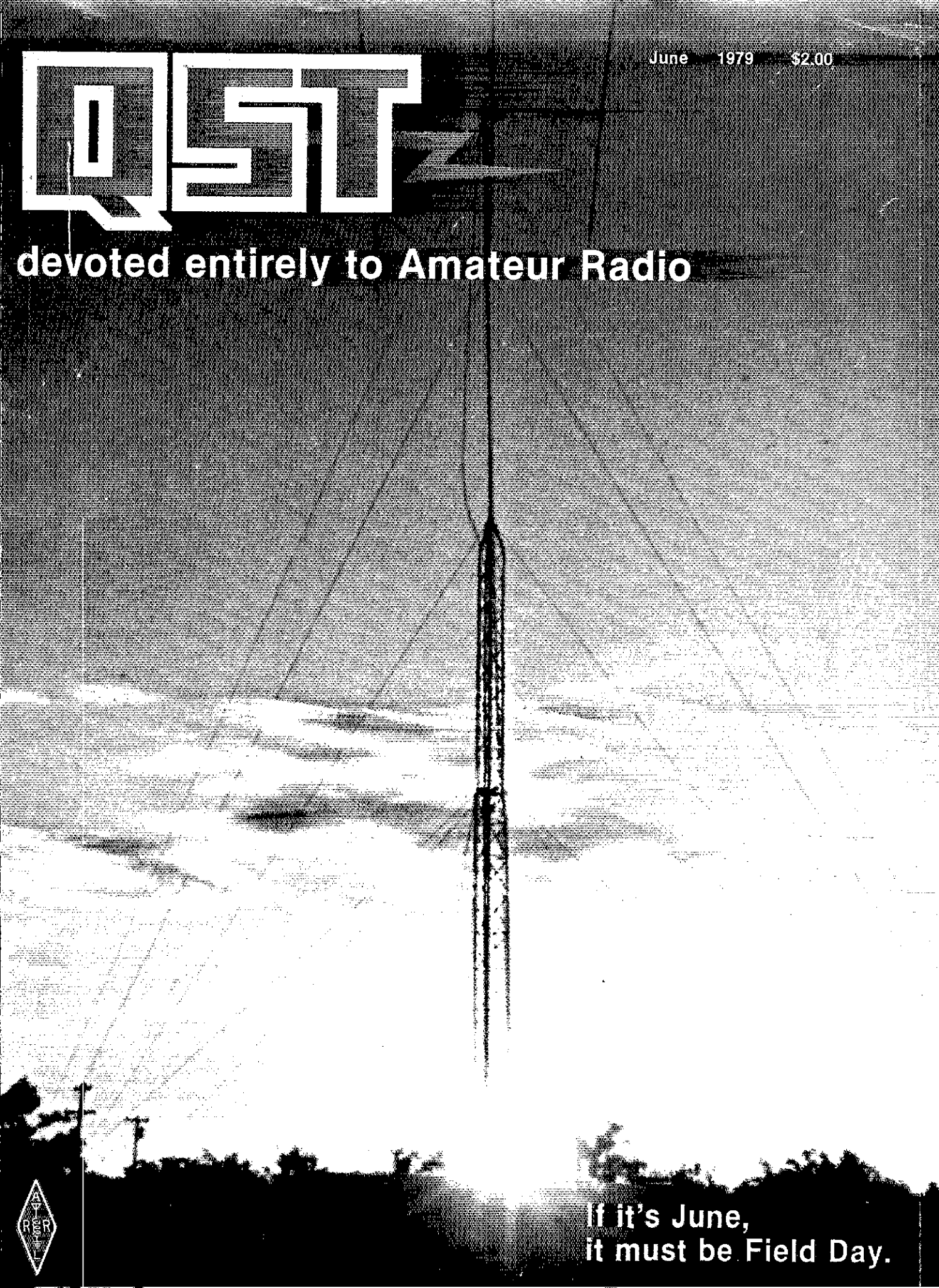
June 1979 $2.00

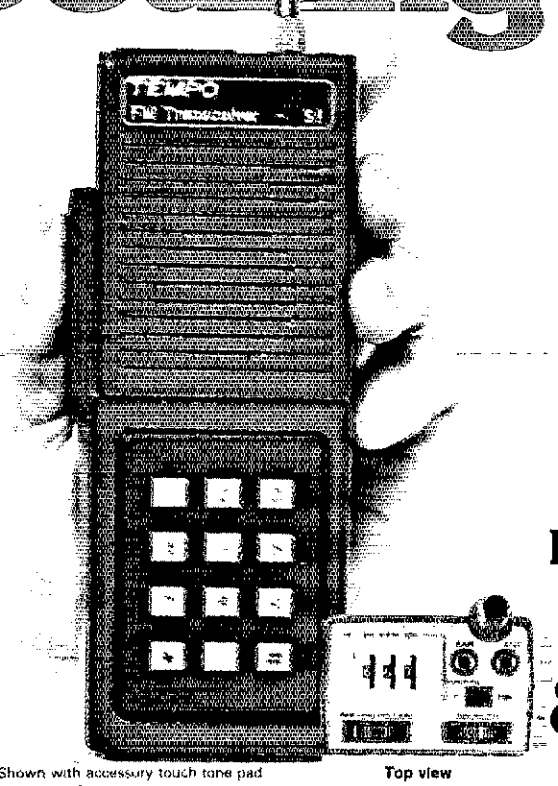
QST

devoted entirely to Amateur Radio



If it's June,
it must be Field Day.

the praise is pouring in



*Shown with accessory touch tone pad

Top view

We have never enjoyed such an overwhelming response to a new product. Letters of praise for Tempo's S-1 are coming in daily. Words such as great, fabulous, and fantastic are common. In a few short months the S-1 has taken the Amateur world by storm. In addition to its unique features and its versatility, it has now proven itself to be an extremely rugged and dependable unit...qualities unmatched at any price, but unheard of at the S-1's low price.

This amazing pocket sized radio represents a major breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The S-1's price includes the battery pack, charger, and a telescoping antenna. But, far more important is its *proven* performance record as a fully synthesized 800 channel hand held transceiver.

The optional touch tone pad adds greatly to its convenience and the addition of a Tempo solid solid state amplifier adds tremendously to its power.

The proven TEMPO S-1 does it all... portable...mobile ...base station and gives you 800 channels in one of the smallest hand helds

SPECIFICATIONS

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

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

OPTIONAL ACCESSORIES
Touch tone pad: $65 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VDC power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $169

Price... $349.00 With touch tone pad... $399.00

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

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

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

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

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

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

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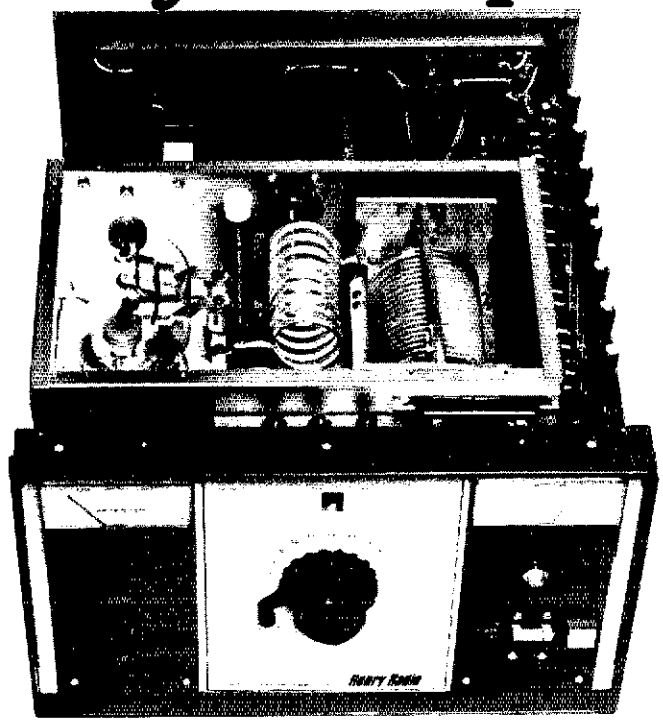
Henry Radio

Prices subject to change without notice

Before you buy an amplifier

Lift the Lid



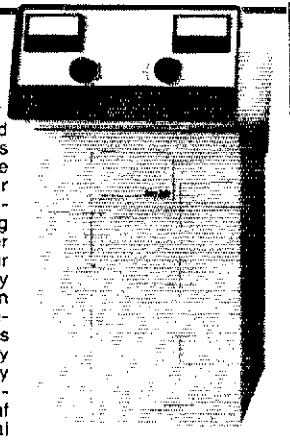
Before you invest your hard earned money in a linear amplifier, consider what's inside. That's where the difference in quality is obvious. No lightweight, cheaply built components...In Henry amplifiers you will find only the best quality, heavy duty components. We build our amplifiers to perform at peak level month after month, year after year. Both the 2KD-5 and the 2K-4A will operate full legal power continuous duty on all modes. We offer the amateur the linear amplifier that we would want in our own stations.

At Henry Radio we know how to build only one kind of amplifier...the best!

2KD-5 GENERAL SPECIFICATIONS:

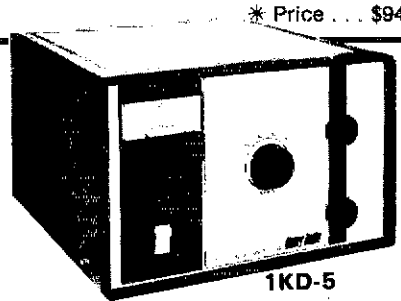
- The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands.
- Two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit.
- Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
- Full legal input in all modes. 2000 watts PEP input for SSB, 1000 watts DC input for CW, RTTY and AM.
- Jumper for 115 or 230 VAC, 3 wire single phase.
- 10.5" high x 15" wide x17.5" deep
- Price . . . $945.00

2K-4A



Never has a linear amplifier racked up so many hours of dependable operation for amateurs worldwide. . .operating at full legal power . . . hour after hour . . . under every type of condition imaginable. Because the 2K-4A is built with the very best, heavy duty components available, it can loaf along at full legal power. It offers engineering and features second to no other linear on the market. The 2K-4A will put your signal on the air with greater strength and clarity than you ever dreamed possible. Operates on all amateur bands, 80 thru 15 meters (export models include 10 meters)•Two rugged Eimac 3-500Z grounded grid triodes•Pi-L plate circuit with silver plated tank coil•Resonant cathode-pi input circuit•Built-in SWR bridge & relative RF output meter•Maximum legal input all modes. Price $1195

The 2K-4 is still available for export and military use.



1KD-5

A little less power, a little lighter, AND less expensive . . . but the 1KD-5 is a true Henry Radio linear amplifier, offering superior quality and dependability. It is designed to greatly boost the strength and clarity of your signal. Its heavy duty components guarantee years of trouble free, dependable performance.

The 1KD-5 is a 1,200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands (also 10 meters on units shipped outside the U.S.). Features an Eimac 3-500Z glass envelope triode • ALC circuit • DC relay system • Relative RF power meter • Pi-L plate circuit with a rotary silver plated tank coil • Cathode Pi input matching circuits • Conservative power supply with solid state rectifiers. Price $695.

3K-A COMMERCIAL/MILITARY AMPLIFIER*

A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. It provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. 3.5-30 MHz. Price $1595.

4K-ULTRA*

Specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. Features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input.

Price $3450.

*Not available for sale to amateurs in the U.S.

Export inquiries are invited.

Export models of Amateur units available for 10 meter operation also.

NEW TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
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Henry Radio

Prices subject to change without notice

The COMPLEAT 2 meter Ham Shack

IC-211 Multi-Mode Transceiver and **RM2** Remote Microprocessor Controller

Sure you can build up to a 2 meter station with most of the features shown above with some other brand of equipment: **if** you can afford to add on all the optional pieces. You can spend a lot of money consuming your counter space and collecting knobs to fiddle with, and you can take a long time attaining the 2 meter operations you aspire to.

When you compare all the features, you'll see why the **IC-211** is the 2 meter standard: because that's what its outstanding features are...standard, like two dual tracking VFO's at no extra cost. Even the power supply transformer is built-in for working from AC or DC, and ICOM's advanced LSI technology integrates all the high speed tuning functions through one single tuning knob to one instantly coordinated LED display. Also standard are built-in high SWR autopower control, and selectable output of 500 milliwatts and 10 watts for FM operation.

Your 2 meter contest operations were never easy, but now they are with the **IC-211** and the one option that really makes the **IC-211** the easiest 2 meter rig available, ICOM's **RM2** remote microprocessor controller. The **RM2** adds multi-frequency memory, scan, remote frequency control and touch tone generation to the **IC-211's** already astounding list of standard features. With the **IC-211** and its compatible **RM2,** you'll have a fully synthesized, latest state-of-the-art 2 meter station.

ICOM suggests you compare features when you compare cost, and demand all the features of the 2 meter standard, the **IC-211.**

ICOM INFORMATION SERVICE
3331 Towerwood Dr., Suite 304
Dallas, Texas 75234

Please send me a full-color ICOM Product Line Catalog and a list of Authorized ICOM Dealers.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You may send a machine copy of this form.

All ICOM radios significantly exceed FCC regulations limiting spurious emissions. Specifications subject to change without notice.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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June 1979
Volume LXIII Number 6

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT U.S.A. Official organ of the International Amateur Radio Union.

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Subscription rate $18.00 per year postpaid, U.S. funds, U.S. & Possessions; $20.00 in Canada; $21.00 elsewhere. Single copies $2.00. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

QST is available to the blind and physically handicapped on magnetic tape from the Library of Congress, Division for the Blind and Handicapped, Washington, DC 20542.

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No.: 21-9421. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

THE COVER

WB9KZY's photo of the Glen Gates Gang (IN) antenna depicts the essence of Field Day — a great deal of effort expended on behalf of a greatly rewarding operating activity!

Contents

Technical

Basic Amateur Radio

General

Operating

Organizational and Regulatory

Departments

ANOTHER FIRST FROM DENTRON
more power for less.

In January, 1978, our engineers developed a unique linear amplifier. The GLA-1000 was to be the smallest amateur linear to offer 1200 watts SSB PEP input, and 1000 watts CW input, with a built-in power supply, at the lowest possible price, $379.50 sugg. retail.

How would it perform? Could a unit this small (5⅜"H x 11"W x 11"D) and economical measure up to high standards set by "professional" amateurs across the country? We decided to let a group of amateurs tell us.

The GLA-1000 was field tested for 1 month by the following amateurs: Robert Allen W8IO, Harold Unger WA2EQN, Robert Schiers NØAN, Jim Turle WA8RCN, Alan Applegate KØBG, Howard Townsend WA5MLT, Mickey LeBoeuf K5ML, Tom Lutman WB8ZWY, Ed Clegg W3LOY and Andy Calandria K5MVP. The group was instructed to "use the prototype under tough operating conditions, not to baby it in any way."

What was the response? Some on the air comments received by W8IO, *"Fantastic signal, 12 db over barefoot exciter"* (75SSB). *"Excellent keying, no change in wave form, 5-9 +30 db in Kentucky"* (40CW). From NØAN, *"Overall quality excellent and up to the standards DenTron has come to stand for."* From K5ML, *"Finally a high quality amplifier that everyone can afford."*

Response was unanimously positive. Build a powerful linear with special features like full metering of essential voltages and currents, a back-lit, black-out meter that even includes a relative, power output function. Keep it small and economical so that it is within the reach of all amateurs, and you've got a winner!

In inflationary times like these, it's important to find ways to do more for less.

We did, and we're proud of it.

Great Size, Great Power, Great Price. Great Little Amp

DenTron Radio Co., Inc.

2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216) 425-3173

$379.50 Sugg. Retail
FCC Type Accepted

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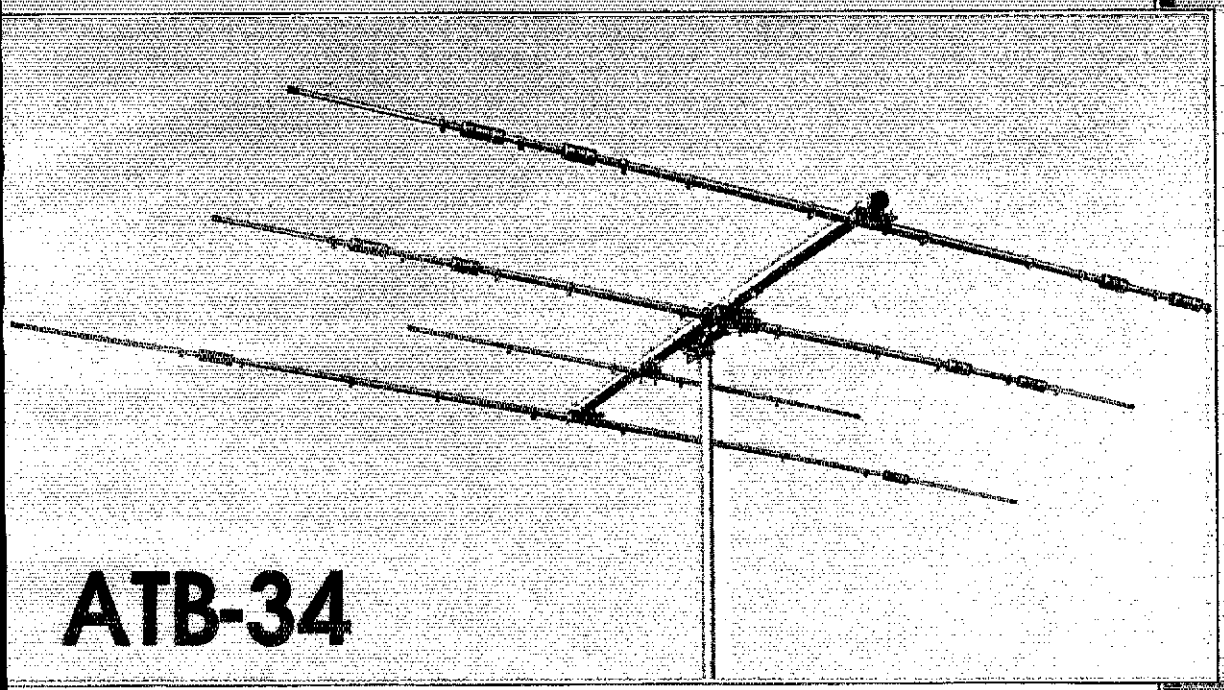

ATB-34

Punch through the pile-ups with an ATB-34. The only three band beam to give you real full size performance. Check ATB-34 element lengths, check the trap design and construction. Check the spacing and the specially developed balun. All of these features add up to the no compromise performance that you expect from Cushcraft.

SPECIFICATIONS

3dB Beam Width	52°
Nominal Impedance	50 ohm
Power Handling	2000 Watts PEP
Boom Length	18'
Longest Element	32'8"
Turning Radius	18'9"
Wind Area	5.4 Ft.2
Weight	42 lbs.
Maximum Mast O.D.	2.5"

Cushcraft vertical antennas are designed to meet the exacting demands of your amateur radio station. They give top performance in easy to use packages. They can be installed at ground level or roof top.

Durability is guaranteed with double wall seamless aluminum base sections and fiberglass high Q traps. If you are interested in local contacts or long path DX communications, a Cushcraft vertical antenna is your best choice.

ATV-3	ATV-4	ATV-5
10-15-20 Meters	10-15-20-40 Meters	10-15-20-40-80 Meters
Height 13.8' (4.2mtrs.)	Height 19.4' (5.9mtrs.)	Height 24.4' (7.4mtrs.)

ALL MODELS

Power Handling 2000 Watts, Nominal Impedance 50 ohms. Maximum Mast Size 2" O.D., Termination: accepts PL-259

UPS SHIPPABLE

cushcraft CORPORATION

THE ANTENNA COMPANY

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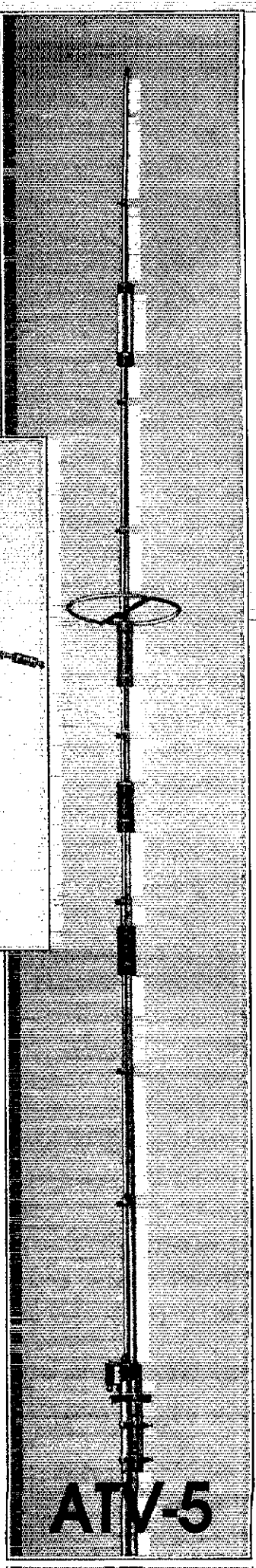


ATV-5

TR-7600

TR-7625

RM-76

TS-700SP

Compact in size... big on performance!

TR-7625
Featuring 25 watts RF output (switchable to 5 watts low power), the TR-7625 is a high-performance 2-meter FM transceiver with memory, and is designed to permit multi-channel (800-channel) operation. Compact and perfect for mobile or ham shack use. When used with optional RM-76 Microprocessor Control Unit, the TR-7625 offers a whole new dimension in channel memory and scanning capability.

TR-7600
Looks the same as the TR-7625, but offers 10 watts RF output (switchable to 1 watt low power). Also uses RM-76 Microprocessor Control Unit. For the Amateur Operator who's looking for optimum versatility in a 2-meter FM transceiver!

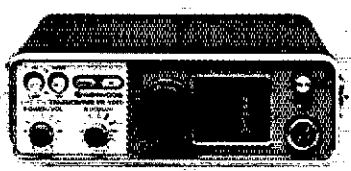
RM-76
Combined with either the TR-7600 or TR-7625, this optional Microprocessor Control Unit allows the operator to store frequencies in six memories (simplex/repeater); scan all memory channels; automatically scan up the band in 5-kHz steps; manually scan up or down in 5-kHz single or fast continuous steps; set lower and upper scan limits; clear scan (for transmitting); stop scan (with HOLD button); scan for busy or open channel; select repeater mode (simplex, transmit frequency offset ±600 kHz or ±1 MHz), or one memory transmit frequency. Operates on 143.95 MHz simplex (MARS) and is adaptable to all MARS frequencies. Display indicates frequency (even while scanning) and functions (such as autoscan, lower scan frequency limit, upper scan limit, and error i.e., transmitting out of band).

TS-700SP
Here's an outstanding 2-meter all-mode transceiver that provides an extra dimension of versatility over the entire 2-meter band. Feature-packed and equipped for SSB, FM, CW and AM. Complete with built-in digital frequency readout, receiver preamplifier, VOX, sidetone, and microphone.

SPECIFICATIONS	Models TR-7600/TR-7625*	Model TS-700SP	Model TR-8300
Frequency Range:	144.00 to 147.995 MHz	144.0 to 148.0 MHz	TX 445.0 to 450.0 MHz RX 442.0 to 447.0 MHz
Mode:	FM	SSB (USB, LSB), CW, AM, FM	FM
Dimensions:	161mm (6-5/16") wide 61mm (2-3/8") high 230mm (9-1/16") deep	278mm (10-7/8") wide 124mm (4-7/8") high 320mm (12-5/8") deep	180mm (7-1/16") wide 60mm (2-3/8") high 240mm (9-7/16") deep
Weight:	1.75kg (3.85 lbs) Approx.	11.0kg (24.2 lbs)	2.3kg (5.1 lbs)
RF Output Power:	High: 10(*25) watts (min.) Low: 1(*5) watt approx. (adjustable to 10 watts)	SSB, FM, CW: 10 watts AM—3 watts FM (Low)—Approx. 1 watt	High: 10 watts Low: 1 watt Approx.
Modulation:	Variable reactance direct shift	SSB: Balanced modulation FM: Variable reactance frequency shift AM: Low power modulation	Variable reactance phase shift
Microphone:	Dynamic microphone with PTT switch, 500 Ω	Low-impedance microphone (500 Ω)	Low-impedance microphone (500 Ω) with PTT switch
Sensitivity:	Less than 0.4 μV for 20 dB quieting	Less than 0.4 μV for 20 dB quieting SSB & CW: 0.25 μV for 10 dB (S+N)/N AM: 1.0 μV for 10 dB (S+N)/N	1 μV for 30 dB (S+N)/N 0.5 μV for 20 dB noise quieting
Squelch Sensitivity:	Less than 0.25 μV	0.25 μV	0.3 μV
Selectivity:	More than 75 dB at 30 kHz of adjacent channel	SSB, CW & AM: 2.4 kHz/-6 dB, 4.8 kHz/-60 dB FM: 12 kHz/-6 dB, 24 kHz/-60 dB	20 kHz/-6 dB 40 kHz/-70 dB
Image Rejection:	More than 70 dB	Better than 70 dB	

ACCESSORIES – VFO-700 remote VFO; SP-70 external speaker; KPS-7 power supply, MC-50 base microphone; MC-30S mobile noise-cancelling microphone, and MC-45 Touch-Tone microphone.

See your Authorized Kenwood Dealer for more details.



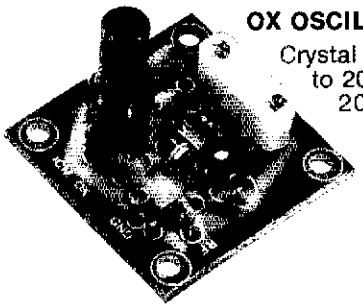
TR-8300
Designed for use in the 70-cm amateur band. Unique design of the TR-8300 makes it a great choice for mobile or fixed-station use. This FM transceiver is capable of F3 emission on 23 crystal-controlled channels (three supplied). Transmitter output is 10 watts.

KENWOOD
...pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT, COMPTON, CA 90220

for the experimenter

INTERNATIONAL CRYSTALS & KITS / OSCILLATORS • RF MIXERS • RF AMPLIFIER • POWER AMPLIFIER



OX OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101.

Specify when ordering

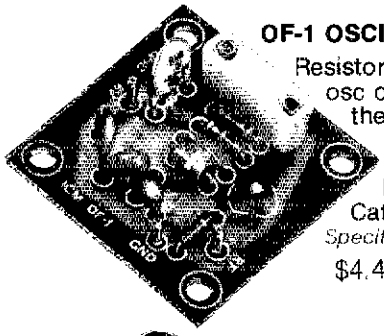
$5.22 ea.

MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106.

Specify when ordering.

$5.80 ea.



OF-1 OSCILLATOR

Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 H, Cat. No. 035109.

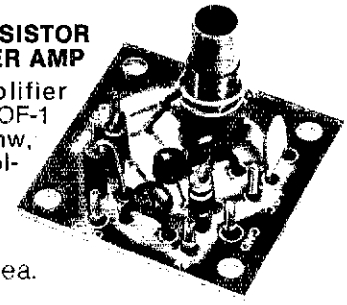
Specify when ordering.

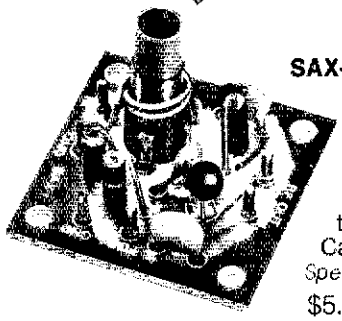
$4.48 ea.

PAX-1 TRANSISTOR RF POWER AMP

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

$6.06 ea.





SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 03512. 20 to 170 MHz, Hi Kit, Cat. No. 035103.

Specify when ordering.

$5.80 ea.

BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107.

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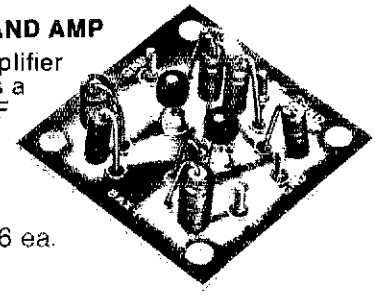

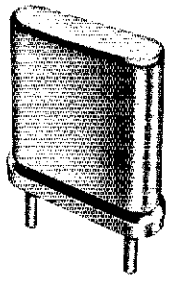

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

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

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

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

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

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

Diversity

One of the most striking features of radio amateurs as a group is the diversity of their interests. There's no such thing as a typical ham these days; about all you can say about us is that, typically, our Amateur Radio interests include several special-interest activities, but exclude even more. It's a rare person who can devote his attention to more than two or three facets of our avocation at the same time.

In general, this diversity is good. It is to our credit as a group that we are progressive enough to keep adding new interests such as OSCAR, microprocessors, slow-scan and medium-scan television, and microwaves. But diversity can also breed divisiveness; it can be as great a weakness as it is a strength, if we aren't careful. We are prone to think that what we are doing is a lot more important and useful than what the other fellow is doing. And, as there become more and more of us, the opportunity for conflict increases. DXers are unhappy when non-DX activities take up space on long-range frequencies; cw men are unhappy when a phone band is expanded into their domain; and Hell hath no fury compared to a ragchewer whose favorite frequency has been pre-empted by a contest.

It's no accident that all of these conflicts involve *frequencies,* for it is an inviolable law of Nature, the FCC and the ITU that we as amateurs must share a finite amount of spectrum. A lot of what we consider to be "our" bands must even be shared with other services. Even if we make some gains at WARC-79, those gains won't begin to keep pace with the increasing amateur population. Like it or not, our need for and use of frequencies is one place where we're all in it together — where we're all on common ground. We *have* to cooperate with our fellow amateurs, much as we might like to think their frequency needs aren't as important as ours. There is simply no alternative but chaos — and if you want an example of what that sounds like, you know where to listen.

Not that interference problems are anything new. In discussing the situation which existed even before 1910, a recent ITU article entitled "Wireless Grows Up at Sea" observed:

> As more and more ships were equipped with wireless, trouble began. Because the spark transmitters used a very wide bandwidth, two chatting operators practically blanketed any other vessel within 100 kilometers that might have wanted to use the air. The only way to choke them off, and it was frequently used by some who wanted to send a message, was to "drop a book on the key." This meant literally that he put a book or any other heavy object on the transmitting key, setting up such a continuous roar of interference that nobody could hear or send anything at all. Confusion was compounded. These and many other inevitable interferences, with everyone operating at will on the same wavelength, naturally led to wireless feuds and quarrels, filling the air with curses, aspersions, and choice obscenities. With such conditions prevailing, naturally the service was far below the efficiency it could have reached even in those early days.

Listening on the bands sometimes leads you to believe that some of us have regressed to that level, doesn't it?

Just as the world's telecommunications community had to find better ways to solve the interference problem than curses and deliberate interference, the world's Amateur Radio community must continue to do the same. In recent years, amateurs have solved some difficult problems through local, regional and international agreements among themselves. Repeater frequency coordination is perhaps the best example. In the future there will be an even greater need for such cooperative agreements. The greatest challenge will lie in ensuring that all of the affected interests, and all reasonable points of view, are given an opportunity to take part in the process.

One constructive response to the increasing QRM on your favorite band is to let it prod you into trying something new. Try OSCAR, or uhf, or microwaves, or some other experimental pursuit that interests you. Much of the pioneering work in Amateur Radio has been done by people who were escaping the QRM on the "low bands." Choosing that path may lead you to greater personal satisfaction and enjoyment than you've found in the more popular activities such as repeaters and DX. It's worth a try, isn't it? — *David Sumner, K1ZZ*

League Lines...

We have a new column this month: "WARC Countdown", page 55. Each month, this is where you'll find the latest WARC-related information between now and the close of this all-important conference at yearend. Last-minute update: Toward the end of April, the U.S. allocations proposals for frequencies below 27.5 MHz finally were sent to Geneva. There were no changes directly affecting the Amateur Service, although International Broadcasting did pick up some additional proposed spectrum at the expense of other services. The February QST article (page 55) remains an accurate description of the U.S. proposals as they would affect the Amateur and Amateur-Satellite Services.

The dates for the 1980 ARRL International DX Competition are February 16-17 (3rd weekend) for cw and March 1-2 (1st weekend) for phone. The phone weekend remains the same as in 1979, but the cw weekend is being moved up one month to take advantage of improved low-band conditions and to avoid conflicts with other contests.

FCC sticks with its decision of last year: There will be no more secondary or special-events station licenses. The action came in denying petitions for reconsideration in Docket 21135 filed by ARRL and six other parties. Details next month in "Happenings."

Readers of the new ARRL Repeater Directory (available now) may be interested in how the metropolitan areas in the repeater listings were determined. The U.S. listings are based on the Census Bureau's "Standard Metropolitan Statistical Areas," as published in 1977. The Canadian listings are those with a population of 50,000 or more according to the 1976 census taken by Statistics of Canada.

In both Canada and the U.S., some metropolitan areas cross provincial and state boundaries. Where this occurs, all repeaters within a metropolitan area are listed under the province or state in which the central city of the area is located, not necessarily the province or state where each repeater within the area is actually located. This is designed to assist the mobile ham who is traveling in unfamiliar parts of the country. For example, a ham traveling in southwestern New Jersey may not know the area, but he does know that he is near Philadelphia, so he looks under Philadelphia in the directory and finds repeaters in both Pennsylvania and New Jersey that are accessible to him.

Do you remember the "Russian Woodpecker", that wideband pulse-type signal causing harmful interference on the amateur (and other) bands, generally between 7 and 21 MHz? Chances are you don't have to think back very far, because it's still with us! Despite numerous complaints to the FCC by the users of several radio services in the U.S., and despite the fact that the U.S. State Department has been involved in the matter for nearly three years, the interference persists. The next time you experience the interference, don't give up in despair. Write the Watch Officer, Monitoring Branch, FCC, Washington, DC 20554.

Attention prospective QST authors: Photographs accompanying articles should be 8 X 10-inch glossy prints. If snapshots only are available, they will be used only if they will reproduce well in our publications. Photos or slides to be considered for use on the cover should be in color.

New radio Public Service Announcements featuring California Angels outfielder Joe Rudi, WA6PVA, are now available from the Public Information Office. Those people who can arrange for air time should contact Bobbie Chamalian, WB1ADL, at ARRL hq.

Attention affiliated clubs: The Public Information Office is looking for letters of thanks or congratulations signed by government officials and given to clubs for their public service assistance. We also need 35-mm color slides to accompany the present TV Public Service Announcements. If the creative urge strikes and you wish to submit slides with copy suitable for new Public Service Announcements, your League will gratefully accept them.

A Medium-Power Solid-State Transmitter

Here is an easy-to-construct solid-state transmitter that delivers up to 50 watts cw or RTTY output and can be tailored for 160, 80 or 40 meters.

By Albert Helfrick,* K2BLA

When was the last time you worked a station that was using a homebuilt transmitter? It seems that very few amateurs are building solid-state transmitters today. A search of Amateur Radio literature turns up several QRP transmitters, a few exotic ssb rigs, but very few 25- to 100-watt cw transmitters, or, as they used to be called, "Novice transmitters."

This is an all-solid-state single-band transmitter that can be built from inexpensive parts. It is *not* another QRP rig! Depending on the transistor used, the unit is capable of delivering 35-50 watts output. A frequency counter is used in lieu of a dial, and good voltage regulation and sequenced keying provide a clean cw note. The transmitter described here is set up for 80-meter operation, but it can be easily modified to work on 160 or 40 meters.

The medium-power solid-state cw/RTTY transmitter puts out about 35 watts into a 50-ohm load. An antenna tuner should be used for best results if the SWR is different from 1:1, since the output tuning is fixed. The indicated frequency is 3.619 MHz. The control labeled "FSK" is for adjustment of the RTTY shift.

Circuit Description

This is an updated approach to the time-honored MOPA (master-oscillator power-amplifier) circuits from many years back. The MOPA transmitter has the distinct advantage of simplicity. The transmitter consists of an oscillator, often a VFO, driving the final amplifier. For an especially good cw note or higher power levels, intermediate amplifiers can be used. A disadvantage of the MOPA transmitter is that the oscillator must be keyed; if the oscillator is not turned off during receive, it will be heard in the receiver and will cause objectionable interference or even a radiated backwave. Turning the oscillator off during receive solves the receiver interference problem but degrades the frequency stability of the oscillator.

In this transmitter, it is desired to count the actual oscillator frequency for display during periods of receive, and therefore the oscillator must run continuously. Careful shielding will keep the oscillator signal from being heard in the receiver, but with a frequency counter connected to the VFO this is nearly impossible. One method of allowing the VFO to remain on during receive is to operate the VFO at a fraction of the operating frequency and multiply up to the desired band only when transmitting. The VFO can then run continuously and, if the VFO signal is clean, reception is unhindered. But in the practical case harmonic distortion is a problem with this scheme.

Instead of operating the VFO at a fraction of the operating frequency and multiplying during transmit, the VFO is run at a *multiple* of the transmit frequency and *divided* during transmit. See Fig. 1. The fundamental frequency and all harmonics of the VFO are above the operating frequency, and even a "dirty" oscillator will not cause interference. The VFO in this transmitter runs at twice the operating frequency, and the output is divided by a flip-flop during transmit periods.

The VFO is a Clapp oscillator which is voltage tuned with a capacitance diode. The tuning voltage is generated with a 10-turn potentiometer, providing smooth, backlash-free tuning. The potentiometer may be mounted anywhere on the front panel, allowing the VFO circuitry to be placed where it is convenient. (This freedom of placement was used by the author to solve a serious drift problem. In standby, the power dissipated inside the transmitter is about 2 watts, mainly from the frequency counter. During transmit the internal power dissipation can increase to as much as 20 watts. This large increase in power dissipation caused large temperature gradients, resulting in severe frequency instability! The solution was to mount the VFO outside of the transmitter cabinet on small-diameter machine screws. This thermally isolates the VFO from the output transistor and thereby greatly improves the frequency stability.)

The VFO drives a buffer amplifier,

*RD 1, Box 87, Boonton, NJ 07005

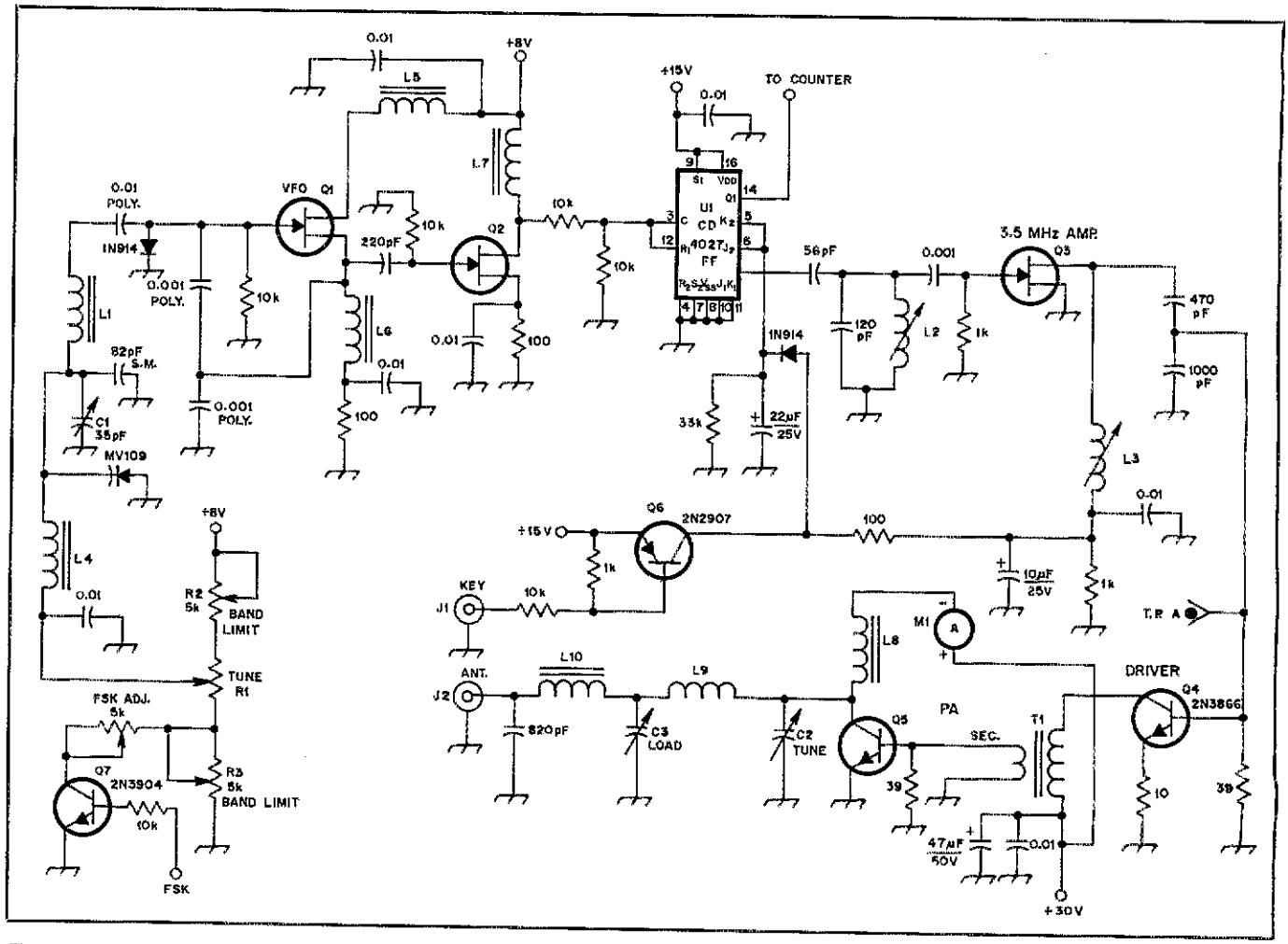


Fig. 1 — Schematic diagram of the solid-state medium-power transmitter. Unless otherwise specified, capacitances are in µF, resistances are in ohms. S.M. = silver mica; POLY = polystyrene. L2 and L3 are adjusted according to the instructions in the text.

C1 — Trimmer, approx. 3-35 pF, Arco 403 or equiv.
C2, C3 — Four Arco 469 trimmer capacitors in parallel (680-3120 pF).
J1, J2 — Builder's option.
L1 — 40 turns no. 24 on Amidon T-50-6 core (12 µH).
L2, L3 — 6.5-10.6 µH, Cambion 2060-3 or equiv.
L4 — 1-mH molded choke, Nytronics WEE-1000 or equiv.
L5, L7 — 100-µH molded choke, Nytronics WEE-100 or equiv.
L6 — 330-µH molded choke, Nytronics WEE-330 or equiv.
L8 — 25 turns no. 24 on Amidon T-50-6 core (8 µH).
L9 — 11 turns no. 20, 3/4 inch (19 mm) dia.
L10 — 18 turns no. 20 on Amidon T-68-2 core (2 µH).
M1 — Ammeter, full scale 2 to 3 A, General Electric 50-250100LJLJ or equiv. Any meter of smaller scale may be shunted.
Q1-Q3 — J308 or MPF102.
Q5 — 2N3866 or equiv. (see table).
R1 — 10-kΩ 10-turn potentiometer, Bourns 3509S or equiv.
R2, R3 — Band-limit resistors (see text).
T1 — Primary, 7 turns no. 22; secondary, 1 turn no. 18 on Amidon T-50-6 core.
U1 — Dual CMOS flip-flop, CD4027, Radio Shack 276-2427 or equiv.

which in turn drives both halves of a dual CMOS flip-flop. One half of the flip-flop divides the VFO frequency by two during transmit periods. The VFO drives the reset input of the second flip-flop, causing the flip-flop to act as a buffer amplifier. The output frequency is not divided by two in the second half of the flip-flop, but emerges at 7 MHz to drive the counter.

