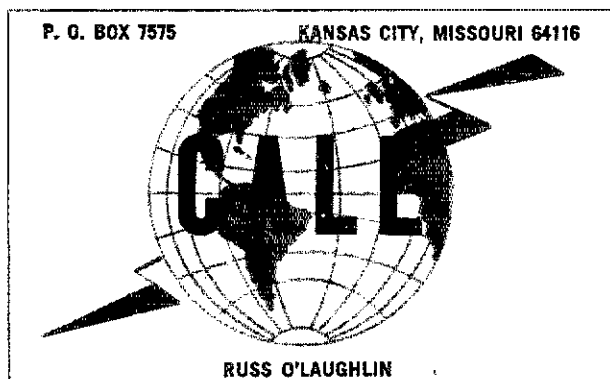
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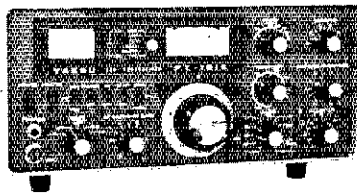
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AND DG-5 DIGITAL FREQUENCY DISPLAY

A NEW STANDARD IN ECONOMY TRANSCEIVERS

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The new TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15,000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-502 and TV-506 transverters, your TS-520S can cover 160 meters to 2 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

The new Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The new TS-520S incorporates a 3SK-35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

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VERNIER TUNING FOR FINAL PLATE CONTROL

A new vernier tuning mechanism allows

easy and accurate adjustment of the plate control during tune-up.

FINAL AMPLIFIER

The new TS-520S is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built-in to the TS-520S.

RF ATTENUATOR

The new TS-520S has a built-in 20 dB attenuator that can be activated by a push button switch conveniently located on the front panel.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO has been designed to match the styling of the TS-520S and provide maximum operating flexibility on the band selected on your TS-520S.

AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (option) allows for mobile operation of the TS-520S.

EASY CONNECTION PHONE PATCH

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

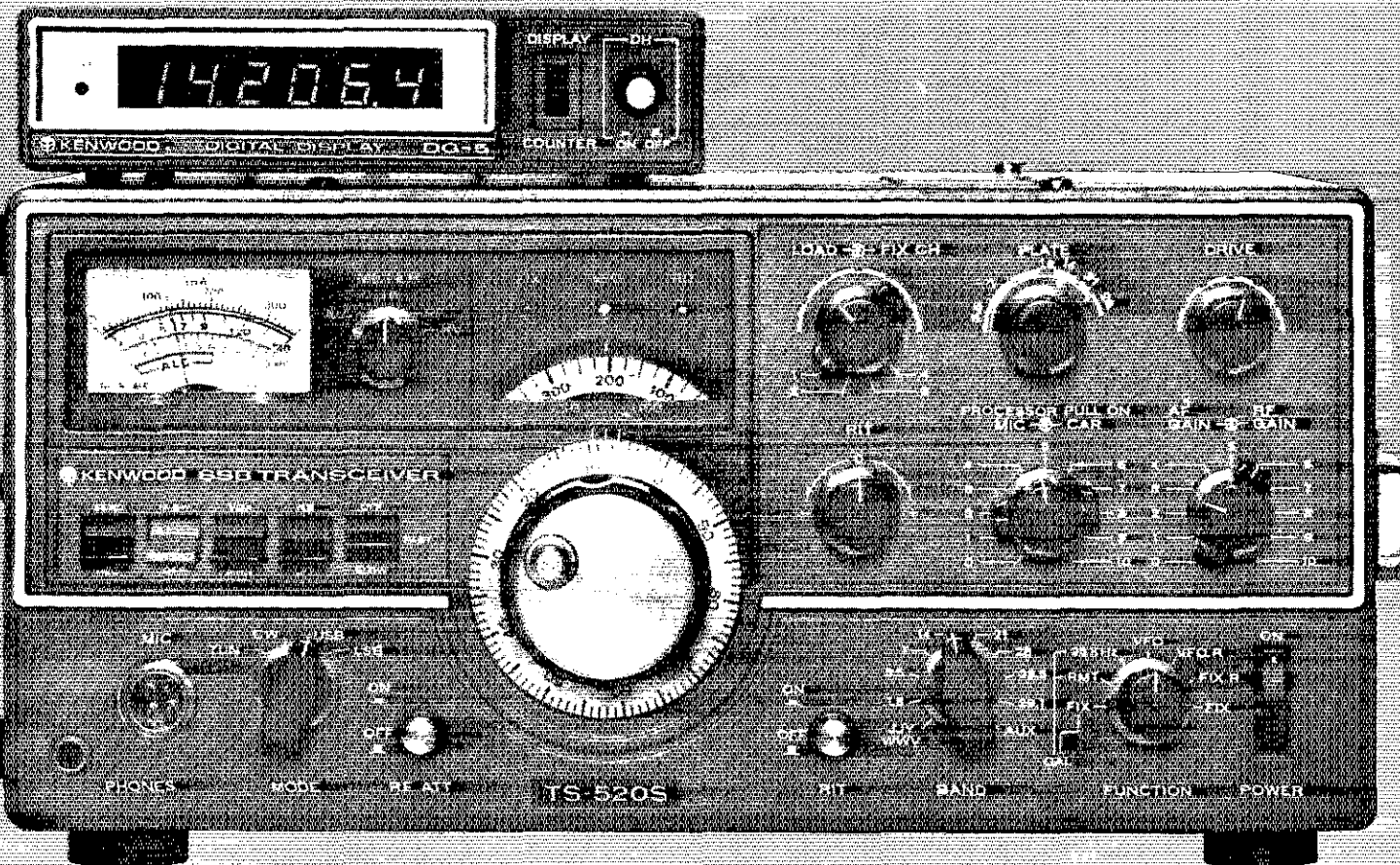
CW-520 — CW FILTER (OPTION)

The CW-520 500 Hz filter can be easily installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.



Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
 Modes: USB, LSB, CW
 Antenna Impedance: 50-75 Ohms
 Frequency Stability: Within ± 1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
 Tubes & Semiconductors:
 Tubes (52001A x 2, 12BY7A) 3
 Transistors 52
 FETs 19
 Diodes 101
 Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
 Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
 Dimension: 333(13 1/4) W x 153 (6-0) H x 335(13-(13-3/16) D mm(inch)
 Weight: 16.0 kg(35.2 lbs)
TRANSMITTER
 RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
 Carrier Suppression: Better than -40 dB
 Sideband Suppression: Better than -50 dB
 Spurious Radiation: Better than -40 dB
 Microphone Impedance: 50k Ohms
 AF Response: 400 to 2,600 Hz

RECEIVER

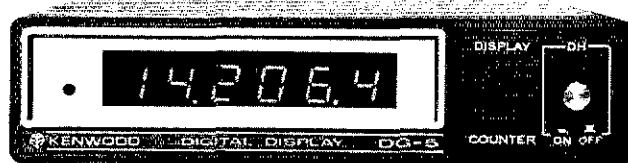
Sensitivity: 0.25 μ V for 10 dB (S+N)/N
 Selectivity: SSB: 2.4 kHz/-6 dB, 4.4 kHz/-60 dB
 Selectivity: CW: 0.5 kHz/ 6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
 Image Ratio: Better than 50 dB
 IF Rejection: Better than 50 dB
 AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
 AF Output Impedance: 4 to 16 Ohms