The divide-by-two flip-flop drives a double-tuned FET amplifier. The loaded Qs of the tuned circuits are low. The input circuit is tuned for the lower end of the band while the output circuit is tuned for the high end of the band. This provides constant input to the driver transistor over the entire band. Since the spectrum of the square-wave output from the flip-flop includes only odd harmonics, only the third harmonic need be attenuated by the double-tuned amplifier; even low-Q circuits are adequate for this.

A 2N3866 is used to provide about 1.5 watts of drive to the final amplifier. Emitter feedback is used to improve stability. The final amplifier is a single-transistor, Class C stage with a pi-network matching section. The actual values of the matching-section components are dependent primarily on the transistor type used for the output stage. Most acceptable transistors require a power-supply of between 25 and 30 volts. The higher the supply voltage, the higher the output-transistor impedance that must be matched to the antenna. Although an amplifier operating from 12 volts at this power level would be convenient for operating mobile, it would limit the number of suitable transistor types and increase the cost and complexity of the matching network.

Selection of an output transistor should be determined from availability at a good price. The table lists several types that have appeared on the surplus market recently and that are suitable for operation on 1.8, 3.5 and 7 MHz. The component values shown in Fig. 1 are for the 80-meter band and include enough latitude to accommodate any of the transistors indicated on the list. It may be necessary, of course, to use a huskier supply transformer, depending on the choice of transistor.

Very few rf power transistors are specified for high-frequency, Class C cw or RTTY service. The transistors listed in the table were originally designed for use in audio amplifiers, switching power supplies, and high-speed peripheral drivers. Matching in the transmitter is done primarily by trial and error, since none of the transistors listed are designed for rf-

Other Suitable Devices for Use in the Power Amplifier of the Medium-Power Transmitter.

Device Type	*Suggested Operating Conditions*
2N5000	30 V @ 1.2 A
2N5004	35 V @ 2 A
2N5038	28 V @ 3 A
2N5039	28 V @ 3 A
2N5671	25 V @ 5 A
2N5672	25 V @ 5 A
2N6032	25 V @ 5 A
2N6033	25 V @ 5 A
2N6338-41	25 V @ 4 A
2N6496	25 V @ 5 A
2N3996-99	20 V @ 1.5 A
MJE205	30 V @ 2 A
MJE2801	30 V @ 3 A

amplifier service and necessary data for design calculations are unavailable.

Counter

A frequency counter (Fig. 2) is used for the "electronic dial." It is not mandatory that a frequency counter be used for frequency readout, since the tuning potentiometer could be geared up to a dial mechanism. But the frequency counter is more accurate, and in the long run probably easier to construct.

The counter uses CMOS logic for low power consumption. Incandescent readouts were used here although LEDs, fluorescent, or even liquid-crystal displays may be used with the counter. The CMOS ICs must be operated with a 15-volt supply because of the frequencies involved.

The actual frequency counted by the frequency counter is twice the operating frequency. It is up to the counter logic to display the proper operating frequency. If a frequency counter is to display a frequency to the nearest kilohertz, a 1-millisecond gate time must be used. If the gate time were reduced to 1/2 ms, then the displayed number would be half the actual frequency. The 1/2-ms gate time in this counter gives 1-kHz resolution while dividing the frequency by two.

The frequency-update rate of the counter is about 10 times per second. A relatively low update rate is desirable to prevent ambiguous readings. (If the readout were updated at a rapid rate, the slowness of the human eye would not perceive the display as two distinct numbers, but the confluence of the two. For example, if a display were alternating rapidly from 6 to 7, the eye would perceive an 8!) The update rate is set by RC feedback from the output to the reset of the reference divider.

Regulated supply voltages are used throughout the transmitter. The power-supply circuit is shown at Fig. 3. Even the final amplifier uses a simple pass regulator. This provides an extremely stable and pure cw note.

Construction and Checkout

The transmitter is constructed in a 5 × 10 × 7-inch (127 × 254 × 178-mm) wraparound aluminum case. This case was chosen for its similar appearance to the Collins S-Line, with which it is used in the author's shack. Do not be tempted to build the transmitter in too small a case. The smaller the case, the greater and more rapid is the temperature rise, and the more severe the VFO frequency drift will be.

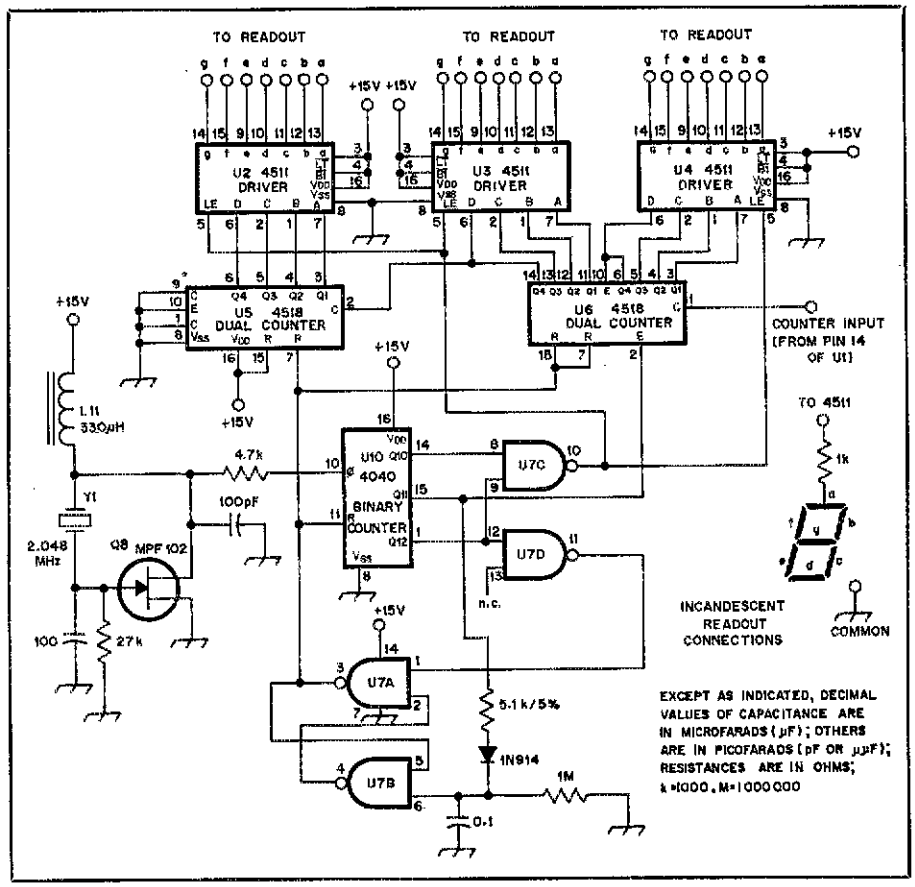


Fig. 2 — Frequency counter diagram. The input to the counter is twice the actual operating frequency (see text).
U2-U4 — Type 4511 CMOS driver, Radio Shack 276-2447 or equiv.
U5, U6 — Type 4518 CMOS counter, Radio Shack 276-2490 or equiv.
U7 — Type 4011A CMOS quad 2-input NAND, Radio Shack 276-2411 or equiv.
U10 — Type 4040 binary counter, Allied 569-3440 or equiv.

The buffer amplifier and flip-flop are mounted together in a shielded box, and they feed the intermediate power amplifier which is located on a piece of copper-clad board on the bottom of the main chassis. This copper-clad board also contains the final-amplifier components except for the output transistor, which is bolted to the back panel. It is imperative that all leads to the output transistor be made with extra heavy wire. The shield from a piece of miniature coax such as RG-174/U makes an excellent lead. For best operation all leads must be kept as short as possible.

After the transmitter is constructed, operation should be checked out stage by stage. Before applying power, attach a dummy load to the output. Although this transmitter is capable of operating into an occasional mismatch, it is not capable of operating into a severely mismatched load (such as no load) for long periods of time. Turn on the power and check for excessive current, smoke and incorrect power supply voltages. The first stage to be checked is the VFO. There should be negative voltage on the gate of Q1, indicating that the VFO is oscillating. If the frequency counter is operating, it should be displaying the last three digits of the frequency in kHz, and turning the VFO tuning control should cause the readout to change. The frequency range may now be set by adjusting R2, R3 and C1. It isn't necessary that the transmitter cover the entire band — any segment may be selected by adjusting R2 and R3. Since the actual operating frequency is displayed by the counter, the tuning limits are only approximate and may be set easily by trial and error.

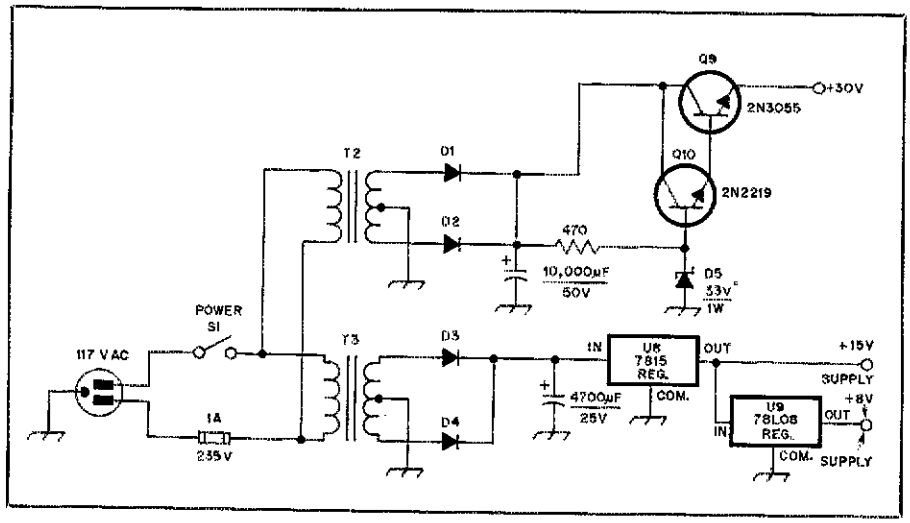
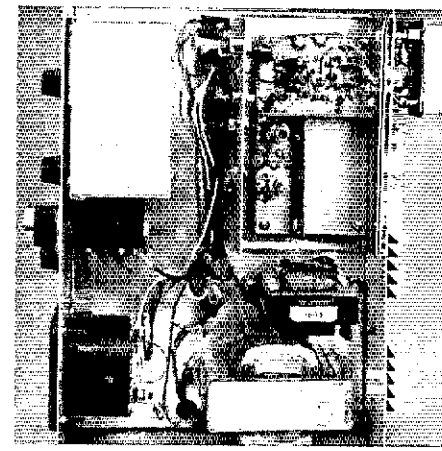


Fig. 3 — Power supply for the transmitter. Any supply capable of providing the proper voltages may be used.
D1-D4 — General-purpose silicon rectifier, 200 PRV, 3 A, General Electric 1N5624 or equiv.
D5 — 33-V, 1-W Zener diode, 1N5257A or equiv.
S1 — Spst toggle switch, minimum 117 V at 1 A.
T2 — Filament transformer, 48 V ct at 1 A, Stancor P-8605 or equiv.
T3 — Filament transformer, 36 V ct at 0.3 A, Stancor P-8612 or equiv.
U8 — Voltage regulator, type 7815, Radio Shack 276-1772 or equiv.
U9 — Voltage regulator, type 78L08, Motorola MC78L08CG or equiv.



Top view of the transmitter with the cabinet removed. The 10-turn tuning potentiometer is at left center. The final amplifier heat sink is visible at the lower right. The shielded box at upper left is the frequency counter.

Set the VFO control about 1/3 of the way up from the bottom of the selected frequency range. While monitoring the voltage at test point A with an rf voltmeter, adjust L2 for a maximum indication. Set the frequency about 1/3 of the way down from the top of the frequency range and adjust L3 for a maximum reading on the voltmeter. Tune the VFO from the top to the bottom of the selected frequency range while observing the voltmeter at test point A. The ratio of the greatest voltmeter reading to the smallest reading should not be more than 2:1.

Tuning the final amplifier requires long periods of key-down conditions. If properly adjusted, this transmitter is capable of operating key down continuously, but during tune-up the key-down periods should be kept short and the output transistor should be watched carefully for possible overheating.

With the VFO tuned for the middle of its range, hold the key down and tune the output capacitors (C2 and C3) for maximum output. This may take quite a bit of jockeying back and forth between the tune and load capacitors. If it appears that all of the capacitors are tight in either the tune or load bank, add another trimmer in parallel. If it appears that they are all loose, remove a capacitor. Be sure the adjustment is carried out with a good 50-ohm load. The transmitter will be internally adjusted to drive a 50-ohm load and will not be tuned during normal operation. Make a note of the power-amplifier current with the correct load.

Modifying the Transmitter for Use on Other Bands

The transmitter may be operated on the 160-meter band simply by increasing the values of the inductors and capacitors in the circuit. Halve all of the frequencies (except in the frequency-counter time base), and double the values of all inductors and capacitors in the tuned circuits. You may wish to use some fixed capacitors in the final amplifier rather than using eight parallel trimmers.

For operation on 40, double all of the frequencies and halve the values of the inductors and capacitors in the tuned circuits. Not all CD4027 flip-flops will operate at 14 MHz (the VFO frequency). It would be best to use a 4027B rather than the A version. The B version is guaranteed only to 12 MHz, but most chips will operate at more than 20 MHz with 15 volts applied. It may be necessary to select from several chips for reliable operation.

The first counter chip, U6, must also be selected since 14 MHz is well beyond the maximum frequency capability of the 4518. If 40-meter operation with the counter is anticipated, it is strongly advised that the input counter be selected before building the CMOS counter. If a suitable CMOS counter cannot be found, then a TTL IC will suffice. The basic scheme of the transmitter may be used on all amateur bands. Operation on 20, 15 and 10 meters is possible by using Schottky and low-power Schottky TTL logic for the flip-flop and frequency-counter circuits. Like all MOPA transmitters, however, the higher the operating frequency, the more difficult it becomes to achieve stability.

Operation

Operation of the transmitter requires only adjustment of the VFO to the proper operating frequency. Although the output of the transmitter is relatively clean,* it is desirable to operate the transmitter with an antenna tuner. When the transmitter is properly matched to the antenna, the power amplifier current will be exactly the same as that obtained when the transmitter was tuned into the 50-ohm dummy load. When adjusting the antenna tuner, work quickly and do not allow the key to remain down for long periods of time with a mismatch. If an SWR meter is available, it should be placed between the antenna tuner and the transmitter and the tuner adjusted for a minimum of reflected power.

Since the VFO is voltage tuned, it is a simple matter to shift the tuning voltage and hence the operating frequency. A front-panel control was included for the RTTY frequency-shift potentiometer, but if the range of frequencies used for fsk operation is small, this control may be set once and then forgotten. RTTY operation requires care in the thermal design of the transmitter. Operating with long key-down periods tends to shorten the life of the output transistor if the temperature rise is not kept to a minimum. It would be advisable to use a finned heat sink if RTTY operation is anticipated. It would also be advantageous to use a larger power transformer.

The author's unit has been operating for several hundred hours with no transistor failures. The transistor output delivers about 35 watts to a 50-ohm load at about 75-percent efficiency. This produces respectable signal reports for such a small box! QST

*[Editor's Note: Tests in the ARRL lab show that the author's transmitter exceeds the requirements of Part 97.73 of the FCC regulations, with the second harmonic 48 dB below the fundamental. All other spurious outputs are greater than 60 dB down. Short leads in the rf section and shielding along the lines shown in the photo will assure the builder of equally successful results.]

Build Your Own 5/8-Wave Antenna for 146 MHz

Why not make your own fm/mobile antenna? It can be done for less than $2. Here's the scoop on how to do it.

By Doug DeMaw,* W1FB

A popular 2-meter antenna for both mobile and fixed-station use is the 5/8-wave vertical. At low radiation angles it offers approximately 3 dB of gain over a 1/4-wave whip, and yet it is omnidirectional. Sure, you can go out and get a store-bought antenna, but it's a simple task to assemble an effective homemade 5/8-wavelength vertical from ordinary materials. In most parts of the USA, it should be possible to do the entire job (minus the 50-ohm coaxial cable) for under $2. Another feature worth mentioning is that no large holes need to be drilled in the car body when using the mounting technique shown in this article. Only two no. 6 sheet-metal screws are used to secure the antenna to the vehicle, and those are affixed under the trunk lid.

Construction

The whip section is made from 1/8-inch (3-mm) brazing rod. It can be obtained at most welding supply stores or shops. The standard length seems to be 36 inches (0.9 m). Ideally, a piece of rod 47 inches (1.2 m) long would be used. In this example an 11-inch (279-mm) extension of no. 10 solid copper wire has been soldered to the top end of the whip. The opposite end of the brazing rod is threaded (6-32) and screwed into the coil form for the matching network. The builder may be able to purchase a 47-inch length of stainless steel rod (1/8-inch diameter) which has been threaded at one end by a machinist. This type of material would cost more than a section of brazing rod, but it would be more durable under stress.

Fig. 1 shows a pictorial view of the antenna. L1 is wound on a 3-1/2-inch (89-mm) length of 3/4-inch (19-mm) diameter solid Plexiglas rod. One end of the form is tapped for a 6-32 thread. The opposite end has a 10-32 thread for affixing the coil form to the mounting bracket. Other insulating materials can be used as the coil form, such as phenolic rod, fiberglass or other high-dielectric solids.

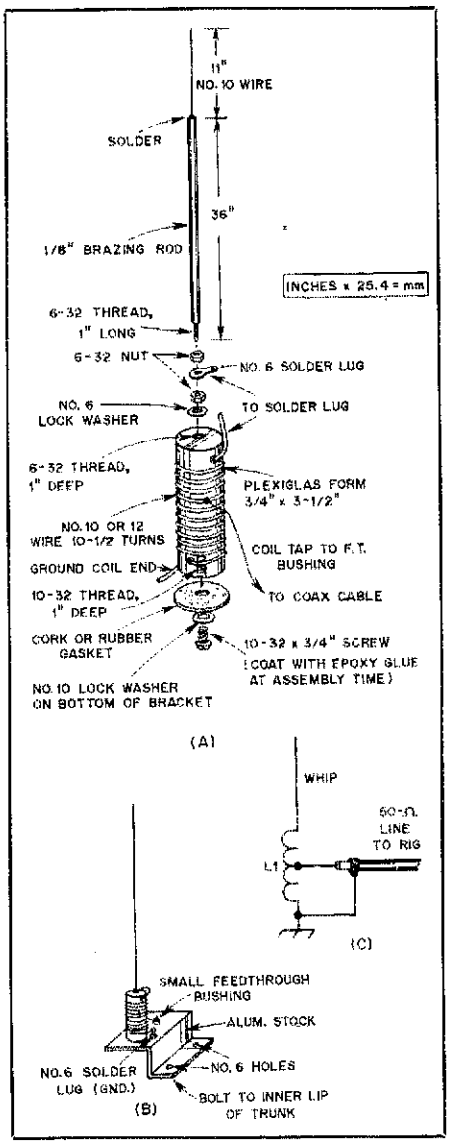


Fig. 1 — A breakaway view of the antenna is shown at A. Detail B shows the relative shape of the mounting bracket. The electrical equivalent of the antenna is given at C.

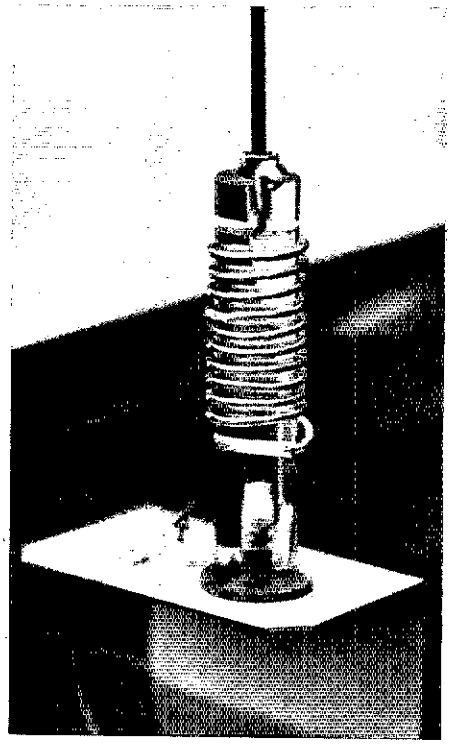
L1 contains 10-1/2 turns of no. 10 or 12 solid copper wire. The tap is located 4 turns from the top of the coil. A spacing of one wire diameter is used between the coil turns. A small hole is drilled off center through the coil form at each end of the coil. This permits threading the wire through the form to keep the coil turns in place.

The mounting bracket is fashioned from 1/8-inch (3-mm) aluminum stock. It must be bent in a manner similar to that shown in Fig. 1, but on a custom basis to fit the vehicle with which it will be used. In this case it has been installed on a 1977 Pontiac Bonneville. The bracket is attached to the inner lip of the trunk. There is sufficient space between the car body and the trunk lid to allow clearance for the vertical portion of the bracket. Vehicles with engines in the rear are suitable for front mounting of the antenna. The writer did that when equipping his XYL's 1971 Volkswagen fastback with a 2-meter antenna some years ago. In the interest of minimum ignition noise in the fm receiver, it is wise to install the antenna as far from the engine as possible.

Following adjustment of the antenna it is prudent to weatherproof the coil. A layer of gray vinyl electrical tape was used with the model shown. If large-diameter heat-shrinkable tubing is available, it will be ideal. Alternatively, a heavy coating of exterior spar varnish or glyptol will suffice.

For those desiring the 5/8-wavelength vertical for fixed-station use, refer to the details in Fig. 2. There are four radials employed. Each is 20 inches (508 mm) in

*Senior Technical Editor, ARRL



Close-up view of the coil assembly before weatherproofing. The RG-58/U cable is attached beneath the bracket with a 1/4-inch (6-mm) cable clamp.

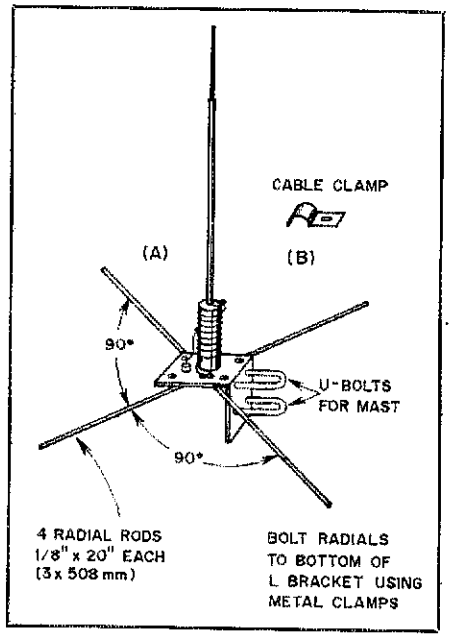


Fig. 2 — Details for adding radials and a mast bracket for fixed-station use. A brass plate could be used, in which case the radials could be soldered to the bottom of the L bracket.

length. Brazing rod is suitable for use as radial stock.

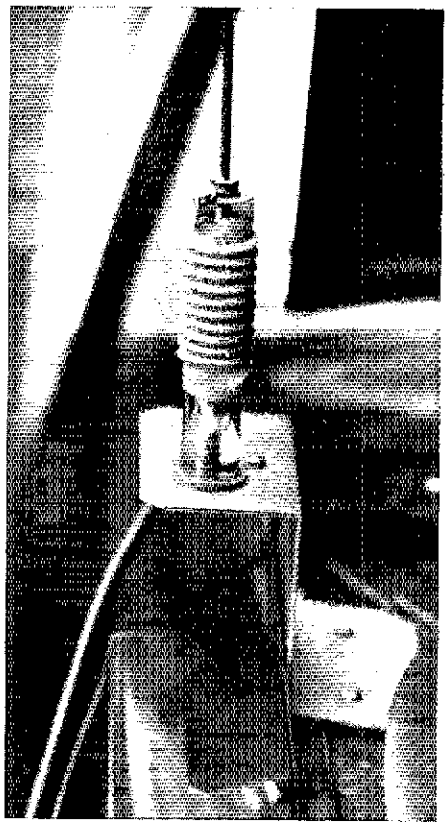
Tune-up

After the antenna is mounted where it will be used, adjustment for an SWR of 1 is made. An SWR indicator is placed in the feed line between the transmitter and the antenna. The tap on L1 is adjusted for the lowest SWR attainable, then soldered in place. The reflected-power reading will probably not drop completely to zero. This is so because some harmonic energy is present in the output of most rigs. The antenna will reject those frequencies and result in a false SWR reading. But most rigs will yield a reading of less than 1.5:1 when the tap position is optimum.

Another tune-up technique is to make the whip 50 inches (1.3 m) long, place the coil tap four turns below the top end of L1, then prune the end of the whip (1/4 inch or 6 mm at a time) until a match is obtained. Be sure to park the car well away from power and phone lines, downspouts and other conductive objects during the tune-up process. If not, such objects will detune the antenna and negate the matching adjustments.

Performance

Performance from this antenna compares favorably with that obtained from a $28 commercial version which was used three years earlier. The main limitation is that vandals can bend or break the brazing rod more readily than would be possible if stainless steel were used. But then, for a $2 antenna many of us would be willing to replace the rod section if it became damaged or stolen, eh? QST

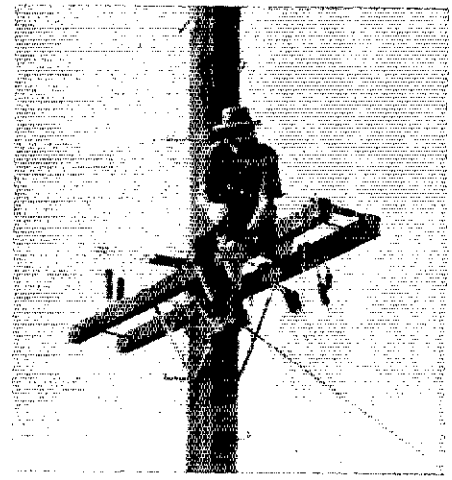


The completed antenna, showing how it mounts to the inner lip of the auto trunk. The bracket can be painted the color of the car to improve the overall appearance.

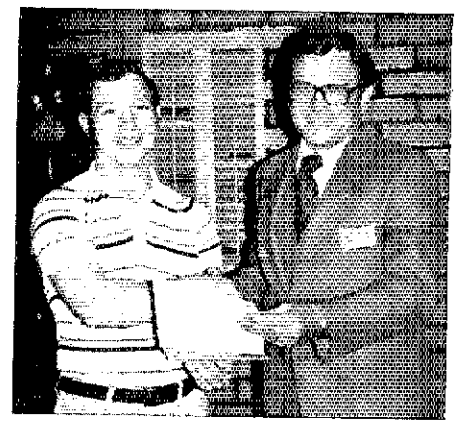
Strays

TELL US ABOUT YOUR FOREIGN PAYMENTS

☐ Are you sending money to ARRL from another country — International Money Order or bank draft? If so, please write us promptly, stating the amount sent and what the payment is for. This will help us serve you most effectively. Many times we receive such remittances and can take no action because we have not heard from the individual who sent it. — *Marion E. Bayrer, Circulation Department*



If you've never heard the signal from W6AM's Palos Verdes antenna farm, it's probably because you don't frequent the bands when this ham is going after some rare DX. Pat, W6RYX, got this shot of Don Wallace who, even at the age of 80, insists on repairing a favorite rhombic. *(W6RYX photo)*



Bud Chiller, WD8BIL (left), receives the ARRL Certificate of Merit for his service as control station for the Lake Erie ARA during the transfer of patients from Cleveland's Highland View Hospital to new facilities at Metropolitan General Hospital. Making the presentation is Al Severson, AB8P, emergency coordinator for Cuyahoga County, OH. Congratulations Bud! *(WD8PYV photo)*

An LED Readout for the HW-2036

A boon for the nighttime driver! Now, just a quick glance in the dark tells the HW-2036 operator to which frequency the rig is tuned. The circuit is simple.

By Helge Blucher,* LA8OH/W8

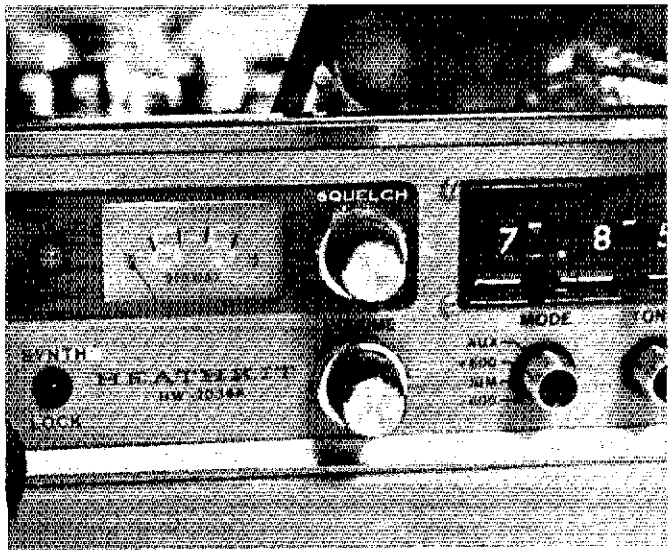
The use of the thumbwheels on the Heathkit HW-2036 (and '2036A) to select the frequency is fine when you are in a well-lit shack or in the car during daylight hours. But on a busy freeway while traveling at 55 mi/h (88 km/h) at night it becomes a dangerous task to change frequency. Unless you tune in a particular repeater to determine if you have selected the right numbers, the only way to make sure you've dialed the right digits is to turn on the light and look.

Confronted with this situation, I began searching for a display that could be installed in my HW-2036A. I ruled out drilling more holes because of the double front panel Heath uses on this rig. I thought about removing the S meter to make room for the display when I noticed that the back of the meter is made of translucent material. I quickly hooked up a seven-segment LED display that could be easily read from the front even in normal room light. The circuit diagram appears in Fig. 1. How to mount the display behind the meter became the next problem. Room must be found for a small circuit board. To resolve the matter, I selected two Litronix Data-Lite 707 0.3-inch (7.6-mm) displays, thin enough to fit in the rather narrow space behind the meter. I fastened the two displays together with epoxy cement, then soldered the wires directly to the display leads. The leads were carefully bent to the side on the left digit (pins 1-7 only) as shown in the picture. The other leads were trimmed as short as possible, but left straight. You will see why when you mount the display. The VCO box leaves very little room for connections to the left digit.

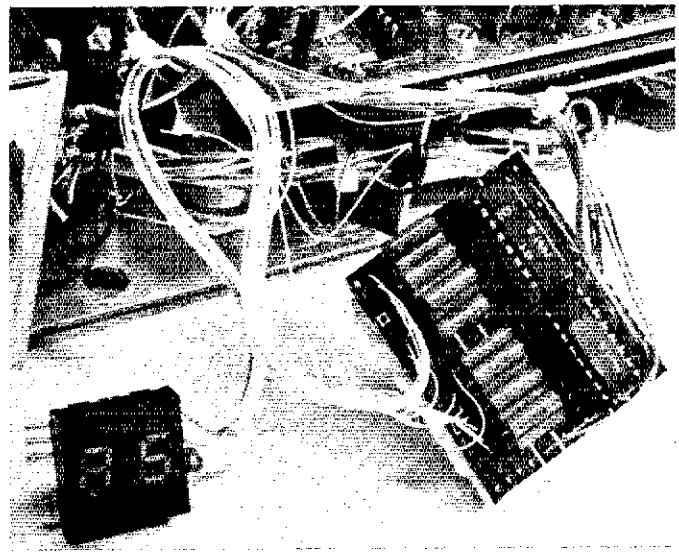
The printed circuit board is a small piece of Vector Universal DIP board. I provided sockets for the two 7447 decoder ICs. Make the wire harness between the board and the display long enough to allow hookup and testing before final installation. I did my wiring for this project with no. 28 wire. Any small-gauge wire, preferably stranded, is satisfactory. Ribbon-type cable, such as used in computers, is perfect for this application.

*6290 Snowapple Dr., Clarkston, MI 48016

A digital display placed behind the S meter of this Heath HW-2036A is useful to the mobile operator. With only a quick glance at night, one can determine the frequency that has been selected.



Neatly bundled wiring links the digital display shown in this photograph with the readout circuit board connected to the HW-2036A. The display will be mounted behind the S meter. Space behind the thumbwheel switches is used for mounting the circuit board.



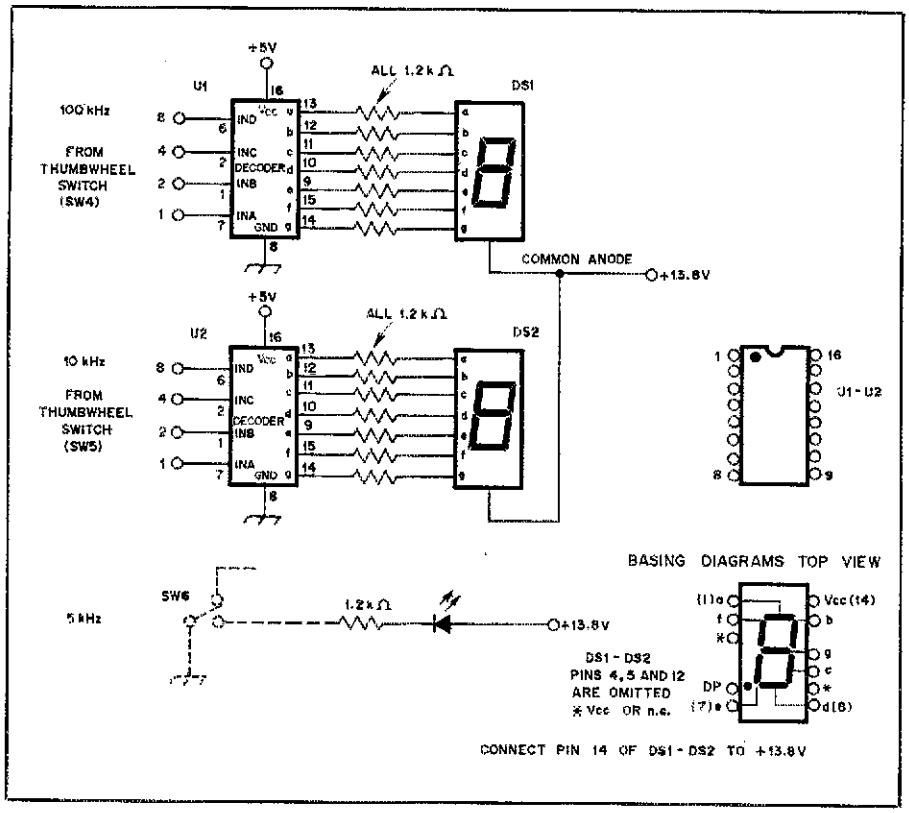


Fig. 1 — An LED readout circuit for the Heath HW-2036. U1 and U2 are type 7447 decoder/drivers. DS1 and DS2 are Litronix type 707 or 707R common-anode displays. All resistors are 1/4-watt. R3, connected to meter lamp PL1 in the HW-2036, should be changed to 100 ohms for better viewing of the display. The 1.2-kΩ resistors between the decoders and the drivers limit the current to 10 mA per display segment at 13.8 V.

You will notice the LED to the right of the second digit on my display. I planned to use the decimal point on my 707R to indicate +5 kHz, but accidentally shorted out the limiting resistor during testing which did a fine job of disabling the decimal point. Since my displays already were epoxied together, I just glued a red LED next to the second digit. To my pleasant surprise, this LED appeared right behind the "5" on the dial, indicating a +5-kHz operation.

There are several places in the rig from which +5 and +13.8 V can be picked up. I chose to make a connection to the +5-V line on the synthesizer board and to R141 on the transmitter board to obtain +13.8 V.

Connections for the BCD input of the 7447s can be made directly to the thumbwheel switches. After testing the circuit to make sure that all digits are displayed correctly, position the display behind the meter and check that none of the display pins are shorting to the VCO case. It may be a good idea to glue some insulating material to the VCO case or cover the display pins with insulating tape. If you are certain that all connections are correct, you may want to glue the display directly to the back of the meter. I chose to make my installation less permanent and found that a small piece of foam rubber will hold the display in place with good contact against the meter.

I employed the same method to mount the circuit board in the open space under the synthesizer board just behind the thumbwheel switches. Others may find simpler and better ways of mounting the display and circuit board.

Perhaps I'll try to mount a three-digit display later, but I find that my two digits suffice. For those who have an HW-8 QRP transceiver, it may be worth noting that it, too, uses the same meter. Maybe a digital frequency readout would look nice in that rig. Good luck, and safe driving! QST

Feedback

☐ Erroneous information accompanies the circuit board etching patterns for "Boots for the HW-8" (April 1979 *QST*, page 47). The lower pattern, for the filter board, is single sided (copper on one side only).

☐ Several errors occurred in "CW-The Universal Language" (May 1979 *QST*, page 26). The Voyager spacecrafts are not equipped with slow-scan TV cameras. The images from the ships are received as digital signals on Earth. They will be transmitted as slow-scan TV pictures by the Jet Propulsion Laboratory ARC.

Besides the frequencies listed in the article, the club also will transmit on SSTV on 3845, 7220, 14,235, 21,340 and 28,680. Heavier operations will occur on weekends and from 4 P.M. to 7 P.M. Pacific *Daylight* Time during the week.

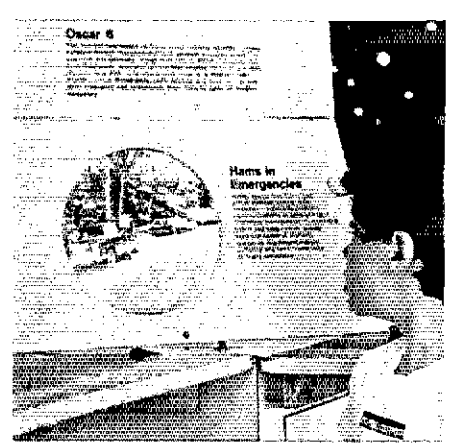
The club will issue a special QSL card of the Voyager expedition. The club address is 4800 Oak Grove Dr., Pasadena, CA 91103.

The JPL ARC also has compiled a souvenir SSTV tape cassette featuring highlights of Jupiter and its moons as seen by Voyager I. To receive the tape, send $5 to Dick Piety, K6SVP, MS 158-205, 4800 Oak Grove Dr., Pasadena, CA 91103.

☐ James R. Tweedy, W7WPN, was incorrectly included in the May "Silent Keys" list.

☐ David R. Brush, W7DX, was incorrectly included in the April "Silent Keys" list.

Strays



Jay, the 7-year-old son of Gary Jacobs, WA4PDM, examines the OSCAR exhibit in the main entrance way of Florida's Kennedy Space Center. *(WA4PDM photo)*

An Accurate, Low-Cost Antenna Elevation System

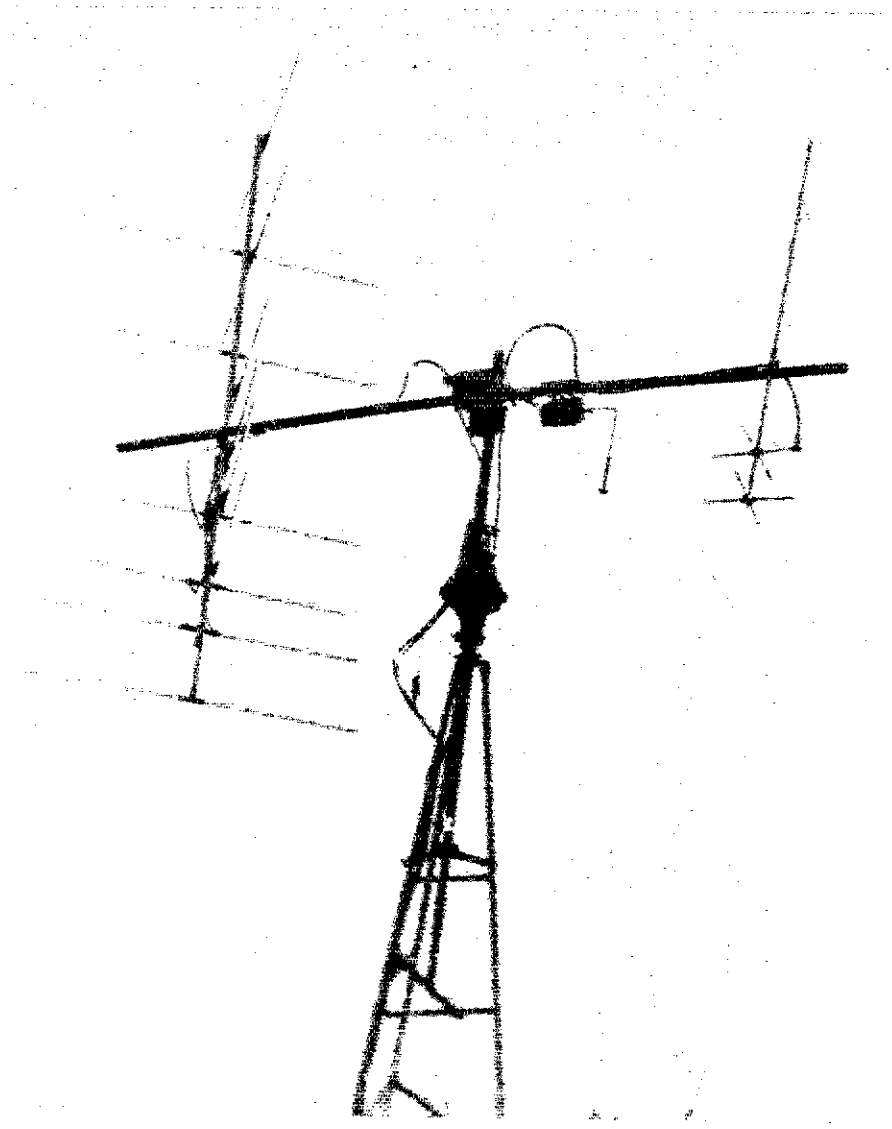
Interested in OSCAR or EME operation? Here's a cost-effective elevation device. A TV-antenna rotator and two synchro transformers do the trick!

By Jim Bartlett,* K1TX

Moonbounce and OSCAR work have one major thing in common: They both require antenna arrays that can be steered — in azimuth *and* elevation. Accurate amateur elevation systems have always been difficult or expensive to implement. Commercially available elevation rotators have been consistently high in price, and many have had less than desirable accuracy.

Many amateurs have adapted TV rotators such as the Alliance U-100 for use as elevation devices. For small OSCAR antennas with wide beamwidths, the U-100 rotator has performed satisfactorily. Unfortunately, however, the elevation of antennas with the stock U-100 rotator is limited to increments of 10 degrees. This limitation, combined with the tendency of the control box to lose synchronization with the motor, causes the actual antenna elevation to differ from that desired by as much as 30 or 40 degrees at times. With high-gain, narrow-beamwidth arrays, such as those needed for EME work and for future high-altitude satellites (Phase III), this large a discrepancy is undesirable and unsuitable. (Note: For EME arrays, the U-100 rotator should not be used. Other rotators designed specifically for use in the horizontal position should be used instead. The elevation readout system described here will still provide superior accuracy when used with most rotators.)

This system uses a pair of *synchro transformers* to provide an accurate, continuous readout of the elevation angle of the antenna array. A U-100 rotator control unit is modified so that the motor can



The synchro generator and U-100 rotator elevation system for the OSCAR antennas at K1TX.

*Basic Radio Editor, *QST*

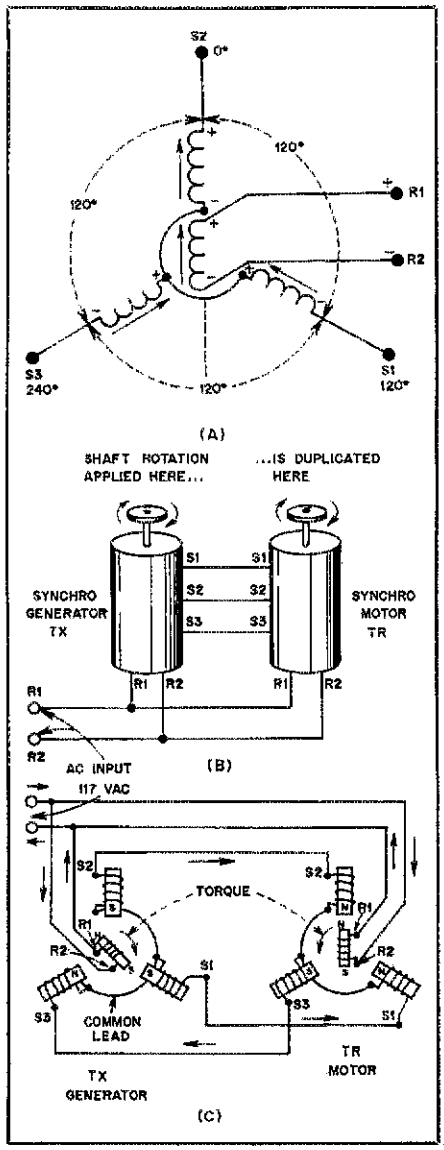


Fig. 1 — At A, a schematic diagram of the synchro transformer. Connection of two synchros in a repeater loop is shown at B. The drawing at C shows the instantaneous forces in the repeater loop with the rotor shafts at different positions. The "TX" and "TR" notations stand for *torque transmitter* and *torque receiver* respectively. Sometimes, synchros are listed in catalogs by these "type" symbols.

be operated to provide a continuously variable angle of antenna elevation. This system is certainly nothing new. In fact, many amateurs have used synchros to provide accurate azimuth readout for rotatable towers, where conventional rotators with built-in readout facilities could not be used. The adaptation of synchros for elevation readout use was originally suggested to me by Joe Muscanere, WA5HNK. Two surplus synchros were obtained, and the work began. Total cost for the system, including the U-100, was under $70. If all new parts were purchased, the cost would probably still have been less than $100.

Synchro Transformer Operation

Before we cover the construction details, let's review synchro theory and operation. This information may help you to purchase the right type of synchros for this use, and will give you a better understanding of how they work. Synchro transformers, also known to many hams as Selsyns, or Selsyn motors, have been used extensively by the military in indicator systems. There are many types of synchros, but for our purposes, only the most basic ones need be discussed.

The synchro is actually a specialized form of transformer. See Fig. 1A. It might be best described as a transformer having three secondary windings and a single *rotating* primary winding. Synchros are sometimes called "one-by-threes" for this reason. When two synchros are connected together as in Fig. 1B and power is applied, the shaft attached to the rotating primary in one synchro will track the position of the shaft and winding in the other. When two synchros are used together in such an arrangement, the system is called a *synchro repeater loop.*

Usually in repeater loops, one synchro transformer is designated as the one where motion is initiated, while the other simply *repeats* this motion. When we have two synchro transformers in such a repeater loop, the individual units can be thought of as "transmitter" and "receiver," or *synchro generator* and *synchro motor* respectively. In our application, where one unit is located at the antenna array and another is used as an indicator in the radio room, we will call the antenna unit the generator and the indicator unit the motor.

The synchro generator is so named because it "generates" and transmits, by electrical energy, a rotational force to the synchro motor. The motor, also sometimes called the *receiver, follower* or *repeater,* receives this energy from the generator, and turns its shaft accordingly.

Physical Characteristics

Synchro transformers, both generator and motor types, resemble small electric motors, with only minor differences. Generator and motor synchros are identical in design for all practical purposes. The only difference between them is the presence of an *inertia damper* — a special flywheel — on units specifically designated as synchro motors. For our use, the inertia damper is not a necessity, so we will discuss generator and motor synchros as though they differ only in application.

Fig. 1A shows the synchro transformer schematically. In each synchro, there are two elements: the fixed secondary windings, called the *stator*, and the rotatable primary, called the *rotor.* The rotor winding is connected to a source of alternating current, and the shaft is coupled to a controlling shaft or load — in our case, the antenna array or elevation readout pointer. An alternating field is set up by the rotor winding as a result of the ac applied to it. This causes voltages to be induced into the stator windings. These voltages are representative of the angular position of the rotor winding at any specific moment.

The stator consists of many coils of wire placed in slots around the inside of a laminated field structure, much like that in an electric motor. The stator coils are divided into three groups spaced 120 degrees apart around the inside of the field with some overlap between them to provide a uniform magnitude of attractive force on the rotor regardless of its position. The leads from the rotor and stator windings are attached to insulated terminal strips, usually located at the rear of the motor or generator housing. The rotor connections are labeled R1 and R2; and the stator connections, S1, S2 and S3. These are shown in Fig. 1A. These rotor and stator designations are standard identifications, and should appear on the terminal strips on any synchro motors or generators you might happen to find.

Synchro Transformer Action

We said before that synchros operate much like transformers. The main difference between them is that in a synchro, the primary winding (rotor) can be rotated through 360 degrees. The ac that should be applied to the synchro rotor coil varies, but the most common ratings are 115 V/60 Hz, 115 V/400 Hz, and 26 V/400 Hz. The 400-Hz varieties are easier to find on the surplus market but more difficult to use, since a 400-Hz supply must be built. I used 60-Hz synchros for this project, and the 90 volts they required was obtained by using two surplus transformers back to back (one 6.3 volt and one 5 volt). Regardless of the voltage or line frequency used, synchros should be fused, and *isolated from the ac mains by a transformer.* This is important to ensure a safe installation.

The voltages induced into the stator windings are determined by the position of the rotor, and by the turns ratio between the rotor and stator. Although the turns ratio varies widely for different types, the most common is 2.2 to 1. For our discussion, we will assume the synchros in our examples have this ratio. Referring to Fig. 1A, note that the maximum number of magnetic lines of flux cut S2 with the rotor in this position (the electrical "zero" position). Using the turns ratio, we can determine the voltage induced into S2 as

$$\frac{\text{rotor voltage}}{\text{turns ratio}} \text{ or } \frac{V_r}{2.2}$$

If we had a 115-volt synchro, the voltage induced into S2 would be approximately 52 volts, assuming negligible losses. Therefore, we can say that a maximum of 52 volts can be induced into any of the three stator coils. This maximum induction occurs when the angular displace-

ment between the primary and secondary coil is zero.

We can also calculate the voltage induced into the other coils, and in fact, into any of the coils at any time regardless of the specific angle of displacement, as long as we know what it is. In Fig. 1A, the S1 and S3 stator coils are each displaced from the rotor winding by 60 degrees. By multiplying the maximum induced voltage (52) by the cosine of the angle of displacement, we can determine the induced voltage. Thus, for S1 and S3, the induced voltage with the rotor in the position shown would be $V_S = \cos(\delta) \times V_{MI} = \cos(60) \times 52 = 0.5 \times 52 = 26$ volts, where V_S is the stator voltage, δ is the displacement angle and V_{MI} is the maximum induced voltage.

If the rotor is turned perpendicular to the axis of S2, we can calculate the induced voltages the same way. In this position, the rotor would be displaced 90 degrees from S2, and 30 degrees from both S1 and S3. Using the formula $\cos(\delta) \times V_{MI} = V_S$ we would find the induced voltages to be 0 at S2, 45 at S1 and 45 at S3. The same procedure can be used to determine the induced voltages for any given angular displacement between stator coil and rotor.

As the rotor changes position and different values are induced, the direction of the resultant fields changes. We could also say that the magnetic field rotates in synchronization with the rotor.

When a second synchro transformer is connected to the first, forming a generator/motor pair or repeater loop, the voltages induced in the three generator stator coils are also induced into the respective motor stator coils. As long as the two rotor shafts are in the same position, the voltages induced in the stator windings of the generator and motor units are equal. However, these voltages are of opposite polarity due to the connection scheme used between the two units. Since this results in a zero potential difference between the stators in the two synchro units, no current flows in either set of stator coils. With the absence of current flow, there is no magnetic field set up by the stator windings and the system is static. This means that there is no force applied to either rotor. This situation exists whenever the two rotors are aligned in identical angular positions regardless of the specific angle of displacement from the zero point (S2).

The repeater action of the two-synchro system occurs when one rotor is moved, causing the voltages in the system to become unbalanced. When this happens, current flows through the stator coils setting up magnetic fields that tend to pull the rotors together so that the static condition again exists. A torque is set up in both units, causing the two rotors to turn in opposite directions until they tend to align themselves. However, the generator shaft is usually attached to a control shaft or large load (relative to that attached to the motor shaft) so that it cannot freely rotate. Thus, as long as the motor rotor is fairly free to move, it will be brought into alignment with the generator rotor. Fig. 1C shows the instantaneous forces present in a repeater loop with unaligned rotors.

Selecting the Synchros

As I mentioned earlier, 60-Hz synchros are the easiest to work with because the power requirements can easily be met. I used two old filament transformers back to back to get the 90 volts needed for the General Electric synchros I purchased. See Fig. 2A. The best bet, if you want to keep it simple, is to purchase 115-volt/60-Hz synchros, and use an isolation transformer or a pair of surplus transformers with similar secondary voltages. The operating voltage on synchros is not critical. Most units will function with voltages as much as 20 percent above or 30 percent below their nominal ratings. Make sure the transformer(s) you use will handle the necessary current.

Synchro transformers you are likely to find in surplus catalogs and at flea markets may not necessarily be suitable for this application. Some of the types you should *not* buy are ones marked *differential generator, differential synchro,* or *resolver synchro.* These synchros are designed for different uses.

Sources for synchro transformers are available.[1,2] Write for catalogs and look for the least expensive set of synchros that will operate at the voltage and line frequency you desire. Some catalog numbers for synchros that should work are TM20K228, TM17K743, TM20K531, TM20K523 and TM20K524. When comparing specifications, look for synchros that have a high *torque gradient* or accuracy. It is possible to obtain accuracy as good as ±1 degree with a properly installed synchro readout system.

Once you have obtained the synchros and designed a power supply, you are ready to begin construction of the elevation system. First, check the synchros out; hook up the two units as shown in Fig. 1B and verify proper operation. Then set the synchros aside and begin modification of the U-100 control unit if you have decided to use this rotator.

The U-100 Control Unit

When you open the control box that comes with the U-100 rotator, you will find a fancy electromechanical switch, a transformer, a solenoid, a pilot light, and an ac electrolytic capacitor. Remove the transformer, capacitor and pilot light (if you want to use one) from the unit and discard the rest. Mount the transformer and capacitor in a small, shallow enclosure, like the one shown in the

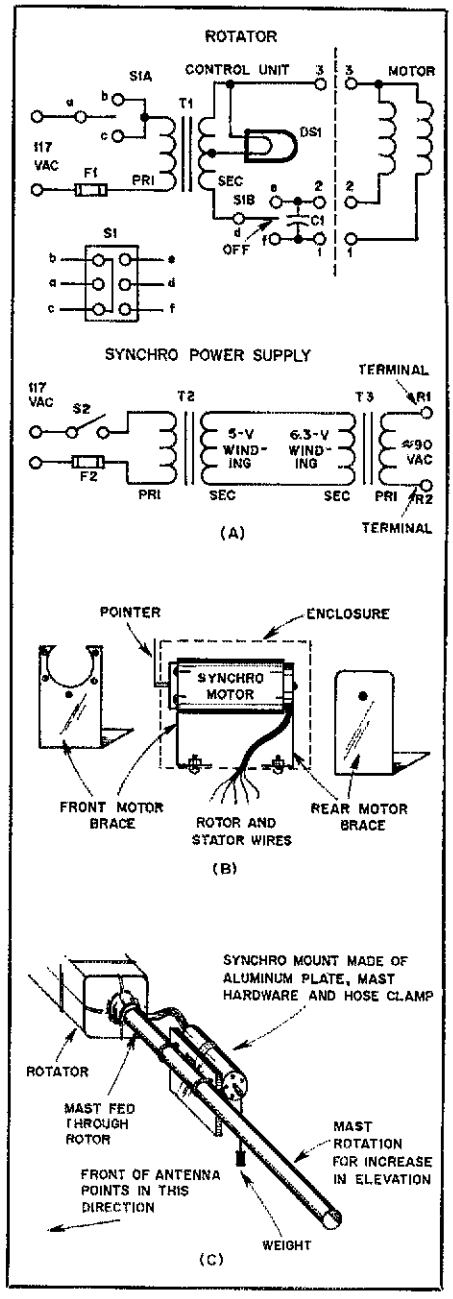
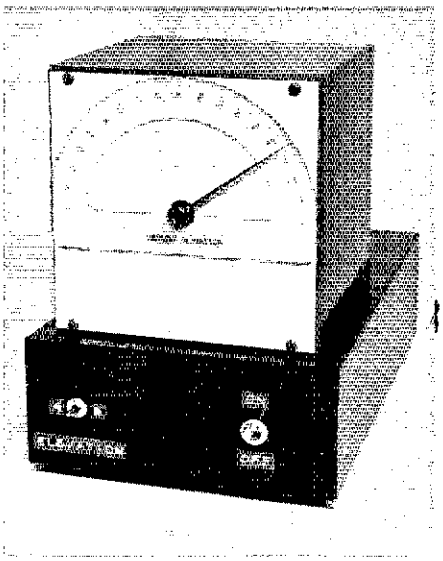


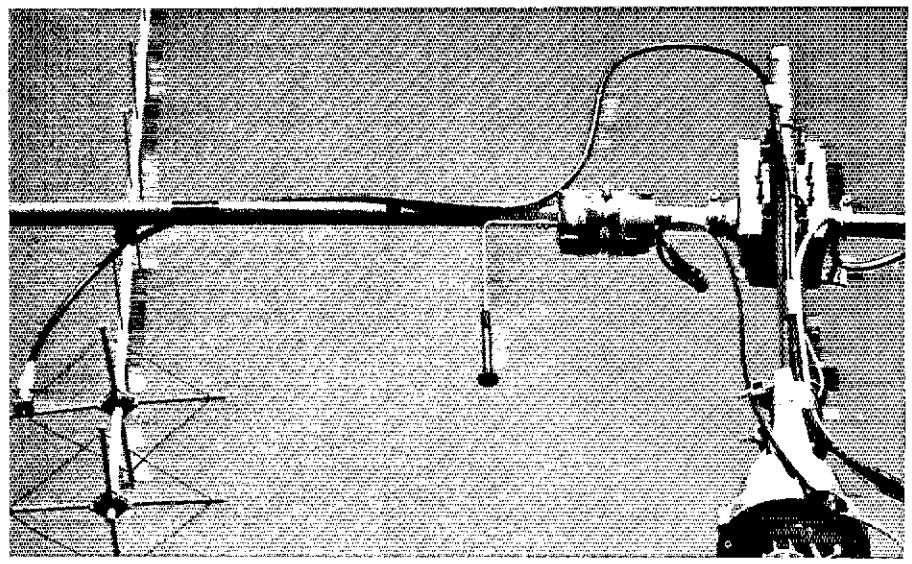
Fig. 2 — Shown at A are the circuits for the modified control unit and the synchro power supply. T1, DS1 and C1 are from the stock U-100 control box. See text. At B, the mounting method used to secure the synchro motor is shown. Details of the synchro generator mounting are shown at C. See text for description of materials.
F1, F2 — 1-A, 250-V fuse.
S1 — Dpdt momentary-contact, center-off toggle switch.
S2 — Spst toggle switch.
T2, T3 — Transformers selected for proper voltage to synchro rotor.

[1]Herback & Rademan, Inc. (See catalog, volume 44, no. 6.) 401 East Erie Ave., Philadelphia, PA 19134, 215-426-1700. Also see American Design Components, *First Source for Electro-mechanical Equipment and Components,* 39 Lispenard St., New York, NY 10013, 212-966-5650.

[2]A Sperry synchro generator, part number R5663642, and a Canadian Radio Compass indicator, part number MN-98, also make an excellent indicator system for antenna elevation. They may be used with 6.3 V ac and are currently available from Fair Radio Sales Co., Inc., 1016 E. Eureka St., Lima, OH 45802, phone 419-223-2196. An article explaining how to modify these units for use together in an elevation readout system is planned for a subsequent issue of *QST.*



The completed control/readout unit for antenna elevation. The dial face was made from a plastic protractor.



Close-up shot of the synchro transformer mounting method. The weighted arm is kept short to minimize wind effects on elevation readout.

photo. The synchro power supply will also go inside this box, so plan ahead for the addition of the necessary parts.

Wire the rotator control circuit as shown in Fig. 2A. The transformer, pilot light and capacitor shown in that drawing are the ones removed from the U-100 control unit. Be sure to add a fuse at the point shown. If you wish, you can tie the input to this circuit and that of the power supply circuit together and use a common fuse. The rating of the fuse will depend upon the current drain of the synchros used, but a 1-A fuse should be ample to handle the whole thing (no pun intended). As you can see, the fourth wire in the U-100 system is not used. In the stock rotator system, this wire is used to energize the solenoid and advance the switch mechanism in the control box.

Test the completed control unit before putting the U-100 motor up on the mast. Connect the motor to the modified control unit and check to see that it rotates properly in both directions with S1 is activated. This switch should be a dpdt, momentary-on, center-off toggle switch. When you are satisfied that the rotator is operating properly, install the synchro power supply inside the rotator-control enclosure. Some type of multiconnector plug/jack combination should be used at the rear of the cabinet so that the rotator and synchro control wires can be easily disconnected from the control box. Since a total of eight wires is used between the control unit and the synchro and rotor mounted at the antennas, I used an 8-pin, octal-type connector set and standard 8-wire rotator cable. A suitable alternative connector set is Calectro F3-248 (male cord) and F3-268 (female chassis).

Mechanical Details

The synchro motor used to provide the elevation readout was mounted inside an old cube-shaped chassis that had been gutted of old parts. Two aluminum brackets support the motor inside the box, as shown in Fig. 2B. The motor was positioned to allow the shaft to protrude through the front panel of the enclosure. As with most synchros, my G.E. units both had threaded shafts. This made attachment of the pointer needle a simple task. The pointer was fashioned from a scrap sliver of copper sheet, and soldered to the edge of a washer. This was then secured to the shaft between two nuts. The dial face was quite simple: A large protractor happened to fit the front of the enclosure exactly. I formed a groove in it so that the center of the motor shaft would line up with 0 and 180 degrees on the protractor. Then the plastic "scale" was fastened to the front panel with three small drops of "super glue."

When the motor assembly was completed, I fastened it to the top of the control chassis, and fished the synchro wires (R1, R2, S1, S2 and S3) down into the control box. All connections except those going to the synchro generator and U-100 rotor were made on terminal strips inside the bottom enclosure.

Mounting and Calibration

The synchro generator mounting was next. An aluminum plate was drilled and fitted with standard mast hardware, as shown in Fig. 2C. Two slots were made between the clamps, and a large stainless-steel hose clamp was fed through the slots and tightened around the generator casing. The generator is mounted close to the U-100, and so that it is directly behind the elevation mast when the antennas are pointed at the horizon. The U-100 and azimuth rotator are mounted in the normal fashion, as shown in the photos. Elevation of the antennas causes generator-shaft rotation through the use of a weighted rod fastened to the synchro shaft, as shown in Fig. 2C and the photos.

As the antenna array is elevated, the synchro generator is rotated through an arc from behind the mast through a position directly below it to one in front of it. During the swing through this arc, gravity keeps the weighted rod perpendicular and the synchro shaft turns in proportion to the elevation angle. (If high winds are common in your area, you may wish to keep the "plumb-line" swing arm short so that gusts won't cause fluctuations in the elevation readout.)

The easiest way to calibrate the system is to attach the antennas and synchro to the mast when the U-100 is at the end of rotation (at a stop). Do this so that any movement must be in the direction that will elevate the array with respect to the horizon. Finally, with the antennas pointing at the horizon, set the synchro motor pointer to zero degrees at one end of the protractor scale. The proper "zero" end depends upon the specific mounting scheme used at the antenna. However, if the generator is mounted as shown in Fig. 2D, and all connections are properly made, the elevation needle should swing from right to left as the antennas move from zero through 90 to 180 degrees.

The finished system works very well, and has received a number of positive comments from visiting hams. The synchros provide a simple, yet very accurate readout. They could also be used in conjunction with surplus gearboxes to remotely tune antenna matching networks. In fact, they should work well in any application where an accurate transmission of angular displacement information from a remote source is needed. The uses for these surplus jewels are limited only by your imagination. QST

Installation Techniques for Medium and Large Yagis

These tips on mounting your new tribander atop that stately tower may save you some agony and possible mishaps!

By Steve Phillabaum,* K7NR

As you check off the final steps of the assembly instructions for your new multielement Yagi, you may realize that even though the antenna might be rated at a minimum of 9-dB gain on all bands, it won't perform too well supported by sawhorses in the backyard. After the problems of interpreting unclear instructions and finding substitutes for missing parts have been solved, there still remains the matter of getting the antenna well above ground level atop a tower. Once the tower has been erected, getting the Yagi to the top of the structure and secured is something else.

Chances are that the antenna assembly instructions are of little help where raising and mounting the beam is concerned. For instance the directions for assembling the six-element, 58-foot long, 20-meter Yagi I put up last summer did not even mention installation. Some amateurs, lucky enough to have advice from others experienced in antenna installation, may not even think of the process of installation as a problem. But others, who lack appropriate instruction or advice, may be discouraged from trying beams because of the difficulties that can be encountered during installation. However, with a few simple techniques and lots of rope, installation problems can be minimized to the extent that even large beams can go up fairly easily.

*505 Vista, Olympia, WA 98501

Preparation

All antenna installations are different in some respects. Therefore, thorough planning is the most important first step in installing any antenna. At the beginning, before anyone climbs the tower, the whole process should be thought through. The procedure should be discussed to be sure each crew member understands what is to be done. Plan how to work out all bugs. Consider what tools and parts must be assembled and what items must be taken up the tower. Extra trips up and down the tower can be avoided by using forethought.

Getting ready to raise the beam requires planning. Done properly, the actual work of getting the antenna into position can be done quite easily with only one person at the top of the tower. The trick is to let the ground crew do all the work and leave the man on the tower free to guide the antenna into position. Because the ground crew does all the lifting, a large pulley, preferably on a gin pole placed at the top of the tower, is essential.

Often local radio clubs have gin poles available for use by their members. Stores that sell tower sections to amateurs and commercial customers frequently will rent them.

A gin pole should be placed along the side of the tower so the pulley is no more than two feet above the top of the tower or the point at which the beam is to be placed. Normally this height is sufficient to allow the antenna to be positioned easily. An important reason that the pulley is placed at this level, however, is that there can be considerable strain on the pole when the antenna is maneuvered past the guy wires.

The working rope (halyard) through the pulley must be a little longer than twice the tower height so the ground crew can raise the antenna from ground level. The rope should be 1/2 inch, or better yet, 5/8 inch, in diameter for the sake of strength and ease of handling. Smaller diameter rope is less easily manipulated. It has a tendency to jump out of the pulley track and foul up the operation. Needless to say, Murphy's Law is applicable to raising antennas, too!

The first person to climb the tower should carry an end of the halyard up with him (or her!) so that the gin pole can be lifted and secured to the tower. Anyone who climbs the tower *must* have a safety belt. Aside from the safety reason, there is no way to work efficiently while hanging onto the tower with one hand.

Once positioned, the gin pole and pulley will allow parts and tools to be sent quickly to the tower man. A useful trick

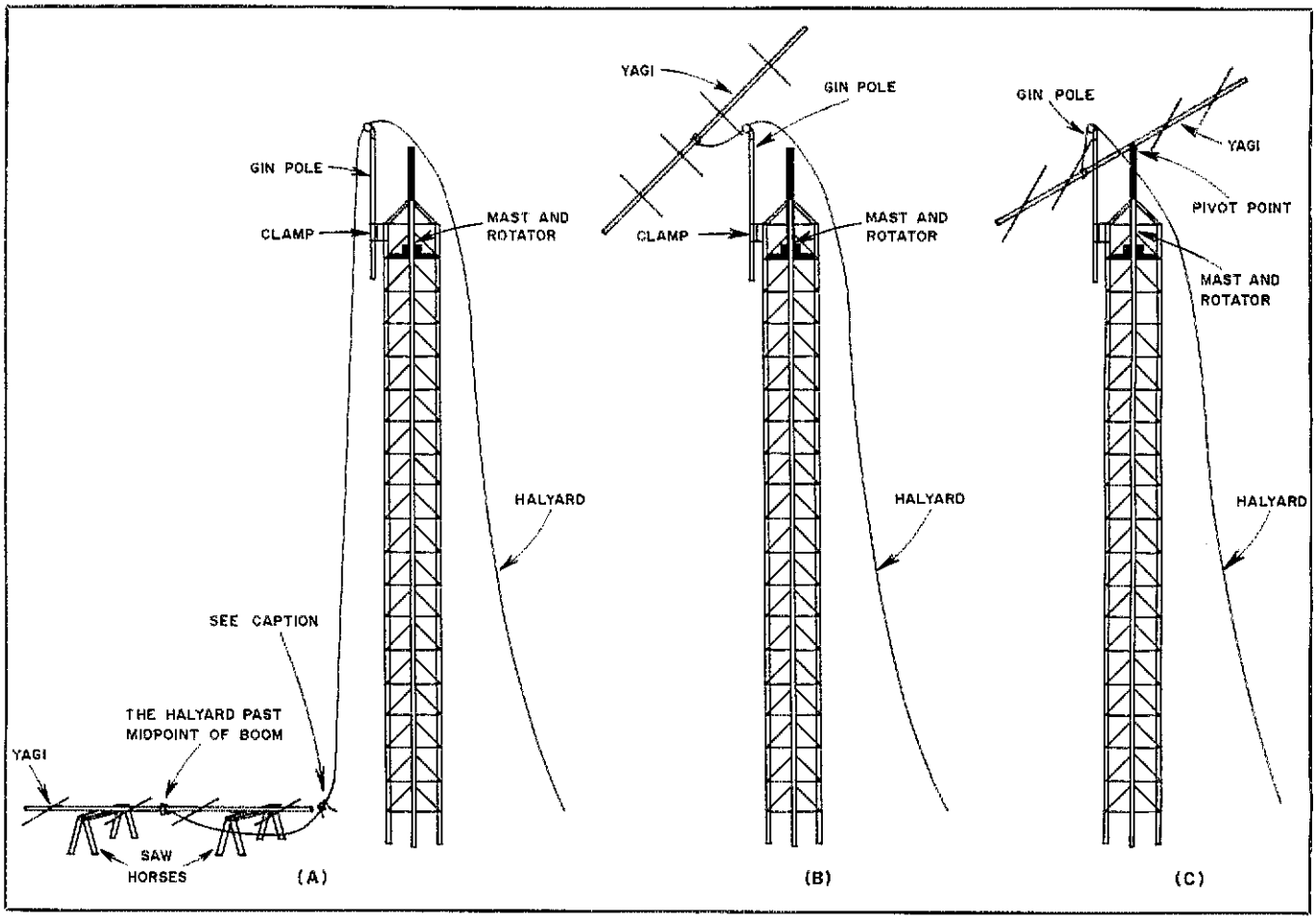


Fig. 1 — Raising a Yagi antenna to the top of a tower. In drawing A the Yagi is placed in a clear area and pointing toward the tower. The halyard is passed under the elements, then secured to the boom beyond the midpoint. B shows the antenna approaching the top of the mast. The tower man guides it after the lifting rope has been untied from the front of the antenna. In drawing C the antenna is pulled into a horizontal position by the ground crew. The tower man inserts the pivot bolt and secures it.

Note: A short piece of rope is tied around the halyard and the boom at the front of the antenna. It is removed by the tower man when the antenna reaches the tower top.

for sending up small items like bolts and pliers is for a ground crew member to stick them through the rope strands where they will be sufficiently gripped by the rope for the trip to the top of the tower. Large items or those which might be dislodged by contact with the tower should either be taped or tied to the halyard.

Take heed of this caution: *Remember, once someone is on the tower, no one should be allowed to stand near the base of the tower!* Anyone who has seen a falling soldering gun explode on impact will testify as to the foolishness of standing near a tower when someone is working above.

Raising the Antenna

A little technique can save much effort when the work of raising the antenna gets underway. First, the halyard is passed through the gin-pole pulley and the leading end is returned to the ground crew where it is to be tied to the antenna. The assembled antenna should be placed in a clear area of the yard (or on the roof) so it points toward the tower. The halyard is then passed *under* the front elements of the beam to a position past the midpoint of the antenna where it is securely tied to the boom (Fig. 1A). Note that once the antenna is installed, the tower man must be able to reach and untie the halyard from the boom. Therefore don't tie the rope more than an arm's length along the boom from the center of the antenna. If necessary, a large loop may be placed around the first element located beyond the midpoint of the boom, with the knot tied near the center of the antenna. The rope may then be untied easily after completion of the installation. The halyard should be tied to the boom at the front of the antenna by means of a short piece of light rope or twine.

While the antenna is being raised, the ground crew does all the pulling. As soon as the front of the antenna reaches the top of the mast, the tower man unties the light rope and prevents the front of the antenna from falling, as the ground crew continues to lift the antenna (Fig. 1B). When the center of the antenna is even with the top of the tower, the tower man puts one bolt through the mast and the antenna mounting bracket on the boom. The single bolt acts as a pivot point and the ground crew continues to lift the back of the antenna with the halyard (Fig. 1C). After the antenna is horizontally positioned, the tower man secures the rest of the mounting bolts and unties the halyard. By using this technique, the tower man performs no lifting.

Avoiding Guy Wires

Although the same basic methods of installing a Yagi apply to any tower, guyed towers pose a special problem. Steps must be taken to avoid snagging the antenna on the guy wires. Let's consider, therefore, some ways in which this difficulty can be circumvented. With proper precautions, even large antennas can be pulled to the top of a tower, even if the mast is guyed at several levels.

Perhaps the easiest method is to temporarily relocate one of the guy wires, removing it from the path of the antenna as it is raised. (See Fig. 2). Often a nearby tree or post will serve as a temporary anchor.

If the guy wires cannot be moved, sometimes one of the top guys can provide

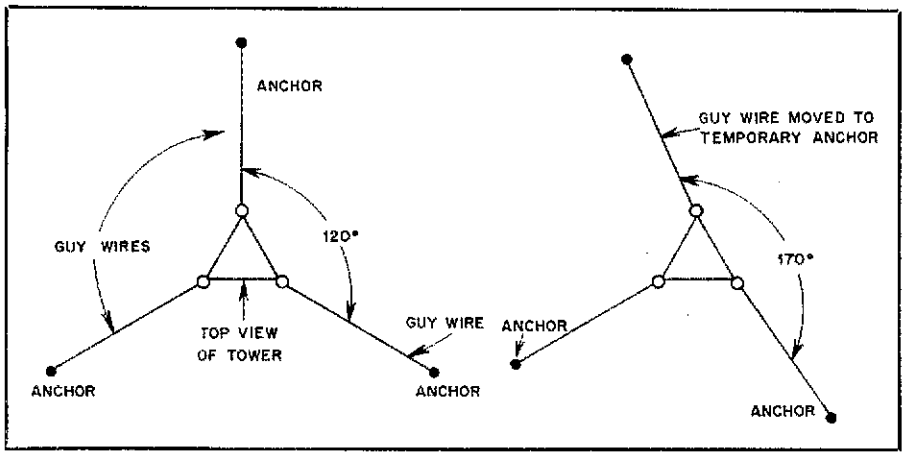


Fig. 2 — Relocation of guy wires to provide an unobstructed path for raising the beam antenna.

a track to support the antenna as it is pulled upward. Insulators in the guys, however, may offer obstructions that could cause the beam to get hung up. A better track made with rope is an alternative, provided there is sufficient rope available. One end of the rope is secured outside the guy anchors. The other end is passed over the top of the tower and back down to an anchor near the first anchor. So arranged, the rope forms a narrow V track strung outside the guy wires. Once the V track is secured, the antenna may simply be pulled up the track.

Another method, requiring less rope than for a track, may be used without repositioning a guy anchor. Simply tie a rope to the back of the antenna (but within reach of the center). The ground crews then pull the antenna out away from the guys as the antenna is raised. With this method, some crew members are pulling up the antenna to raise it while others are pulling down and out to have the beam clear the guys. Obviously, the opposing crews must be coordinated or they can literally tear the antenna apart. The beam is especially vulnerable when it begins to tip into the horizontal position. If the crew pulling out and down continues to pull against the antenna, the boom can be broken. Another problem with this approach is that the antenna may rotate on the axis of the boom as it is raised. To prevent such rotation, long lengths of twine may be tied to an element, one piece on each side of the boom. Ground personnel may then use these to stabilize the antenna. Where this is done, provision should be made for untying the twine once the antenna is in place.

Special Techniques

In addition to the more traditional methods of installing an antenna atop a tower, sometimes the more adventurous amateurs employ hot-air balloons. Even helicopters are used. Lest those of us with modest budgets be unduly envious, I wish to point out that these methods also may involve problems that must be overcome.

Balloons are expensive. They require a large area for setup. Furthermore they are unstable where there is appreciable air movement. Because of this instability, most balloon operators require that the balloon be moored at several points while located over a fixed position such as a tower. This means that we're talking about 1000 feet of fairly heavy rope to adequately secure the balloon at a moderate height over the tower. If the balloon operator lacks that amount of rope, the expense for obtaining it may well rest with the owner of the tower.

Although a helicopter does not require being moored, substantial unobstructed room for maneuvering is essential. Hiring one of these aircraft is expensive. I mentioned the famous laws of Murphy before. The use of a helicopter for this purpose does not exempt the operation from these ubiquitous rules as WB7BBO learned last summer when he hired one of these whirlybirds to assist in the installation of his beam. Work progressed admirably as the antenna went up into the air, but as it was lowered to the tower, the pilot descended too fast, causing the front of the boom to tilt upward. The rotor blades cut off both ends of the front director. On the second try, a longer rope was used between the helicopter and the antenna. This time the performance was flawless, but the first effort was awfully expensive.

Conclusion

Each antenna installation presents problems that seem unique. No set of general instructions will exactly suit a particular installation. The basic techniques I've described may be modified, and supplemented with a little ingenuity to fit the immediate needs. The key to success is careful planning, taking time to think through all the installation steps while the antenna is still on the ground. To those of you who are about to have an antenna-raising party may I say, "Good Luck!"

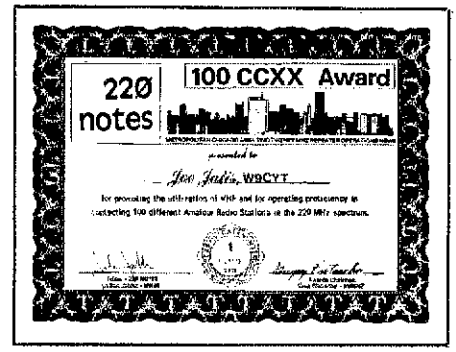
Strays

MEXICAN CONVENTION

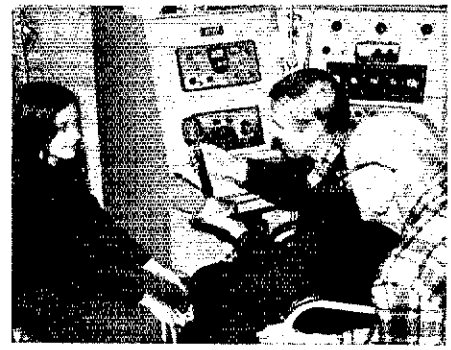
☐ An Amateur Radio convention, cosponsored by the Liga Mexicana de Radio Experimentadores (LMRE) and the Associacion de Radio Amateurs de Mexico (ARARM), will be held in Guanajuato, Mexico, from July 19 to 21. For further details, contact Tony Pita, XE1CCP, P. O. Box 7, Tlalnepantla, Edo. de Mexico.

AWARD OFFERED

☐ The Gospic (Yugoslavia) ARC, YU2EAB, is offering an award certificate to commemorate the birth of hometown inventor Nikola Tesla. To be eligible, amateurs must work special station YUØNT, scheduled to operate July 7 to 17, and any other Gospic station. Send log data with five IRC's or $2 to YU2EAB, Box 55, 48000, Gospic, Yugoslavia.



The 220-MHz band is alive with hams working toward this 100 CCXX Award, offered by the publishers of *220 Notes*. Joe Jatis, W9CYT, earned the first 100 CCXX Award since it was introduced on Valentine's Day. For a log sheet, send s.a.s.e. to Greg Pietrucha, WB9SNZ, Award Chairman, 2216 N. Kildare Ave., Chicago, IL 60639.



Amateur Radio classes closed the generation gap between Laura Kmetzo, 9, and her grandfather, John Kmetzo, 70, both of Fairfield, CT. They are the youngest and oldest students to enroll in Novice classes taught by ARRL Assistant Director "Dee" Logan, W1HEO, center. Laura is the daughter of John Kmetzo, K1INQ, who, with W1HEO, is a member of the Greater Fairfield Amateur Radio Association. *(K1INQ photo)*

An Audio Transducer for the Deaf

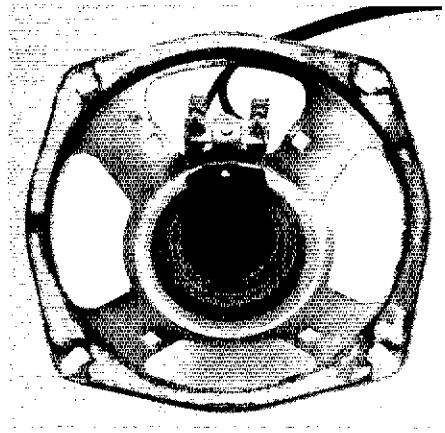
This "hearing aid" will allow even the totally deaf ham to copy cw.

By Michele Bartlett,* N1AGD

While blindness is surely a regrettable handicap, in ham radio a sightless person has an edge over someone who is deaf. There are many ingenious devices for helping a blind ham tune the rig, read meters, rotate antennas, and negotiate many troublesome aspects of radio that a sighted ham would take for granted.

But what about the deaf ham? Once he tunes his rig and turns his beam, how does he communicate? Well, there's always RTTY, of course, and SSTV. He could even buy or build a code reader with a video display, if he's not on a tight budget. But if he can't afford a state-of-the-art decoder, he can still join the ranks of cw fans with the aid of a simple transducer. That's what Gayle Sabonaitis, WA1OPN, uses — and she copies a brisk 20 words per minute. Gayle doesn't have much choice about what mode she uses: She is deaf *and* blind, and that rules out RTTY and SSTV.

A transducer allows the deaf ham to feel the code, and is very easy to make. You'll need an 8-ohm speaker and a cutting tool like a razor blade, matt knife, or small scissors. (The exact value of speaker impedance is not extremely critical, but should be fairly close to the receiver output impedance to ensure strong vibrations in the transducer.)



The audio transducer is made from a small speaker by removing the paper cone as discussed in the text. The deaf ham places his fingers on the dust cap to copy cw. A Ping-Pong ball can be cut in half and glued to the dust cap if a harder surface is desired.

With the knife or scissors, carefully slice around the dust cap (the small round dome or pad located at the center of the paper cone), being sure not to puncture the suspension material or "spider." Leave a small margin (about 1/8 inch or 3 mm wide) around the dust-cap perimeter, and a tab where the input wires are connected to the paper cone. It's best to hold the speaker at eye level while cutting to be sure you cut only the paper cone.

After cutting around the dust cap, slice the cone around the rim of the speaker and lift the paper away. You should now have a transducer similar to that shown in the photograph. A possible addition might be to glue half of a Ping-Pong ball to the small margin around the dust cap. The inverted Ping-Pong ball won't add much mass to the voice coil assembly. It will protect the fragile dust cap, and provide a harder surface for "coupling" the vibrations to the operator's fingers.

The speaker terminals can be connected to a piece of "zip cord" terminated with an appropriate connector. The completed transducer can be housed in a commercial chassis or other suitable enclosure, such as a margarine tub. It can even be recessed into the operating-table surface.

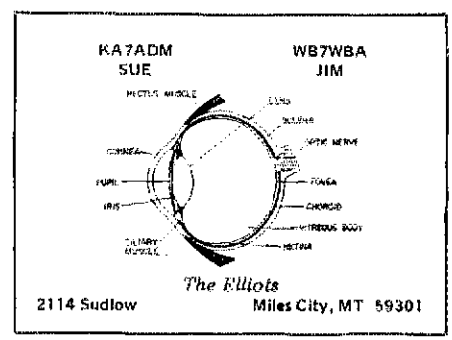
You may wonder why a deaf ham doesn't just place his fingers on an unmodified speaker. Two reasons: First, the transducer provides superior low-frequency vibrations, making it easier for the deaf ham to copy the code. Second, a transducer is practically inaudible. The receiver volume control can be cranked way up; it will be easy to feel the vibration, but the noise pollution will be minimal.

*Coordinator, Blind and Handicapped Program, ARRL.

Strays

THROUGH THE DARKNESS

Members of the Parkersburg (WV) ARC were delighted when Vicki Smith, WD8LKR, volunteered to assist with Morse code instruction in their Novice class. Luckily for course instructor Jim Steele, WA8HPD, and 25 class members, Vicki was ready to help in a totally unexpected way. When a car struck a power transformer, blacking out an entire section of the city (including the high school where the course was being held), Vicki led the students from the dark classroom to the parking lot. Vicki, who is blind, said she was glad to oblige. — *WB4KZR/8*



This unique "eyeball" QSL card belongs to Jim Elliot, an optometrist from Miles City, MT.

Measuring Transmission-Line Velocity Factor

The technique described by the author was devised by Chet Smith, K1CCL. With it, you can determine the speed of radio waves traveling on your transmission line!

By George Downs,* W1CT

Radio waves travel slower along a transmission line than they do in free space. Therefore, if a piece of coaxial cable or twin-lead is cut to a specific fraction of a wavelength for the purpose of impedance matching or phase shifting, the physical length of the line will be shorter than the free-space dimension calculated from the wavelength formula. The ratio of the speed of the wave inside a coaxial line (or other transmission line) to that of the wave in free space is called the *velocity factor* of the line, (V_f). For instance, the V_f of RG-58/U is given in the ARRL *Handbook* as 66 percent or 0.66. This means that instead of being 40.145 inches long, a half-wave section of RG-58/U at 147 MHz would be 40.145 × 0.66, or 26.496 inches long.

$$\lambda = \frac{299.79}{147} = 2.0394 \text{ meters}$$

$$\frac{\lambda}{2} = 1.0197 \text{ meters} = 40.1453 \text{ inches}$$

$$40.1453 \times 0.66 = 26.4959 \text{ inches.}$$

The problem is that the ratings listed in the tables are only approximations, especially where foam dielectrics are concerned. The actual cables vary by as much as 10 percent from batch to batch, and sometimes change (but much less so) even from one part of a reel to another. For precise work, it is desirable to measure the V_f of the actual cable being used. The K1CCL method is simple and straightforward.

1) Take a piece of the type of cable to be used. Preferably, this section should be more than 5 feet long.

2) Short the inner conductor to the shield at one end of the cable.

3) Peel back just enough insulation at the other end so that you can solder directly to the shield and center conductor.

4) Prepare three coils by winding no. 20 bare wire around the shank of a 1/4-inch (6-mm) drill bit. Make the coils 1, 2 and 3 turns respectively. Be sure that the turns are *complete* turns. Space the turns evenly so that they are 1/16 inch (1.6 mm) apart. Leave 1/2-inch (13-mm) pigtails on each coil.