DG-5

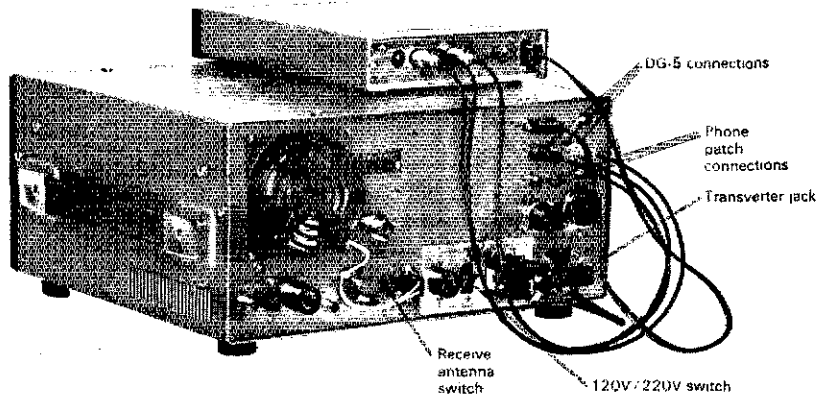
SPECIFICATIONS

Measuring Range: 100 Hz to 40 MHz
 Input Impedance: 5 k Ohms
 Gate Time: 0.1 Sec.
 Input Sensitivity: 100 Hz to 40 MHz . . . 200 mV rms or over, 10 kHz to 10 MHz . . . 50 mV or over
 Measuring Accuracy: Internal time base accuracy ± 0.1 count
 Time Base: 10 MHz
 Operating Temperature: -10° to 50° C/14° to 122° F
 Power Requirement: Supplied from TS-520S or 12 to 16 VDC (nominal 13.8 VDC)
 Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)
 Weight: 1.3 kg(2.9 lbs)

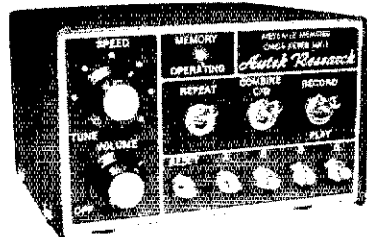
DG-5 (optional)



The luxury of digital readout is available on the TS-520S by connecting the new DG-5 readout (option). More than just the average readout circuit, this counter mixes the carrier, VFO, and heterodyne frequencies to give you your exact frequency. This handsomely-styled accessory can be set almost anywhere in your shack for easy to read operation . . . or set it on the dashboard during mobile operation for safety and convenience. Six bold digits display your operating frequency while you transmit and receive. Complete with DH (display hold) switch for frequency memory and 2 position intensity selector. The DG-5 can also be used as a normal frequency counter up to 40 MHz at the touch of a switch. (Input cable provided.)
 NOTE: TS-520 owners can use the DG-5 with a DK-520 adapter kit.



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Also remembers name, QTH,
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ADVANCED "MOS" MEMORY:

- Designed for daily QSO's, not just contests.
- Records as fast as you can send! Change instantly by simply recording over old message.
- Just tap button to start any of 4 messages. Each is about 25 characters long. For example, 1 message will hold "CQ CQ CQ DX DE W6DYD W6DYD K". Total memory approx. 100 chars.
- Handy "repeat" switch repeats message forever until reset. Use for longer CQ's, or leave a listening pause at end of CQ. If no answer, keyer automatically repeats CQ until answered. YOU SIT BACK AND WAIT FOR A CALL!
- Another switch combines 2 of the 4 messages for extra length (approx. 50 chars.), e.g. "QTH IS LA LA NAME IS BILL BILL RIG HR IS KW ES BEAM ES NEW MEMORY KEYS"
- "Memory-Saver" feature standard.

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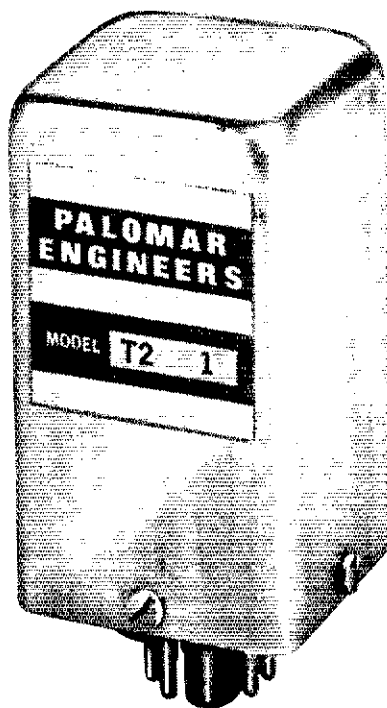
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Mayor Overcash proclaiming Mar. 14 as Ben Myers Day — in appreciation for his dedication to CQ and RACES/SKYWARN activities. Director Gant, W5GM visited Hurst ARC. Hurst ARC has an extensive record of service to Amateur Radio, and to other worthy organizations. SWOT group having lively discussion on relative merits of vertical vs horizontal polarization on 2, and urging all to support AMSAT Phase III missions, membership up to 400 now. G.L. Baker, W5DQX reports more CQ activity than anyone in Section, his reports are complete and his contact with those having difficulties uniformly excellent. KSSOR reports on battery power with plans for wind-plant this summer. Temple weather-watch in full swing. WB2QXC & WB5KTO finally QNI! W5G5N reports he, W5TNN and W5CMT all passed Extra Class. Key City ARC has active skywarn net cooperating with US WX service in Abilene area. W5TI reports 22 states and 6 countries on 160 and going strong. Urge you to listen in on the traffic nets. A few of them are: Tex Tic Net, 2330 on 3961; Tex CW Net, 0000 on 3770. W5YEA reports FTN had 1325 check-ins in 30 sessions in Apr., listed 374 formal and 456 informal traffic items. If you haven't tried working in the traffic nets, give it a spin, you'll enjoy it! AREC activities need your help, contact W5DWL Traffic; W5RI 260, W5SHN 186, W5DWL 48, K5SOR 40, W5YK 16, W57ADC/5 11, W5G5N 2.

OKLAHOMA: SCM, Leonard Hollar, W5FSN — Asst. SCM, Ray Miller, W5REC, SEC: W5ASML, W5BKNR, new EC for Craig County, W5RFX new Bulletin Station for Ardmore Repeater, W5OSN and W5TTU, new OVS appointees. With the recent openings on 2 we should receive some good reports. The "Anderson Column" stirred up some of our people here. Newspapers, I think the Amateurs came out ahead on that one. Enid Tri-State Band festival is history. The Enid Club did another fine job handling the "Million Dollar Parade." Impossible to keep up with all the upgrades and the new calls. Just congratulations to all. Will be checking appointment files on one problem will be the switch to 2-letter calls by many. It would help if you let me know, so that records can be changed and updated. W5FW is back in the swing on QLZ. All of our nets are doing fine but each can use more participation particularly QLZ and the Evening 55B Nets. Traffic: W5NKD 408, W5REC 239, W5RB 164, W5NKC 144, W5SABL 107, W5OCZ 68, W5BAZS 54, W5FW 34, W5SUG 30, W5FKL 24, W5RFX 20, W5SELG 18, W5FSN 14, W5OSN 13, W5PML 10, W5TTU 7, W5OLV 6, W5FLV 4, W5UCM 4, W5OYU 3, W5PVL 3.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR, SEC: W5TOP, RM: K5RG (W5UG), PAM: W5NUM, OQ reports: N5ZZ (W5LTG) W5FH-D W5SCIT W5HGB. OVS reports: N5AF (K5LZJ) W5QGC W5CIT. OVS OPS W54KSG/5 regularly QNI VA and FL nets so he'll be remembered. EC W5TINN reported a fatality accident with W5AAR in HOUSTON (50 mi away) and W5UUV notified Lake Jackson Police; also reports following new Novices: W5SCOL W5DILF W5DGGQ SD5DPL. OPS K5H2R reports W5DGG and W5AUYE won domino tournament, K5FIN and K5H2R won horse shoe pitchin' tournament, and EC W5TINN was awarded Whitney Nugget as the most deserving Amateur present at the 79th Traffic Net Picnic. From ACZ Bulletin, Alvin; W5AEE is now operational on 146.31/91 from atop Danbury Hospital in Angleton. From Coastal Bend Digest, Corpus Christi: W5NRC was featured panelist on KEYS (radio) morning talk show; W5BT (W5GEL) working on a Corpus Christi chapter of QCWA; W5SWIC and W5SWID being transferred to South Africa; W5UJN has new tower; W5BQZW has new 2-mtr rig; W5BQZW has great bunch of new equipment; W5TRL, proudly showing QSL from JH3DPB. W5CNYW W5DSCIC W55ZIC are new Amateurs in the area; W5NWJ reports Stripling Net has 260 members; Corpus Christi March of Dimes Walkathon went off well with communications help from W5A5R, W5UDJ, W5GNG, W5GQJ, W5NDO, W5NWX, K5GT, W5NWN, W5LPHY, W5MKT, W5QEN and K8JT graduated four from latest Novice class. W5LKH and W5KR graduated three. Each class began with more than 20 persons present on opening night. OVS W55VD is organizing the South Texas Slow Speed Net to meet on 3745 kHz at 8:30 PM Central time Sun, with more than 20 new Novices in Cameron County alone, he has hopes of expanding it into a daily traffic and training net. May he have the best of luck. Texas CW Net, 3770 kHz, 7 PM Central, daily, needs help, lots of help, please QNI often, OO K5FCB and K5SIN continue to work with Radio Exper Post 2054 in Spring Branch Area. OVS N5AF (K5LZJ) reports new Amateurs in Cleveland area: W5BWC W5DCTN W5DFFY W5DII — and upgrades W5RUI to Tech, W55VQY to General and W5UUI to Advanced. Traffic (Apr): W5KLY 58, K5H2R 402, W5YEA 16, W5KSG/5 136, W5NUM 183, W5A5VRM 147, K5GM 142, K5GDD 68, W55QV 35, W55QAL 30, W55JVH 22, W5TNN 17, W5KR 16, K5RVF 14. (Mar.) W54KSG/5 184, K5RG 90, W55JVH 25, W55RVT 13, W5LUX/5 8, K5WA 7, W5LTV 6.

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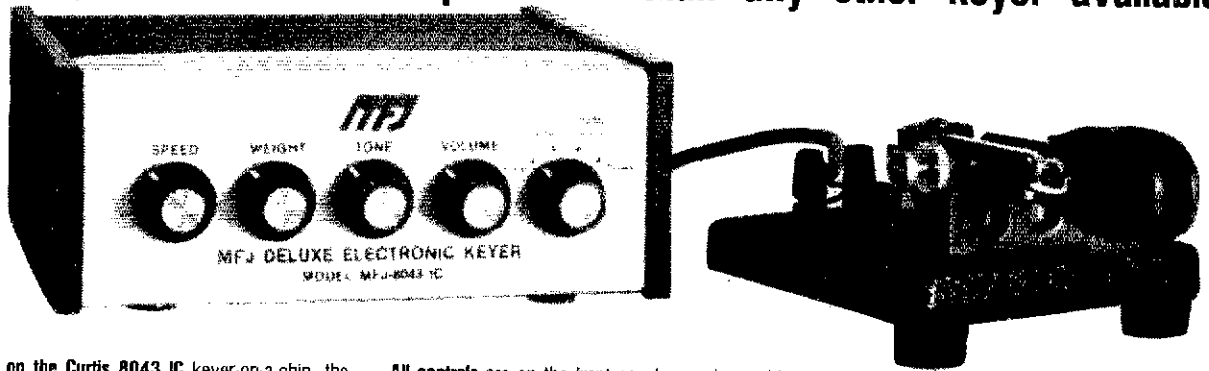
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Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatigue-free sending.

Semi-automatic "bug" operation provides automatic dots and manual dashes. Use a manual straight key to safely key your transmitter or to improve your fist.

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Ultra-reliable solid-state keying. Keys virtually any transmitter; grid block, —300V max., 10 ma. max.; cathode and solid state transmitters +300V max., 200 ma. max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

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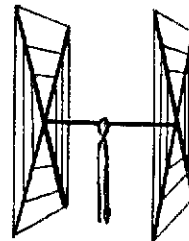
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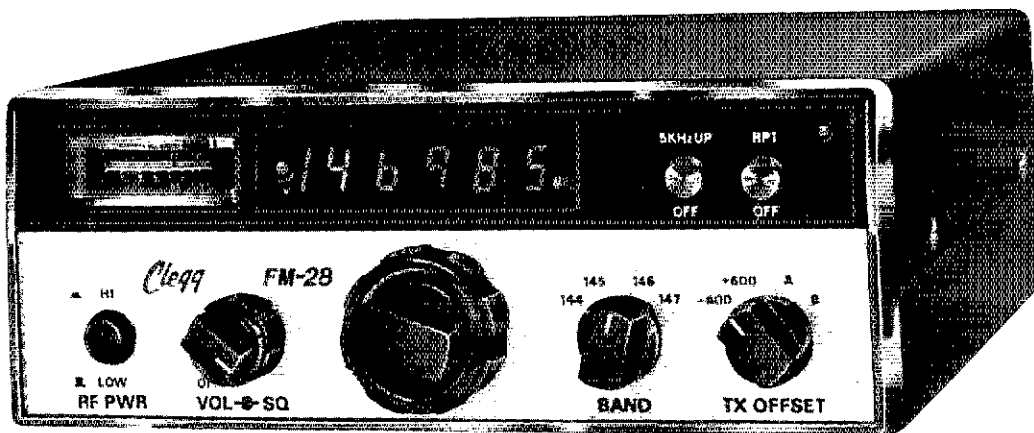
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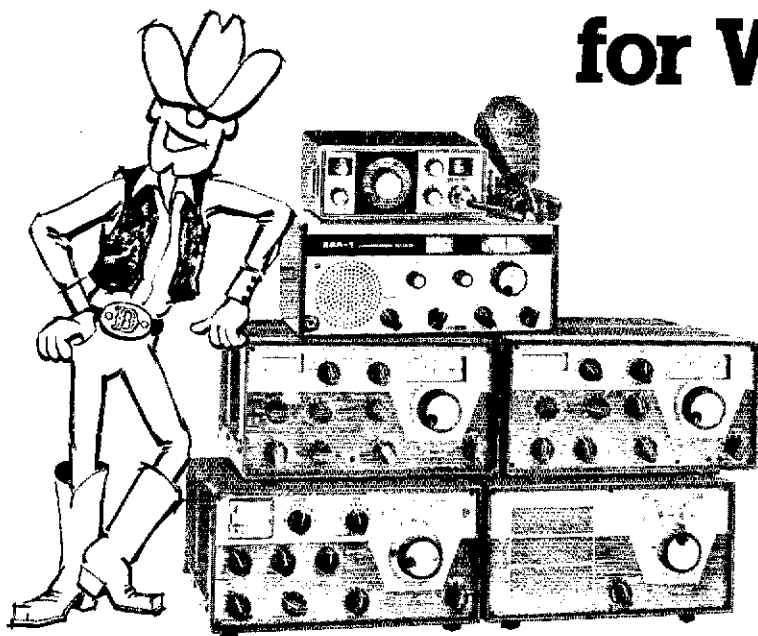