5) Solder one of the coils between the shield and center conductor of the *unshorted* end of the coax, and determine the resonant frequency with a grid, tunnel or solid-state dip meter.[1] (See Fig. 1.) Use minimum coupling that will give a dip reading. A calibrated receiver, wavemeter, frequency counter, or other device may be used as an option to provide greater accuracy of frequency readout. (The accuracy of dip-meter dials is usually not very good.)

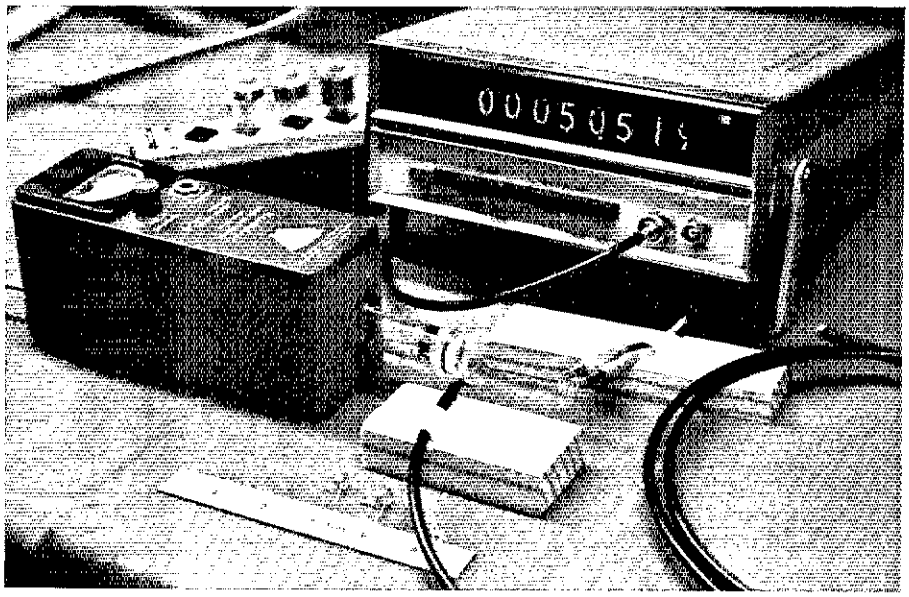
6) Repeat the procedure of step 5 for each of the other two coils. Be sure to keep your data straight.

7) Plot your results (turns versus frequency) for 3-, 2- and 1-turn coils. Do this on a piece of graph paper. Then, using your "calibrated eyeball," a straight edge, French curves or whatever, extrapolate to find the resonant frequency at *zero* turns. (Find the limit of the resonant frequency as the number of turns approaches zero. Since you'd have a difficult time measuring it with zero turns, you simply observe

[1]For more information on the use of dip meters, see Bartlett, "Calculating Component Values," *QST*, Nov. 1978, pp. 25-28.

Dr. Chet Smith, K1CCL, checks the setup for demonstrating his simple method of measuring coaxial cable propagation factor.

*c/o GTE Sylvania, 189 B Street, Needham, MA 02194



Loose coupling is the key to accuracy in this test setup. On the right is a 76-inch (1.93-m) long sample of RG-58/U with a one-turn coil in place. This coil couples to the grid-dip meter at left. The frequency-counter pickup coil is below the counter input port. As indicated in the text, the one-turn coil dipped at 50.5 MHz (50.519 displayed on counter). Cable ends supporting coils are taped to wooden blocks for positioning. The two- and three-turn coils, for which readings have already been taken, are in the foreground.

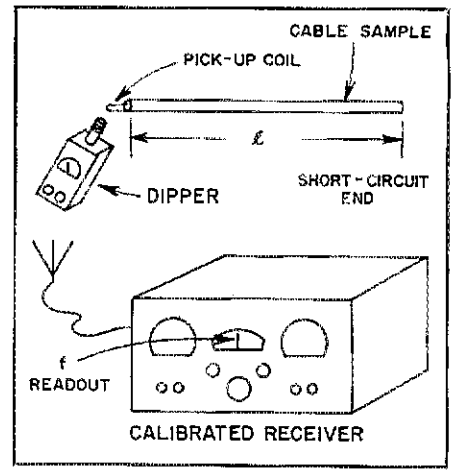


Fig. 1 — The test setup for measuring the velocity factor for coaxial cable or other transmission line. The receiver is tuned for a beat note.

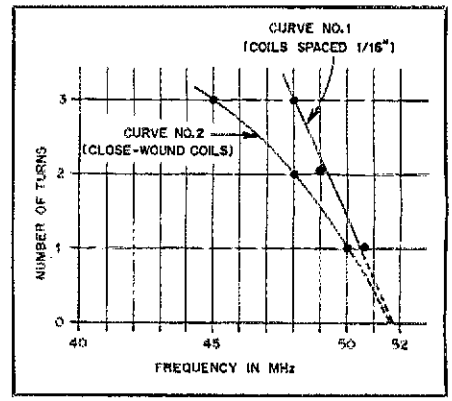


Fig. 2 — The results of measurements taken on RG-58/U coaxial cable. These measurements were made using the methods outlined in the text, and the results plotted as shown here.

the trend of the curve as the number of turns *approaches* zero.) See Fig. 2. Where the extrapolated curve reaches zero turns, note the frequency and call it "f" in MHz.

8) Measure the overall length of the cable you have been using. Convert this length to meters if not already in that form. (One meter ≈ 39.37 inches.) Call this length "ℓ" in meters.

9) Substitute the f and the ℓ values for the variables shown in the formula below.

$$V_f = \frac{2f\ell}{3}$$

where

V_f = the velocity factor expressed in percent,

f = the resonant frequency (in MHz) at zero turns, and

ℓ = the length of the cable in meters.

Those who want an elegant solution should start with the cable length (ℓ) equal to 1.5 meters (59.06 inches). Then the 2/3 cancels and the formula becomes $V_f = f$.

Here's an actual example:

Cable: RG-58/U, length: 76-1/4 inches or 1.937 meters.

Data: $f_{1t} = 48$ MHz, $f_{2t} = 49$ MHz, $f_{1t} = 50.5$ MHz. f (extrapolated) = 51.7 MHz (see Fig. 2).

$$V_f \text{ (measured)} = \frac{2f\ell}{3}$$

$$= \frac{2 \times 51.7 \times 1.937}{3} = 66.76 \text{ percent.}$$

This figure is pretty close to the value given in the *Handbook*. Those persons without a calibrated receiver in the 100-MHz range can use a cable sample of 4 meters or more to get the readings down into the hf range.

Note: It is important that the spacing between the turns on the coils be the same in all three coils. A 1/16-inch spacing seems to give fairly linear results, as shown on curve no. 1 of Fig. 2. Curve no. 2 was made with a second set of coils. These were wound with no. 22 enameled wire *close-spaced* on a 1/4-inch drill bit shank. The curve was not linear; however, the answer came out the same.

The next time you need a 1/4- or 1/2-wave section of coaxial cable, and you want to be *accurate*, try measuring the velocity factor of the line you're using. You may find that it is very close to that shown in the *Handbook* tables . . . and then again, you may be surprised. ■

Strays

INVENTOR JOINS ARRL

☐ One of the ARRL's newest members is W. L. Faust, KB3DI, codiscoverer of the CO_2 laser. He writes, "The thing that pushed me to fury and finally making the thrust into radio after years of casual intention was Jack Anderson's foolish column in the *Washington Post*, to the effect that CB should take over ham frequency space! I look forward to years with the ARRL, and agree fully on the need for mutual support in today's climate."

MOVING? LET US KNOW

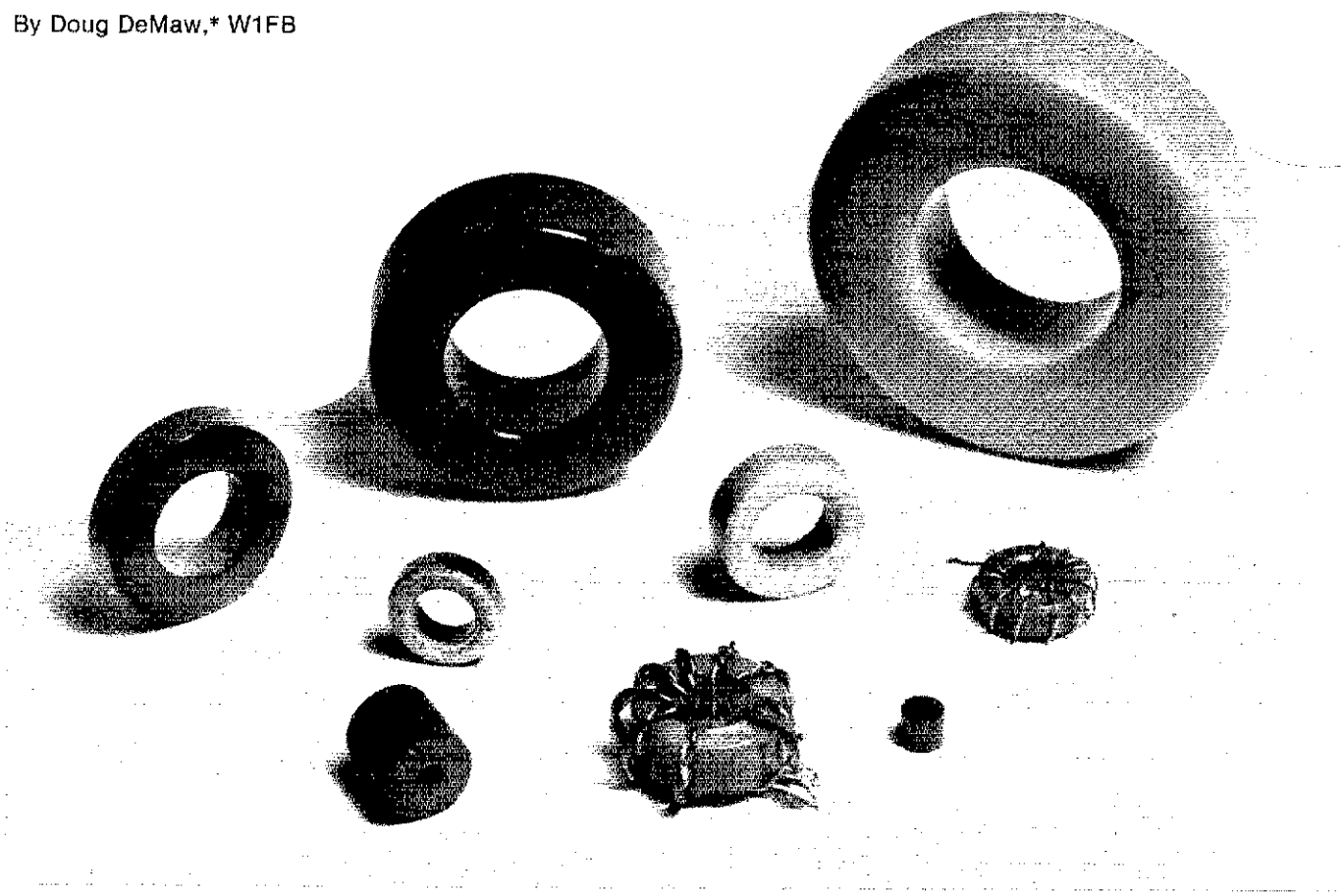
☐ If you've missed a couple of consecutive issues of *QST*, the Circulation Department would like to know. Perhaps you have moved and failed to drop us a line to that effect. (Send us an old label along with your new address.) Possibly the post office has slipped up, and we can help. Please don't wait six or eight months to complain. We always try to replace missed issues, but now and then an issue goes out of print very quickly and becomes irreplaceable. Change-of-address notifications should be sent directly to us for proper action, *not* via the post office. Many times, address changes are not received for one reason or another, but we seem to be at fault for nonaction. — *Marion E. Bayrer, Circulation Department*

● *Basic Amateur Radio*

The Practical Side of Toroids

What type of core? How many turns? What's meant by bifilar, trifilar and quadrifilar? Here are some answers for newcomers to the fine art of toroid winding.

By Doug DeMaw,* W1FB



Toroids come in all sizes and types. The flea-size ones seen here are called "beads." Some toroid cores have smooth surfaces (tumbled and coated) while others are in the "rough."

"You authors of amateur-equipment articles take too much for granted!" That's what has been said by a number of *QST* and *Handbook* readers with regard to the winding information for toroids. That old blind spot which so-called "professional" amateur writers fall victim to may well be the cause of the readers' confusion. Most of us have wound so many toroids and other types of inductors and transformers that we assume that everyone knows what we're talking about. The oversight is never intentional, and most of us who prepare construction articles aren't Ph.D.s, as it is often charged! I know a lot of darned good authors — even *QST* Cover Plaque winners — who have no formal background whatsoever in electronics. But, that's not the issue here. Let's talk about toroids, their selection and how to wind them.

*Senior Technical Editor, ARRL

Why Use Toroids?

No primer on toroid use would be complete without an explanation of why we might want to use a toroidal-wound inductor or transformer in place of a "conventional" equivalent. Well, the answer is pretty ordinary: Toroids yield high Q (quality factor), they are self-shielding (an aid to circuit isolation), and they are compact. A simplistic explanation might be, "I use them because they're neat." Indeed, they *are* "neat." The finished product looks neat, and they perform in a neat manner. So, I guess "neat" might be okay as a descriptive term.

But, let's examine the salient features of toroids in greater depth. The Q of a toroid which has been wound on a core that is appropriate for the operating frequency is typically high. This is so because for a given inductance, say 50 μH, fewer turns of wire are needed than would be required for an air-wound coil of equivalent inductance. Therefore, the overall wire resistance (in terms of ac) is lower when a toroid is used. Fig. 1 illustrates this concept. The notable exception is when the

air-wound coil is very large physically and contains large-diameter wire or tubing. But huge coils are usually impractical, especially in small-signal (low-power) applications. Can you envision a 160-meter portable rig which had a transmitter tank coil that was 1 foot long, 1 foot in diameter (0.3 × 0.3 m), and used no. 8 copper wire? The same performance could be obtained with a toroid core only 2 inches (51 mm) in diameter! The reason, of course, that fewer wire turns are needed on a toroid core is because the core material is a magnetic substance (steel tape, powdered iron, or ferrite). This property effectively increases the coil inductance in accordance with the rated permeability of the core. The higher the effective permeability (μ_e) the greater the inductance for a specified number of turns, assuming that the core material is suitable for the chosen operating frequency. The small number of turns leads to less ac resistance, and hence higher Q (Q = $2\pi fL/R$ or $Q = X_L/R$, where f is in Hz, L is in henrys and R and X are in ohms).

In many instances we can gain from the use of toroidal inductors with respect to direct current versus ac resistance. If current from the power supply passes through a coil or transformer winding to a transistor or tube, and if there is considerable direct current flowing, a small number of turns are desirable. This means that the IR voltage drop to the tube or transistor will be lower than when many turns are used, owing to a lower series resistance. This will also reduce heating.

Let's consider the matter of self-shielding. The magnetic field of a toroidal-wound inductor is pretty much confined to the assembled unit. Magnetic coupling between coils and other circuit elements is avoided when toroids are employed. From this useful feature we derive an uncomplicated layout benefit. Metal shield cans or partitions aren't needed to provide isolation between circuit sections. Unwanted coupling between toroids, or between toroids and other circuit elements, can occur, however, by means of *capacitive* paths. This will happen if the toroid is in close physical proximity to another toroid or immediately adjacent to some other component in a circuit assembly. Therefore, it is wise to allow a fair amount of space between all critical elements on a circuit board, unless shielding is used.

Which Core to Use?

The choice of core material for toroids (or for *any* inductor which uses magnetic core material) is of paramount importance. For most amateur rf and audio work, the choice we make is powdered iron or ferrite. As a rule of thumb, powdered iron can handle more rf power without saturating or being damaged than is true of an equivalent-size ferrite core. Furthermore, if a ferrite core is subjected to excessive power for its cross-sectional area, it will change in permeability. The change will remain fixed, and if the power level is high enough the core might even shatter. I had this happen once when W1ICP and I were testing a 6-inch (152-mm) ferrite core in a Transmatch circuit: At the 300-watt level the core broke into six pieces! Powdered-iron cores, on the other hand, will return to their initial permeability (μ_i) value after they cool down.

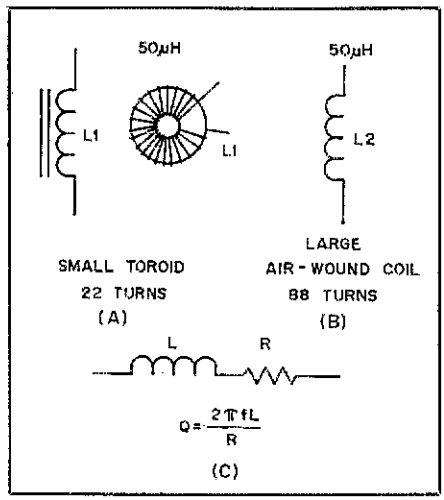


Fig. 1 — A toroidal inductor is shown schematically and pictorially at A. The two vertical lines to the left of L1 symbolize the magnetic core material. The illustration at B compares an air-wound inductor to a toroidal one (A). This shows that more turns are needed for air-wound coils to obtain the same inductance. At C is the series-resistance (R) illustration and the equation for Q.

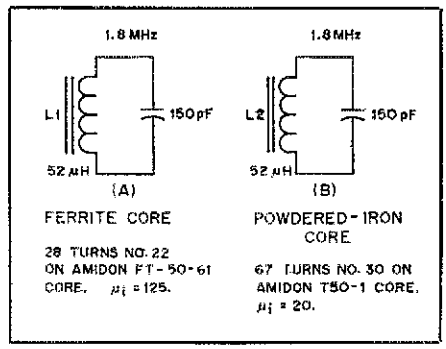


Fig. 2 — A comparison between high-mu ferrite and low-mu powdered-iron toroid cores for a specified inductance. Fewer turns are needed for the higher permeability (mu) core.

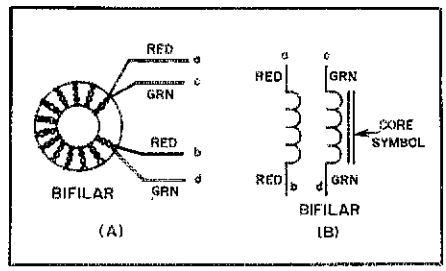


Fig. 3 — Schematic and pictorial presentation of a bifilar-wound toroidal transformer.

You are probably wondering why anyone would bother to use ferrite in view of the foregoing comments. Well, it is possible to obtain much higher values of permeability with ferrite materials than it is with iron. This is especially useful at the lower frequencies when, if powdered-iron core material was used, it would require many more turns of wire than if ferrite were employed. For a given core size, the wire gauge on a powdered-iron core would be much smaller in order to accommodate the necessary number of turns for a specified inductance. This would increase the resistance of the winding, lower the Q, and possibly cause unnecessary heating. Fig. 2 illustrates the comparison between the required number of turns for a particular inductance wound on a 0.5-inch (13-mm) ferrite core and one of identical size using powdered iron. Each core is rated for optimum Q at the specified operating frequency (1.8 MHz). At A in Fig. 2 we need only 28 turns of wire to obtain 52 μH, and the core will accommodate no. 22 enameled wire. Fig. 2B shows that 67 turns of wire are needed to effect the same inductance on a powdered-iron core. In order to get all of the turns on the core (single-layer wound), no. 30 enameled wire is necessary. Not only is the winding job more involved, the resistance of the winding for L2 is substantially greater than for L1 of Fig. 2. This will degrade the Q of our tuned circuit.

Broadband Versus Narrow-Band Inductors

Toroids are used extensively these days in broadband transformers and tuned circuits (narrow-band). Ferrite or powdered-iron core material can be used for either application, but ferrite is the most frequent choice for broadband circuits. This is chosen because higher values of permeability can be obtained with ferrite. If a broadband transformer is to be used with 1.8 to 30 MHz, as one might do in a solid-state power amplifier, the higher permeability is essential for the low end of the frequency range. As the operating frequency is made higher, the core material tends to "vanish" as far as the inductor or transformer is concerned, owing to the relative unsuitability of the core material at the higher end of the operating range.

There is one fundamental rule that must be followed when building a broadband transformer. The reactance (X_L) of the smallest winding must be roughly four times the ohmic value of the impedance at that point. For example, if a broadband transformer is used between a 50-ohm exciter and the input of a solid-state power amplifier — transistor base impedance of 10 ohms — the smaller winding should

have an inductive reactance of approximately 40 ohms and the larger winding should have an X_L of 200 Ω. Thus, at 3.5 MHz, we need 1.8 μH of inductance in the winding that feeds the transistor base ($L_{\mu H} = X_L/2\pi f$, where f is in MHz). The primary winding needs 9 μH of inductance as a minimum.

The same rule applies to rf chokes, since they are broadband devices in most circuit applications. Let's assume that we want to feed 12 volts of dc to the collector of a transistor power amplifier. Our collector impedance for the chosen operating power is 58 ohms. The choke should have an X_L of 4 × 58, or 232 ohms. Therefore, the required inductance for 3.5 MHz is 10.55 μH. The main reason for this rule is that if the X_L is too low, power loss through the inductor or transformer winding can result. Also, too low an inductance may disturb the normal circuit impedance through unwanted shunting action.

When we apply toroids in narrow-band circuits (tuned circuits), powdered-iron cores are usually the choice above 1.5 MHz, even though some ferrites are entirely acceptable below approximately 25 MHz. The powdered iron can handle somewhat more power without saturating (for a given core size), and high operating Qs are easy to obtain with powdered iron up through the vhf region.

A common problem in the use of ferrite or powdered-iron toroids is encountered when the circuit in which they are used handles considerable power (100 watts or more for this discussion). If the circuit is of relatively high impedance, high values of rf voltage will be present. This is particularly true of narrow-band circuits. At some point along the way the rf voltage can arc between the winding and the core, or even between turns on the toroid winding. The best preventive measure we can take is to tape the core with high-dielectric tape (3M glass tape, Mylar tape or similar) before placing the winding on it. Additional protection can be had by using Teflon-insulated wire for the winding. Ordinary enamel- or Formvar-insulated magnet wire will break down pretty fast under high-voltage conditions. With the high-voltage breakdown possibility in mind, we should ensure that the completed toroid is spaced a reasonable distance away from other conductive objects on a circuit board or chassis. A generous coating or two of polystyrene cement (Q-Dope) over the completed toroid winding will protect the winding from abrasion, moisture and unwanted movement of the turns. It will also aid in providing high-voltage insulation. Homemade Q-Dope can be had by dissolving small pieces or chips of polystyrene material in acetone.

Proper Core Size

There is no simple guideline a beginner can follow safely with regard to core size — specifically cross-sectional core area — versus circuit power. If a rule of thumb were offered here, I'd use the vernacular and say, "Use the largest core the law will allow." This is valid because the larger the core, the greater the power-handling capacity. The choice of size is dependent upon the maximum allowable flux density (B) of the core material, or B_{max}, versus the operating flux density, B_{op}. B_{max} is sometimes referred to as B_{sat}, which is the flux density at which the core will saturate.

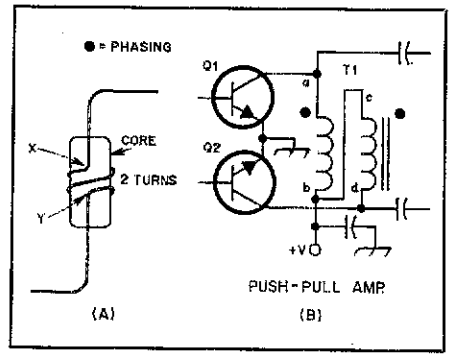


Fig. 4 — The view at A shows how the turns on a toroid should be counted. The large black dots in the diagram at B are used to indicate the polarity of the windings (phasing).

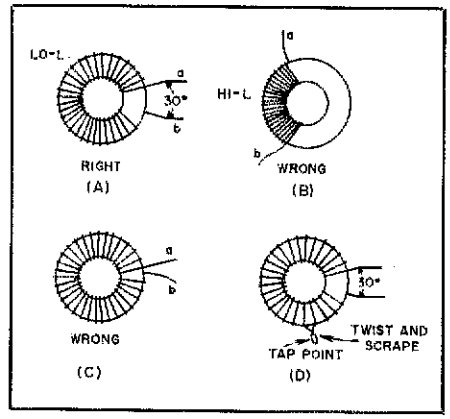


Fig. 5 — The suggested winding method for a single-layer toroid is shown at A. A 30° gap is recommended (see text). Wrong methods are shown at B and C. At D is a method for placing a tap on the coil.

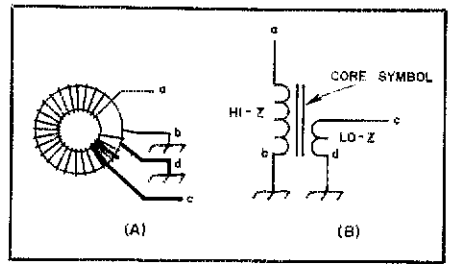


Fig. 6 — Comparison between a schematic and pictorial version of a toroid which has a link winding.

The actual B_{op} for a given circuit in which a toroid or other magnetic core is used is determined by several factors. Among these considerations are the applied voltage (E_{rms}), equivalent area of the magnetic path in cm² (A_e), the number of core turns (N) and the operating frequency (f). The equation for determining the B_{op} is

$$B_{op(ac)} = \frac{E_{rms} \times 10^8}{4.44\ f\ N\ A_e}$$

and when dc is also passed through the toroid winding the equation becomes

$$B_{op(total)} = \frac{E_{rms} \times 10^8}{4.44\ f\ N\ A_e} + \frac{N\ I_{dc}\ A_L}{10\ A_e}$$

where

I_{dc} = the direct current through the toroid winding,

A_L = the manufacturer's inductance index for the particular core in use.

B_{op} is in gauss and f is in Hz for both equations. The A_e and A_L terms of the equations can be obtained from the manufacturer's data sheets. The remainder of the terms must be known to the amateur who winds a toroid for a given circuit. Once the equation is worked, the flux density in gauss is known. A core is then chosen in accordance with the manufacturer's B_{sat} or B_{max} specifications. These are usually given on the data sheets for each core type and size. In all cases, the B_{op} should be substantially less than the B_{sat} to avoid core saturation or damage.

We can see from the equations that one of the more significant terms is E_{rms}. The higher the ac voltage, the greater the B_{op}, which is one reason why problems arise when a toroid is used in a high-power, high-impedance circuit. There are some designers who feel that a toroidal inductor or transformer should not be used above, say, 600 ohms. I tend to agree with that feeling, especially in circuits which handle large amounts of rf power. This is particularly significant when broadband transformers are employed. The 6-inch diameter core that W1ICP and I exploded was capable of 20 kW of power in a low-impedance balun application, according to the manufacturer. But in our high-impedance (hence very high E_{rms}) application, it was destroyed at the 300-watt level at 14 MHz.

Winding Hints

We receive scads of inquiries at Hq. about how to wind toroids. Some readers have difficulty understanding what we mean when we say, for example, "bifilar wound, trifilar wound, or quadrifilar wound." Others are perplexed about how to spread the turns on the core, how to add a coil tap, or where on the core to place a secondary winding. Actually, all

of this is quite ordinary.

A *bifilar* winding is one which has two identical lengths of wire, which when placed on the core result in the same number of turns for each wire. The two wires can be put on the core side by side at the same time, just as if a single winding was being wound. An easier and more popular method is to twist the two wires (8 to 15 times per inch or 1-1/2 to 3 mm per "twist" will suffice), then wind the pair on the core. The wires can be twisted handily by placing one end of the length of two wires in a bench vise. The remaining wire-pair ends are tightened into the chuck of a small hand drill, and the twisting is done.

A *trifilar* winding has three wires and a *quadrifilar* winding has four. The procedure for preparation and winding is otherwise the same as for a bifilar winding. Fig. 3 shows a bifilar type of toroid in schematic and pictorial form. The wires have been twisted together prior to placing them on the core. It is helpful, though by no means essential, to use wires of different color when multifilar-winding a core. The more wires used, the more perplexing it is to identify the ends of the windings correctly once the core has been wound. There are various colors of enamel insulation available, but it is not easy for amateurs to find this wire locally or in small-quantity lots. I solved my own color-coding problem by taking lengths of wire (enameled magnet wire), cleaning them to remove dirt and grease, then spray-painting them. Ordinary aerosol-can spray enamel works fine. Spray lacquer is not as satisfactory because it is brittle when dry and tends to flake off the wire.

The polarity of the windings of a multifilar toroidal transformer is important in most circuits. Fig. 4B illustrates this principle. The black dots adjacent to the top of the T1 windings indicate polarity (phasing). The phase is the *same* where the dots appear on a diagram. In this example, winding points *a* and *d* are of opposite phase (180° phase difference) to provide push-pull voltage feed to Q1 and Q2. If points *a* and *c* were used instead, the two transistors would operate in parallel because the phase at those points is the same.

Every toroid has what is known as a self-resonant frequency. This is so because of distributed capacitance which exists across the winding, and between the turns of the winding. A typical medium-size toroid which contains 1000 turns of wire might have 80 pF of stray capacitance if the ends of the winding were closely adjacent as shown in Fig. 5C. By providing a 30° gap, as shown at A of Fig. 5, the distributed capacitance might drop to 40 pF. The bad effect of stray capacitance is that it increases the "effective inductance" of a toroid and lowers the Q. The closer the self-resonant frequency is to the operating frequency, the lower the circuit Q. Therefore, the winding method of Fig. 5A is highly recommended for all toroid winding. This consideration is especially important when winding broadband transformers.

Although the illustration at B of Fig. 5 is labeled "wrong," it can be used to advantage in some circuits. If a "fudge factor" is desired in a toroid which is used in a tuned circuit that contains a fixed-value capacitor, the winding can be made to occupy roughly one half the core area. In that form the winding should have approximately the required inductance for the desired resonant frequency. After the circuit is assembled the winding can be spread or compressed to peak the tuned circuit. Compressing the turns (moving them close together) increases the inductance. Spreading them over more of the core will lower the inductance. Once resonance is established the winding can be coated with Q-Dope to hold the turns in place.

Illustration D of Fig. 5 shows how to put a tap on a toroid winding. As the core is wound, a single-turn loop is formed at the turn where the tap belongs, then the remainder of the turns are placed on the core. The insulation can be scraped off the wire at the tap point to permit making a solder connection.

Finally, when placing two windings on a toroid core (primary and secondary of a transformer), the scheme at Fig. 6A is used. The large winding is done first. The small winding is placed over it at the low-impedance end of the larger winding. This is often called the "cold" end, ac-ground end, ground end, or B+ end. It depends on the type of circuit in which the toroid is used. In specific terminology, "cold end" means the end where there is no rf or ac energy present. The term "Hi-Z" refers to the high-impedance winding of a transformer. Conversely, "Lo-Z" means the smaller (low impedance) winding.

Fig. 4A shows how to count the turns on a toroid. The count starts at point *x* and ends at point *y*. The example shows two complete coil turns. When more than one winding is used, each should be wound in the same sense — both clockwise or both counter clockwise. Some commercial designers recommend that a small winding on a toroidal transformer (link *c/d* of Fig. 6A) be made to occupy all of the core area, as in Fig. 5A. This method is okay in low-impedance circuits, but in narrow-band tuned transformers it is best to wind the link as shown in Fig. 6A. This method reduces unwanted capacitive coupling to the high rf point on the transformer (stray capacitance exists between the wires of the two windings).

How Many Toroid Turns?

Most toroid manufacturers publish in their data sheets an A_L factor for each core size and type they produce. This is derived by winding a known number of turns on a core, then measuring the inductance. The equation used is

$$A_L = \frac{L_{\mu H} \times 10^4}{N^2}$$

where

A_L = the desired inductance index,
L = μH, and
N = the number of turns placed on the unknown core for the test.

Even though this equation can be used to test surplus cores obtained from flea markets and other random sources, the user must be sure to use the correct core for narrow-band circuits. The wrong core can degrade the Q. The typical equation for turns is

$$N = 100\sqrt{L_{\mu H} \div A_L}$$

where

N = the required number of turns and
A_L = the manufacturer's inductance index.

For high permeability cores (when ferrite cores are employed) the equation is

$$N = 1000\sqrt{L_{mH} \div A_L}$$

when ferrite cores are employed.

Let's do a sample problem to demonstrate how the equation for core turns is used. We have an Amidon toroid core which is suitable for use at 3.5 MHz, as indicated by the data sheet. It is a T68-2 type of powdered-iron core. The number means that it is a toroid (T), it has a 0.68-inch (17.3-mm) diameter and is made of type 2 core material (red code). Our circuit calls for an inductance of 28 μH. We look at the data sheet and learn that the T68-2 has an A_L factor of 57. Hence,

$$N = 100\sqrt{28 \div 57} = 70 \text{ turns}$$

We must next find what wire gauge to use in order to fit all 70 turns on the core in a single-layer winding. The manufacturers publish this information in tabular form. The Amidon chart indicates that 80 turns of no. 28 enameled wire will fit on a T68 size core. Therefore, we will wind 70 turns of no. 28 on our core to obtain the desired inductance. These data are available from Amidon upon request.[1]

Conclusion

This article is far from all-inclusive. In fact, we've only scratched the surface with respect to magnetic-core materials. But, we do hope that your most common questions have been answered here. Toroids are relatively inexpensive and are an aid to compact equipment design. Give them a try in your next project. I think you'll be pleased with the results.

[1]Amidon Assoc., 12033 Otsego St., N. Hollywood, CA 91607.

● *Basic Amateur Radio*

The Wee-Keyer

If you're looking for a weekend project, this one will never do. It's too easy. You probably have all nine parts in your junk box!

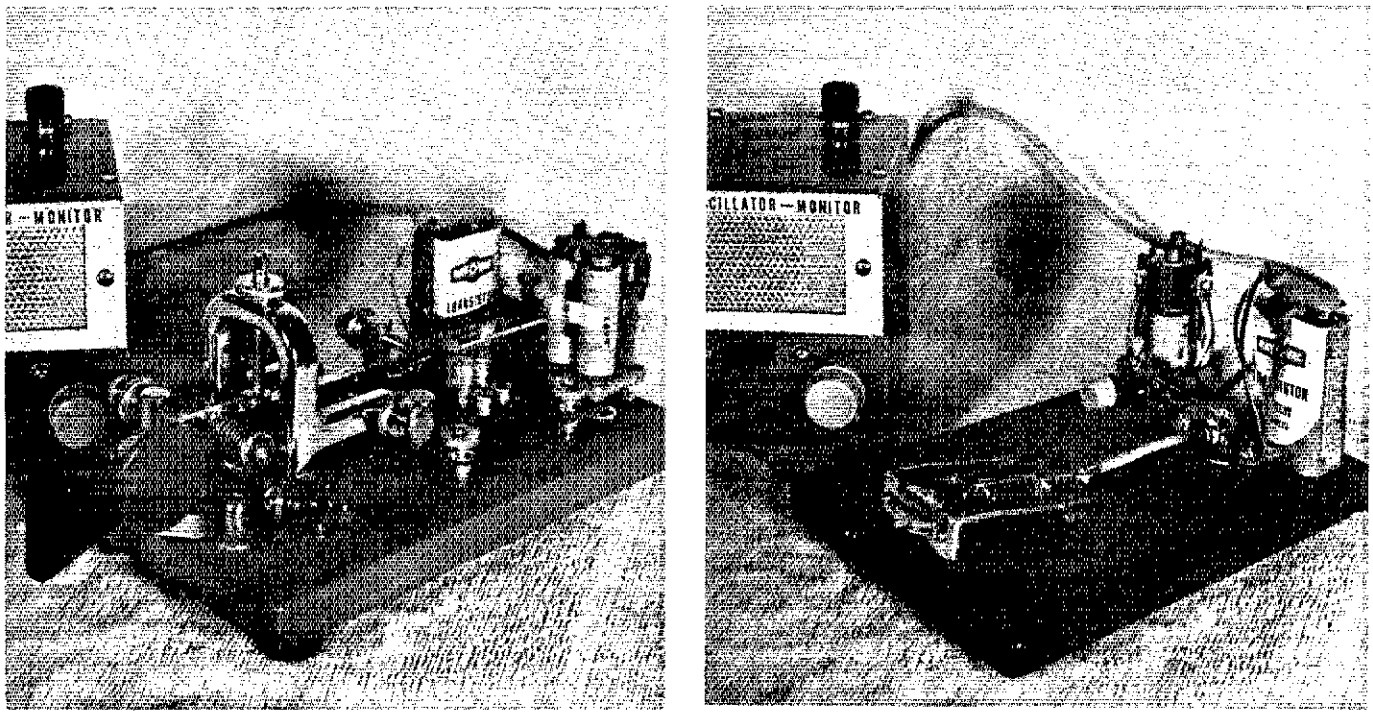
By Robert W. Wilson,* K9RBW

It should only take you a couple of hours to complete one Wee-Keyer, so if your heart is set on a weekend project, make a half dozen and give them to your friends. This has to be the simplest electronic keyer yet. You will be amazed at what this little cricket *won't* do. It won't complete a single letter. It won't remember a thing. It can't be programmed and it won't make coffee. What it *will* do is make automatic dits and dahs while requiring the operator to develop genuine expertise . . . and that's all.

Most modern keyers would flabbergast Granddad. Can you imagine him talking into a shiny gadget which in turn bleeps out cucumber-cool code? He might even object to the Wee-Keyer as an unnecessary modern contrivance, but he wouldn't object on the basis of complexity. Fig. 1 shows the simple Wee-Keyer circuit. The values of the two potentiometers are far from critical. I tried several RATIO pots between 5000 Ω and 15 kΩ, and a number of SPEED pots between 10 kΩ and 50 kΩ. Not much difference in performance was noted when these components were substituted. Keying speed is also affected by the value of R1, with speed increasing as R1 is made smaller.

Every pnp transistor I tried worked fine, speed varying from transistor to transistor. The only tricky part is the relay. As a rule of thumb, any dpdt relay will be acceptable as long as it can be reliably actuated by a 9-volt battery while *out* of the circuit. I found two sealed relays marked 30 volts dc. I nearly passed over these fine relays, supposing the battery would not close them. However, when the spring tension was reduced to nearly nothing, the 9-volt battery closed them with ease. One set of contacts (between the paddle and battery terminal) must be normally closed; the other set (used to key the rig or code-practice oscillator) normally open. A very important adjustment on some relays is the small screw that limits the amount of armature travel. You will find that wider armature spacing allows the keyer to operate at lower speed, but that extremely wide spacing may cause the first dit in a dit series to be too long. It is fun finding the proper combination of RATIO control, SPEED control and relay tension for your "fist," yet it is not terribly difficult.

*507 N. Main, Georgetown, IL 61846



Two models of the Wee-Keyer, both built by the author. At left, the Wee-Keyer mounted on the author's bug; at right, a version built for a friend.

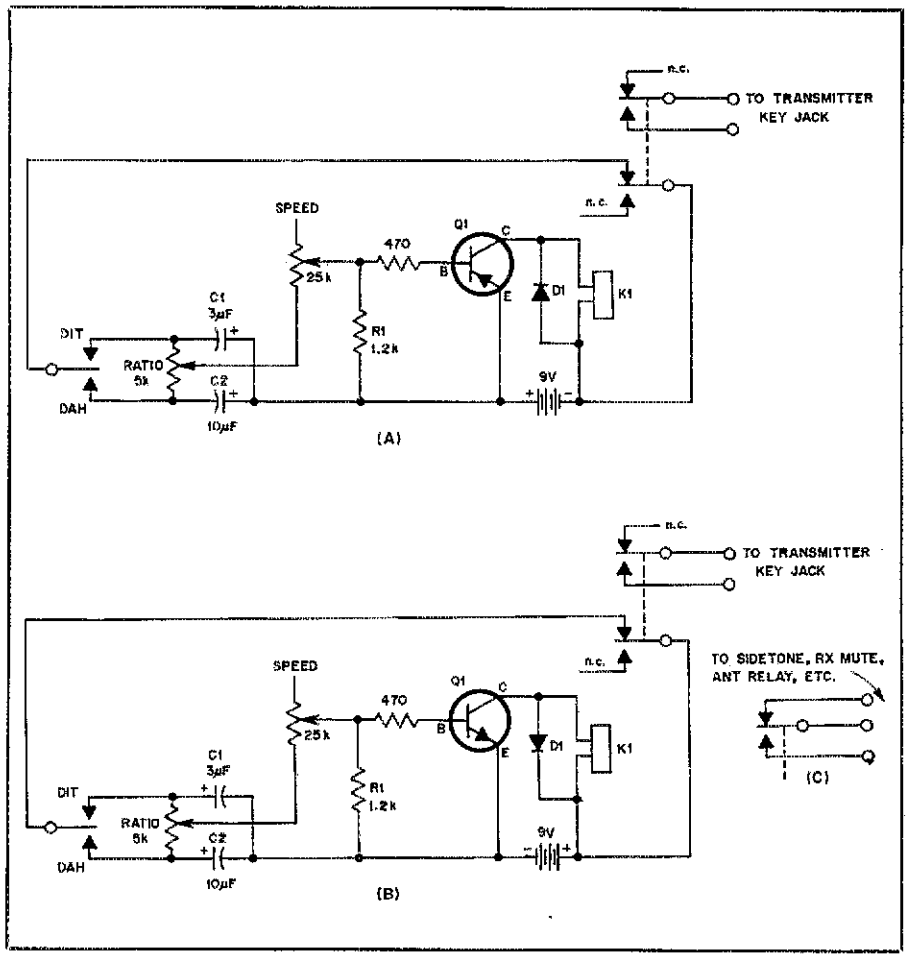


Fig. 1 — The "Wee-Keyer" schematic diagram is shown at A with a pnp transistor at Q1. The diagram at B shows the necessary circuit modifications for use with an npn transistor. Resistances are in ohms; k = 1000. If a pc board is made for this project, the same layout should work for both circuits, since the only changes that need to be made are the reversal of the battery leads and opposite polarity for C1, C2 and D1. At C is shown the possible connections of extra sets of contacts if the relay you use is a 3pdt or 4pdt. A suitable dpdt relay is Radio Shack catalog number 275-206. See text regarding D1.

Any small-signal diode will serve at D1. This is only to protect the transistor from voltage spikes generated by the relay coil.

The Wee-Keyer on the wooden shingle (see photo) is one that I built for a friend. I confess that the modified lever switch "paddle" is bound to put some strain on our friendship. If Ted could learn to play that thing, he could qualify for some kind of sideshow at a carnival! Actually, the switch needs to be replaced with a decent keyer paddle. But that's his problem. Yes, I must remember to suggest it to him.

How unusual it is to buy something for a quarter at a hamfest and find a use for it. I bought a handful of small pc boards with six mounted components on each. I removed the npn transistor, two silver-mica capacitors and a small choke. The two pots, 5000 Ω and 25 kΩ, stayed. Some pc foils had to be cut, but the modified board worked fine. Chances are you won't be this lucky, but you can make your own board or mount all the parts on a tie strip with eight solder lugs.

I built my own final model with battery, relay and keyer board all mounted on a modified Vibroplex bug. The bug stem is secured so that it does not move. Adjustment of the dit contacts is required. The pc board is attached to the dah post and the relay to the dit post. The bug must be rewired on the underside so the dit and dah posts are electrically separate and both insulated from the common line. A ground connection can be picked up anywhere on the plate.