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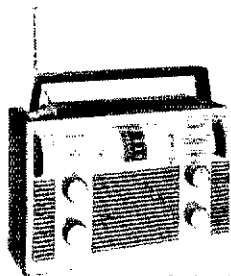
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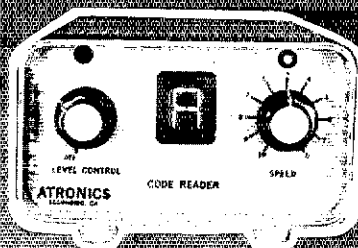
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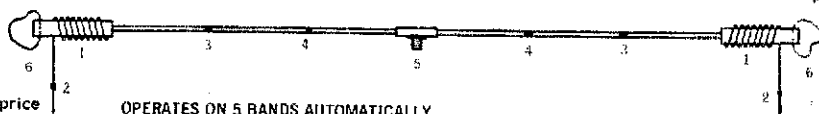
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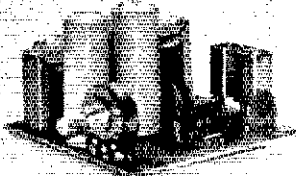
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1N4004	2N4005	2N4005	2N4005	LM3012
1N4005	2N4006	2N4006	2N4006	LM3013
1N4006	2N4007	2N4007	2N4007	LM3014
1N4007	2N4008	2N4008	2N4008	LM3015
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1N4157	2N4158	2N4158	2N4158	LM3165
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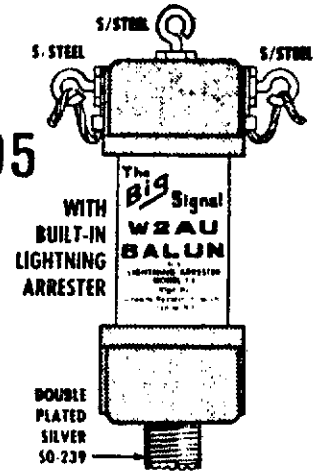
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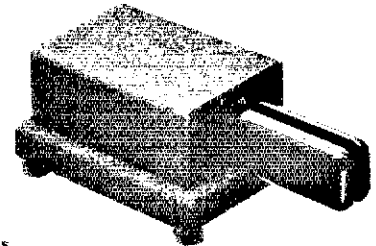
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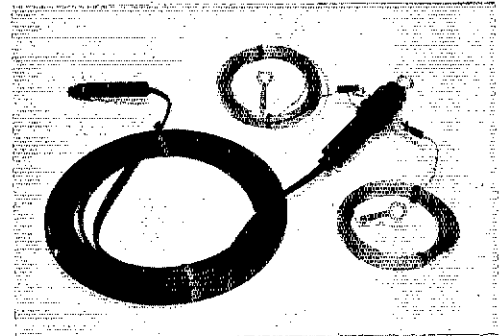
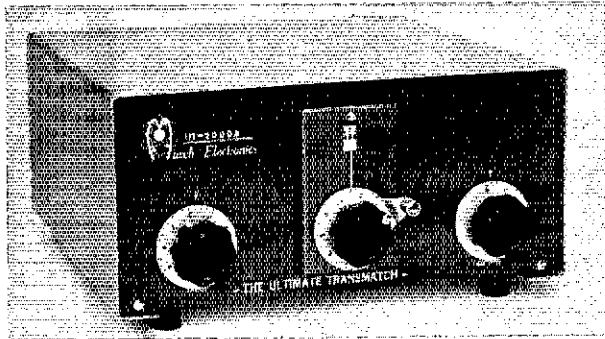
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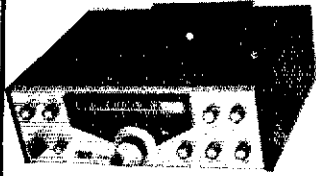
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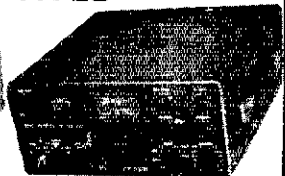
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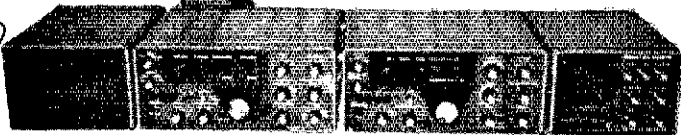
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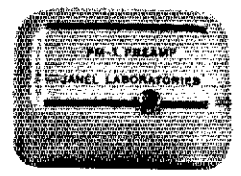
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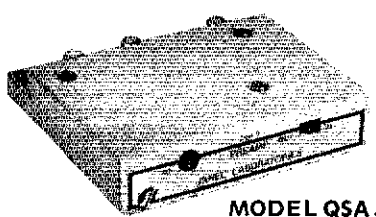
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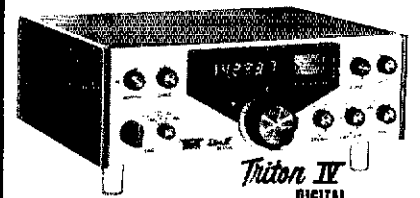
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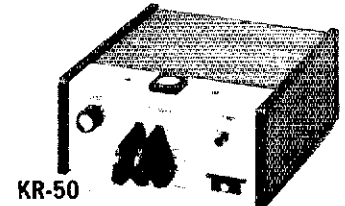


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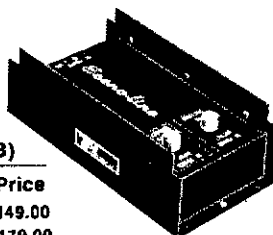
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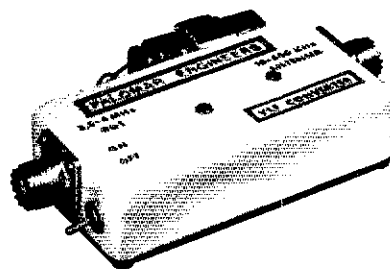
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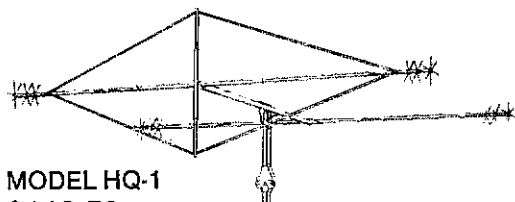
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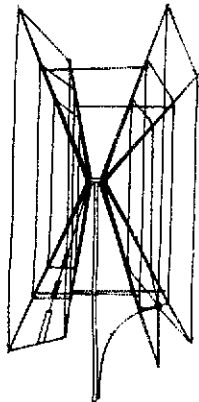


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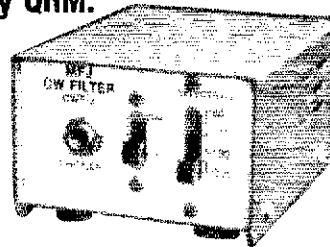
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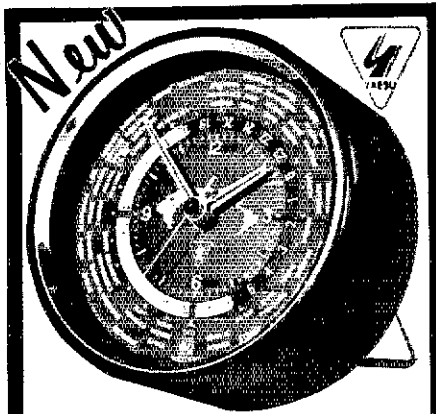
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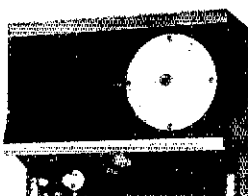
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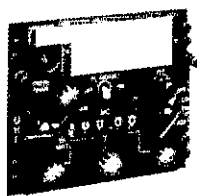
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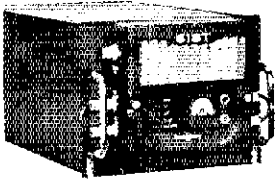
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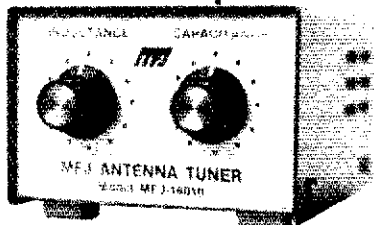
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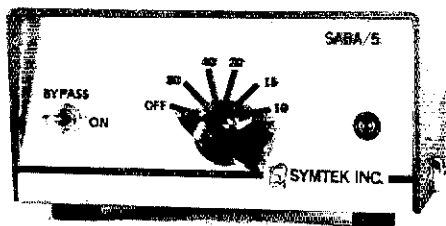
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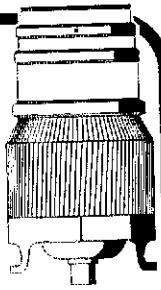
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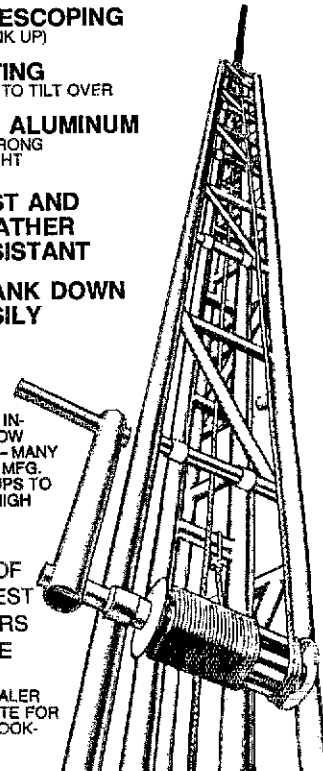
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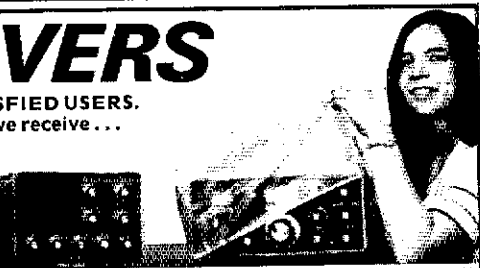
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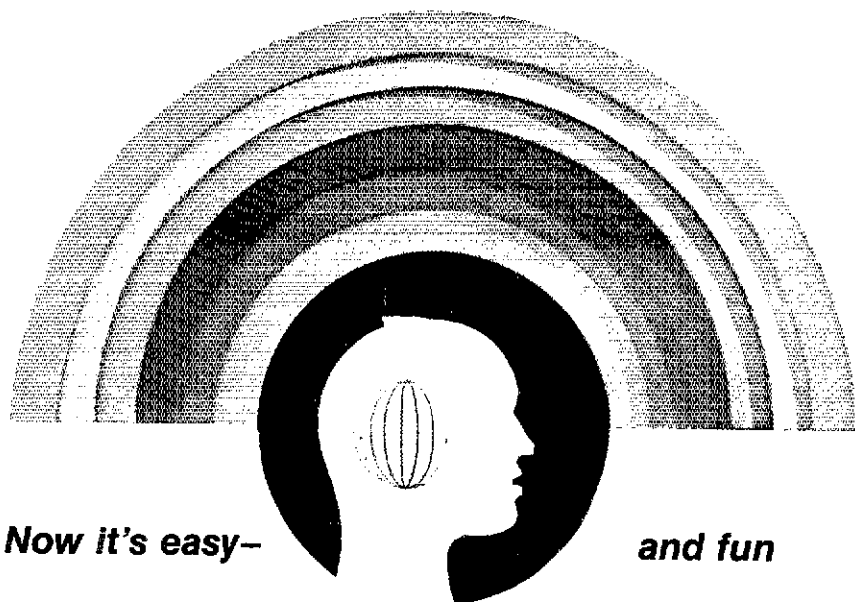
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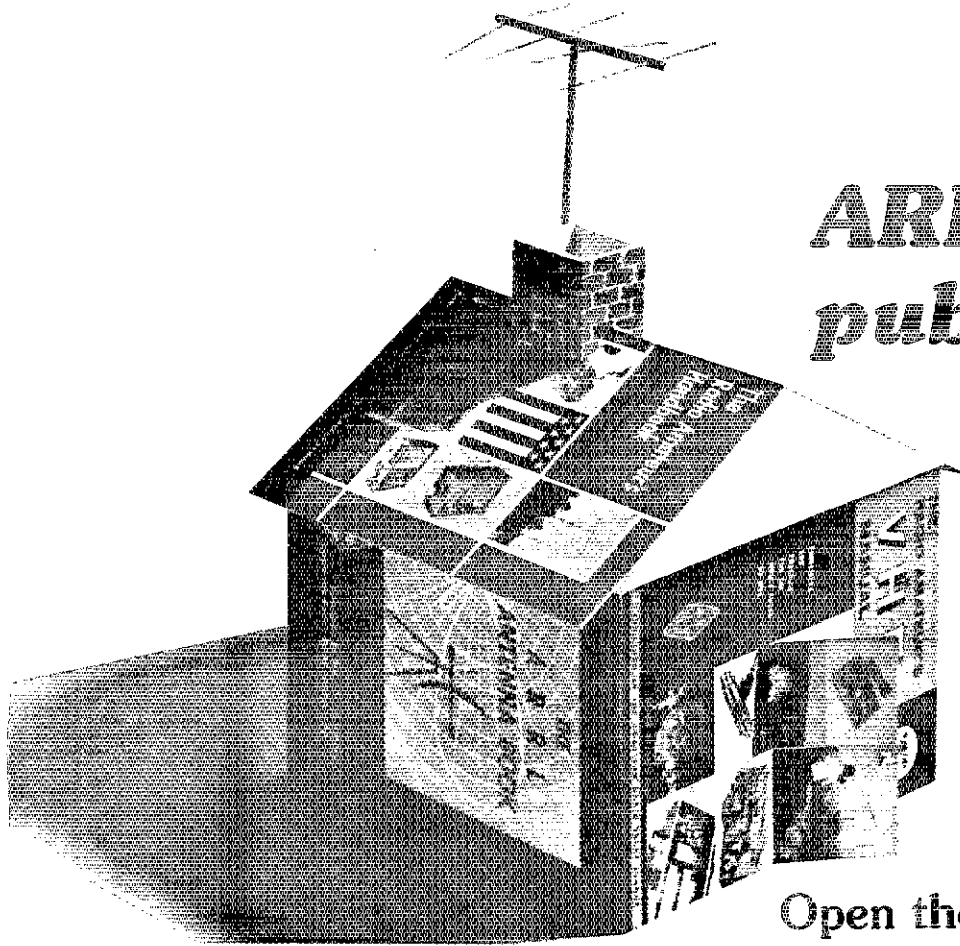
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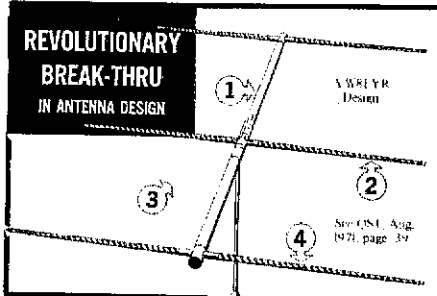
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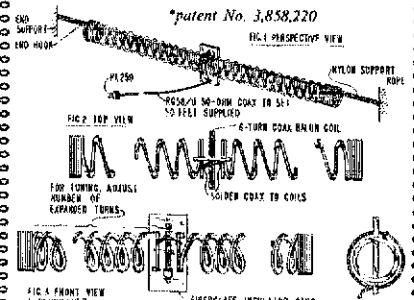
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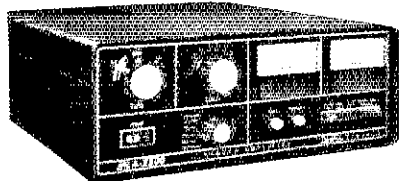
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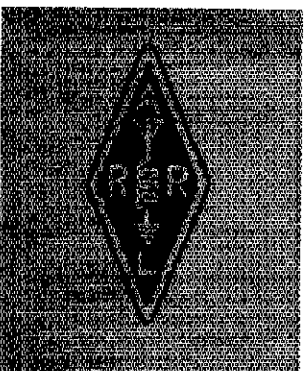
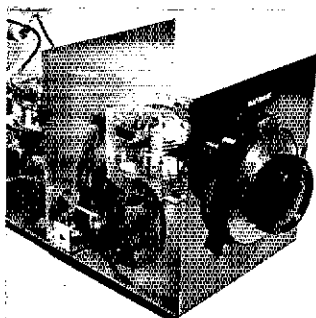
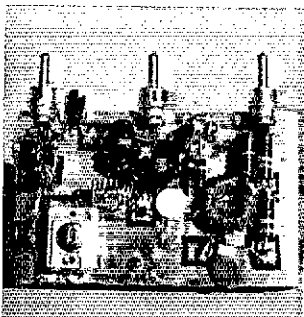
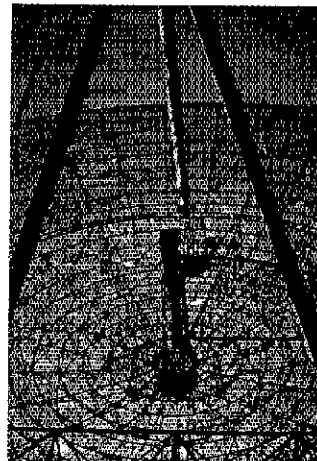
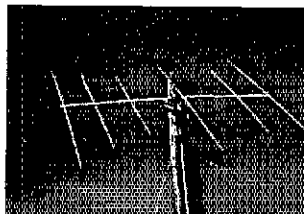
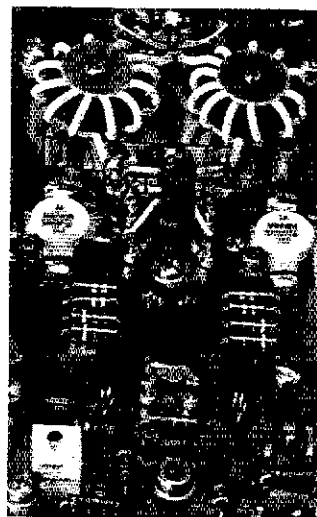
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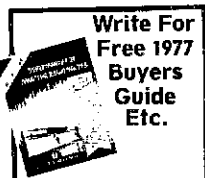
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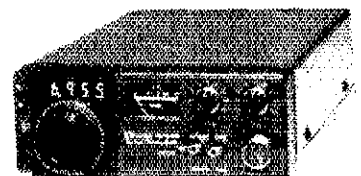
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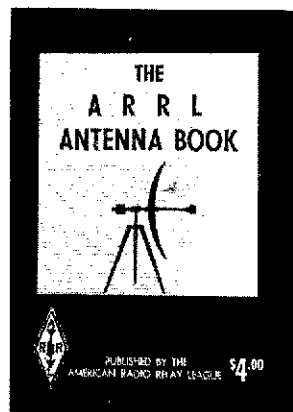
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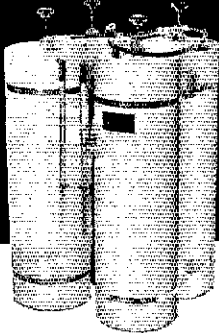
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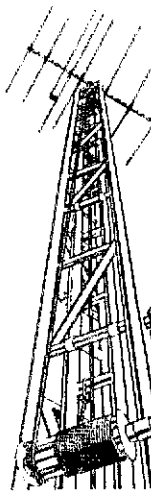
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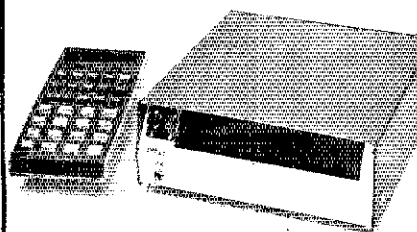