So there it is. Simple, huh? You will enjoy the Wee-Keyer because of the personal satisfaction derived from operating a keyer that *does not* do everything for you. QST

Strays

Al Gallagher, WB9BPL, proudly displays the 35 straight keys in his telegraphy collection. The oldest key in the assortment dates back to 1918. *(K9ZZ photo)*

STOP THE FIRE, NOT YOUR GEAR

☐ Have you got a fire extinguisher in your shack? Watch out which type you use — some may cause more damage than the fire! Dry chemical extinguishers generally have one of three bases, sodium bicarbonate, potassium chloride or ammonium phosphate. The potassium chloride, in combination with moisture, can corrode many metallic materials. Ammonium phosphate forms a soft, sticky mass when hot and clings to surfaces after cooling. It can't be blown or brushed away. The best fire extinguishers to use in your shack are carbon dioxide, Halon 1301 and Halon 1211. A fire also may be doused with water, *after the power has been killed.* The recommended extinguishers aren't cheap, except for the water, but neither is most electronic gear. Use whatever is available if further property damage or loss of life possibilities exist. But, if you have a choice, try to stay away from dry chemicals. — *LEARA Newsletter*

Product Review

Swan 100MX HF Transceiver and Accessories

In recent years the trend in mobile operating has been toward vhf fm. However, the increasing availability of modern, compact and efficient hf ssb equipment may rekindle some interest in hf mobiling. A recent American-made transceiver for this class of service is the Swan 100MX.

The 100MX is an excellent compromise between power, size and operating features. Its 100-watt PEP output level is just right for reliable communications without overtaxing the vehicular electrical system. The dimensions are small enough for easy mounting in most subcompact automobiles, yet the controls can be easily manipulated without mutual interference. The designers deserve applause for this area of human engineering.

The unit operates ssb or cw, with full coverage of 80 through 15 meters and a 500-kHz segment of 10 meters (28.5 to 29.0 MHz with the crystal supplied). On ssb, PTT or VOX control may be selected by a front-panel switch. This switch may be used for T-R control on cw, or alternatively the VOX position provides "semi-break-in" operation.

Other features include a 25-kHz crystal calibrator, receiver incremental tuning (RIT), an rf gain control which overrides the agc, and a noise blanker. The rear panel has phono jacks for a frequency counter interface and an auxiliary set of relay contacts for controlling an external amplifier or other accessory. The external-speaker jack is also on the rear panel.

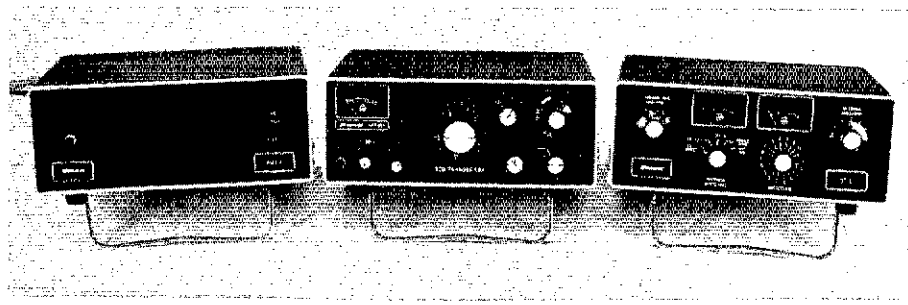


Fig. 1 — The new hf line from Swan. From left to right are the PSU-5 power supply, the 100MX ssb transceiver, and the ST-3 Transmatch. All three units are finished in black semi-crinkle paint.

Some Circuit Observations

The 100MX is completely solid-state. The circuitry employs a wide variety of semiconductor devices including discrete bipolar transistors, JFETs, a dual-gate MOSFET, linear and digital ICs, PIN diodes and an LED. The quad ring doubly balanced mixers are made with discrete diodes.

The familiar single-conversion scheme is used with a 9-MHz i-f and a 5-MHz VFO. The VFO is a permeability-tuned Colpitts (PTO) circuit using JFETs in the oscillator and source-follower stages. The dial drive is stiff but smooth. Stiffness is necessary to ensure stability under mobile conditions. We tested the mechanical stability with several sharp blows to various surfaces of the unit. It was necessary to rap the PTO module itself to cause any frequency shift.

An RC-coupled video amplifier is used in the noise-blanker circuit. The blanker is fairly effective against some types of sharp-pulse noise, such as that generated by modern capacitive-discharge ignitions, and also surprisingly effective against some types of line noise. It was less effective against noise produced by older Kettering ignitions, and useless against the woodpecker.[1] Anyone who builds a circuit that can neutralize the woodpecker without sacrificing dynamic range has a real future in radio! When WIAW (one mile from the test location) was on the air within 60-70 kHz away from desired signals, the noise pulses seemed to be keyed by the WIAW signal, even when the receiver was operating normally otherwise. These deficiencies are not unique to the Swan transceiver. We have seen them in every noise blanker we've tested.

The i-f section uses an 8-pole crystal filter and a high-gain IC amplifier. The agc is audio derived and controls a PIN diode attenuator, the i-f amplifier, and the second gate of the preselector/exciter transistor. This combination achieves an agc figure-of-merit of 6 dB output change for 100 dB of input change, with a control threshold of one microvolt. Whether this much control range is necessary or even desirable is a subject of recent debate (see Rusgrove, "Human Engineering the Station Receiver," January 1979 *QST*). Regardless of its utility, however, the realization of this much loop gain with stability and reasonable transient response is a commendable feat.

[1] [Editor's Note: The "woodpecker" is a pulse transmission frequently heard in the 20-meter amateur band, occasionally in others. The pulse duration and repetition rate create a woodpecker-like sound when the signal is tuned in a receiver.]

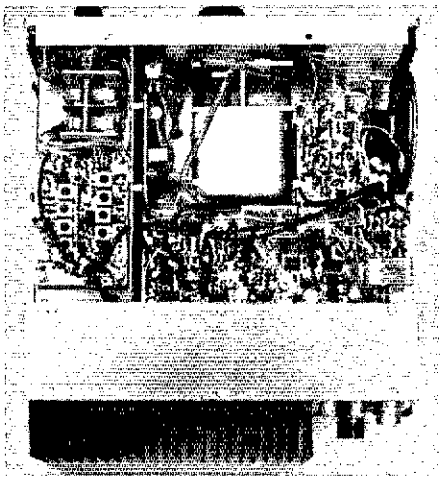


Fig. 2 — An inside shot of the 100MX. The shielded compartment at the rear of the unit houses the power amplifier.

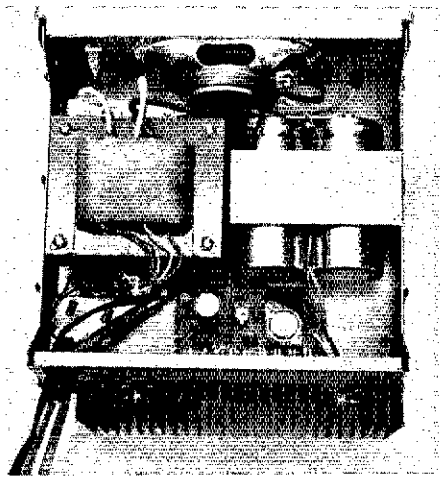


Fig. 3 — The PSU-5 power supply has lots of room for add-on gadgets. Note the ferrite chokes on the ac input.

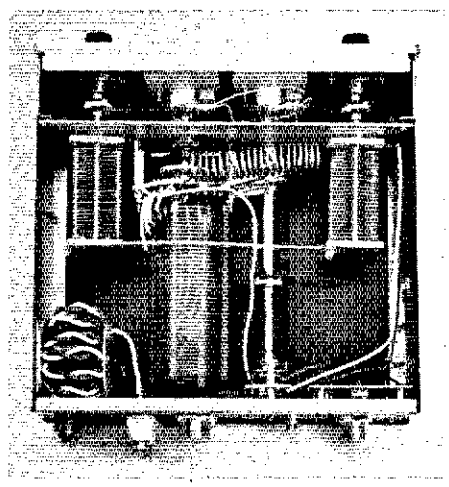


Fig. 4 — Inside view of the ST-3 Transmatch. The tuning capacitors have smooth vernier drives.

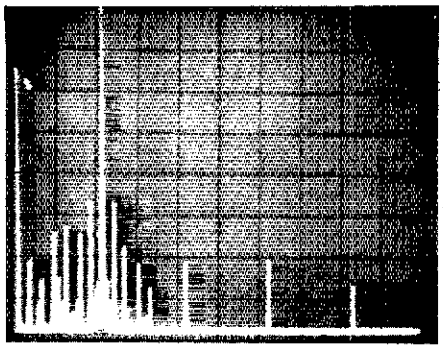


Fig. 5 — Spurious and harmonic output spectrum at 21 MHz. Horizontal scale is 10 MHz per division and vertical scale is 10 dB per division. Reference level is 100 W. The pip at the far left of the photo is generated by the spectrum analyzer. Worst harmonic output is approximately −61 dB, and worst spurious is approximately −47 dB. This complies with current FCC specifications for spectral purity. Tests performed in the ARRL lab.

100MX Manufacturer's Specifications (Typical)	Measured Performance*
Frequency coverage: 500-kHz segments of 80-10 meters.	
Modes of operation: Usb, lsb, cw, with automatic transmit frequency offset and internally adjustable sidetone.	
T-R control: PTT, VOX, semi-break-in cw.	
Power requirements: 12-14 V dc (negative ground), 20 A peak transmit, 130 mA receive (30 mA with lights extinguished).	
Receiver sensitivity: 0.25 μV for 10 dB S + N/N.	0.25 μV for 10 dB S + N/N
Internally generated spurious responses: 1.0 μV equivalent input signal.	14.250 MHz (S4), 21.200, 21.325 (weak) 3.600. (Input terminated in 50 ohms.) All less than 1-μV equiv. input.
Harmonic output: 50 dB below peak output.	61 dB below peak output.
Spurious output: 50 dB below peak output.	47 dB below peak output.
Carrier suppression: 50 dB below peak output.	55 dB below peak output.
Power output: 100 watts PEP.	90-110 watts over frequency range.
Audio frequency response: 300-3000 Hz ± 6 dB.	300-3000 Hz ± 6 dB.

Dimensions: 100MX, ST-3 and PSU-5 all are (HWD) 3-3/4 × 9-3/4 × 11-5/8 inches (95 × 248 × 295 mm).
Weight: 100MX, 13 lb (5.9 kg); ST-3, 7.8 lb (3.5 kg); PSU-5, 18.3 lb (8.3 kg).
Price class: 100MX, $700; PSU-5, $180; ST-3, $170.
Manufacturer: Swan Electronics, 305 Airport Rd., Oceanside, CA 92054, 714-757-7525.
*Verified in ARRL lab.

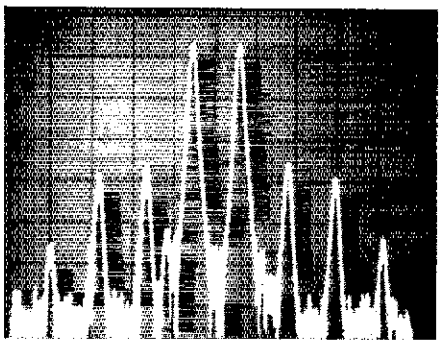


Fig. 6 — Two-tone IMD spectrum in the 40-meter band. PEP output is 100 watts. Each tone is 6 dB below this reference level. The tone frequencies used are 700 Hz and 1900 Hz. Vertical scale: 10 dB/division, horizontal scale: 1 kHz/division. Third-order products are approximately 35 dB below the PEP output.

The preselector/exciter stage has a dual-gate MOSFET with tuned input and output circuits. Band switching is accomplished with PIN diodes. The peaking capacitor is controlled by a ball drive that feels smoother than the VFO! The control gate of the transistor is activated by the age on receive and by the alc on transmit.

Push-pull MRF458s are used in the final power-amplifier stage. The driver uses push-pull MRF433s. The two predriver stages are single-ended. Use of heavy feedback and ferrite transformers allows the power-amplifier assembly to cover the entire hf range without adjustment. Band-switched output filters assure good spurious and harmonic suppression. The 15-meter spectrum shown is the worst case we could find.

To operate properly, this system needs to see a 50-ohm resistive termination. A mismatched load will degrade the attenuation of the filters as well as possibly subjecting the output devices to excessive voltage. A directional coupler at the output detects a load mismatch and causes the alc loop to reduce the drive to the amplifier, preventing damage.

A single power transistor and diode network regulates the final and driver idling current. It would seem that better overall linearity could be obtained with independent bias controls. The transistors share a common heat sink, however, so thermal tracking isn't a problem. The IMD spectrum photograph clearly shows the linearity to be adequate.

Mention of the heat sink raises another point. Normal voice operation is of fairly low duty cycle, so the fins remain below skin-scorching temperature. Similarly, short transmissions of medium-speed cw cause no problems. However, the use of a speech processor, or even talking the unit too far beyond the alc threshold, can cause the amplifier to generate more heat than the cooling fins can dissipate. An excursion into the Novice band exerts a similar hardship because of longer key-down periods. For RTTY and SSTV service, Swan recommends reducing the power output to 50 watts and cooling the heat sink with a fan. Such an arrangement is easy to implement. A dc fan can be connected between the 12-volt accessory output and the auxiliary relay contact. An automotive accessory fan is suitable for this purpose.

Now that transistors have taken over the world, it's socially acceptable to admit that they *don't* last forever. It has recently been shown that the thermal resistance of silicon and beryllium oxide increases with temperature. In other words, the hotter it gets, the hotter it gets! This means that the actual thermal fatigue of a power transistor is much greater than would be expected from a constant thermal resistance. This increased thermal fatigue results in lower mean time before failure (MTBF) expectancy. (See Johnsen, "When Will Your RF Power Transistor Really Fail?", *r.f. design,* November/December 1978.) The point of this discussion is to emphasize the importance of proper cooling for solid-state amplifiers. The transistors in the 100MX or any other rig won't last forever, but if operated sensibly they should certainly outlast several sets of sweep tubes.

While the 100MX power amplifier is well shielded, the transceiver as a whole is not. The top and bottom covers are painted where they contact the chassis, and their long gaps allow rf leakage. Fortunately, the use of toroidal inductors and liberal bypassing confines most of the fields within the enclosure, and the unshielded circuits operate at low levels. In all fairness we must report that no TVI was noticed, even with the rig operating on the same table with a plastic-enclosed television set. If you should experience TVI in fringe areas, however, the first thing to try is scraping the paint off the cover contact surfaces. The 100MX is by no means the most difficult transceiver to correct in this regard. Some rigs have large sections of their enclosures made of *plastic!*

Impressions

The 100MX is well constructed. We didn't operate mobile with it, but it did survive several journeys over the corduroy roads of the Hartford area in the trunk of the reviewer's rough-riding car. The photos tell the packaging story. The pc boards have a high component density, but servicing isn't difficult. We had two opportunities to demonstrate this fact. As received, the test unit had a frequency offset problem; that is, it wouldn't transceive. The problem was traced to a faulty eyelet on the RIT board. The fact that we were able to quickly troubleshoot the unit without the manual is a positive comment on the intelligent board layout and labeling. Swan informs us that only a small pilot run of transceivers used eyelets for pc board connections.

Operating the 100MX is generally a pleasant experience. Tune-up (into a 50-ohm load) is simply a matter of peaking the preselector control and setting the mic gain for proper drive. *It is very important to turn off the crystal calibrator before transmitting.* The 25-kHz square wave is injected into the input of the preselector/exciter stage. If the calibrator is left on during transmit periods, the transceiver becomes a veritable comb generator! Although the operator is expected to use good sense, this potential hazard could have been avoided by routing the power for the calibrator through the T-R relay on the exciter board. This is one of the very few engineering oversights we noticed, and it could be easily corrected.

The internal loudspeaker, similar to those in imported rigs, is the limiting component in the audio system. It is a half-watt speaker in a transceiver capable of blasting out four watts of audio. The speaker enclosed in the external power supply cabinet is high fidelity by comparison.

We made contacts on five bands with the 100MX, and all stations reported good voice quality. The high receiver sensitivity proved useful one night when the atmospheric/local

noise level dropped so low that hour-long QSOs were had with stations too weak to move the S meter. Similarly, good reports were had on cw. The keying envelope was classically clean as long as we didn't exceed the 100-watt output level. Beyond this point, the envelope became pear-shaped. We speculate that this is a manifestation of power supply transient response or alc attack time.

The 2700-Hz i-f bandwidth is, to say the least, wide for most cw work. Undesired strong signals in the passband actuate the age, and weak signals that would ordinarily be readable, even with the interference, are lost. The desire to improve the cw reception caused us to reach for the soldering iron again. The 100MX has audio-derived age, so an audio filter installed before the age detector should solve the desensing problem. It did, but the i-f amplifier was subject to blocking on strong signals outside the audio/age passband but within the i-f passband. This exercise demonstrated that the proper place for selectivity is ahead of the major gain block. It would be a simple matter to apply the technique of crystal bypassing to the transistors on either side of the ssb filter. (See Schultz, "Cw Selectivity with Crystal Bypassing," *Ham Radio*, June 1969.) The purpose of reporting these investigations is to suggest that the 100MX is far more than a toy for appliance operators. It can be an excellent vehicle for serious experimenters as well.

The PSU-5 AC Power Supply

For ac operation, the 100MX transceiver needs an external power supply. The PSU-5 satisfies the requirements of the 100MX and the other solid-state Swan transceivers. The PSU-5 is rated to deliver 20 amperes intermittently and 10 amperes "semi-continuously" at a nominal 13.8 volts. Swan defines semi-continuous operation as eight hours out of 24. When we ran it at eight amperes for four hours it got *awfully* hot and the plastic foam used to damp cover/transformer vibrations started emitting a nasty odor, but it still played. Our conclusion is that it probably would survive eight hours at 10 amperes, but if you *must* use it in that type of service, we recommend removing the top cover. Swan recommends a fan. The loudspeaker in the PSU-5 has a good response for voice communications. The resonant frequency of the speaker in the enclosure is 195 Hz. There is ample space on the front panel for a headphone jack, and the lack of one is a real disappointment. But this is no serious matter. The addition of this "convenience" feature is something even an appliance operator should be able to handle. If the user desires an outboard audio filter, there is plenty of room to mount one in the PSU-5. The power-supply circuitry is conventional. With no load and 117 V ac input, the power consumption is 30 watts. At eight amperes of load current, the consumption is 275 watts, for an efficiency of 40 percent. The PSU-5 has ferrite chokes in the ac input leads. This filtering method is not the most effective, but it is certainly a step in the right direction, and there are economics to be considered here.

The ST-3 Transmatch

Like all solid-state rigs, the 100MX requires a 50-ohm nonreactive termination for efficient power transfer. This condition is sometimes difficult to achieve with real antenna installations. The ST-3 Transmatch rounds out the new Swan line of miniature hf equipment. Rated to handle 200 watts PEP, the ST-3 is capable of transforming most antenna systems the amateur is likely to use, so that they match the transceiver.

A standard T network is used in the ST-3. A front-panel rotary switch selects one of 18 taps on the inductor. Final matching is accomplished by adjusting two variable capacitors. Separate meters for "forward" and "reflected" power grace the front panel. Individual meters are a great convenience for rapid and confident tuning. In our review unit, the power readings were in close agreement with a Bird model 43 wattmeter. The meters can be illuminated, too, with power from the 100MX.

A front-panel switch on the ST-3 selects one of five outputs. The rear panel has three SO-239 connectors, one of which is for straight-through operation (such as to a dummy load). Ceramic binding posts are provided for single-wire and balanced feeders.

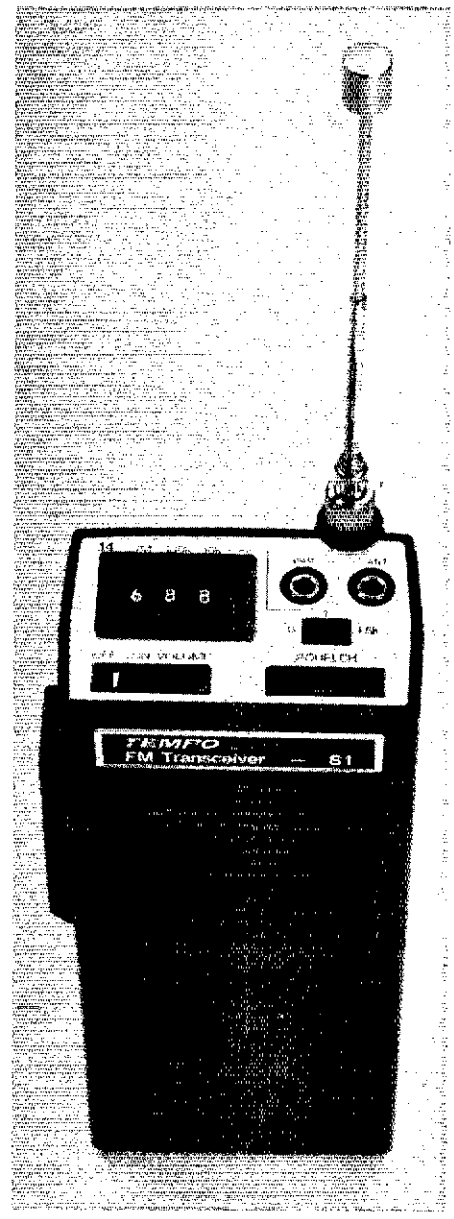
The balancing act is performed by a ferrite-core toroidal balun. We tested the balanced output on 80 meters with a 100-ohm resistive load. The loss, including matching network and balun, was 0.8 dB, and the imbalance was 1.6 dB. The effect of the imbalance is to allow some feed-line radiation. This is of little consequence unless one is feeding a highly directive array. The loss and balance figures may well improve at higher frequencies, because of higher winding reactance. We couldn't measure this with confidence because the loading effects of the test instrument increased with frequency.

An often-overlooked application of this type of Transmatch is as an interface between a solid-state transceiver and a cathode-driven linear amplifier. The input impedance of such an amplifier is a dynamic parameter, varying with the drive level. The effect of this variation is to increase the distortion in both the amplifier and the exciter, particularly if the latter is solid-state. If one is planning to build an amplifier, the input tuning network can be omitted if a Transmatch such as the ST-3 is available. The improved power transfer may allow the transceiver to be driven more lightly, further improving the system linearity.

By itself, the Swan 100MX is an efficient way to go mobile on hf. With the matching accessories, it is a versatile fixed station. Most of the test operating was done on the dining-room table, and the ability to assemble or dismantle and remove the system at a moment's notice was a great asset. The implications for portable and emergency operation are obvious. Not too long ago, the level of performance available from the new Swan series could be had only from large heavy boxes on a dedicated bench. Here's to progress! — *George Woodward, W1RN*

HENRY RADIO TEMPO S1 SYNTHESIZED, HAND-HELD FM TRANSCEIVER

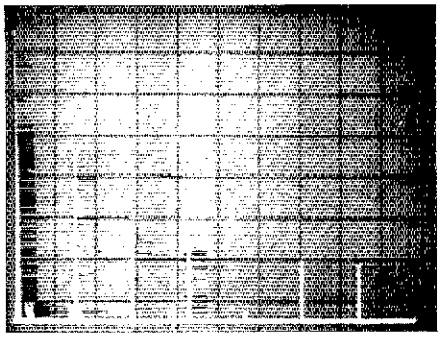
"A high neatness coefficient!" That's the phrase that popped into mind as I enclosed the Tempo S1 2-meter rig in my hand. The dimensions (HWD) are 6.5 × 2.5 × 1.6 inches (165 × 64 × 41 mm) and the weight is a mere 16 ounces (450 grams). I asked myself, "How could anything this small and lightweight have so many features?" What features? Well, how about full-frequency synthesis from 144 to 148 MHz? The built-in synthesizer provides 800 channels — one every 5 kHz. Thumbwheel encoding switches are located on the top end of the transceiver. A slide switch to the right of the thumbwheels can be moved left or right to provide 0- or +5-kHz splits. Another slide switch (located on the lower rear of the plastic case) permits simplex operation, +600-kHz separation or −600-kHz separation of the transmit and receive frequencies. This makes the unit compatible with reverse repeater pairings which are found above 147 MHz, or with the "normal" pairings below 147 MHz.



The Tempo S1 hand-held is quite small compared to many of the units currently available on the amateur market — especially when you consider that it contains a complete synthesizer! Too bad space limitations dictate a miniature phono jack for the external antenna connection; a BNC would have been much nicer!

A red LED illuminates during the transmit mode. Additionally, it glows during receive periods when the batteries (8-cell NiCad pack) need to be charged.

The Tempo S1 is suitable for mobile operation because it has an external-antenna jack (50 ohms) and a charging-voltage jack. However, the built-in 9.6-volt battery pack is capable of



Output of the Tempo S1 as displayed on a spectrum analyzer. Vertical scale is 10 dB per division, and horizontal divisions are each 100 MHz. The top reticle line in the photo represents full amplitude of the fundamental, which is partially notched out here (approximately 33 dB) to prevent overload distortion in the analyzer. The most significant spurious emission is the second harmonic, down about 53 dB with respect to the full scale fundamental. All other spurs are down at least 56 dB. The S1 meets current FCC regulations concerning spectral purity. Measurements taken in the ARRL lab.

Henry Radio Tempo S1 FM Transceiver

Frequency range: 144-148 MHz fm.
Frequency generation: PLL synthesizer.
Frequency resolution: 800 channels, 5-kHz intervals.
Deviation: ±5 kHz.
Rf output: 1.5 W nominal.
Receiver sensitivity: Better than 0.3 μV for 20 dB SINAD.
Selectivity: 80 dB for ±30-kHz points.
Dimensions (HWD): 6.5 × 2.5 × 1.6 inches (165 × 64 × 41 mm).
Weight: 16 ounces (450 grams).
Power requirements: 9.6 V dc, 400 mA on transmit, 17 mA during receive (squelched). Uses 8-cell NiCad pack.
Audio output: 0.5 watt with less than 10-percent distortion.
Price class: $350 without Touch-Tone pad; $400 with.
Distributor: Henry Radio, 11240 Olympic Blvd., Los Angeles, CA 90064, 213-477-6701.

many hours of use, as the receiver draws only 17 mA during standby (squelch actuated). During transmit the battery drain is 400 mA. The battery pack has a 250-mAh capacity. The S1 is sold with a mating ac charger/adaptor. Charge time for an uncharged NiCad pack in this transceiver is 10 hours. A cigarette-lighter plug-in charger (TS-MC) is sold by Tempo as an accessory.

Other accessories are the TS-HA (helically-wound antenna), TS-CC (leather case), S30 (30-W amplifier) and S1T (12-button Touch-Tone pad). The unit comes equipped with a telescoping whip antenna.

I was astonished at the receiver sensitivity of the S1. It has been some five years since I had the occasion to play with an assortment of hand-held fm rigs that were then considered state of the amateur art. In those days, receiver performance ranged from adequate to "stinky," depending on the brand and price class. But when I turned on the S1 inside my aluminum-sided house and heard repeaters 50 miles distant coming through at "full quieting" I was thoroughly impressed. The measured 1.6 watts of transmitter output power was not enough to key some of the repeaters heard so well, let alone operate through them! This proved to be a psychological handicap until I became used to the phenomenon. But a proper mating of the unit transmitter and receiver performance would be realized if a suitable outdoor gain antenna were employed, or if a power "brick" were added to the transmitter.

Once the deviation was adjusted for my voice characteristics I received numerous reports of excellent voice quality. Some operators were heard to say, "Boy, that sounds like a fixed station rather than a hand-held!" Similarly, the audio from the receiver was loud and without detectable (by ear) distortion.

The accompanying spectograph indicates that the transmitter complies with current FCC regulations for spectral purity. A laboratory check of the receiver sensitivity indicated that 20 dB of quieting occurred at 0.2 μV of signal — somewhat better than the advertised specification of 0.3 μV for 20 dB SINAD. No IMD products were heard in the receiver on any channel during two months of use. The notable exception was that when WIAW (2 blocks from my home) was transmitting code practice and bulletins on 2 meters, some signal "blips and blurps" could be heard on quiet repeater frequencies. However, as soon as the repeaters were activated, no trace of WIAW could be detected.

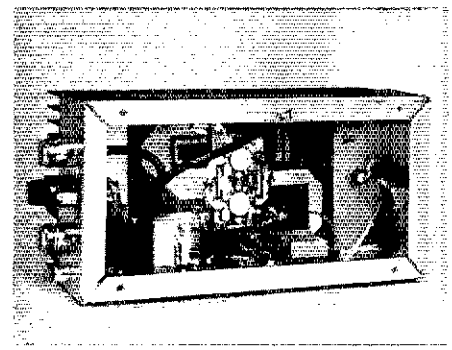
One problem that cropped up after several months of use was a scratchy volume control. Because of the thumbwheel-control knob design in the S1, it seems that dirt can filter down through the case and enter the potentiometer. When this happened in the review model, the audio became scratchy and at times intermittent. The fix was quick and simple. The case was disassembled and a shot of TV tuner spray was used on the scratchy control. This cleared up the audio problem, but not permanently, as dirt will continue to sift down through the top of the case and into the volume potentiometer. Perhaps a little care and an occasional cleaning is all that is necessary to ensure that dirt stays where it belongs — *outside* the hand-held!

The only feature that seems to be missing from the S1 is provision for an external microphone with PTT capability. This would be a worthwhile addition, especially for mobile use. In its present form, the unit must be raised to the operator's face to permit using the speaker as a microphone. The price of this hand-held transceiver may seem a bit inflated, but the frequency capability and good performance tend to balance the scales somewhat. — *Doug DeMaw, W1FB*

KLITZING 70CM10W60 UHF AMPLIFIER

The model number of this new linear amplifier tells it all. Klitzing's 70CM10W60 is designed for use in the 70-centimeter band, and provides 60 watts of output power for 10 watts input.

On the outside, the Klitzing amp looks much like any other "black box" with a finned heat sink. However, the *real* story lies *inside* the aluminum enclosure. Removal of the four sheet metal screws allows the bottom cover to be taken off. The photo shows the neat stripline layout and other components nestled inside.



The Klitzing 70CM10W60 power amplifier for 432 MHz. The unit is shown here with the bottom cover removed. At left are the input and output N-type connectors, two-prong power connector, transmit line jack (RCA-type phono) and fuse holder. The switch mounted on the front panel (right) allows the user to switch the amp in or out of the line. Just visible to the right of the relay is a small pc-mount potentiometer that controls the rf-VOX circuit dropout time.

A single stage of amplification (two MRF644 or similar transistors in parallel) provides between 7 and 8 dB gain. Class AB bias provides linear operation, allowing all-mode utilization of the amplifier. T-R switching can be manual or automatic, as the 70CM10W60 has both an rf sensing circuit and an auxiliary transmit-keying line. The rf VOX circuit requires a minimum of 1-watt input to function.

Operation

The Klitzing unit was quite easy to install in my existing 432-MHz station. Initial tests indicated a full 60-watt output with 10 watts of drive from an MMT 432/28S. The Klitzing output was checked for purity on a spectrum analyzer and found to be relatively clean. (There are no specific FCC regulations pertaining to the purity of emissions from transmitters or amplifiers operating above 235 MHz.) The spectral photograph was taken with the amplifier putting 60 watts into a 50-ohm load. A 10-watt driver was used and an interdigital filter was inserted between the exciter and amp to ensure a clean drive signal.

The amplifier was used intermittently for several months, and finally received the "torture test" during the January 1979 VHF Sweepstakes. While most of us in New England received a good coating of ice on our antennas that weekend (mine certainly had their share), the amplifier never stopped operating, even though I'm sure the SWR must have been quite high. The amplifier did get good and warm, and finally began to cycle briefly after every transmission, the rf VOX circuit tripping a few times before shutting off completely. This was attributed to rf feedback inside the amp caused by the high SWR on the feed line. After the contest was over and conditions returned to normal (some contesters swear this never happens), the Klitzing began functioning properly again.

Concluding Remarks

The Klitzing 70CM10W60 certainly should

be considered by those uhf-ers who are shopping for commercial power amps for 432 MHz. This unit is one of the newest entries in a small but growing equipment class. The amp also should be a nice addition to existing 440-MHz fm stations, or ATV setups. A brief mention of the instruction sheets is warranted. Although the pertinent paperwork we received was a little on the short side, it was to the point and included the all-important "problems" information. This 1-1/2-page text detailed solutions to the difficulties most often encountered by neophytes, thus making installation and operation of the Klitzing almost foolproof. A warranty registration, list of specifications, schematic diagram and a page of standard "how to use" information complete the instruction set. — *Jim Bartlett, K1TX*

Klitzing 70CM10W60 432-MHz Linear Amplifier

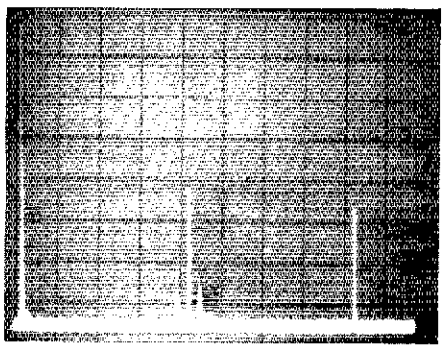
Claimed by Manufacturer

Power output: 60 watts, at 10 watts input.*
Power input: Up to 15 watts (maximum).
Gain: 7 dB minimum.*
Input/output impedance: 50 ohms.
Rf VOX sensitivity: 1 watt input.*
Nominal drive power: 10 watts.
Power requirements: 13.8 V dc, 7 A nominal.*
Supply-voltage tolerance: 12-15 V dc.
Maximum duty cycle: 50 percent.
Frequency range: 420-450 MHz.**
Dimensions (HWD): 3.5 × 4 × 9.5 inches (89 × 102 × 241 mm).
Weight: 2.31 lbs (1.05 kg).
Price class: $200; dc power cord included.
Manufacturer: Klitzing Electronics, 5300 Trio Court, Fremont, CA 94538, 415-651-8473.

**Confirmed in ARRL lab*

Power output: 60 watts.
Gain: 7.7 dB.

***All measurements made at 432 MHz.*



The spectral output of the Klitzing 70CM10W60, as viewed on a spectrum analyzer. The photograph was taken with the amp running 60 watts output at 432 MHz. A 10-watt exciter and interdigital filter were used to ensure relatively clean drive. Vertical divisions are 10 dB; horizontal divisions are 100 MHz. The second harmonic is down 46 dB with respect to the full-scale fundamental, which was attenuated approximately 42 dB by a two-cavity notch filter to prevent overload distortion in the analyzer. The close-in spurs were not generated by the amplifier. These originated in the exciter and were amplified along with the fundamental.

CUSHCRAFT ATB-34 ANTENNA

The ATB-34 is a triband beam covering 20, 15 and 10 meters while using a single feed line. The performance of any triband beam is based on several points. Probably the most important consideration as far as gain (and front-to-back ratio) is concerned is the element spacing. What may be optimum spacing for 20 meters certainly would not apply on 10 meters. For example, 20 and 15 can be set up for reasonable performance, or 15 and 10, but not *all* three with any expectation of theoretical gain. (As you may know, the ARRL does not permit antenna manufacturers to publish gain figures in *QST*. The reason for this policy is simply that at the present time, there are no provisions at ARRL hq. to accurately verify such claims.)

One way around the problem of element spacing is to shoot for two bands with optimum spacing and then improve the third band by adding an element. This is what Cushcraft did — they added a separate reflector for 10 meters to improve performance there.

Another criterion in triband beam design is that all ohmic losses should be kept at a minimum. This means the largest possible conductors with the least lossy capacitors in the traps. Cushcraft overcomes this problem by using no. 10 wire in the traps in conjunction with low-loss capacitors. One other important consideration in the design of triband arrays is the overall element length. There is an old saying in Amateur Radio that one should make the antenna as large as possible and put it as high as possible and if it stays up, it was not high enough or big enough! In the ATB-34, longer element lengths are achieved using minimum but feasible coil inductance in the traps.

Physical Description

There are three active elements on each band, plus an optimum-spaced reflector on 10 meters. The overall array length (boom length) is slightly less than 20 feet (6 m), made up of sections of 2-1/8- and 2-inch (54- and 51-mm) OD aluminum tubing, 0.058-inch (1.5-mm) wall. The reflector starts off with 1-1/4-inch (32-mm) OD stock and tapers down to 5/8-inch (16-mm) OD at the ends. The same stock sizes hold for the other two trap elements.

A rugged boom-to-mast fixture is provided. The driven element is a split dipole fed with 50-ohm coaxial cable through a balun.

Some Conclusions

Our primary gripe was one of packaging. An awful lot of time was spent just sorting out the hardware and elements. In our opinion, even if the manufacturer has to up the cost slightly, better identification of the element tubing and labeling of the hardware would be worthwhile. However, we have to admit, we've seen few antenna manufacturers come up with what could be called good or well-written instructions.

On the plus side, the ATB-34 doesn't take a back seat as far as on-the-air performance is concerned. The SWR measured better than 2:1 across both 20 and 15 meters, reaching 1:1 at the center design frequency. (The antenna can be tuned for the low, middle or high segments of the bands.) The SWR on 10 meters was less than 2:1 from 28 to 29 MHz on our model. The antenna weighs 42 pounds (19 kg) and the price class is $260. The ATB-34 is manufactured by Cushcraft Corp., P. O. Box 4630, Manchester, NH 03108. — *Lew McCoy, W1ICP*

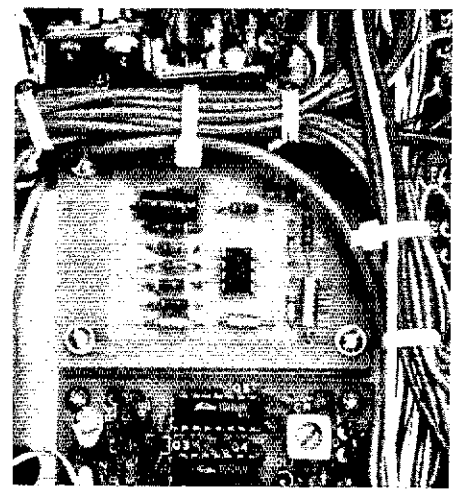
KLITZING SSB-1 SQUELCH BOARD

Ever wished your multimode 2-meter rig had squelch capability in the sideband mode so you could listen for band openings, and so on? Here's a product that may interest you. The Klitzing SSB-1 is a small kit of components and printed circuit board that can be assembled and installed inside a Kenwood TS-700 and many other multimode rigs. After installation is completed, the squelch circuit is functional on both fm *and* ssb/cw. This allows you to set the squelch threshold at the point where signals significantly stronger than the noise level will break audio silence.

The pc-board kit is quite simple. The time required for total assembly and installation of our sample kit in a Kenwood TS-700A was less than an hour. No modification to the front panel is required, as the circuit makes use of the existing squelch control. The operation varies slightly with different rigs, but basically the SSB-1 uses age voltage from the product detector as a reference. As you might guess, this means that signals must be strong enough to move the meter if they are to be expected to break the squelch.

This type of operation is fine if you just want to keep the rig turned on so you can hear your buddies when they call on sked, but for weak-signal work it may leave something to be desired. Unfortunately, if a band opening *did* occur and you happened to be "listening" for it with the SSB-1 squelch activated, you could conceivably miss a good portion of the usable opening simply because the signals never reached the level necessary to break the squelch.

Nevertheless, the SSB-1 *does* function very well as intended, and should provide added versatility to any existing multimode rig, if installed properly. Those operators who own TS-700s (all models), 600s, FT-221s, FT-225s, IC-245s, IC-211s, or Multi-2700s should be able to install the SSB-1 using the instructions provided by Klitzing. Owners of other multimode transceivers should contact Klitzing before ordering to determine whether or not the SSB-1 can be used with those rigs. The SSB-1 kit is in the $30 price class, and is manufactured by Klitzing Electronics, 5300 Trio Court, Fremont, CA 94538, 415-651-8473. — *Jim Bartlett, K1TX*



The SSB-1 board is shown here as installed in a Kenwood TS-700A.

Hints and Kinks

ACCU-KEYER MODIFICATION CURES INITIAL-CHARACTER TRUNCATION

Severe truncation of the initial character following a reset of the clock became a problem that plagued my CMOS version of the WB4VVF Accu-Keyer (January 1976 *QST*). A nuisance at low keying speeds, the situation was untenable at speeds in excess of 20-25 wpm. The difficulty probably could be attributed to normal variations in component parameters in the clock, particularly those of the transistors. Rather than spend hours in trial-and-error parts substitution, I developed the CMOS IC clock circuit illustrated in the drawing.

U1 is a dual monostable multivibrator, type MC14528, while U2 is a quad dual-input NAND gate, type 4011. Gate U2B could be eliminated with U2C being wired as an inverter by connecting pin 8 of U2 to the +V line. U2B and U2C as connected in the diagram serve to keep the clock interval constant even if the enable line should go high before the end of the clock interval. This shouldn't occur in the Accu-Keyer but could perhaps in some other application. Pin 3 of U1 must be connected to the +V line as indicated, and not to pin 10 of U2, for a deadlock condition could result because of propagation delays. The only connections to U2D appear in the drawing.

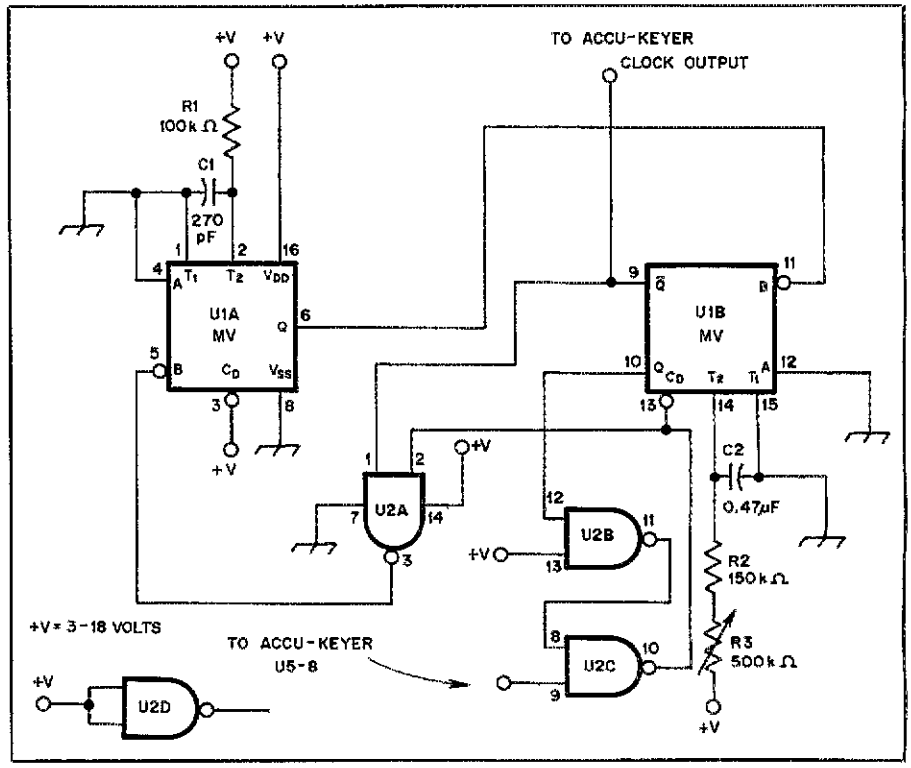
With the time constants shown, the clock generates a series of 10-μs pulses when the enable line to pin 9 of U2 goes low. The pulse spacing varies with R3 and is such that the keying speed range is about 10-50 wpm. The clock period, not the frequency, varies linearly and thus the speed varies inversely with rotation of the potentiometer.

The speed range is compressed at the high-speed end with the compression ratio being proportional to the square of the speed. A potentiometer with an inverse log taper will improve the resolution at the high-speed end.

The running current consumption is comparable to the discrete version while the quiescent current is substantially less. Note that the speed is a function of supply voltage. Therefore, for a uniform keying speed the circuit should be supplied by a fixed source. The speed range in my keyer is for a supply of 6.2 V. For other supply voltages, the speeds scale as $L_n(6.2)/L_n(+V)$ in accordance with the formula for pulse width $PW = 0.2R_1C_1L_n(+V)$.

A CD4098 chip may be substituted for U1, although the time constants may be slightly different. You can use a 74C00 for U2, but that requires a change in pin connections.

Although the cost of U1 is substantially more than the two discrete transistors (about $2), the trouble-free operation of this circuit more than compensates for the price. A source for the CD4098 is James Electronics, 1021A Howard Ave., San Carlos, CA 94070. — *Barry S. Newberger, W5KH, Los Alamos, NM*



This modification of a CMOS version of the WB4VVF Accu-Keyer eliminates truncation of the initial character following a reset of the clock. U1 is a dual monostable multivibrator, type MC14528. U2 is a quad dual-input NAND gate, type 4011.

KEYING AN FT-101EE WITH THE ACCU-KEYER

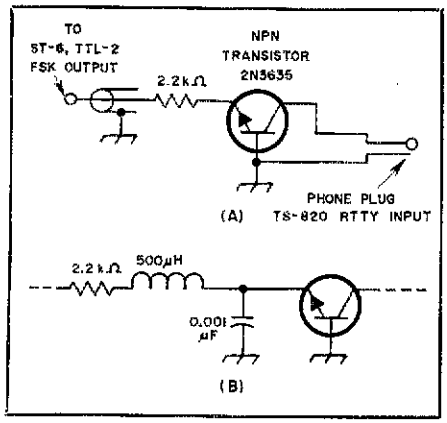
With a helping hand from WB1DHZ, I built the WB4VVF Accu-Keyer for use with my Yaesu FT-101EE. The power output of my transceiver was noticeably lower with the Accu-Keyer than when keyed directly. W1TCJ and WB1DHZ indicated that a likely source of the difficulty was the voltage divider between the output impedance of the keyer and the input impedance of the rig. Changing R10 from 470 to 270 ohms corrected the problem. — *Bob Menton, WB1CWT, Waterford, CT*

RTTY AND THE KENWOOD TS-820

Radio amateurs who are planning to operate RTTY units in conjunction with a TS-820 transceiver, may find this information helpful. The RTTY input jack on the TS-820 may be connected directly to a terminal unit having an RS-232 output or MIL equivalent. The polarity of the MIL standard is in reverse of that of the RS-232 but works well with the TS-820. The effect of using the RS-232 output is that it provides inverted mark and space signals when transmitting. On the other hand, the MIL standard signals are transmitted with standard mark and space frequencies. It is not necessary to use a polar relay when connecting the TS-820 to a terminal that functions with either one of the above outputs. However, a polar relay is required when the TS-820 is operated in conjunction with an older type terminal unit that functions with a 60-mA loop current system. — *John R. Johnson, Customer Service, Trio-Kenwood Communications, Inc., Compton, CA*

To interface an RTTY unit with my Kenwood TS-820, I use the simple transistor circuit shown in the accompanying diagram. Advantages of this interface are that it avoids the purchase of a rather expensive relay, the problems of contact bounce and resistance are sidestepped and the operator does not have to make keying-speed adjustments of the contacts. Furthermore, the cost is under a dollar.

The circuit can be mounted inside the phone plug which connects the RTTY unit to the TS-820. Almost any junk-box variety npn transistor may be installed. I use a 2N3635. Power (13 V) is derived from the RTTY input of the transceiver. Additional power may also be obtained from the output of TTL-2 or ST-6 terminal units. For those situations where rf pickup may affect the shift in the TS-820, the



An RTTY interface for use with the Kenwood TS-820. Any inexpensive npn transistor may be used in place of the 2N3635. The filter circuit at B is recommended where strong rf fields exist near the equipment.

optional filter circuit shown in the drawing may be added. — *J. R. Popkin-Clurman, VE7DVS/W2BK, Ganges, BC*

IMPROVING REPEATER SQUELCH ACTION

While working on the squelch and audio board for a new repeater, I found a technical problem that was resolved in the following manner. The solution may interest fellow amateurs.

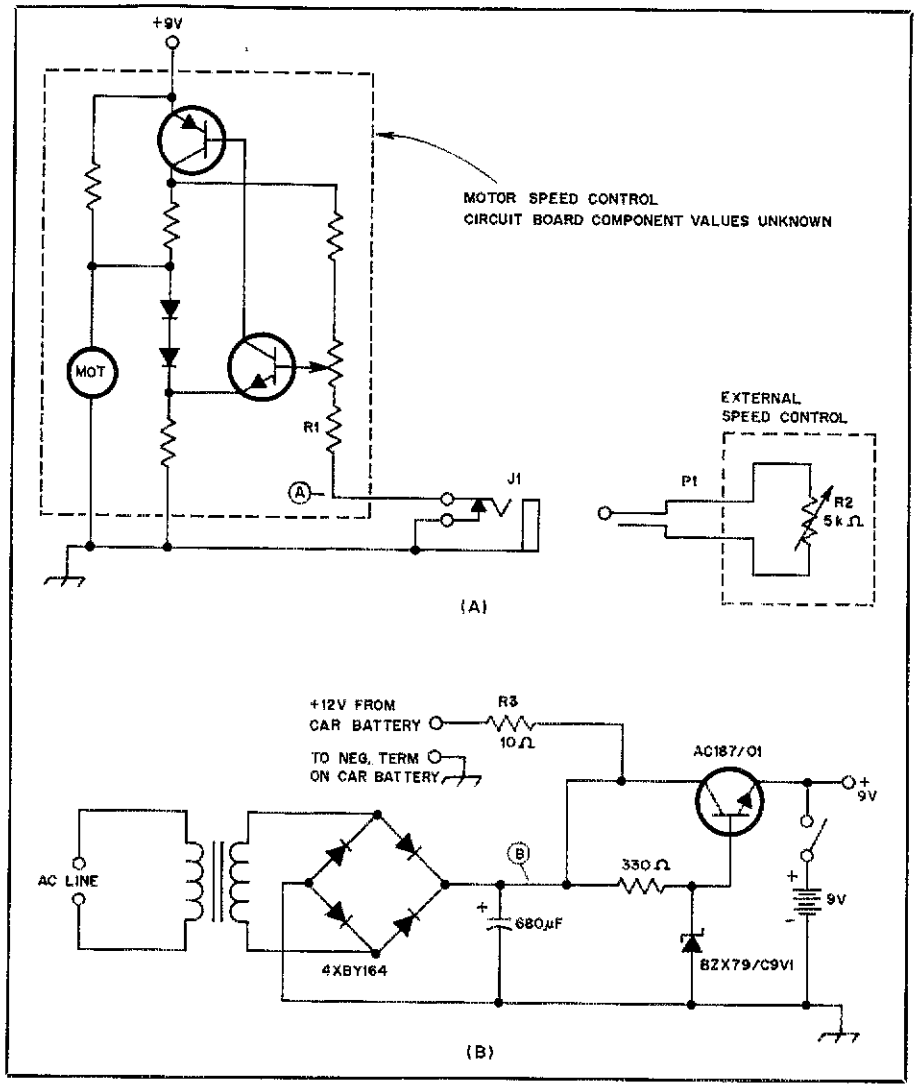
The circuit for this portion of the repeater employed an LM-380 audio-amplifier IC. Squelch action was provided by using a noise amplifier and transistor switch to pull pin 1 of the LM-380 to ground. The presence of a signal released pin 1, which would then "float" above ground by whatever potential is generated within the IC. Normally this pin is also bypassed with a 2-μF electrolytic capacitor. The circuit seemed to work well at room temperature or above, but under cold-temperature conditions the audio signal failed to pass through the IC even though the switch was released. This condition often resulted in the repeater COR actuating without a signal being passed. To correct the deficiency, a 15-kΩ resistor can be connected from pin 1 to the +12-V dc (Vcc) line. This change will effect improved performance at any temperature with more positive squelch action that correlates well with the COR trip point.

A similar circuit is employed in the VHF Engineering series of 2-meter receivers. Some amateurs have encountered much the same problem with these units. Several local owners of VHF Engineering repeaters, however, report success in curing the difficulty by means of this fix. — *Ted VonKampen, WAØVMT, Ogallala, NE*

COMMUTER CODE PRACTICE

PAØWV suggests that commuter driving time is an excellent period for brushing up on code proficiency. To this end suitable practice material can be recorded on cassette tapes and replayed in the car where it is copied by ear. I have gone a step further so that code speed can be matched to growth in proficiency. By adding a speed control I can now double the code speed.

The illustrations show how the motor control is connected to my Philips N2204 recorder.



PAØSE controls the speed of his cassette recorder with the external pot shown in drawing A. J1 and P1 were originally used for an external speaker. Withdrawal of the plug restores the circuit to normal, connecting R1 to common. Illustration B shows how the recorder power supply is adapted for use with a 12-V car battery.

This probably is typical of other makes also. Point A, originally connected to common, is rewired as shown. The connector jack, of the type intended for use with an external loudspeaker, accommodates the speed control circuit. Removal of the speed-control plug restores the recorder circuit to normal.

Because of fairly high current drain required by the recorder, I looked for and found a way to operate it from the 12-V car battery. The recorder has a voltage-stabilizer circuit (see the drawing) which is used when the recorder is fed by ac. Point B carries about 11 V. Additionally, R3 limits the current to a safe value in case something goes wrong in the stabilizer.

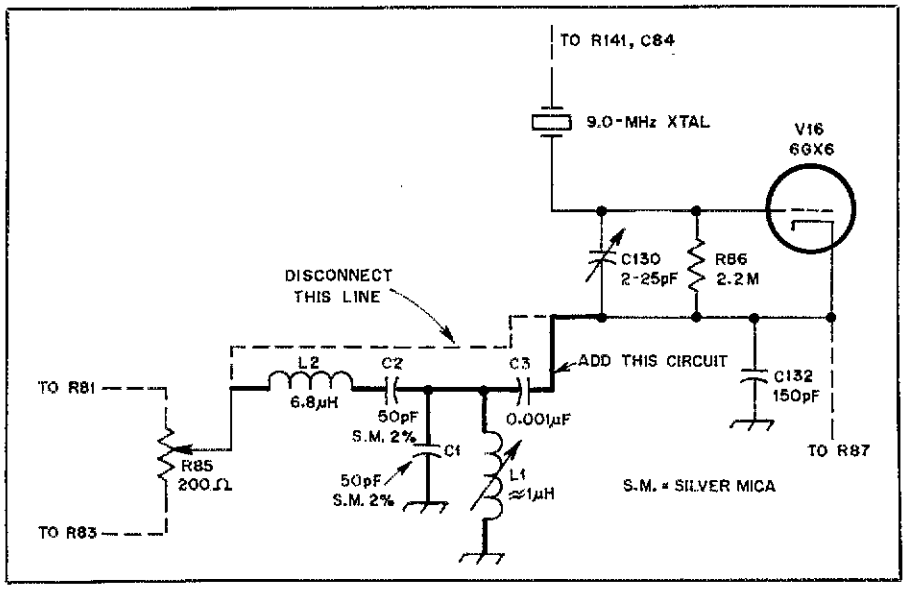
The car battery is connected to the recorder by way of a free pin on one of the multipin sockets. This contact is intended for remote control of the recorder from the microphone. — *Dick W. Rollema, PAØSE, Leiderdorp, The Netherlands*

DRAKE TR-4 TVI PROBLEM SOLVED

I've experienced a TVI problem with my Drake TR-4. For the benefit of others who may have this difficulty, I wish to offer my explanation of the cause and cure.

Problem: Harmonic interference appeared on TV channel 2 when my TR-4 was operating on 14 MHz and on channel 4 when the transceiver was on 21 MHz. Use of a low-pass filter at the output of the transmitter and high-pass filters on the TV sets partially eliminated the TVI. Further steps had to be taken for a complete cure.

Cause: Strong radiation on the 2nd, 3rd and 4th harmonics was noted. A low-pass filter effectively reduced interference received via the transmitting antenna. With the help of a search loop and spectrum analyzer, I established that undesirable harmonic radiation was coming from the chassis. Further investigation disclosed the presence of relatively strong harmonics at the grids of the 6JB6 final amplifiers. These unwanted signals passed right through [or perhaps *around* — Ed.] the 9.0-MHz sideband crystal filter. Correcting this condition and eliminating harmonic content in the final amplifier by adjusting the amplifier for proper linearity brought the matter to a successful conclusion.



This filter circuit is designed to eliminate TVI from Drake TR-4 transceivers. The heavy lines show circuit changes.

Harmonic Radiation from Drake TR-4

	f_o	$2f_o$	$3f_o$	$4f_o$
Before Modification	0 dB (ref)	−38 dB	−42 dB	−43 dB
After Modification	0 dB (ref)	−55 dB	−60 dB	−60 dB

Cure: Oscillator distortion was corrected by installing a 9.0-MHz parallel-resonant circuit from the wiper of the carrier balance potentiometer to the cathode circuit of V16. This circuit is tuned to approximately 9.0 MHz with the aid of a dip oscillator. Final adjustment is accomplished by observing an oscilloscope connected to the grids of the 6JB6 amplifiers while tuning for maximum amplitude. The transmit-gain potentiometer should be set in the linear region (about the nine o'clock position) for this adustment. Realignment of the 9.0-MHz oscillator according to instructions in the Drake manual is also required.

Linearizing the final amplifiers is done simply by providing for additional cathode degeneration. To do this merely remove the 470-pF capacitors from pin 3 of the 6JB6 amplifiers. The power reduction is not noticeable.

Results: Harmonic radiation from my TR-4 was reduced on 14 MHz as indicated in the table. Measurements were taken at the output connector. — *J. H. Mehaffey, Vice-President, Engineering, Solid State Systems, Inc., Marietta, GA*

LIGHTNING PROTECTION AND WEATHERPROOFING FOR COMMUNICATIONS INSTALLATIONS

Lightning arrestors minimize lightning risk to costly two-way radio equipment such as receiver front ends, transmitter final amplifiers and harmonic filters. The Motorola Communications *Buyers Guide* lists several protective devices that should interest the radio amateur. These include type uhf and N coaxial arrestors, ac-line surge protectors, and control-line protectors, in addition to grounding-clamp kits. The latter, constructed of stainless steel, are essential on two-way communications equipment where there may be a risk to equipment or personnel from shock or lightning.

Other useful items include Duxseal, an all-purpose, weatherproof, corrosion-resistant sealing compound for indoor-outdoor caulking of conduit, antenna lead-ins, journal boxes and other devices. Motorola offers a plastic cold-weather electrical tape with vinyl backing which will not crack or split, remaining flexible at below freezing temperatures. It forms a tight, moisture-proof seal.

To seal out moisture on N and uhf fittings, Motorola also has a special silicone grease that fills connector voids. Not to be overlooked are two sizes of heat-shrinkable tubing for weatherproofing 1/2-in. Heliax or other coaxial lines and 7/8-in. Heliax. — *Paul Grauer, WØFIR, Wilson, KS*

SPRING CLIP ELIMINATES HEATING/COOLING-SYSTEM STATIC

Erratic electrical discharge noises that bothered reception at my station were traced to the blower system of my heating/cooling system. These short but annoying static bursts apparently were caused by friction somewhere between the electric motor, the V belt and the blower. I cured this aggravation by grounding the motor shaft via the bearing cap as shown in the accompanying drawing. I formed the clip from piano wire. Rubber shock washers apparently had prevented proper grounding of the motor casing.

Anyone who desires to use this method to solve a similar problem should heed this advice. Electrically disconnect the motor before commencing any work on the blower to avoid an accident. — *Keith P. Johnson, WD8JZC, Medina, OH*

CALCULATING UNKNOWN L OR C VALUES

Even seemingly complicated formulas often can be reduced to familiar and workable terms. With reference to the method of using rf noise generated by a calculator to find unknown L and C values ("Hints and Kinks," August 1978 *QST*), consider the following formula. This reduction of the standard formula makes possible the plugging of numbers into the simplest of 4-banger calculators to determine unknown L or C values:

$$\text{Unknown L or C} = \frac{25280}{\text{known L or C} \times (f_{MHz})^2}$$

where
f_{MHz} = MHz
L = μH
C = pF

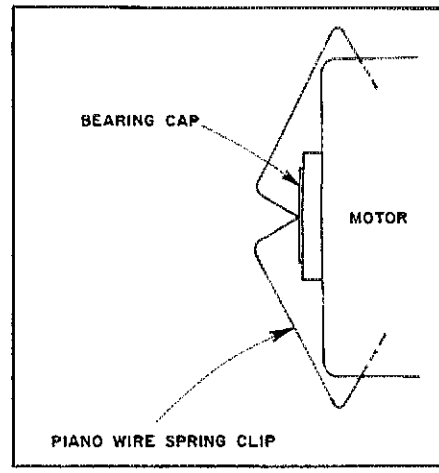
Something familiar about that numerator? Yes, for easy recall, simply remember that it has a 2 followed by the equivalent of the number of feet in a mile. To use the formula with your calculator make these entries: 25280 ÷ known L or C ÷ f_{MHz} ÷ f_{MHz}. That's all there is to it. I use the same formula for calculating parallel and series trap components of homemade antennas. — *Ed Stegmann, KA2CEQ, Tuxedo Park, NY*

[Editor's Note: The above method provides a close approximation to the exact answer, within 0.2 percent. For higher accuracy, use the harder-to-remember value 25330 in the numerator.]

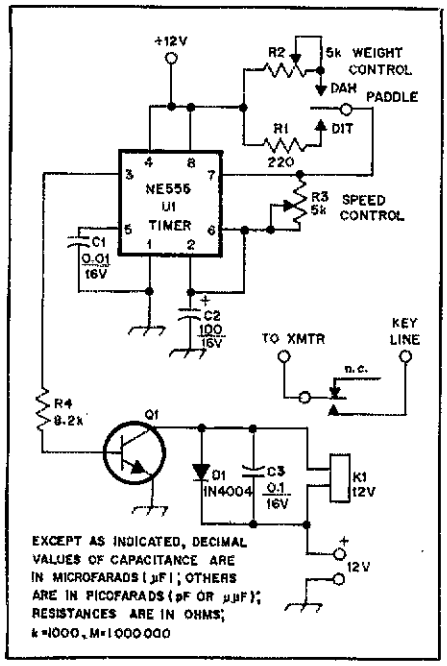
A KEYER THAT'S EVEN SIMPLER

Over the years I have seen a number of keyer circuits in Amateur Radio publications including *The Radio Amateur's Handbook*. Among all of these, it was Andy King's article, "Build the World's Simplest Keyer," appearing in the May 1977 issue of *73* that stirred me to action. I was attracted by Andy's uncomplicated circuit using an NE555 chip.

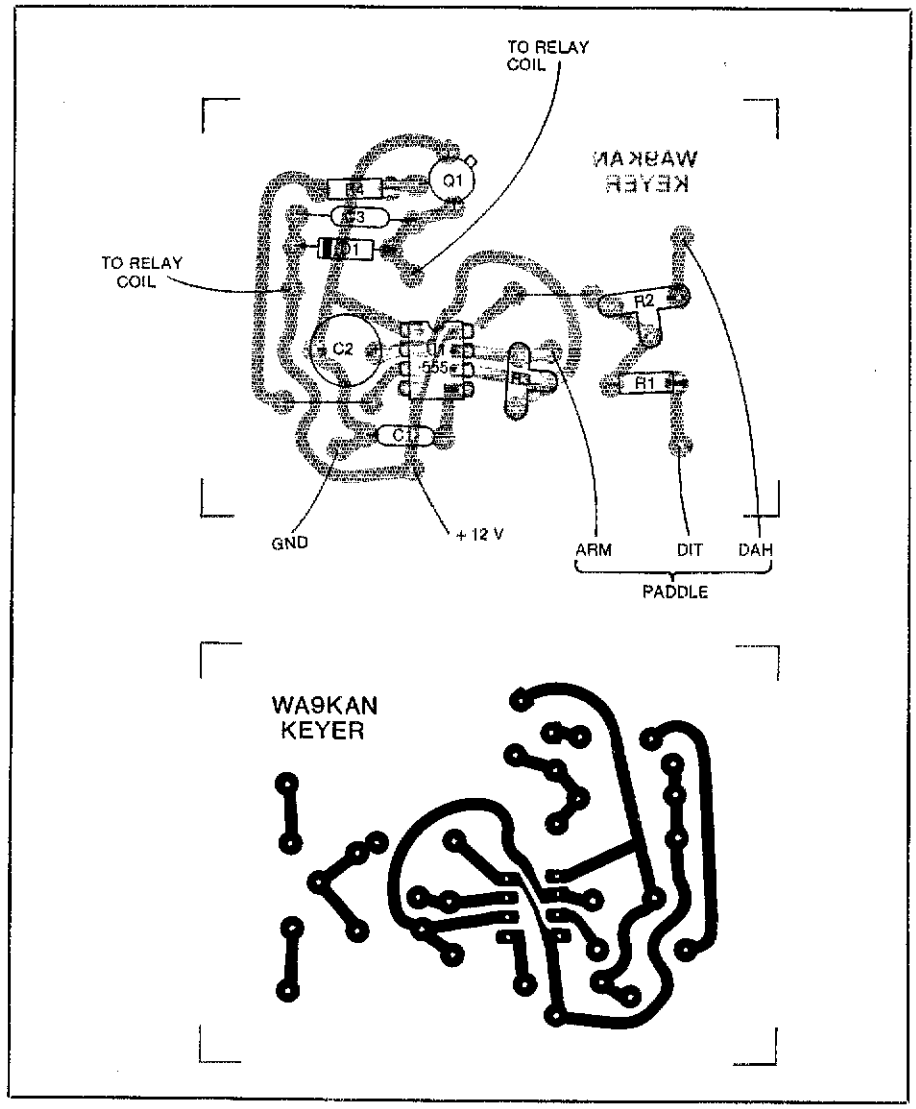
As I fingered my way through the junk box for components, I rationalized that a simpler approach was indeed possible. And by rearranging the circuit a limitation of not being



WD8JZC fashioned a piano-wire spring clip as shown in this drawing, placing it at the end of the blower motor on his heating/cooling system in order to eliminate friction static.



Simplicity is the main feature of this keyer circuit which may be used on positive or negative key lines without modifying the transmitter or transceiver. D1 is a type 1N4004 or equivalent. Q1 may be a 2N697, 2N2222, 2N3904 or equivalent. The author can furnish a ready-made, drilled circuit board for $2.50 postpaid: Box 279, River Forest, IL 60305.



Top, the parts-placement guide for the "Keyer That's Even Simpler." All components except the relay and paddle key are mounted on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Resistances are in ohms; k = 1000. Bottom, the circuit-board etching pattern. The pattern is shown at actual size from the foil side of the board, black representing copper.

able to use Andy's keyer with a standard paddle could be overcome. My circuit is shown in the accompanying diagram. When completed, my unit was not disappointing. It is capable of operating with any transceiver or transmitter without modification.

Construction is easy. All parts except the relay and the paddle key are mounted on a 1-15/16-in. (49 mm) × 2-7/8-in. (73 mm) circuit board. A suggested circuit-board pattern and parts-placement guide are included here, but parts placement is not critical and you can certainly use another layout. I suggest to builders that a 5-kΩ potentiometer be used instead of a fixed resistor for R2. Resistors may be 1/4 watt if desired. The relay has a 12-volt, 300-ohm coil with pull-in occurring between 20 and 40 mils.

When the unit is keyed, pin 3 goes high, forward biasing Q1 which is driven close to saturation. The voltage at the collector drops toward zero, developing approximately 12 volts pulling in the contact arm. R3 controls the speed of the keyer while R2 regulates the weight of the dah and R1 governs the dit.

My keyer employs a 12-volt unregulated power supply. A 9-volt battery, rated at 500 mA-hours, could serve the purpose but with a 4.5-mA current drain, battery life would be less than 10 operating hours.

The relay is available for $1.75 (part no. 12-2344) from Budget Electronics Inc., 2704 W. North Avenue, Chicago, IL 60647. — *Alan Monet, WA9KAN, River Forest, IL*

HINTS

☐ I have 40- and 80-meter half-wave dipoles stretched between trees. For pulleys I use four heavy-duty glazed and jacketed screw-in type insulators. No chance for the pull-up rope or wire to get stuck. For years these antennas have taken all the pull needed for tautness without breaking an insulator. — *The Rev. J. A. Terstegge, W9LQE, Poland, IN*

☐ Troubled with dial-cord slippage? Try a dab of golf-club or tennis-racquet grip cream on the cord. It really works. — *Arthur S. Gillespie, Jr., K4TP, Gastonia, NC*

☐ R-392 owners unable to locate 6AJ5 tubes can replace these with 6AK5s. The latter, more commonly available, will work well except in the squelch relay circuit. 6AJ5s on hand should be saved just for this part of the R-392. — *Marcus Frisch, WA9IXP, Brookfield, WI*

☐ Rubber tie-downs, sold by automotive and hardware stores, make excellent tension-providing supports for the ends of wire antennas, even in severe weather. — *Al Smith, WIGAA/K3ZMS, Temple, NH*

☐ Looking for a cheap source of RTTY paper for those hungry teleprinters? Used computer printout paper is available free for the asking at many places including college or university computing facilities. The stack may be cut to the proper width and the back side used for printing. For thick stacks of printout, a handsaw may be used to cut through the stack if it is held securely or rolled up and taped. — *Paul Holmes, WBØRRE, Fargo, ND*

☐ To hold the adjustment on paddles and keys simply put a drop of white glue behind the locknuts. Your troubles with the hardware will be over. — *Leonard Nielsen, WBØOGW, Yankton, SD*

☐ The use of heat-shrinkable plastic tubing provides a neat and efficient method of insulating wire splices and other connections. By placing my project a few inches above a burner of my kitchen range, which I set for moderately high heat, I'm able to get uniform shrinkage of the tubing in short order. — *Brenda K. Stewart, WB8VDN, Ravenswood, WV*

Technical Correspondence

OBTAINING DESIRED CAPACITOR TEMPERATURE COEFFICIENTS

☐ Here'a a neat little trick you can use the next time you have trouble locating a capacitor with a specific temperature coefficient. This is a procedure I learned in pharmacy school many years ago for the purpose of combining solutions of different percentage strengths in order to obtain a solution of an intermediate strength. The method is called "allegation."

Suppose you need a 75-pF capacitor with a temperature coefficient of N-470; your supplier has all values of N-750 and NP0 capacitors in stock, but no N-470 components. How can you combine (in parallel) an N-750 capacitor with an NP0 capacitor to produce a 75-pF, N-470 capacitor?

Refer to Fig. 1. First, draw a vertical line. At the top and to the left of this line, write the number 750 (for the N-750 capacitor). At the bottom and to the left of the line, write a zero (for the NP0 capacitor). At the center and to the right of the line, write the number 470 (the desired coefficient).

Second, draw another vertical line parallel to the first line, and to the right of the number 470. Then perform two diagonal subtractions: 470 − 0 and 750 − 470. The difference (470 − 0) is written at the top and to the right of the second vertical line, and the difference (750 − 470) is written at the bottom and to the right of the second line.

Now add the figures to the right of the second line. In the example of Fig. 1, this gives 470 + 280 = 750.

Interpretation of the resulting diagram is very simple. Starting at the top and reading from right to left, the combined capacitor will consist of 470 parts of an N-750 capacitor and 280 parts of an NP0 type. The value of the N-750 capacitor will thus be 75 pF × 470/750 = 47 pF, and the value of the NP0 capacitor will be 75 pF − 47 pF = 28 pF (the nearest standard value is 27 pF).

This procedure will work for any two coefficient values to provide any intermediate value of coefficient. — *James M. Willis, WA5TFK, 12 Tamar Dr., Texarkana, TX 75501*

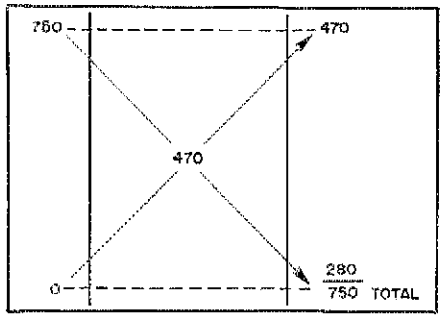


Fig. 1 — WA5TFK shows us his "allegation" method of determining the values of available N-750 and NP0 capacitors that will combine in parallel to provide a 75-pF, N-470 capacitor. The completed figure is read as follows: We need 470 parts of the N-750 type in parallel with 280 parts of the NP0 type (read horizontally along the dotted lines).

RFI TO AUTOMOBILE CRUISE CONTROL

☐ I just returned from West Virginia via the interstate. This was my first experience with 2-meter mobile. Prior to the trip, I had a Sears "add-on" cruise control installed in my 1976 Chevy pickup. The wiring for the mobile unit was rather hastily installed and some of the radio wiring came through the same hole in the firewall as the cruise-control wiring.

On the road with the cruise control engaged, keying the microphone in the high-power (15-W) position caused the speed to "lug down." It returned to normal when the rig was not transmitting. The antenna is a 1/4-wave whip on top of the cab. In the low-power (1-W) position, the problem did not occur.

On the return trip I overheard a QSO in which one of the ops made a remark about speed lug-down while transmitting. He did not mention any particulars as to the car model or rig specifications. I wonder how many amateurs experience this problem and if someone may have found a cure. — *G. L. Baker, W5QPX, 101 Rita Blanca Trail, Amarillo, TX 79108*

MEASURING SMALL VOLTAGE DIFFERENCES

☐ It is occasionally desired to measure small voltage differences accurately, such as when evaluating the performance of a regulated power supply. With the usual analog voltmeter, visual interpolation may be inexact at best. The circuit of Fig. 2 simplifies this task, and furnishes more accurate readings.

This circuit displays only the *difference* between the two voltages. Hence a lower-voltage scale may be used. Instead of using, say, the 0-50 volt scale (Simpson 260) or the 0-60 volt scale (Triplett 630) to observe the merit of regulation of a nominal 14-volt power supply, we can make use of the 0-1 volt scale (recent series Simpson) or the 0-3 volt scale (Triplett).

Much greater accuracy can be obtained in this manner. For example, a change from 14.0 to 13.85 volts (0.15 volt drop) covers only 0.3 percent of the 0-50 volt scale of the Simpson 260; on the 0-1 volt scale, the movement comprises 15 percent of full scale. This is a significant improvement in the observation process!

In Fig. 2, E1 is the measured voltage source. E2 is developed from any convenient source of voltage capable of equaling or slightly exceeding the measured source. (Dry cells are excellent for this purpose.) For example, if the supply being checked furnishes 13.8 volts under no load, the reference source should be capable of supplying about 15 volts. Potentiometer R1 loads the reference source only slightly. Its value may be moderately high — around 1 kΩ to 50 kΩ — since E2 is not required to furnish power.

The technique is as follows: Before connecting the VOM as shown, have E1 on and set E2 (by means of R1) to be nearly equal to E1. E1 and E2 should differ by less than the full-scale voltage of the scale to be used for difference measurements. Then connect the VOM into the

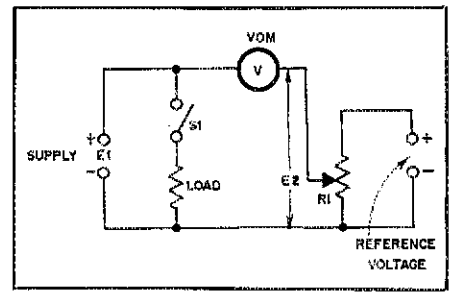


Fig. 2 — Method of measuring small voltage differences as discussed by K5CN. The supply voltage, E1, is approximately balanced by E2 via R1. The load is then switched in with S1 and the supply voltage drop will cause a change in the VOM reading.

circuit and switch to a range that will handle the expected voltage drop. Adjust R1 so that the indicating needle aligns precisely with some dial mark, preferably in the upper range of the scale. Then connect a load across the supply. E1 will usually drop, and the voltage difference will be easy to read by subtracting the new reading on the VOM scale from the reading under no-load conditions. — *A. W. (Bill) Edwards, K5CN, P. O. Box 6482, Corpus Christi, TX 78411*

COMPONENT-VALUE TOLERANCE AND Q IN BUTTERWORTH FILTERS

☐ The article, "The ABC Active Filter," in June 1978 *QST* was very interesting. The problem of selecting proper component values is the same here in the other half of the world. A 1-percent tolerance component is beyond the reach of many amateurs.

A computer was used to determine the effects of component-value deviations of up to 5 percent in the circuit of Fig. 3. This is an ordinary 2-pole, unity-gain Sallen-Key low-pass circuit having an equivalent Q of 0.707.

A 5-percent component-value error will cause a fluctuation in the attenuation characteristic of 1.8 dB at most. I believe this is quite acceptable for the average builder.

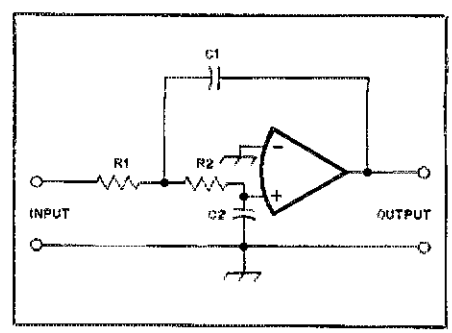


Fig. 3 — The low-pass filter circuit evaluated by K. Bill Imamura, JA6GW. The cutoff frequency was calculated for various combinations of values for R1, R2, C1 and C2 ranging from 95 to 105 percent of the normal value. The equivalent Q is 0.707.

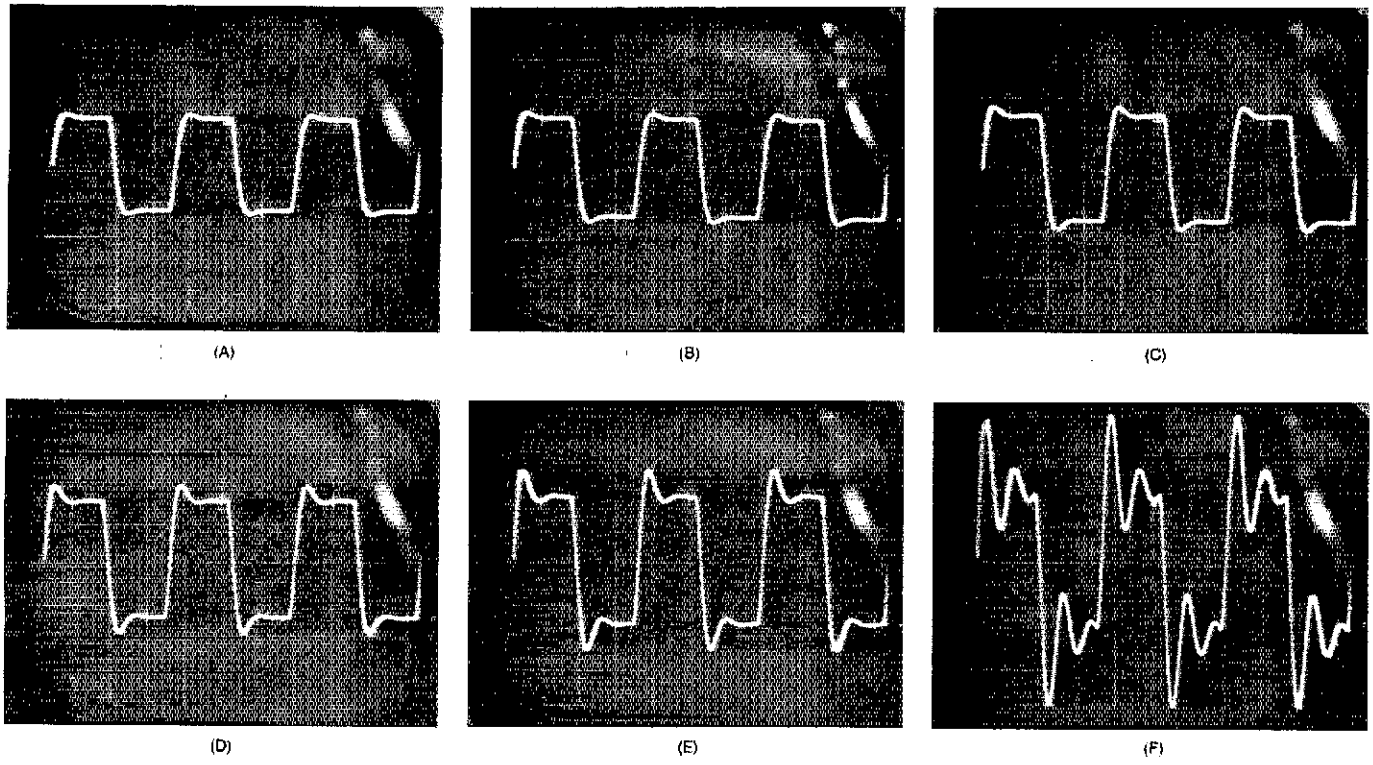


Fig. 4 — Results of applying a 400-Hz square wave to the input of a 2-pole Butterworth low-pass filter having a cutoff frequency of 2600 Hz. At A, Q = 0.707; at B, Q = 0.72; at C, Q = 0.80; at D, Q = 0.92; at E, Q = 1.10; at F, Q = 1.57.

Another factor which must be considered in filter construction is the circuit Q. A filter with a sharp attenuation characteristic requires high-Q circuit design, which results in poor transient characteristics. A 400-Hz square wave was applied to 2-pole low-pass active filters with Qs ranging from 0.707 to 1.57. The cutoff frequency was 2600 Hz. A glance at the output waveform led me to conclude that the Q must be held below a certain value for speech circuits — perhaps 0.707. See Fig. 4.

The easiest way to improve the transient characteristic is to put a passive filter section ahead of the active section, resulting in a 3-pole filter. Experiments on this filter show that the Q can be a high as 1.0 without noticeable overshoot.

Practical design of a 3-pole Butterworth filter is quite a problem for amateurs, because one can seldom find three proper capacitances among the standard values. Fortunately, there is some flexibility in the design; a slight shift in the circuit design parameters (such as the cutoff frequency of the passive section or the Q of the active section) will not affect performance significantly. — *K. Bill Imamura, JA6GW, 2-3 Hikari-ga-oka, Fukuoka City, Japan*

NOTES ON THE TOP-BAND CONVERTER

☐ The October 1978 issue of *QST* describes a 160-meter converter designed by Max Arnold, W4WHN, and Doug DeMaw, W1FB. The design is excellent in almost every respect. However, several minor errors crept into the design, and they should be mentioned. One simple change is to bypass the 12-MHz signal energy that will appear on the +12-V supply line; use a 0.01-μF capacitor. For some reason the 1000-ohm resistor on the collector of Q3 is not bypassed at the supply end. No capacitor appears on either the schematic diagram or the circuit-board pattern.

The common-gate input amplifier is poorly biased, so that the dynamic range of the stage is severely limited. Some approximate calculations show that the 68-ohm resistor used to bias the FET will result in the quiescent current being very close to the maximum for the device (I_{DSS}). Unlike a bipolar transistor, the FET cannot handle large quiescent currents. With the device operating near its maximum current, the linear current-swing range is limited. This cannot be tolerated in a supposedly "crunch-proof" receiver! One solution would be to set the quiescent current at about half the I_{DSS} value. A resistance of 375 ohms or so should do this nicely. Rather than connect the 68-ohm resistor at the source of Q1 directly to ground, connect it to a 310-ohm resistor, and bypass the junction with a 0.1-μF capacitor. Even with I_{DSS} = 8 mA, this will allow the amplifier to operate linearly with output signals of over 14 V rms, providing 1.4 V rms to the mixer. With a mixer drive level of +7 dBm, the mixer (not the input amplifier) will limit the dynamic range.

With the original biasing, the input amplifier stage could easily go into gain compression before the mixer. Living relatively close to the Nantucket Island Loran facility, I would recommend increasing the mixer drive to +13 dBm and picking up an additional 6 dB of dynamic range!

One last thing that was not mentioned in the article is that the receiver input should provide a dc return for the mixer i-f output. Double-balanced diode mixers have been shown to have performance degradations when there is no dc path for the diodes under strong-signal conditions. If the receiver input is capacitively coupled, or has a high resistance to ground, an rf choke could be placed between the output (J2) and ground. A value of around 100 μH should be satisfactory for this purpose.

While these faults are not overwhelming, they may cause problems for hams who duplicate the design — particularly if they live close to other top-band operators, or happen to pick up some 2N5486s with low I_{DSS} values. — *Mal Crawford, K1MC, 19 Ellison Rd., Lexington, MA 02173*

☐ Mr. Crawford offers some valid points in his critique of the 160-meter converter circuit. The Q3 bypass capacitor might be worth adding. This will depend upon the characteristics of the power supply used. Most well-designed regulated supplies have very low impedance voltage buses by virtue of internal bypassing for rf and ac. With power supplies of this type, assuming the connecting dc leads are not excessively long, it should be unnecessary to add the 0.01-μF bypass capacitor.

Thus far, no one has reported the performance problems suggested by Mr. Crawford. Although his recommendations are in keeping with ideal design practices, the published circuit performs well only two city blocks from WIAW during code-practice sessions and bulletins on 160 meters. — *Doug DeMaw, W1FB*

Aeronautical Mobile — The Only Way to Fly

We all can help prevent tragedy in the sky by obeying the regulations for airborne operations.

By J. D. Stewart,* WA4MVI

"TransGlobal Flight 302, this is Middle City approach control. You are still left of course. Do you have the airport in sight?"

"Say again, Middle City. Your transmissions are garbled."

"TGA 302, if the runway is not in sight, execute missed-approach procedure. Turn left heading three zero zero, climb and maintain four thousand, acknowledge."

"We can't read you, Middle City. Transmissions are garbled and our Instrument Landing System is erratic . . ."

Meanwhile, on another vhf frequency aboard Flight 302 . . .

"You're 5 by 9 here, old man. We're aeronautical mobile over Middle City. Rig here is a SuperYaker running 2 watts. Weather is cloudy. We can't see past the wing tips . . ."

A growing number of hams are operating aeronautical mobile aboard scheduled commercial flights. This practice is not only dangerous, in most cases, it's illegal. Federal Air Regulations (FAR) rule 91.19 prohibits the use of portable electronic devices, including Amateur Radio equipment, aboard commercial aircraft. Rule 91.19 applies to both receiving and transmitting on board.

The airline company (not the pilot) may, in special cases, allow aeronautical mobile operation. These cases are the exception; don't expect that you'll be granted permission to operate on a scheduled airline flight. The captain has no legal authority to allow passengers to operate hand-helds on board. But, the captain must be advised of any special grants and "approve" the portions of the flight in which the hand-held can be used. Usually, operation will not be permitted during takeoff and landing. Hams operating without the captain's knowledge, like the passenger on Flight 302, are in violation of rule 91.19 and endanger the lives of all the passengers.

Airline companies can, and do, make rules for their own aircraft which are far more restrictive than the FAR. They have the right, for example, to require that any fm equipment carried on board be deactivated to prevent its operation during the flight.

Besides the legal restrictions, common sense dictates that we don't operate aeronautical mobile aboard commercial flights. Because of the need for clear communications between the pilot and ground control, it is vital — and in our self interest as passengers — that we do not interrupt these critical transmissions with our hand-helds.

Many frequencies are used to guide an aircraft safely through the sky. For commercial flights, 200 to 400 kHz, 75 MHz, 108-136 MHz and many frequencies above 1000 MHz are utilized for navigation, guidance and communications. The modern aircraft is a remarkable collection of radio and electronic equipment; many possibilities exist for interference. It is our responsibility to keep the bands free of interruption.

Ease of operation with today's portable 2-meter fm equipment belies the dangers involved. You'll need special permission to operate onboard a commercial airliner — and for good reasons.

In any case, operating a hand-held from a commercial airliner is often impractical, since the fuselage is a well-shielded tube. Getting out anything but a weak and highly directional signal is unlikely.