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T-50	51	40	18	.50	.55
T-25	34	27	12	.25	.40

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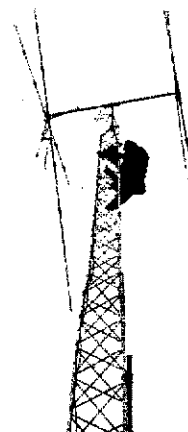
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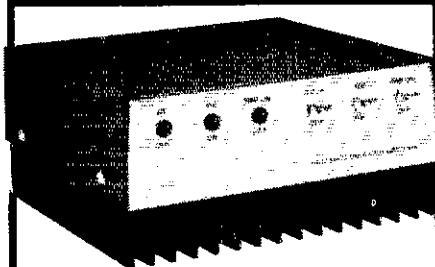


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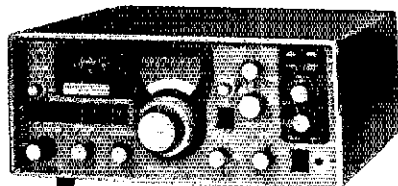
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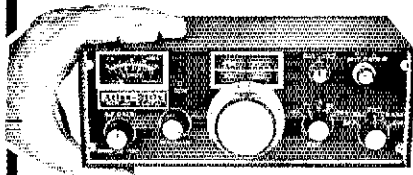
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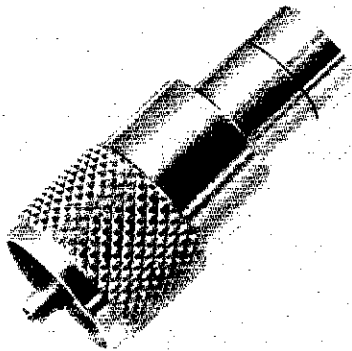
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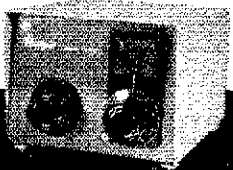


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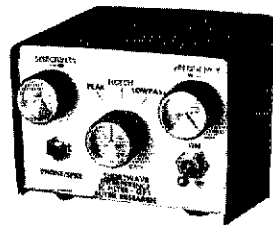
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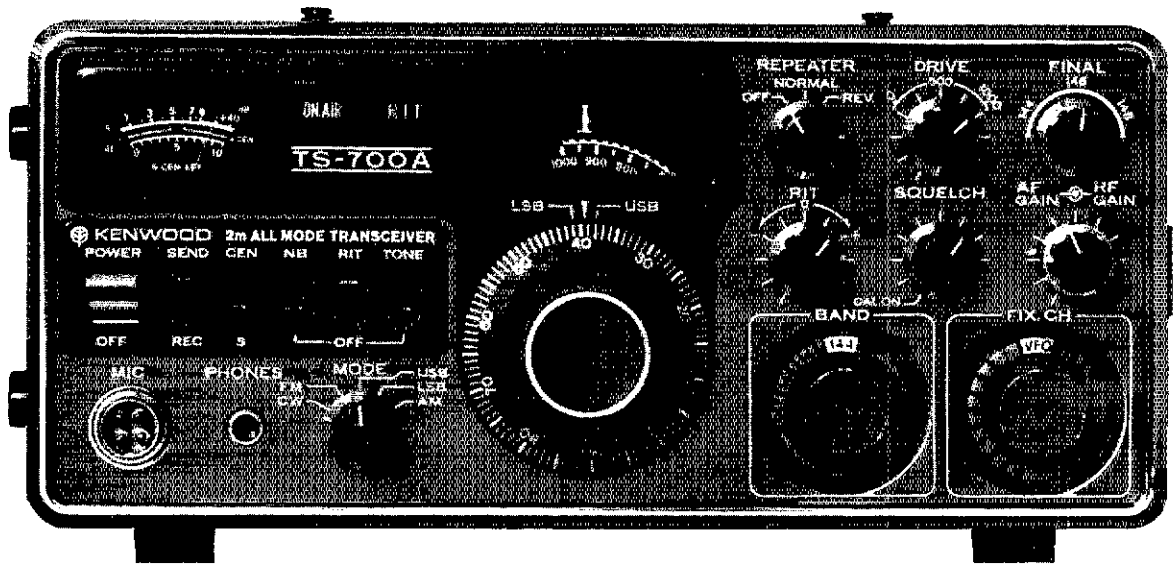
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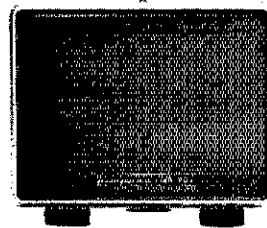


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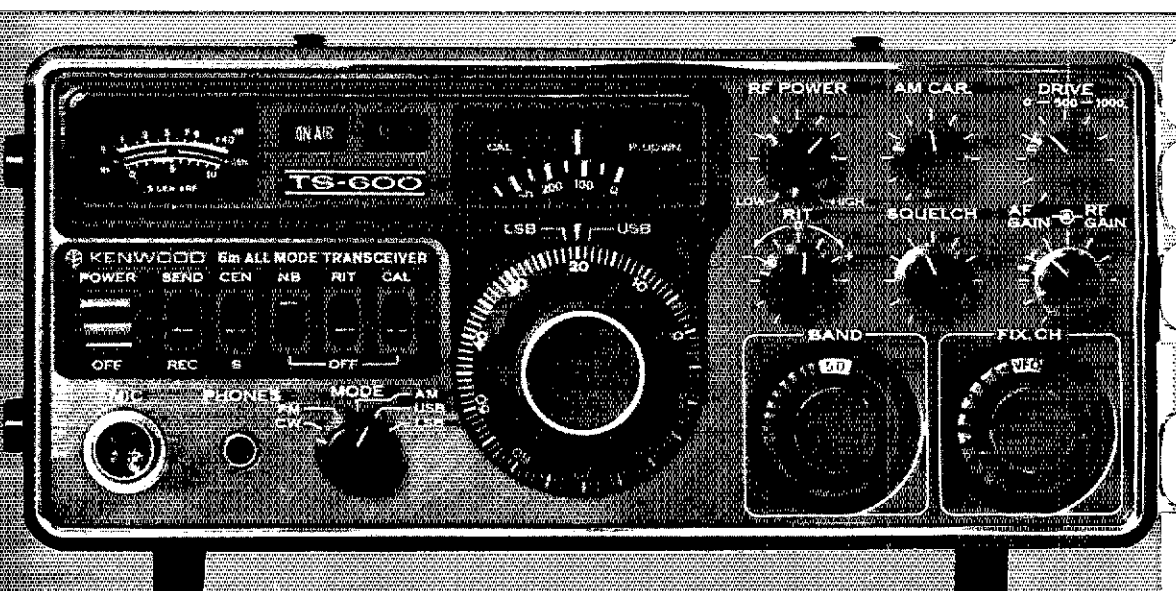
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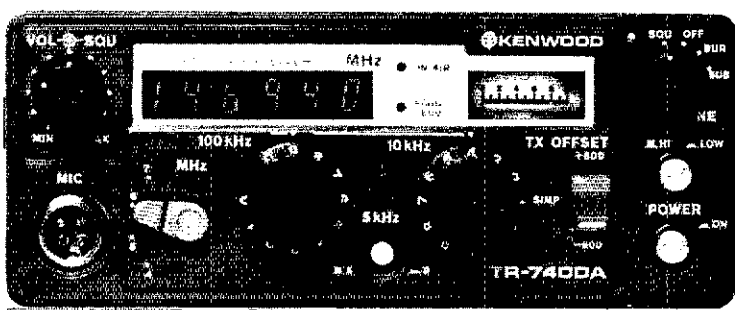
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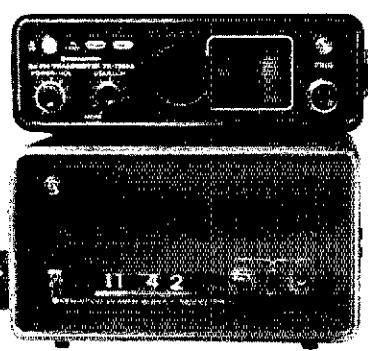
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TR-7400A