Private Aircraft Rules Differ

Amateur equipment may be operated aboard noncommercial aircraft under certain conditions. Ask the pilot if he will be flying under Instrument Flight Rules (IFR). If so, unhindered operation of the plane's electronic equipment is critical for a safe journey. The pilot must determine if the use of amateur equipment will interfere with the instruments. In any case, it is advisable to remain QRT under these conditions. If you are flying Visual Flight Rules (VFR) on a noncommercial aircraft, hand-helds may be operated. It is your responsibility to make the pilot aware of your operation.

If in doubt as to whether operation of amateur equipment is allowed on a flight, leave your hand-held in a suitcase. Operating aeronautical mobile from a private plane can be an exciting and rewarding experience. Just remember to stay within the legal restrictions to insure everyone's safety in the sky. QST

*Rte. 8, Box 92, Hendersonville, NC 28739

This is WA7NEV/AM Listening 76

Just as a camera at 10,000 feet sees things differently than it does on the ground, 2-meter fm is a new experience in the air. To illustrate the difference between land-borne and airborne operations, consider the following example.

I have heard traveling hams say that fmers, particularly those in big cities, tend to be unfriendly. A recent 7000-mile trailer trip could have left that impression. Waiting until a repeater was idle, I would announce my presence and sit back expecting a stampede of responses. Most times, the only stampede I got was one of silence. I decided to go to the mountain if it wouldn't come to me. Breaking into general QSOs or waiting until 73 had been passed and then calling one of the stations that had just signed off dispelled any feeling of unfriendly treatment. Once they've been called, hams are as congenial in New York City or Washington, DC, as they are here in the desert.

Aeronautical mobile is something else! In the air you don't have to call anyone. "This is WA7NEV/Aeronautical Mobile listening 76," has never failed to scare up a QSO. In fact, sometimes it's caused a veritable 2-meter pileup.

My 2-meter fm transceiver is both convenient and versatile. It operates portable on internal Ni-Cad batteries, contains its own charger, and can be plugged into a cigarette-lighter receptacle or other 12-volt power source. A 19-inch whip is built-in, and a uhf connector on the back end allows the use of various external antennas.

I have 5/8-wave whips permanently mounted on both my car and truck with a BNC-ended coax run from the antenna and coiled under the front seat. With a BNC-to-uhf adaptor screwed onto the rig and a cigarette-lighter power cord, I can change vehicles in seconds.

My airplane, a two-seater, has a small storage deck behind the seats with the battery under the deck. I mounted a cigarette-lighter receptacle in the deck and fused it to the battery. The antenna is mounted directly above the deck on top of the fuselage. The rig is strapped (I don't like anything loose in the cockpit) inside the fuselage next to my left thigh and connected to the battery and antenna, just as it is in my other vehicles. With this arrangement, installation and removal of the rig take no more than 30 seconds.

Of course, more elaborate installations are possible. The rig could be mounted permanently in the control panel, like regular aviation radios, and wired to the battery and antenna. Since the vhf aviation band is from 108 to 136 MHz, standard aircraft antenna can be installed on the plane and trimmed for the best SWR on 2 meters. Federal requirements dictate that any structural or electrical work done on an airplane get written approval from an aircraft mechanic and First Class Commercial Radio licensee.

No Interference

I don't use my ham rig when the aviation radio equipment is needed, so there have been no interference problems. As a test, on the ground, I turned everything on at once with no apparent ill effects. Ignition noise bothers the a-m aircraft radios much more than the fm, especially on weak signals.

Noise in the cockpit is a definite deterrent to the intelligibility of the transmitted signal. Reducing mic gain and speaking louder helps to solve this problem. Many land-bound mobiles should try the same trick. Another way to eliminate engine noises is to dispense with the engine! I have taken the rig up in a sailplane twice, and loved it, but that's another story.

It's the Law

The legal guidelines pertaining to airborne operations are explicit. Hams considering aeronautical mobile operations should remember these *Federal Air Regulations:*

§91.19 Portable electronic devices.

a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S. registered civil aircraft:

1) Aircraft operated by an air carrier or commercial operator; or

2) Any other aircraft while it is operated under IFR.

b) Paragraph (a) of this section does not apply to:

1) Portable voice recorders;

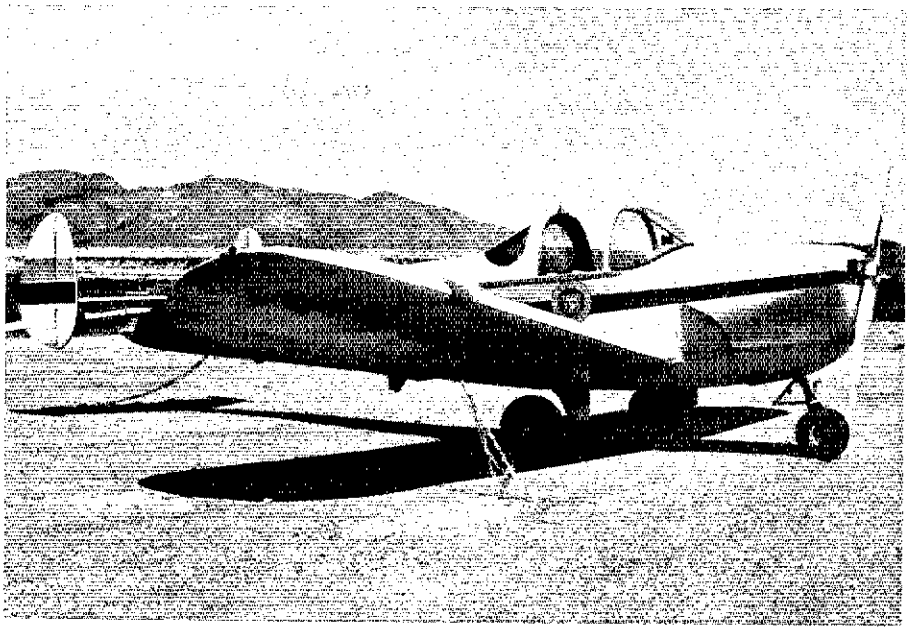
2) Hearing aids;

3) Heart pacemakers;

4) Electric shavers; or

5) Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

c) In the case of an aircraft operated by an air carrier or commercial operator, the determination required by paragraph (b) (5) of this section shall be made by the air carrier or commercial operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.



WA7NEV's plane stands ready for flight. A temporary 2-meter antenna is just to the rear of the open cockpit. *(WA7NEV photo)*

With the rig on his lap also serving as a desk, AE8V operates aeronautical mobile from a DC-3. *(WD8BIN photo)*

Flying — and Operating — High from a DC-3

In January 1979, I found myself in South America as part of a four-man team chosen to fly two 35-year-old Douglas DC-3 airplanes to Ohio. Recognizing this trip as a perfect opportunity for aeronautical mobile operation, I began preparing equipment and antennas. A power supply problem on board the DC-3s limited me to use of a Heathkit HW-8 during the aeronautical mobile effort. The planes had dual, fixed-wire antennas and automatic tuners. I unhooked one of the antennas, connected the transceiver to 15 feet of RG-58 coax, and ran it up to the cockpit and into the rig. An SST T-2 tuner was taped on the best rf/SWR meter that Radio Shack makes, while a 12-volt lantern battery powered the rig.

The initial transmission tests were discouraging. The fixed wire (about 28 feet) produced a mismatch on all settings. I had to be satisfied with SWRs in excess of 3:1! The rf meter showed that output was down to about 600 milliwatts.

Undaunted, I sent and chased a few CQs. Because of the RFI in the plane, 20-meter cw was the best band to use. I operated as AE8V/R2AM (Region 2, aeronautical mobile).* After getting a few QRZ replies, W4VBB in Emery, VA, responded with an RST of 579. I couldn't believe it! From 3000 miles away, with a mismatch, a lantern battery and 600 milliwatts, I had a half-hour QSO of solid copy.

I operated on 20 meters for two and a half days as we island hopped back to the United States. It was a continual enjoyment to hear the perplexed and excited reactions from the other end. This "first-time" aeronautical mobile experience was unforgettable, the kind of thrill that Amateur Radio offers many times. I guess cw really is "the only way to fly!" — *Carl F. Hilker, Jr., AE8V*

*This type of station identification is perfectly legal, but it has been optional since November 1977.

With height as an advantage, the low power (1.5-watt) output of the rig is more than adequate. QSOs in excess of 100 miles are typical, but this can create problems. Even here in the desert, it is possible with a little altitude, to bring up as many as three repeaters at once. The most productive procedure is to stir up activity by operating simplex on the repeater output frequency and then move off to a simplex frequency.

Although I have done a great deal of hf mobiling on the ground, I haven't tried it in the air. There are many hf transceivers small enough to do the job, but antenna design would pose a major difficulty. The only one that seems practical is the trailing wire type, which would have to be retracted for takeoffs and landings. A retractable antenna could be let out until a good SWR reading was attained for a given band. The antenna's length could be altered as bands were changed.

Any 2-meter rig that works on 12 volts dc is a candidate for aeronautical mobile operation. Hand-helds that contain their own batteries also could be used. Hand-helds are a good way to try out aeronautical operation before doing any installation; they also are practical if you rent rather than own your airplane.

Just as land mobile has helped pass many long road miles, airborne operation has added to the enjoyment I get from flying. So if you should hear "This is WA7NEV/Aeronautical Mobile listening 76," give me a shout. I might be flying over your backyard! — *Rod Hallen, WA7NEV*

Strays

SUPER SLEUTHS ON SUPER SUNDAY

[Editor's Note: The ARRL recommends that you use caution when dealing with bootleggers. If you suspect someone is operating with a stolen rig, ask the police to investigate rather than acting yourself.]

Normally, not even a band opening would keep some hams from watching television on Super Sunday. But this year, at least six hams from the Davidson County (TN) Repeater Association missed most of the Super Bowl. Why? A bootlegger was on our 28-88 machine.

I had just settled back to watch the football game when the repeater began responding to some erratic kerchunking. Then came the tones. I turned up the volume just in time to hear a youthful voice say, "Come in . . . this is WD4OK . . ."

After turning on a tape recorder, I called my fellow control operators. We agreed to clear 88 and try to catch the bootlegger. Via our club's 67 machine, all operators were asked to keep 88 clear.

The bootlegger was having trouble getting the patch up. He was hitting the Touch-Tones in a pattern, so we figured he was trying to make a phone call. We decided to bring the patch up the next time he hit the tones. He took the bait and called one of his friends.

"Hey Scott, can you hear me?" he whispered.

"Yeah. What are you doing?"

"I'm on the radio . . ."

"You're what? Hey Jeff, come listen. Brad is on the radio."

"Hey Brad, how could you do that?"

"'Cause I'm smart . . .," Brad replied, "I gotta go. My mom will get mad if she catches me using this thing."

"Bye . . . I'll see you later."

Brad tried to make a patch two or three more times. We got a clear recording of the Touch-Tones each time. Next came the detective work, trying to decode them.

N4BGA, a sightless ham who works as a piano tuner, immediately deciphered the first set of digits. N4VHM and WD4NQT then phoned to say they had the number figured out. I relayed the information to our trustee, WB4FQW.

WD4NQT called the party who had received the illegal call and explained the problem. He told them that all we wanted was to get the rig back and help Brad before he got into further trouble. WD4NQT got Brad's address and phone number, and the wheels began to turn. Our trustee called Brad's parents while three hams took off through a fresh six-inch snowfall to retrieve the rig.

Brad's mother, who had been unaware of her son's activities, was very cooperative. In less than three hours, Nashville's Davidson County Repeater Association had possession of the radio. An announcement was made on the 76 machine that the bootlegger had been caught and the radio retrieved. In less than 24 hours, the owner of the stolen rig called and identified his radio.

In less time than it takes to play a football game, we had recorded the illegality, decoded the number called and retrieved the rig. — *Ron Johnson, WB4GWA, Hermitage, TN*

***QST* congratulates . . .**

☐ Bill Leonard, W2SKE, who has been named president of CBS-TV News. Leonard was executive vice president and chief operating officer of the news unit prior to assuming his new post.

☐ The Reverend Tom Carten, K1PZU (ex-WA1DJC), scheduled to be ordained to the Priesthood of the Roman Catholic Church on June 9. Tom is well-known as a traffic-handler, helper of the handicapped and contributor of short items in *QST*.

Dr. Strangetone

How I learned to stop worrying and love the code.

By Dave Bell,* W6AQ

When I was in high school back in the dark ages before transistors and Novice licenses, three of us decided to learn "Morris Code" (as we called it), cram a little radio theory, and journey into Cleveland to get Class "B" ham tickets. Almost immediately, one of our trio fell in love with Olive and out of love with "Morris" — which was probably just as well, given our town's rumor mill. It could grind an untruth so fine that it became gospel within a week. So it was up to Hal and me to dive into the strange new language of Morse.

It was clear from the beginning that Hal was better at it than I was. "N" remained dash-dot for me long after Hal had it down as dah-dit. His patience, attention span and ability to withstand intermittent pain left me in awe (and in the dust). I complained about Hal's fist because he sent faster than I could receive; he complained about mine because it was lousy (and still is).

Of Small Towns and Climbers

The only ham in Andover, our unique little northeastern Ohio town, was W8LIO. (The word *unique* describes Andover perfectly. My high school Latin teacher pointed out that its roots are *uni*, meaning one, and *equus*, meaning horse, and that's just the kind of town it was.) To the best of my knowledge, the uniham in our town never worked cw. When I mentioned my difficulties with code to Jack, he smiled and said, "Why, David, that's no hill for a climber," dismissing my depression with a slap on the back and positive words of encouragement meant to assuage my skepticism and general ineptitude.

But nothing I tried worked. Every time I found W1AW, it immediately became buried in every kind of interference imaginable. The ham fraternity seemed to be in cahoots with Mother Nature in plotting against me. (This was before anyone realized it's not nice to fool with Mother Nature.) Even the code record I ordered came broken. I couldn't afford an "Instructograph." Audio cassettes weren't available, probably because audiotape hadn't been invented yet. There were no electronic keyers and the old-time brass pounders I managed to pick up on my S20R had me on the ropes with their roundhouse rhythms.

In the winter of '47 when I was struggling to learn the code, there wasn't even a Novice license, which meant I had to go from zero to 13 wpm in one fell swoop. On top of that, all the hams on the air had passed the test I was studying for; looking for anyone sending slower than 15 wpm was like searching for a diamond in a coal pile, and just about as rewarding.

He Was W8BGJ; I Was Batting .550

When spring replaced my winter of discontent, I hadn't gotten to first base with the code, so ham radio lost me to baseball. Hal cared little for nonscientific pursuits, and, being rid of the dead weight he'd been carrying (me), redoubled his effort and passed the FCC exam on the first try. The fact that I was batting in the neighborhood of .550 when his ticket came in the mail did not diminish my envy. He was W8BGJ (now W8CY), and I was just another top-notch American Legion ballplayer destined to be overlooked by the pro scouts.

Despite Hal's help, it wasn't until nearly two years later, on my second try, that I passed the test. After the victorious moment when I crested Morse's hill and so laboriously drew diagrams of power supplies and neutralizing circuits while combing my memory for carefully stored electronic facts, it seemed like an eternity before my ticket arrived in the mail. It finally did. I was W8GUE.

A real ham at last, I was done with the code and good riddance. I grabbed my microphone and avoided cw like an AA member shuns booze.

But then, as if to rub my nose in those three anguishing years of dah-dit-dah-dit dit-dah-dah memorization, almost immediately after I passed my exam the FCC announced something they called the "Novice license." They had come to the conclusion that going from zero to 13 wpm was cruel and inhuman punishment. Belated revelations from Washington!

Oh, how we old-timers railed against "lowering our standards"! It was like the school board taking the paddle out of the principal's hand. It was the stick-in-the-mud college president banning fraternity hazings. *We* had suffered! Why shouldn't everybody! Our anguished cries fell on governmental (deaf) ears. There I was, double-crossed by our government and not even old enough to vote the rascals out of office.

My vindictiveness passed with time, and I began to see the wisdom of the Novice license. And besides, I eschewed cw so I wasn't talking to any of those ersatz hams anyway.

For 20-odd years, I was happy in the knowledge that I'd never again shed any sweat in an FCC office. When the Extra Class license came along, I blithely ignored the alleged opportunity to upgrade, especially since it required a 20-wpm code proficiency. No way. All the incentives the FCC could dream up were like carrots dangled over the wrong end of a horse. Except one. Extra Class licensees would be issued two-letter calls. And not only distinctive calls, but calls of your choice (subject to availability, of course). I could swap W6BVN for, who knows, maybe my initials or something even better.

I Wasn't Fooling Around

What the heck — I'd learned it once; I could learn it again. I discovered W6QIE, the West Coast equivalent of W1AW. Code practice began every night at 8 P.M. starting at 5 wpm (just my speed). This time I wasn't going to fool around; this time I would apply myself. I made a vow to listen to code practice for 20 minutes every night. I managed to do that about five nights a week for a year. I went from solid copy four wpm to solid copy 20 wpm — and then some.

In addition, I got on the Novice band and shocked newcomers with my decrepitude. I dropped my pulsating kilowatt into some DX pileups and then

*5700 Hill Oak Dr., Hollywood, CA 90068

promptly asked the distant station to QRS amidst catcalls from the hoard of cw aficionados on the frequency. Until you've heard a catcall in cw, you haven't heard indignation.

I bought a keyer. Then I bought a memory keyer. I bought the best paddle I could find and retired the hand key which had never worked too well anyway. I bought prerecorded code cassettes and spent three solid weeks of my vacation boning up on the theory. Getting solid state into my solid head took dedication.

In August 1976, slightly more than 25 years after I passed by first licensing exam, I braved the FCC examiner in Long Beach. He looked like he'd just gotten out of high school. I sat down determined to copy the 20 wpm solid. I did, almost. My heart rate was just this side of astronomical. The examiner asked me if I'd like to take a break before my sending test. He obviously didn't need a coronary right there on government property.

When I came back, I hooked up my keyer and sent a sentence which was nearly 100 percent error. Something seemed to be wrong with my keyer. The examiner told me there was nothing to be nervous about. He'd done this thousands of times. After a couple of false starts, I finally sent what must have been 20 (please God) words without a mistake. Then I goofed. He stopped me, along with my heart. "Okay," he said, "you pass." Were it not for the crowd in the room, I would have kissed him. My sigh could have triggered another earthquake along the nearby San Andreas Fault. My glasses fogged. I was sorry I'd quit smoking. The theory test was anticlimatic and, by comparison, easy.

"African Queen" Redux

In late September, my Extra arrived, to be returned to the FCC immediately with my carefully-thought-out list of two-letter calls. In mid-November, while I was shooting a film in upstate New York, the post office delivered my new ticket, W6AQ. When my wife told me my new call, the phonetics "African Queen" flashed across the marquee of my mind and I tried to talk out of the corner of my mouth. I called my assistant "doll." He looked at me strangely. W6AQ — how about that? It was the last "A"-suffix call available in California and I was delighted with it. I still am. Dit-dah Dah-dah-di-dah. Not bad. In retrospect, the year of spare-time work I put into it really *wasn't* much of a hill for a climber.

What's happened is that I've learned to like code. I'm still not really good at it, but I enjoy it. I've begun to view it as the hams' secret language. It's the principal thing we have in common; cw sets us apart from ordinary people. And for sure, hams are an extraordinary bunch. And the crème de la crème are the brass pounders! Dit-dit-dit-dah-di-dah!

Hamfest Calendar

Alabama: The Clanton Amateur Radio Club will hold its annual swaptest on June 10 from 8 to 4 at the Alabama National Guard Armory, Airport Rd., Clanton. No admission charge. Tables available, picnic area, refreshments, prizes. Talk-in on 19/79, 28/88 and 52. Contact CARC, P. O. Box 29, Clanton, AL 35045.

Colorado: The Northern Colorado ARC's annual hamfest is June 16 from 9 to 4 at the Exhibition Building in Greeley. Talk-in on 52. Indoor flea market, $1 for tables. Prizes, displays, cw contest. Admission is $2 in advance, $2.50 at the door, under 12 free. For details, write A. M. Fox, P. O. Box 895, Greeley, CO 80632.

Connecticut: The CQ Radio Club will sponsor a hamfest June 17, rain or shine, at the Fish and Game Property, Torrington. Talk in on 52, 84/24. Write to Robert O'Neil, W1FHP, Hard Hill Rd., Bethlehem, CT 06751.

Georgia: The MARAC Convention is July 5-8 at the Raddison Motel in Atlanta. Election of officers, operations update, tours of Atlanta planned. For more info, contact Lyn Welliver, WB4RVW, Rte. 5 Box 153, Melbourne, FL 32935.

***Illinois:** The 22nd annual ABC Hamfest, sponsored by the Six Meter Club of Chicago, is June 10 at the Santa Fe Park Speedway, 91st and Wolf Rd., Willow Springs. Advance tickets $1.50, at the gate $2. Prizes, refreshments, plenty of parking. Talk-in on 94, 37/97. Tickets from Val Hellwig, K9ZWV, 3420 S. 60th Ct., Cicero, IL 60650.

Indiana: The Indianapolis Hamfest Association will hold its hamfest July 8 at the Marion County Fairgrounds, Indianapolis, at the intersection of I-74 and I-465. Commercial exhbits, flea market. Overnight parking and RV hookups available. Talk-in on 16/76, 28/88 and 10/70. Details from IHA, Box 1002, Indianapolis, IN 46206.

***Indiana:** The Lake County ARC's sixth annual Dad's Day Hamfest is from 8 to 5, June 17 at the Lake County Fairgrounds, Crown Point. Cost is $1.50 in advance, $2 at the door. Table space available, zoo and playground for children. Talk-in on 84/24 and 52. For info or tickets, write LCARC, P. O. Box 1909, Gary, IN 46409.

Maryland: The second annual Frederick Amateur Radio Club hamfest is June 17 at the Fairgrounds in Frederick. General admission $2. Grounds open at 8 A.M. Contact Roy Hammel, WB3EWF, Rte. 13 Box 44, Frederick, MD 21701.

Michigan: The Central Michigan Amateur Repeater Association will hold its fifth annual Midland hamfest June 16 at the County Fairgrounds in Midland. Tickets are $2.50, XYLs and children free. Tables available. Prizes, computer displays, auction. Talk-in on 13/73 and 52. Write to Raleigh Wert, W8QOI, 309 E. Gordonville Rd. R12, Midland, MI 48640, or call 517-631-5591.

Michigan: The annual hamfest of the Monroe County Radio Communications Association is June 20 from 8 to 4 at Monroe County Community College, Raisinville Rd., Monroe. Tickets $1. Free parking, table space. Contests, auction, displays. Talk-in on 13/73 and 52. Contact Fred Lux, WD8ITL, P. O. Box 982, Monroe, MI 48161.

Minnesota: The Bemidji Hamfest is June 9 and 10 at the Bemidji Fairgrounds on Highway 2. Complete program for hams and nonhams. Camping space available. Tickets $1.50. Talk-in on 34/94 and 3935. Write to Jerry Pottratz, WB0MSH, Rte. 2 Box 239B, Bemidji, MN 56601.

Minnesota: The fourth annual Northern Lakes ARC hamfest is July 8 at Gunn Park, four miles north of Grand Rapids. Talk-in on 28/88. Contact Earl Watson, WB0QXU, Star Rte., Grand Rapids, MI 55744.

***Mississippi:** The Chickasaw Amateur Radio Association will sponsor a hamfest June 9 and 10 at the Northwest Junior College Coliseum in Senatobia. Tickets are $3. Details from CARA, P. O. Box 2, Hernando, MS 38632.

New Jersey: The eighth annual hamfest of the Raritan Valley Radio Club is June 16 from 8:30 to 4 at Columbia Park, Dunellen. For details, write RVRC, RD 3 Box 317, Somerset, NJ 08873, or call 201-356-8435.

New Jersey: The Shore Points ARC's second annual hamfest is from 8 to 4, June 10 at Stockton State College, Pomona, 12 miles west of Atlantic City. Tickets are $2, under 12 free. Prizes, seminars, large menu. Indoor sales space $5, in advance only. Contact Monte Tremont, WB2EYF, P. O. Box 142, Absecon, NJ 08201, tel. 609-266-2678.

New York: The Lake Erie International Hamfest, cosponsored by the Northwestern New York Repeater Association and the Northern Chautauqua ARC, is July 1 at the Dunkirk Fairgrounds. Tickets $3 in advance, $4 at the door. Large flea market, plenty of free parking. Contact Richard Brinkerhoff, WB2HEJ, 123 Fifth St., Dunkirk, NY 14048.

***New York:** The Rome Radio Club will host Ham Family Day June 10 at Fireman's Field in Floyd. For details, contact the Rome Radio Club, P. O. Box 721, Rome, NY 13440.

***Ohio:** The Champaign Logan ARC's annual hamfest is July 1 at the Logan County Fairgrounds, S. Main St. and Lake Ave., Bellefontaine. Free admission. Trunk and table sales $1. Talk-in on 52. Write to John L. Wentz, W8HFK, Box 102, West Liberty, OH 43357 or Frank Knull, W8JS, 402 Lafayette Ave., Urbana, OH 43078.

Ohio: The 12th annual Goodyear ARC hamfest is from 10 to 5, June 10 at Goodyear Wingfoot Lake Park, near Rtes. 224 and 43, east of Akron. Tickets are $3 or two for $5. Five major prizes including a Yaesu FT-101ZD. Flea market, auction. Talk-in on 4/64. For more info or tickets, contact D. W. Rogers, WA8SXJ, 161 S. Hawkins Ave., Akron, OH 44313.

***Ohio:** The Northern Ohio Amateur Radio Society will hold its NOARSFEST July 7 from 7 to 5 at the Lorain County Fairgrounds, Wellington. Go one mile west of Rte. 58 on Rte. 18. Plenty of food, 100 prizes, free parking and camping. Tickets $1.50 in advance, $2 at the gate, under 12 free. Indoor tables $4, advance registration only. Flea market space $1. Write to NOARSFEST, P. O. Box 354, Lorain OH 44052.

Pennsylvania: The Harrisburg RAC annual Firecracker Hamfest is July 4 at the Shellsville VFW picnic grounds. Take I-81 north, exit 27 or 28. Admission is $3, no charge for tailgating. Refreshments, tables and parking available. Talk-in on 52. For more info, send s.a.s.e. to Richard Kerlin, K3AM, 635 Lenker Rd., Harrisburg, PA 17111.

Pennsylvania: The Schuylkill Amateur Repeater Association's second annual hamfest is June 17 at Lakewood Park, Barnesville, along Rte. 54, three miles east of exit 37F on I-81. Talk-in on 78/18 and 52. Tickets $2, XYL and children free. Indoor tables $2, tailgaters $1. Prizes, amusement rides, picnic area, refreshments. Write SARA Hamfest, P. O. Box 901, Pottsville, PA 17901.

Pennsylvania: The Young Ladies' Radio League will hold its international convention June 29-July 1 in Philadelphia. For details, contact Janice R. Scheuerman, WB2JCE, 616 Revere Ave., Linwood, NJ 08221.

***Tennessee:** The Plateau Amateur Radio Club will host a hamfest June 30-July 1 at the Cumberland Co. Community Complex, Crossville. Admission $1. For details, contact Artis Winningham, WA4IUZ, RFD 8 Box 388, Crossville, TN 38555.

***Texas:** The Bridge City ARC's hamfest is July 7 and 8 at the Red Carpet Inn, Beaumont. Total cost is $20. Contact James O. Davis, 755 Ave. A, Bridge City, TX 77611, or call 713-735-4102.

Venezuela: The Asociacion de Radioaficionados de Venezuela will hold its national convention and equipment display July 5-8 in Puerto La Cruz. For details, write ARV, Apartado Postal No. 4524, Puerto La Cruz, ZP 401, Estado Anzoategui, Venezuela.

*ARRL Hamfest

Strays

I would like to get in touch with . . .

☐ amateurs who have a TRS-80 microcomputer. Contact Roy C. Pollitt, WD4MTL, 7515 Cimarron Ct., Richmond, VA 23225.

☐ amateurs who are architects. Contact Francesco Falanga, I7FFE, P. O. Box 58, 70100 Bari, Italy.

☐ other hams who are stamp collectors. Contact Rod Marty Jr., KA9BDW, 122 2nd St., Box 481, New Glarus, WI 53574.

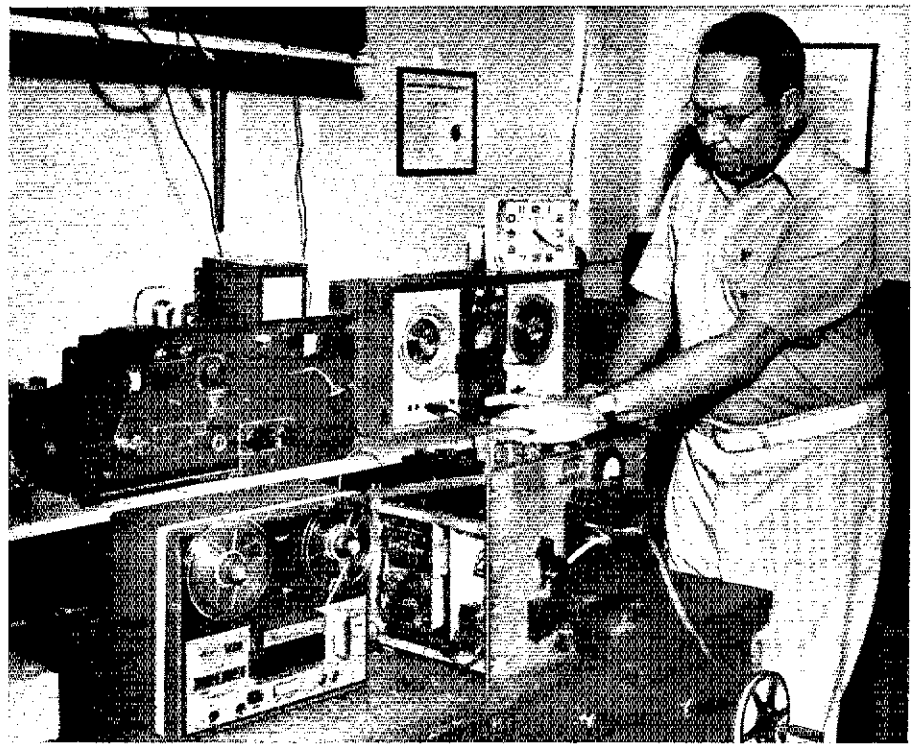
High-Speed CW, Anyone?

Wait! Don't turn the page! This on-the-air code program can help make you a cw expert.

By George Hart,* W1NJM

W1AW, the Maxim Memorial Station, is famous for executing the ARRL Code Proficiency Program. It offers code practice four times daily Monday through Friday, and three times a day on Saturday and Sunday. The practice is transmitted simultaneously on eight amateur bands at nine different speeds (10 counting cw bulletins) ranging from five to 40 words per minute. Certificate qualifying runs are sent twice monthly, once by W1AW and once by W6OWP to enhance West Coast coverage. Thousands of certificates have been issued and are now proudly displayed in shacks across the country and beyond. Still, Headquarters receives many letters suggesting how the program can be improved and expanded.

The W1AW program stops at 40 wpm, high speed for even the average cw operator. Actually, participation tails off rapidly above 25 wpm. Continuation of practice at 30 and 35 wpm and transmission of a qualifying run at 40 wpm is a service to relatively few hams.



Now that he's retired from the ARRL Communications Department, George Hart, W1NJM, has plenty of time to devote to his high-speed code program — during the nonwinter months. His basement shack, chock-full of 20- and 30-year-old gear, is a delight to old-timers — and a revelation to recently licensed hams.

The Sky's the Limit

Nevertheless, a select group of operators clamor for practice and a chance to certify at even higher speeds. What's the limit? How fast can code be copied? The average amateur would say, "as fast as it is still possible to distinguish a dit from a dah." Wrong! Dits and dahs, or short and long sounds, aren't (or shouldn't be) a factor in copying high-speed code. The process becomes one of learning to perceive *sounds*, exactly as in "copying" speech. The recognition of cw sounds goes far beyond the ability to distinguish a dit from a dah. Bill Eitel, W6UF, has proven it can go as high as 100 wpm. That's faster than most people talk; faster than some people read.

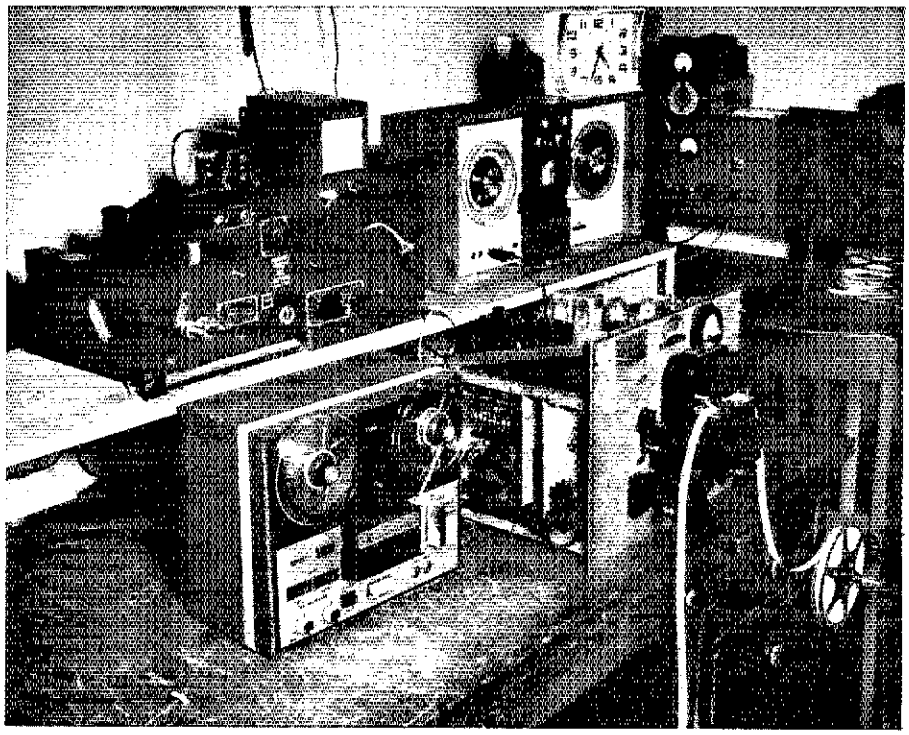
However, the ability to recognize cw isn't copying. Putting down what you hear on paper is entirely different than "reading" the code. To copy code, comprehension must be transferred to physical action by recording the received message in writing. High-speed *copying*, therefore, is limited by the operator's mechanical ability to write or type.

T. R. McElroy holds the world championship in code, copying at 75.2 wpm. Was he an especially gifted man? I doubt it. He was probably an ordinary guy who had the combination of two acquired abilities — code comprehension and typing. McElroy's record ought to be beaten easily by someone who really *wants* to. Most likely, the only reason this hasn't been done is that no one has come along with that kind of drive.

It's Just Momentum

The W1NJM code program could be the spawning ground for the next world-champion code copier. The program doesn't reach the speed attained by McElroy, but it approaches it; the rest is just momentum. W1NJM offers code practice every Sunday night at speeds between 20 and 65 wpm, concentrating on 40 wpm and higher. Certification transmissions are made annually in March

*66 Highland St., Newington, CT 06111



It's not quite a Rube Goldberg, but the W1NJM code-practice station is an ingenious series of machines that allow their operator to watch TV upstairs while his station sends code practice downstairs.

and September at 40, 45, 50, 55 and 60 wpm. Frequencies used are 3636 and 7085 kHz.

This code practice program began in 1958 when I acquired a Boehme photoelectric cell keying head and the circuits to convert the photocell energy into keying pulses. It is quite a gadget, the likes of which I haven't seen since. The Boehme uses two-hole Wheatstone tape pulled by a star wheel so the holes pass over light apertures and cause intermittent light beams to focus on the photocells underneath. This triggers a number of flip-flop circuits which convert the pulses into cw. The unit pulls the tape through the sending gate at speeds varying from 13 to 700 wpm. That's right, 700! Of course, no one can comprehend code sent at that speed, but at one time it was manually recorded on inked tape and later transcribed at about 90 wpm.

When the W1NJM program began, W1AW used the same kind of tape, so W1AW's perforator was used to prepare the tapes needed for my program. Not too much tape was required except for the certificate runs, because W1AW also had a large surplus of code-practice tapes, more than sufficient for my needs. All I had to do was snip out the W1AW identification, paste the straight tape text together, measure it to my own needs, and intersperse it with W1EIA identification. (At first the club call of the Connecticut Wireless Association was used — with the club's permission — since W1NJM might have been associated with ARRL headquarters. This was a purely personal project.) Appropriate introductory and signoff texts were recorded on the tapes, and I was in business.

Murphy Strikes Again

Nothing works right the first time (eh, Murphy?), and some adjusting was necessary in the early stages. Since then, I have become better acquainted with Mr. Boehme, and we have worked together more or less harmoniously.

At first, I used the 150-V dc output of the Boehme to key relays directly. This method was satisfactory, except that I had to change speeds manually. Early in the game, I began recording the audio output of the Boehme on a regular magnetic tape. The playback from the recorder was then adjusted to operate the keying relays. Thus, the code practice transmissions aren't "live." Mistakes made during recording (and I make plenty) can be corrected before the transmissions. A second advantage to this system is that no speed changes are required because they are already on the tape.

During the 20 years the program has been on the air, some 57 reel-to-reel tapes have been recorded with W1NJM/W1EIA code practice. The recordings usually are made on 5-inch reels at 1-7/8 in./s on four tracks, one code practice per track or four complete sessions per tape. No recording is used more than eight times, or more often than annually. (So far, no one has complained that he has memorized the text.) After eight uses, tracks are abandoned; when all four tracks have been used, the tape is erased and recycled with another set of recordings.

High-fidelity equipment and recordings are not required. Some of the tapes are as old as the program itself. The paper tape used in the Boehme to make the recordings also has had a long, useful life. Although it turns yellow with age, the paper tape retains enough strength to reproduce faithfully. In fact, some of the tape used in sessions almost 20 years ago is reused in making new tapes. (Cutting new tapes is hard work!)

The Station

The less said about this, the better. W1NJM is a long way from your modern amateur station with a row of little black boxes sitting atop a polished desk and no wires showing. Three amplifiers run 900, 800 and 300 watts input. The former two are used routinely; the latter is kept on standby "just in case." Antennas are a couple of scraggly inverted Vs or dipoles, with some interaction when both rigs are pounding away. Rf in the keying leads has been a problem at times, but series rf chokes have provided a partial solution. Believe it or not, there is no TVI — or at least nobody has complained. I don't go around asking our neighbors, most of whom give my XYL and myself a wide berth as being eccentric to the extent of probable imbalance. I manage to put out a respectable signal with clean keying despite the haywire, and that's what counts.

With my retirement has come more travel, and this means curtailment of the program to some extent, particularly during the winter months when I'll be hiding from OM Frost in southern climes. To compensate for this, high-speed code practice will be offered on Thursdays as well as Sundays (0130Z Fridays and Mondays) whenever possible. Although retirement and rigid scheduling don't (or shouldn't) go together, I'll try to announce when the next practice will take place at the end of each session. The best way to find out if practice is scheduled is to listen on 3636 or 7085 kHz.

Acquiring the ability to copy code at high speeds is just as worthy an objective in Amateur Radio as any other, and more so than some. It doesn't take a special guy or gal with unique talents. Everybody (well, almost) can do it if he or she *wants* to. Many amateurs proudly display their operating achievements; how many can hang 60-wpm code proficiency certificates in their shacks? Only 44. Wouldn't you like to add to that number?

Vive la Difference . . . Baton Rouge

Rich in color and history, famous for Southern hospitality — won't you meet us there at the 1979 ARRL National Convention?

By William E. Mixon,* K5SVD

The year 1979 will be marked as an important one in the life of Amateur Radio. WARC will convene in September, which makes it very important that amateurs know what lies ahead for their avocation. With this in mind, the Louisiana Council of Amateur Radio Clubs has chosen "The Amateurs' Unique Ability to Enhance International Goodwill" as their convention theme.

The convention will feature a diversified schedule of activities planned to interest the whole family. It will offer a chance to meet and talk to old friends and the "who's who" of Amateur Radio. Manufacturers will be showing the latest in equipment, providing a chance to have hands-on handling of new innovations in the electronics world.

*P. O. Box 891, Baton Rouge, LA 70821

Cajun Country

The history of Baton Rouge reflects the color and fire of Louisiana's history and politics. Part of the great drama of the American Revolution was played out in Baton Rouge, where the only military battle outside the original 13 colonies was fought in 1779. The Old Arsenal Museum marks the spot of that historic conflict. The magnificent Old State Capitol, with its gothic towers and its superb stained glass, still reminds us of an era past. Around Baton Rouge, the great cotton and sugarcane planters built monuments to their own wealth and taste . . . gracious homes that reflect the warmth and charm of that golden decade before the Civil War.

It is a city from the past, with a future as bold and brilliant as tomorrow. The capital of a mighty state and the center of a unique culture, Baton Rouge is a lively, dynamic, industrial city on the banks of the Mississippi, and is one of the busiest ports in the world. Giant ocean-going vessels of every nationality crawl up the Mississippi from the Gulf of Mexico to fill their steel bellies with Baton Rouge's commercial abundance. The splendor of the noble river in the magnificent countryside surrounding the city is a tranquil disguise for one of the most important industrial cities in America.

Huey P. Long, the Kingfish, the most flamboyant of politicians and the most celebrated of Louisiana's sons, came to Baton Rouge as governor and built the tallest State Capitol in the United States, towering 34 stories above the city's summit. He ruled over an era of reform and rebellion, he built roads, he built schools and he put free textbooks in those schools.

The Riverside Centroplex, site of the 1979 ARRL National Convention, is a new facility to Baton Rouge. It contains 35,000 square feet of exhibit space plus a 15,000-seat arena, a 2200-seat theater and banquet facilities for 4000.

A Gothic castle-like building, Louisiana's former State Capitol stands on a terraced bluff overlooking the Mississippi in the state's capital city of Baton Rouge. *(photos courtesy of Baton Rouge Area Convention and Visitors Bureau)*

Convention Activities

Technical sessions begin Friday at 12

P.M. in the Centroplex. Topics will include emergency communications, contest operating, traffic handling, MARS, 10-10, International Goodwill via Amateur Radio, AMSAT and an array of technical programs to suit everybody's interests. The amplifier sessions will feature Dennis J. Had, president, Dentron Radio. An antenna-design discussion will be conducted by Duncan Carter, W5DC; contest operation will be the topic of George de la Matyr, W5GO, and Joe Livingston, WA5IGD. The growing problem of RFI will be updated by Al Markwardt, W5PXH, ARRL Technical Advisor. Robert Smith of Texas Instruments will present a short paper on linear ICs and Ten-Tec's Dick Frey will discuss transceiver specifications. ARRL Technical Department Manager Doug DeMaw, W1FB, will be featured in a session on toroidal inductors. And there will be more that is not in at press time.

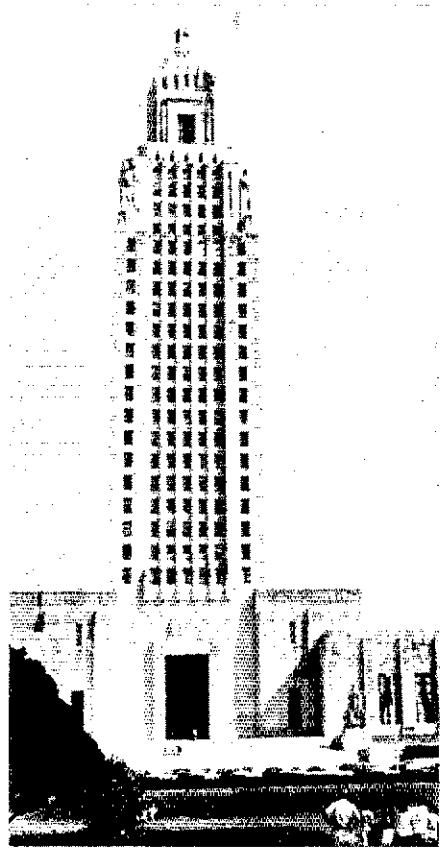
The FCC exams for upgrading will be conducted at 8:30 A.M., Saturday — don't be late! (Bring your completed FCC Form 610 with you.) The FCC Forum will be Sunday morning in the Arena at 8:30 A.M.