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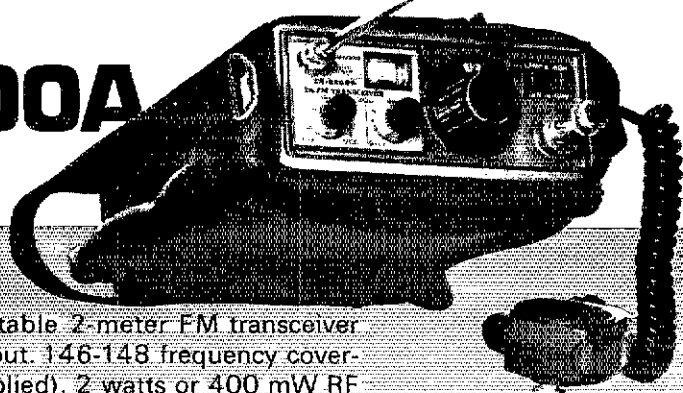
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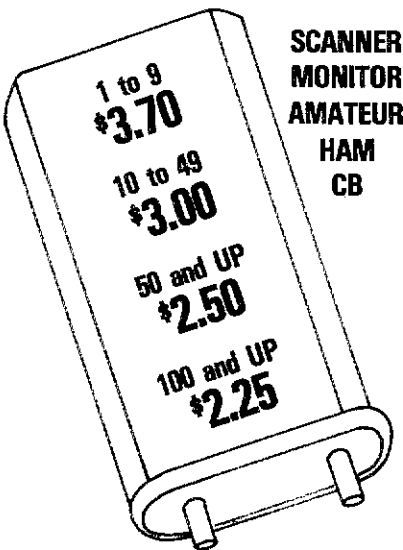
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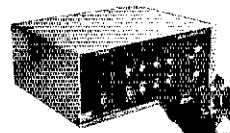
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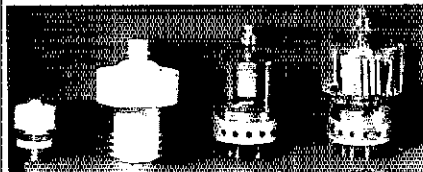
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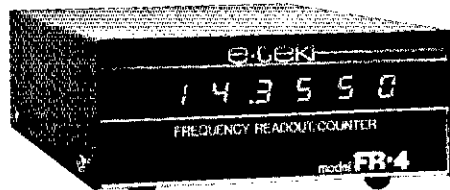
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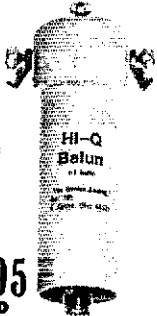
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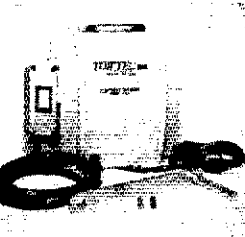
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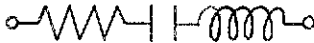
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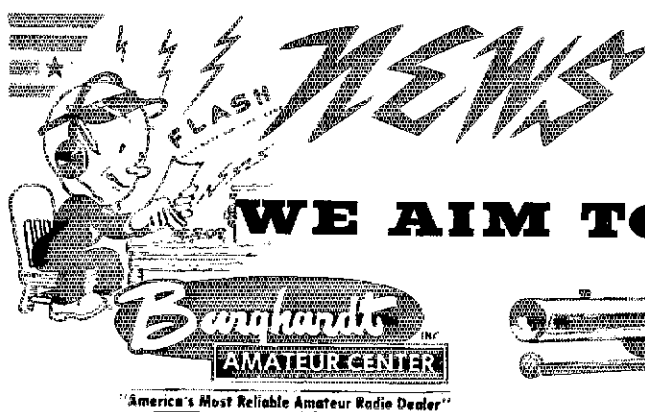
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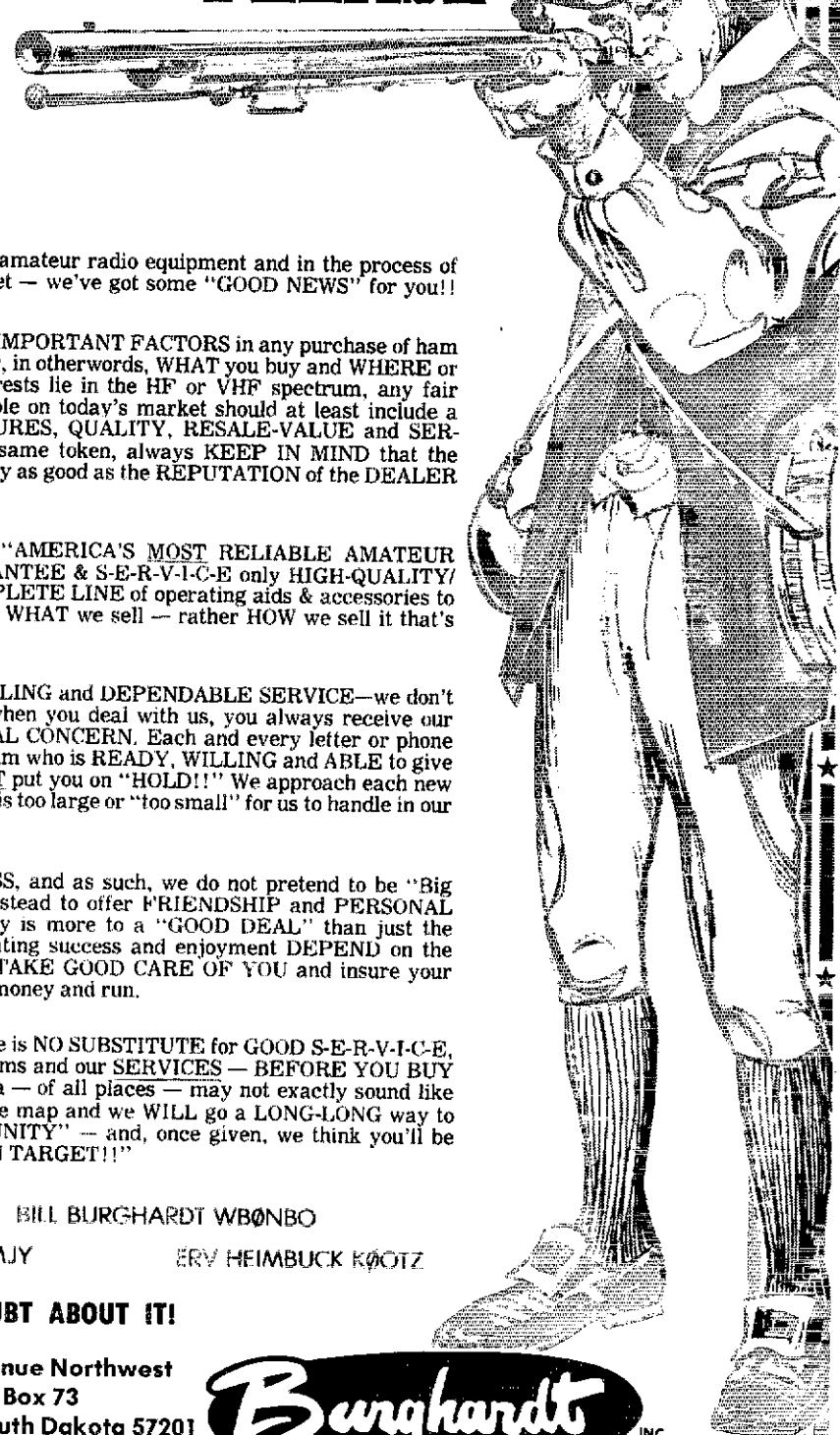
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BULLETIN

WE AIM TO PLEASE



DEAR OM:

If you're in the market for a new or used piece of amateur radio equipment and in the process of shopping around for the "BEST DEAL" you can get — we've got some "GOOD NEWS" for you!!

First of all, we should point out that there are TWO IMPORTANT FACTORS in any purchase of ham radio gear — the PRODUCT and the DEALER — or, in otherwords, WHAT you buy and WHERE or from whom you buy it. Hence, whether your interests lie in the HF or VHF spectrum, any fair evaluation of the various makes & models available on today's market should at least include a comparison of PRICE, PERFORMANCE, FEATURES, QUALITY, RESALE-VALUE and SERVICE-ABILITY among other things. And, by the same token, always KEEP IN MIND that the quality or VALUE of the PRODUCT you select is only as good as the REPUTATION of the DEALER standing behind it.

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When it comes to FAST DELIVERY, HONEST DEALING and DEPENDABLE SERVICE—we don't just advertise it — WE GIVE IT!! Furthermore, when you deal with us, you always receive our prompt, PERSONAL ATTENTION and INDIVIDUAL CONCERN. Each and every letter or phone call puts you in INSTANT TOUCH with a licensed ham who is READY, WILLING and ABLE to give your order or inquiry his undivided attention — NOT put you on "HOLD!!" We approach each new transaction with a fresh frame of mind, and no order is too large or "too small" for us to handle in our usual COURTEOUS, EFFICIENT manner.

To be sure, HAM RADIO IS OUR ONLY BUSINESS, and as such, we do not pretend to be "Big Operators" or "Wheeler-Dealers" — but choose instead to offer FRIENDSHIP and PERSONAL S-E-R-V-I-C-E to those who realize that there truly is more to a "GOOD DEAL" than just the "lowest price." In the final analysis, YOUR operating success and enjoyment DEPEND on the WILLINGNESS and ABILITY of the DEALER to TAKE GOOD CARE OF YOU and insure your COMPLETE SATISFACTION — not just take your money and run.

In short, WE AIM TO PLEASE!! And, because there is NO SUBSTITUTE for GOOD S-E-R-V-I-C-E, we want you to BE AWARE of OUR policies, our terms and our SERVICES — BEFORE YOU BUY somewhere else. Granted, Watertown, South Dakota — of all places — may not exactly sound like THE PLACE to buy ham gear—but, we ARE on the map and we WILL go a LONG-LONG way to S-E-R-V-E YOU. All we ask is for the "OPPORTUNITY" — and, once given, we think you'll be more than happy to discover that we're "RIGHT ON TARGET!!"

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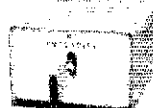


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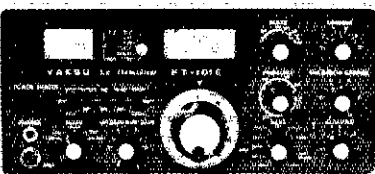
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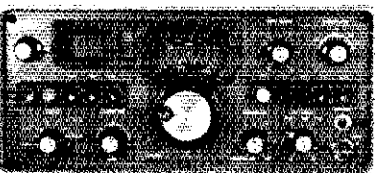
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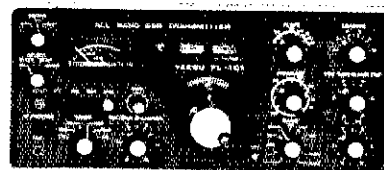
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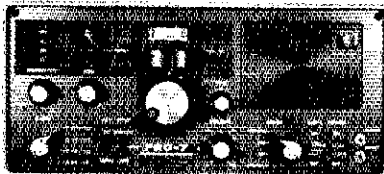
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