Since the 1979 Second Meeting of the ARRL Board of Directors will convene in Baton Rouge on July 18, all directors, vice directors and League officers will be available for the ARRL Forum. The Forum, at 11 A.M., Sunday, will be hosted by Delta Division Director Max Arnold, W4WHN, with ARRL President Harry J. Dannals, W2HD.

To add further interest to convention doings, there are lots of prizes, including several complete stations. Some awards will be restricted to those who are preregistered by July 10th; others will go to participants in meetings and seminars. All preregistrations can be picked up at your hotel or at the preregistration desk in the Centroplex.

Tours and Other Attractions

The Acadiana Tour, hosted by Acadian ladies, will leave Baton Rouge at 9 A.M., Saturday, July 21; cross the Atchafalaya Swamp to St. Martinville, site of Longfellow's famous "Evangeline Oak" to New Iberia to the Steamboat House on Main Street. This fine old brick cotton warehouse was built in 1830. The warehouse now contains a great seafood restaurant. Then, on to the Shadows on the Teche. The Shadows, one of Louisiana's most famous homes, now the property of the National Trust for Historic Preservation, was built in 1835. Next, tour the Dulcito Plantation, built in 1788 and used during the War Between the States as a field hospital. Kids' tour will be a chaperoned visit to the Baton Rouge Zoo, with a box lunch in the park and games and prizes. Babysitting will be available in all hotels so the ladies will be able to relax and enjoy the fine Louisiana hospitality. Walking tours also available will include the Baton Rouge Planetarium, the State Capitol and the Old Arsenal Museum.



Rising 450 feet above the capital city, the Louisiana State Capitol in Baton Rouge is the tallest capitol building in America. It sits alongside the Mississippi River on 27 acres of perfectly manicured gardens.

There will be a treasure hunt in the Gothic Castle which was built in 1847 and served as Louisiana's State Capitol until 1932. The treasure hunt will have wine and cheese stations throughout the building, ending on the Plaza for an Acadian Dance with a Cajun band.

Non-denominational religious services will be conducted in the Centroplex Sunday morning at 8 A.M. Father Chris Springer, W5ISS, will conduct these services. There are churches of all faiths within easy walking distance of the convention center.

A specially built Recreational Vehicle Park containing one hundred spaces with water and electricity is only five minutes from the Centroplex site. The remaining 24.5 acres will be used for self-contained units only. Bus service along with special guards will be provided to and from the Centroplex.

The Louisiana Council of Amateur Radio Clubs will provide talk-in on 19/79, 22/82, 34/94 and 3.910 MHz for the week of July 16 through July 22.

The QCWA will host a breakfast on Saturday morning at 7:30 A.M., with presentations of 50-year certificates as well as other awards.

Accommodations

Worth noting is the use of the Baton Rouge Housing Bureau for our housing. Reservations must be made through the Housing Bureau in order to obtain the convention rates. For preregistrations, the talk-in station will be able to tell your friends just what hotel you are housed in.

For further information write: '79 ARRL National Convention, P. O. Box 891, Baton Rouge, LA 70821.

At the left, the LSU Rural Life Museum, which carries you back to the 1880s, features a plantation overseer's house with separate kitchen, four workers' cabins, a blacksmith's shop, sugarhouse, one-room schoolhouse, barn, commissary and a cemetery. At right is "Magnolia Mound" Plantation Home, a French settler's house built in the late 1700s. It is one of the oldest wooden structures in Louisiana. Recently restored, it is now listed in the National Register of Historic Places and is open to the public.

WARC Countdown

Conducted By David Sumner,* K1ZZ

New Column; Familiar Topic

Usually, when a new *QST* column is begun, we assume it will become a permanent feature of the journal. Of course, columns come and go as the need for them builds up, peaks and then declines; but it is seldom that we start a column *knowing* when it will disappear from *QST*'s pages.

In this initial column, we can already tell you with a high degree of certainty that the last "WARC Countdown" you will read will be in the January 1980 issue. Why? Simple. The 1979 World Administrative Radio Conference (WARC-79) opens in Geneva on September 24 and is scheduled to run for 10 weeks. The purpose of this column is to carry news about WARC preparations as they affect the Amateur and Amateur-Satellite Services, and to provide a monthly picture of what is happening in Geneva during the conference. By the time the deadline for the February 1980 issue is upon us, WARC-79 should be history; the "countdown" will be over. In that issue, we intend to carry a feature article summarizing the results of the conference. It may take a couple of months afterward for all the details to be sorted out, but eight months from now you should know, at least in general, how successful the Amateur Radio community has been in defending and extending its frequency allocations.

At this point, if the subject of WARC is new to you, you have every right to be confused. What we're talking about is a conference, sponsored by the International Telecommunication Union (ITU), which will undertake the most massive revision of the International Radio Regulations since 1959. These regulations are the framework within which the FCC's rules, more familiar to U.S. amateurs, are made.

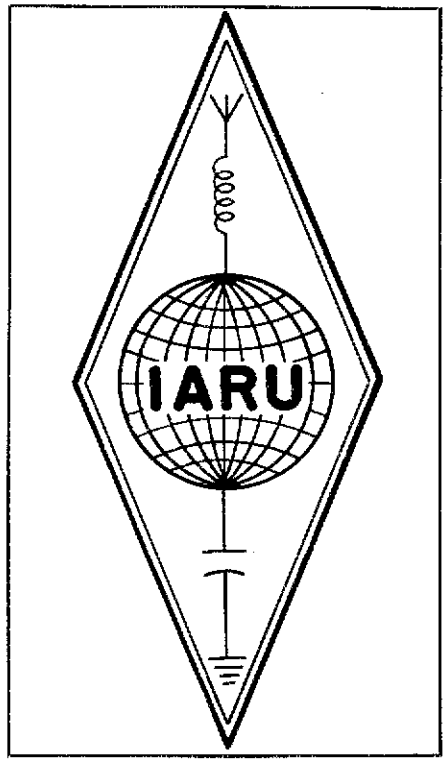
The most important feature of the ITU Radio Regulations is the Table of Frequency Allocations, which defines the rights of the various radio services needing access to the radio spectrum. The limits of the ham bands are not arbitrary or accidental. They are the result of a series of conferences similar to WARC-79 stretching back to 1927. Some of "our" bands are, in fact, shared with other services. The relative status of different services which share the same frequency allocations are also a part of the table.

WARC-79 will have the authority to make sweeping changes in the ITU Radio Regulations. While no country has proposed it, and no well-informed observer expects it to occur, the conference has the power to make drastic changes in the Amateur and Amateur-Satellite Services. Allocations could be sharply reduced; definitions could be rewritten to change the very nature of Amateur Radio; some of the rules under which we operate, such as those involving international third-party traffic, could be substantially altered. All of the radio services which are defined in the ITU Radio Regulations, totaling nearly three dozen, face the same prospect. This makes WARC-79 a very important event for the entire telecommunications community.

When Will Changes Take Effect?

Two questions which are often heard in amateur circles these days are: If we get new bands, how long will it be before they are available? If shifts in the present bands are a result of WARC-79, when will they be made?

Whenever spectrum is shifted from one service to another, there must be sufficient time for stations in both services to make adjustments. Although the WARC-79 outcome should be known in just a few months, there will be several *years* of transition before the new regulations are fully in effect. How long a period of transition is necessary depends in part upon the extent of the changes. In most services, stations are assigned to specific frequencies and are not permitted to operate at will within a band of frequencies, as is the Amateur Service. These frequency assignments are coordinated internationally to minimize interference between stations. The greater the change in the Table of Frequency Allocations, the more stations will have to be coordinated to new frequencies, and the more difficult the job will be.



The emblem of the International Amateur Radio Union will be a familiar sight in Geneva this fall during WARC-79. The IARU observer team will be the official representative of the Amateur and Amateur-Satellite Services during the conference.

History is a good guide, because WARC-79 will function along lines similar to previous conferences. The last time there were major changes in the high-frequency amateur allocations was at the 1947 Atlantic City Conference, which closed in October of that year. At Atlantic City, a new 21.0- to 21.45-MHz amateur band was created (bet you thought we *always* had that band!) and the 14-MHz band was narrowed by 50 kHz. However, it was not until May 1, 1952, almost five years later, that amateurs got to use the new band.

Other conferences have had shorter transition times, generally running about two years. There were fewer administrations in those days, however, and fewer stations; also, it has been 20 years since the last general WARC. Finally, much of the world is sensitive to the economic problems brought about by rendering present equipment obsolete, and there is likely to be resistance to a rapid transition. Canada has proposed a date of December 31, 1983. This is probably as good a guess as any, though the date may well vary in different parts of the spectrum or the world. One thing is certain: It won't be 1979 or 1980!

What Happened to HF Broadcasting?

Back in March *QST*, page 10, we reported that the U.S. proposals for allocations below 27.5 MHz were being delayed pending resolution of a controversy over the amount of spectrum included for International Broadcasting. The FCC Report and Order in Docket 20271 (see February *QST*, page 55) provided for a substantial increase in spectrum available to the broadcasters. However, it was not enough to satisfy the Board for International Broadcasting, the government agency which operates Radio Free Europe and Radio Liberty, or the International Communication Agency, which operates the Voice of America. These broadcasters were successful in blocking the submission of the U.S. proposals for the hf spectrum when the rest of the proposals were sent to Geneva in January, and have waged a relentless campaign for an even greater increase. It is safe to say that this campaign has not won them any friends in the WARC preparatory community.

As of this writing, the chairman of the U.S. WARC delegation, Glen O. Robinson, has announced that he has agreed to a bit more than 500 kHz of additional spectrum for International Broadcasting to be included in the U.S. proposals. Fortunately, none would be at the expense of the Amateur Service. The FCC and NTIA have been asked to comment on the "compromise." Depending upon their comments, it is possible that the revised proposals will be sent to Geneva by the first of May, after the deadline for this column. Check "League Lines" for any late-breaking developments.

Other Countries' Proposals

QST already has carried summaries of the U.S. and Canadian WARC proposals, the U.S. in the previously mentioned February article and the Canadian in the May issue, page 61. Next month, we'll begin to examine the proposals of other administrations, and what's behind them.

*Assistant General Manager, ARRL

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

The New DOC Amateur Examinations

The tumult and the shouting die . . .? Well, not quite! And that, I believe, may just be the understatement of the year!

As most of you will know, late last year, the Department introduced a complete new examination procedure together with new exams. At this writing, two of these new examinations have been conducted and the results tabulated. The rather high failure rate, together with other considerations, has launched a storm of protest from amateur organizations and individual amateurs alike. We must be frank in admitting that we too initially became most concerned; however, after a close and thorough study *of the actual examinations* together with discussions held with the responsible Department officials, we concluded that there is nothing radically wrong or unfair in these new examinations. Granted, perhaps the Department could have been more explicit and informative in their initial advices; however, the fact remains that little, if anything, has been altered or changed in the syllabus itself from that as herebefore. In other words, the prescribed knowledge necessary to obtain an amateur license remains, for all practical purposes, *the same as before*. What has changed, however, is that now a candidate *must be knowledgeable* and not just a good memorizer!

Let's face it. In the past there were but a very few actual examinations and, of course, it was not very long before *all of the questions* became pretty well general knowledge. This even went so far that in some areas copies of the examination papers became available *for sale!* Therefore, in many instances, class instructors fell into the trap of teaching to the examinations instead of to the general knowledge required. This is no longer possible, under the new procedures, inasmuch as each new examination paper will have completely different questions from those of the previous exams. In point of fact, the DOC official responsible for drawing up the examinations has informed us that he has enough questions on hand so that no questions will be repeated for up to five years!

Following the January examinations, your League officials met with the concerned Department officials. Outside of but a very few areas, we were forced to conclude that, as a responsible national organization dedicated to maintaining the high Canadian Amateur standards, there was not very much wrong with the new procedures and examinations themselves.

As in anything else new there are, of course, several areas which merit correction and/or change, such as elimination of tricky and/or ambiguous type questions, standard marking procedures, and so on. We have been assured by the Department that steps will be taken to correct these areas in future examinations. We have also been assured that sometime later this year, following four or five examinations, the Department will conduct a meeting with the national amateur organizations in order to closely examine the results of all of these examinations and to determine where unfair areas exist, and so on. As far as we are concerned, this is a fair, sensible and cooperative approach.

The large majority of the protest letters we have been privileged to see indicate emotion rather than constructive criticism. One of the very few really constructive and objective papers we have seen was submitted by the Slemon Park (PE) Amateur Radio Club. We immediately passed this along to the Department and it will, we are sure, receive due consideration.

We have a suggestion for consideration of all amateur organizations and amateurs. On this subject, we respectfully request that before firing off emotional (and in many respects, unqualified) protests to the Department, it will better serve the interests of the Canadian amateur if such were directed to either one, or both, of your national organizations. One of the primary reasons for our existence is to serve the interest and welfare of the Amateur Service and we both can best do this only when we are organized bodies and not a bunch of rabble. *Uncoordinated action is hardly ever effective.*

In the meantime you may well ask what we are doing about it. In the first instance, we have sent out to all League affiliated clubs and registered class instructors a set of sample questions for all three license class examinations which were furnished to us by the Department. Following *our* representation to the Department we also received a copy of the actual January examinations and these are available, free of charge (s.a.s.e. requested), from our Club and Training Department. In writing, please specify which of the following you would like: Amateur Certificate — Rules; Advanced Amateur and Digital Amateur — Rules; Amateur — Theory; Advanced Amateur — Theory; Digital Amateur — Theory. Please direct your requests to the Club and Training Department, ARRL, 225 Main St., Newington, CT 06111 U.S.A.

DOC TO AMEND RADIO INTERFERENCE ACT

The Department has given notice that they are proposing amendments to the Radio Interference Act. League officials and their Technical Department have carefully studied the proposals and we can see nothing in the document that poses a threat to the radio amateur. Conversely, it should be advantageous to the community, especially those who live in dense metropolitan areas or adjacent to major highways. Ten-, 6- and 2-meter operators should be particularly impressed with the contents of the Notice.

NEW CRRL ASSISTANT DIRECTOR

Because of her exceedingly heavy Communication Department responsibilities, not to mention her involvement with the National Traffic System, Noreen Nimmons, VE3GOL, has found it necessary to resign as an assistant director. She remains, however, as the CRRL consultant on all traffic matters.

We are pleased to announce that another very well-known and respected YL, Ann Nuttel, VE3HAI, has accepted appointment as assistant director. Currently, Ann is the president of the Canadian Ladies Amateur Radio Association and also has been responsible for editing and publishing the association's excellent publication. Welcome to the team, Ann.

NEW RECIPIENTS OF CRRL NATIONAL CERTIFICATE OF MERIT

For their dedicated and "above the call of duty" contribution to the principles and welfare of the Canadian Amateur Radio Service, we are pleased to announce the awarding of our National Certificate of Merit to the following: Jim Goodman, VE3FZG; Marv Nash, VE3FON; and George Davis, VE3BBW. Congratulations! QST

Well-known Western amateur Roy Usher, VE6EA, is here shown accepting his 50-year ARRL membership plaque from Syd Jones, VE6MJ, assistant director and SCM.

Strays

QST congratulates . . .

. . . George H. Russell, W2SJU, who received the Harry C. Williams Outstanding Lay Leader Award from the Metuchen-Edison (NJ) YMCA for teaching Morse code and radio theory class.

. . . Gene Baldwin, WØRUG, who received honors from the National Bureau of Standards for inventing an electronic thermometer. Gene and two others also have received a U.S. patent for a field-intensity meter which measures the strength of radio signals.

. . . Andy Freeman, WØGFE, who was named "Mr. Rural Electric Power" in North Dakota. In the '40s Andy invented the headbolt heater, forerunner of the present-day frost plug heater and tank heater used to warm car batteries.

*Director, Canadian Division

International News

Conducted By Bruce Alan Johnson* WA6IDN

Amateur Radio and the Kingdom of Tonga

Three years ago, there were no radio amateurs in Tonga. Amateur Radio was introduced to the island kingdom by a New Zealander who was first to be licensed by the Tonga Telephone and Telegraph Commission as A35WL.

Having a selfless vision of the great potential Amateur Radio held for Tonga, Bill Lang, A35WL, soon gathered around him a small group of interested Tongans. Together they launched the Amateur Radio Club of Tonga (ARCOT). The International Amateur Radio Union has just welcomed ARCOT as its 105th member.

We all know that enthusiasm is the first step toward mastering anything, but what was to be done to *train* these eager students? Bill Rickertson and Don Greer, A35DE, rolled up their sleeves and began teaching the code and radio theory. Interest grew, and soon ARCOT found itself comfortably headquartered at 'Atenisi University in the capital city of Nuku'alofa.

Stretching 500 miles in the South Pacific, nearly 200 islands compose the Kingdom of Tonga. The Kingdom's 116,000 people, who live mostly on one of these islands (only 45 are inhabited), raise yams, taro, sweet potatoes and bananas. Of course, they enjoy a paradisiacal climate, with temperatures ranging from the 70s to the 90s year 'round.

Great weather for operating, and that's just what Tonga's 12 licensed amateurs do each day. That figure's growing, by the way, as ARCOT continues to provide superb training to persons from all walks of life.

Applicants are expected to pass a 12-wpm code test, along with an examination on radio theory and Tongan regulations governing the Amateur Radio Service. The course may not be easy, but its graduates emerge as true aficionados of the amateur art.

The ARCOT club station, A35FI, can be worked almost daily on 40-meter cw. On the air since July 1978, the station affords the new Tongan amateurs an opportunity to be active and to get acquainted with some of the world's million other hams. (Most Tongans don't have their own stations yet. The annual per capita income in the Kingdom is approximately $200 US.)

Several Project Goodwill receiver and transmitter kits have been sent to Tonga from ARRL/IARU hq., and more will soon be on their way. This will enable more of the A35s to get on the air from their own homes. The gear in the club station, by the way, consists of an old Eddystone 750-X receiver and a low-power Knight T-60 cw transmitter.

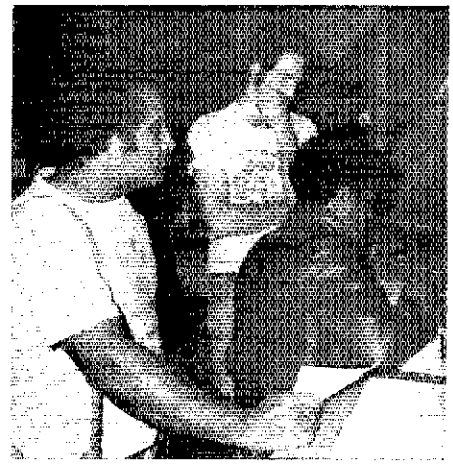
Soon after the first class of students had completed the ARCOT course, the Tonga Telephone & Telegraph Commission (T&T) was taken aback by the unprecedented rush for amateur licenses. The commission was concerned that improperly trained amateurs might cause interference to other radio services. Clark Richardson, A35CR, undertook discussions with the T&T to show them how thorough the training was. The result? The T&T began at once to encourage the work of ARCOT. They recognized that ARCOT was providing Tonga with a vital corps of self-training technical experts who were skilled not only in the principles of radio communication, but in communication techniques and even emergency traffic work. (Dave Goddard, A35DG, was the first to communicate with the outside world during Tonga's destructive earthquake in June 1977.)

ARCOT's new president is Tavake Vi, A35TV, who also holds the distinction of being the first Tongan radio amateur. Tavake proudly informed IARU hq. recently that the Legislative Assembly of Tonga has recognized the Amateur Radio Club of Tonga as the official organization representing Amateur Radio in the Kingdom. And the Crown Prince, His Excellency Tupouto'a, has begun to show interest in ARCOT and in Amateur Radio.

Looking ahead, ARCOT plans to begin Amateur Radio classes in the northern island group soon, and will also found a branch of the club there. They're growing fast, and they're an inspiration to the Amateur Radio societies of other developing countries throughout the world. Next time you work an A35, how about giving him (or her!) a hearty welcome?

Code proficiency certificates were recently presented by ARCOT to its newest licensed members. Shown (l-r) are Puono Taufa'eteau, A35PT; Etuate Kavenga, A35EK; Sione Moile, A35SM; and Dave Goddard, A35DG, past president of ARCOT. *(A35DE photos)*

Official antenna rigger for ARCOT is Sione Moile, A35SM, shown here installing an inverted V for A35FI.



A35PT watches as A35EK works an LU in Argentina. Don Greer, A35DE, stands in the background as Etuate enjoys his first QSO.

Something You Can Do . . .

Project Goodwill has been a smashing success (see January 1979 *QST*, page 58). But we're pleased to report that in many of the developing societies in Africa, Asia and the South Pacific, the members are interested in going beyond the simple station that Project Goodwill provides. They would like to pursue antenna design, simple converters to put the little 20-meter rigs on other bands, simple test gear, etc.

Do you have any spare parts lying around in that junkbox? Parts which are good, but which you might not intend to use? How about giving them to one of these new and growing amateur societies somewhere "over there"? Remember: the state of the art in these developing countries is considerably different than that which we enjoy. Old coil forms, wire, even tubes, are most useful.

If you're willing to pay the postage to get the parts to Newington, we'll roll up our sleeves every few Saturdays and get 'em shipped over to the new amateurs who can put them to the best use. (We'll mix the parts you give with those of others, so that these "grab bags" will offer the most variety.)

The address: Project Grab Bag, c/o International Services Officer, ARRL Hq., Newington, CT 06111.

Thanks!

*International Services Officer, ARRL

Happenings

Conducted By W. Dale Clift,* WA3NLO

Action on Capitol Hill

In the Senate, two bills have been introduced to amend the Communications Act. Senator Ernest F. Hollings (D-SC), who is chairman of the Subcommittee on Communications, has brought forth S.611, with cosponsorship of Senator Howard W. Cannon (D-NV), chairman of the parent Commerce Committee. The second bill is by Senator Barry Goldwater, K7UGA (R-AZ), ranking minority member of the subcommittee; it has been dubbed S.622. Both bills address competition in the marketplace, spectrum management, deregulation and fees. The Hollings bill goes further, looking toward spectrum use fees, but exempting police, public TV, Amateur Radio, CB and the like from having to "rent the frequencies." Goldwater's bill would have only fees based on direct and indirect costs of regulating the entities involved, and would give the Commission authority to waive the fees for governmental, public and noncommercial users.

In the House, Representative Lionel VanDeerlin (D-CA), chairman of the House Subcommittee on Communications, has introduced his "Rewrite of the Rewrite"; HR.3333. Last year's bill to rewrite the Communications Act caught so much flack that this year's bill is expected to be quite different; spectrum use fees figured prominently in the 1978 Rewrite bill.

LICENSE FEE REFUNDS NEAR

In 1976, Federal courts overturned some of the fees that FCC had been charging various providers of communications services. Accordingly on January 1, 1977, FCC halted its collection of any fees from any service, including Amateur.

Since that time, the Commission has been struggling to determine what fees it could have been charging under existing legislation, and what it could do about returning a portion of fees collected. The decision to split the fees into those over $20 and those of $20 or less, and to pay the larger group first, was announced some time ago.

At the end of January FCC adopted a First Report and Order, General Docket 78-316, but it wasn't until the end of March that the 21-page document with 45 pages of appendix was released. Most of the Order explains the philosophies used in arriving at a retrospective schedule of fees to meet the Court's requirements.

Amateurs who, between 1970 and 1976 paid $25 fees to FCC for special call signs will be able to secure refunds of about $20; FCC feels that $5 would cover its costs for issuing these licenses under the guidelines laid down by the Court. Application will be on a standard form expected to be available soon. FCC has set itself a goal of 90 days to process requests, once the forms are in the field and the machinery starts up. The special staff under the executive director will be in place for about a year, and all applicants should attempt to apply for refunds within that time.

Actually, amateurs who applied for special calls wrote checks for $29, but it appears at this writing that only a portion of the major fee, for the call itself, is refundable now; the $4 fee for modification is considered separate and minor.

When the applications become available, ARRL will transmit information on how to obtain them over regular ARRL bulletin schedules from W1AW and other stations manned by volunteer OBS appointees. Information will also appear in "League Lines" or "Happenings" of the first available issue. — *Perry F. Williams, W1UED*

*Deputy Manager, Membership Services

CODE CREDIT RESTRICTION LIFTED

Code credit certificates issued at any FCC field office or testing site are now honored when presented at any other field office or testing site, according to an official news release dated April 6, 1979. Formerly, a code credit certificate was valid only when presented to the same field office which issued the certificate.

Although the purpose of the restriction was to allow FCC personnel to validate the authenticity of certificates presented for credit, the Commission said there had been no problem with attempts to falsify certificates and that the restriction was unwarranted.

The FCC noted that the authentication of Interim Amateur Permits at offices other than the originating field office had not proved difficult.

The action amending Section 97.25(b) became effective April 20, 1979. — *Michele Bartlett, N1AGD*

NOVICE FIVE-YEAR LICENSE AFFIRMED

A Petition for Reconsideration and Postponement of portions of Docket 20282 was dismissed in a Memorandum Opinion and Order adopted by the Commission on March 21, 1979. The request, filed by Michael G. Ash on behalf of the Meriden (CT) Amateur Radio Club, Inc., noted that the FCC's decision to make Novice licenses renewable and valid for five years, would create a "depository" of semi-trained operators. It also maintained that renewable licenses would eliminate the incentive for Novices to upgrade, that long-term Novices would eventually demand an expansion of frequencies and other privileges, and that the system of issuing renewable licenses upon examination by a volunteer examiner had been shown to be unworkable in years past with respect to Technician (C) licenses.

The Commission pointed out that the Novice license conferred sufficient operating privileges to support many of the principles forming the basis and purpose of Amateur Radio. The FCC added that while it hopes that Novices would want to eventually become more proficient, the Commission is not prepared to state that Novice operators neither served the public interest, nor furthered Amateur Radio principles.

The FCC maintained that the increased privileges inherent in the present system provides sufficient incentive for Novices to upgrade. It added that the Commission was quite able to resist demands for increased operating privileges which would be contrary to the public interest, should such a situation arise.

The Commission concluded that since the degree of difficulty in obtaining a Novice license is less than that for getting a Technician class license, and since the operating privileges for Novices are limited, there was little reason for an applicant to attempt to obtain a Novice license by fraudulent means, which may have been the case with some Technician and Conditional class licensees. — *Michele Bartlett, N1AGD*

ASSISTANCE WANTED FOR LOCATING "GRANDFATHERED" PHONE PATCHES

Some phone-patch installations around the country meet the following conditions: (1) They were connected to the telephone company lines before October 17, 1977. (2) No coupler or protective isolating arrangement was used. (3) The installation was on record with the telephone company before October 17, 1977.

The FCC considers phone patches connected in this manner to be "grandfathered" and, therefore, may remain in place legally without the user being required to obtain a coupler from his telephone company. Certain users only are eligible to establish a unit's "grandfathered" status: gas or electric utilities, local heating oil companies, trucking or transport companies, the National Aeronautics and Space Administration (NASA), the U.S. Department of Defense (MARS installations) and telephone company customers in hazardous or inaccessible locations. If you're aware of a phone patch connected according to these conditions, write ARRL headquarters with the particulars, and we'll pass the information on to the FCC. Don't delay. The deadline set by the FCC for notification is July 1, 1979. For each unit "grandfathered," all other units by the same manufacturer and model number are covered, as well. This may include some of these commercial units that are now in use at

some Amateur Radio stations. — *Alexander N Gerli, ACIY*

FCC KEEPS 220-MHZ PROPOSAL

Very late in the process of planning U.S. proposals for WARC-79, in Docket 20271, an entry was penciled in for the Maritime Mobile Service at 220-225 MHz. It would replace the Radiolocation and Amateur Services as primary services, but amateurs could continue as secondary (see pages 9 and 55, February *QST* for details).

Predictably, several petitions for reconsideration or retraction were filed with FCC concerning this part of Docket 20271. The Spectrum Management Association of Southern California argued that amateurs had not been given a chance to comment on the proposed sharing with the Maritime Mobile Service and that the move would adversely affect amateurs. Comments of other petitioners were that amateurs could not share with the Maritime Service and that the frequencies 216-220 would be sufficient.

In a Memorandum, Opinion and Order released April 10, the petitions were denied. FCC pointed out that the allocation was proposed after a proceeding incorporating nine Notices of Inquiry and covering four years. It said petitioners had not presented new material or factors. Finally, FCC noted that it had already sent the proposals to the Department of State, which in turn had transmitted them to ITU headquarters. — *Perry F. Williams, W1UED*

RTTY IDENTIFICATION RULE UPHELD

A request for amendment of 97.87(g) to permit Amateur Radio station identification by teleprinting has been dismissed by the FCC. The Petition, RM-2360 submitted by Leslie Haye of Anchorage, AK, stated that operators transmitting by teleprinter were subjected to unnecessary interruption by the current requirement that identification be made by either telegraphy or telephony.

The FCC said the rule was intended to aid amateurs' self-policing and interference detection capabilities, which could be undermined by the requested amendment. Determining the call signs of stations using teleprinters would require the use of special terminal equipment, which would not be in the interest of the Amateur Radio Service.

The Commission also noted that the use of automatic telegraphy identification equipment, now widely used by amateur stations in repeater operation, would eliminate the "minor burden" of teleprinter identification. Therefore RM-2360 is dismissed. — *Michele Bartlett, N1AGD*

CALL-SIGN PETITIONS DISMISSED

Four petitions for rulemaking, requesting modification of the FCC's call-sign assignment system, were dismissed by the Commission on February 22, 1979. The proposals were RM-2759 by Alan Bloom, WA3JSU, dated August 1976, requesting distinctive call signs for Novices; RM-3175 by Richard Swain, K8AIT, dated July 1978, asking that currently licensed amateurs, as well as those newly licensed, be allowed to request a call from the four groups; RM-3186 by David Novoa, KP4AM, dated July 1978, asking for a special prefix for a particular U.S. possession; and RM-3198 by John Bartko, WB3KTH, asking that relinquished 1 × 2 and Group C calls with K or W prefixes be reassigned on demand.

In declining to amend its rules, the FCC said it would continue to consider suggestions for changes in the call-sign assignment system, but it could not foresee circumstances warranting such changes being made through rule amendments. The Commission stated that the flexibility of the present approach is preferable to incorporating the details of the system into the rules. Therefore, RM-2759, 3175, 3186 and 3198 are dismissed. — *Michele Bartlett, N1AGD*

LICENSES SUSPENDED

Two Albuquerque, NM, Amateur Radio operators who were caught severing the transmission line of another amateur station have had their operator licenses suspended for six months. The suspension order, adopted March 8, 1979, stated that deliberate damage to equipment which renders a radio station inoperative is adverse to the public interest, and is a violation of 97.127. The Communications Act of 1934 gives the FCC the authority to suspend the operator license of any amateur who has willfully damaged radio apparatus.

Noting the age of the amateurs (16 and 17 years old) and the fact that they had paid to have the damage repaired, the Commission decided to suspend the licenses rather than revoke them. — *Michele Bartlett, N1AGD*

ANNE JONES CONFIRMED

The U.S. Senate completed its expected confirmation of Anne P. Jones, most recently the General Counsel of the Federal Home Loan Bank Board, to replace Margita White as the newest FCC Commissioner. Her term is to run until 1985. Jones was sworn in at Boston College, her alma mater.

BEHIND THE DIAMOND

You won't find any spelling errors in this article. All verbs will agree with subjects, no participles will dangle, and any "hopefullys" will have long since met their doom at the point of a red pen. But then, Joel Kleinman, WA1ZUY, edits every *QST* article with the same meticulous care that he will give to this one.

Joel began his career at ARRL hq. in the Club and Training Department in June 1976, as the OSCAR educational program assistant. It was in this capacity that he wrote parts of the series "Getting to Know OSCAR," helped develop the OSCARLOCATOR, and organized a teachers' conference at Kennedy Space Center to demonstrate the use of amateur satellites in the classroom.

Less than a year later, Joel stepped over to the Production Department as editorial assistant, moving in rapid succession to features editor, editorial supervisor, and to his present post of editorial/production supervisor.

With an undergraduate degree in English from the State University of New York at Buffalo, a master's degree in journalism from the University of Montana and two years' experience with a weekly newspaper, Joel knew he could handle the language. But what about the nitty-gritty of Amateur Radio? "When I came on board, I didn't know much about ham radio. But it was made very clear to me that I soon would — and I did!" Before long, Joel had written such *QST* articles as "The Lure of 2 Meters," the OSCAR articles, and "Network Hams — A Hobby Becomes a Career."

"I really enjoyed doing 'Network Hams,' " Joel says. "It's not often that a person gets to go on behind-the-scene tours of the Headquarters of all three broadcast networks in two days."

Joel actually wears two hats. As editorial supervisor, he reads all the nontechnical material that goes in *QST* (and "as much as possible" of the books), checking for accuracy and consistency. He points out that the journal has to meet the high standards that League members have come to expect. *QST* authors and editors are kept apprised of their efforts through a monthly *QST* questionnaire sent to a random sample of members. "Many people go out of their way to say that we've been doing a fine job," he explains. "That says a great deal for all those who contribute to the journal. Others, of course, provide constructive criticism that we use to plan future articles and changes."

Taking advantage of special "gift" rates, the Atlanta Radio Club, Inc. presented five complete sets of ARRL publications to the Atlanta-Fulton library system, to be placed in circulation in the central library and in libraries in the Atlanta metro area. Morris Johnson, KB4IT, presented the publications to Library Director Ella Yates, with Vice President Dave Johnson, WA4SSU, looking on. (The five people in the background are library employees.) The 400 members of the club were proud to make this presentation, KB4IT said. For information on how your ARRL affiliated club can purchase publications at reduced rates, write to Circulation Manager John Nelson, W1GNC, at Hq.

Joel Kleinman, WA1ZUY

Joel proposes the roster of general-interest articles to the monthly *QST* editorial conference, works with contributing editors, and supervises production of all *QST* articles and League publications. "It's very satisfying seeing a finished product each month," Joel says. "We take a lot of pride in the fact that *QST* is appealing to the eye as well as to the intellect. I enjoy working with others in the building on the way that they can best present their material."

As production supervisor, Joel oversees a staff of eight people, including typesetters, proofreaders, pasteup and layout artists and an editorial assistant. "We're responsible for getting *QST* to the printer on time. Things always get hectic as the deadline approaches, but that's what makes life exciting," he says.

With that kind of an attitude, it's not surprising that his favorite amateur activity is Field Day. "Last year we went to Pennsylvania. It took six hours to set up the station and I had about a half-hour to operate before I had to leave for home! But the cooperation and teamwork involved was the best part of Field Day for me."

The hitherto unpublished story behind Joel's first contact should hearten even the most discouraged Novice. "I was so nervous, I couldn't get my own call sign right. Not surprisingly, I didn't get a QSL card." Joel soon moved up to Technician, and is working on his code for the General class license.

Joel is the outdoor type — he and his wife Jayne spent their honeymoon on a camping trip from their native New York to Montana, and a framed photograph on his office wall testifies to the fact that he once climbed Mt. Katahdin, the highest mountain in Maine. He belongs to several environmental groups, including one that campaigns to save whales from extinction.

An avid motorcyclist, Joel points out that three *QST* editors — Managing Editor WICUT, Technical Editor KITD, and he — all ride bikes to work. "My Honda 125 is only a baby, but just wait 'til she grows up!" — *Michele Bartlett, N1AGD*

U.S. Amateur Frequency and Mode Allocations

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

Bandwidth Limitations

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz and between 50.1 and 52.5 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz, single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

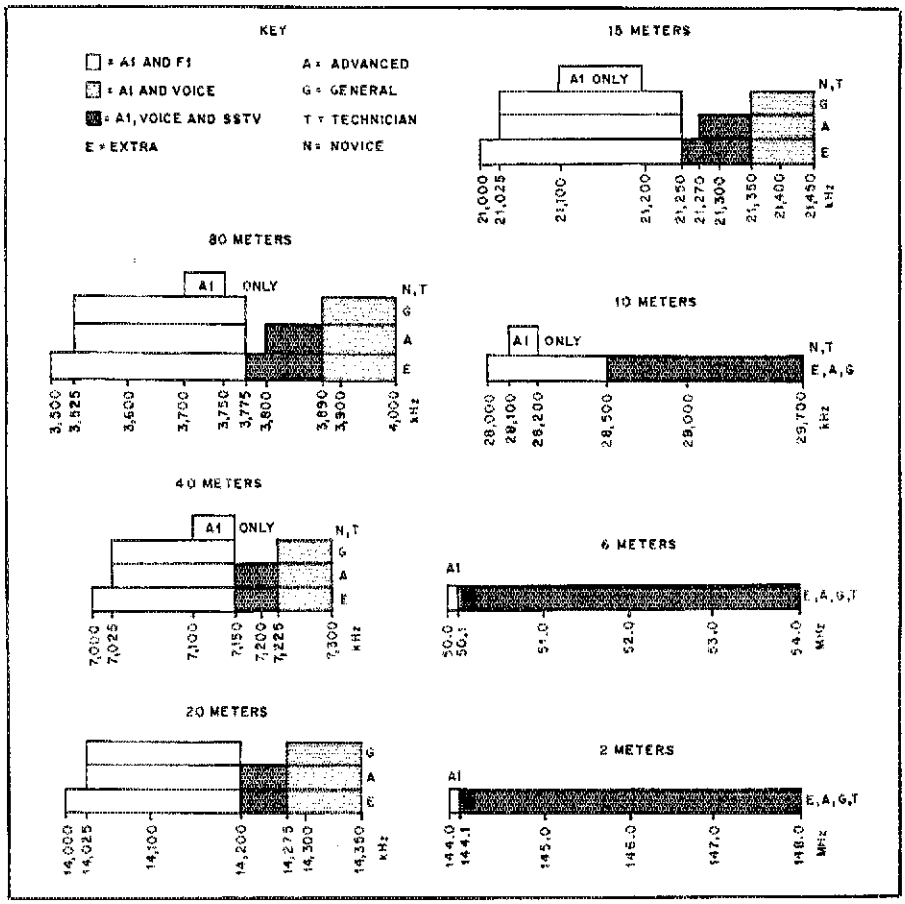
RTTY: When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

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

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

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

Other — All modes, except as noted.



Extra, Advanced, General, Technician

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

*Pulse not permitted.
**1 GHz = 1000 MHz.

Correspondence

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

KEEP THE CODE

☐ No, No, No! Let's not lose our code requirements. ("It Seems to Us," February *QST*.) If people want to use phone, buy a CB. But if they want to join the ham ranks, they should pay the dues by making the code requirements. If we do away with the code dues, what we'll have in the future is just another CB service. If we are going to give away ham tickets, why don't we also give away driver's licenses? That is also a privilege that many people can't have because they can't pass the required tests. — *Bob Miller, WD9IOD, Wolcottville, IN*

☐ I understand that the FCC wants to omit the code requirements for Amateur Radio licenses. That isn't fair to any amateur who wants to keep the hobby as it was intended to be: good clean operation, good clean fun. Elimination of the code may turn the 2-, 1-1/4-and 3/4-meter bands into CB at its worst. — *Steven Chapko, WD8QDA, Chester, WV*

☐ The code requirements are well founded. The use of this mode should not be belittled by anyone. A1 is the most reliable and cheapest mode available (except AØ). It doesn't matter if Novices get a subband on 1-1/4-meters or wherever. The only stipulation would be A1 only at 250-watts input or the legal ERP. In the event that Novice privileges extend to other places, the appropriate information should appear on the new exam. This exam, due to its technical nature, should be administered at an FCC office. The Novice license is the most important one in the Amateur Radio Service. It gives people a taste of what ham radio is like with the least amount of effort. It also provides a learning-by-doing situation important for upgrading through problems encountered in day-to-day operations. — *Harry Dougherty, WD5HQZ, Bixby, OK*

☐ I have been associated with electronics and radio for over 25 years. I believe cw is an antiquated requirement. After all, we are not required to be able to speak to get a license. I do not believe that anyone should be forced to pass a cw test. I appreciate the fact that worldwide communications require the use of cw, but there are probably thousands of operators that haven't used code since the day of their test(s). Also, thousands never come in contact with a foreign language operator. I believe that a hobby should not have requirements that may restrict many from enjoying that hobby. Maybe there should be a division within the license or separate voice and cw licenses. — *J. Tom Lowery, WD4MMV, Eau Gallie, FL*

TRADE MY EXTRA FOR TECH

☐ For the purpose of explaining the ground rules of privilege expansion to several of the bellyachers whose letters appeared in February *QST*, perhaps someone will prepare an article to be entitled "U.S. Amateur Privilege History Lesson — The Last 25 Years." This will demonstrate that all good things come to those who wait. It will also help them determine their degree of initiative or lack of same. The original Novice privileges included radiotelephone on 2 meters. This privilege was soon lost when it became apparent many Novices could not upgrade. They had frittered away their cw practice time gabbing on 2 meters. When their one year, non-renewable license expired, these Novice fallouts for the most part went to the Technician ranks. Thus the Technician class, started for the noble purpose of promoting serious vhf/uhf experimentation, became a home for the frustrated. Since Technicians did not originally have 2-meter phone privileges, the old Novice rig was worthless. Their loud bellyaching changed that, and Techs were extended partial 2-meter privileges. Let's recall what "erosion of privilege" means. Extras and Advanced class operators had a big chunk of the hf spectrum to themselves. Extras even had an exclusive segment, but not for long. This has been whittled away, mostly to the benefit of the Advanced ops. Later, Novice privileges were expanded to include the option of throwing away their crystal-controlled sets and increasing power from 75 to 250 watts. All classes were compelled to observe that power limit while operating on the Novice bands. The ground rule seems to be that bellyaching Novices and Technicians will be rewarded for doing nothing else. Each expansion of their privileges has come at the expense of the higher classes through erosion of privilege. The Generals, when not going backwards in this game, were lucky to stand still; no carrots or gravy for them. And we scratch our heads in bewilderment about why incentive licensing hasn't worked. If I had the time to wait, I'd trade my Extra Class for a Tech ticket, just to get the freebies and be sure I'd be moving up. — *Robert Wheaton, W5XW, San Antonio, TX*

RESTORATION

☐ In light of all the tactics being employed by the FCC and Amateur Radio magazines to increase the ranks of our population, a little consideration is due the pre-1968 General class operator who, after a long, hard climb, reached the desired level of achievement only to be reduced in privilege, pride and dignity by the so-called "incentive licensing" docket. Confiscation of privileges is not incentive. A few electronic wizards wanted exclusive use of a frequency portion held by Generals. Many operators of all classes are unhappy, and some are still outraged by the FCC's method to reduce frequency privileges of the General class operator. Amateurs of all classes are signing a petition currently being circulated by K3ZKW. We are merely asking the FCC to restore to the Amateur Radio operators affected in 1968 the privileges then taken away. — *Jack Willard, K3ZKW, Telford, PA*

☐ Let's stay strong on incentive licensing. Every time I pick up my *QST*, I read about Novices wanting phone privileges on 220 MHz and Techs wanting phone on 10 meters. Why don't they upgrade? Some want to eliminate code, others want a so-called spouse license. It would hardly be fair to the amateurs who have worked hard to get on certain bands to have others come in the back door. Let's quit trying to wholesale licenses. I would like to see: 1) the Novice term 2 years, nonrenewable; 2) any tech who hasn't ever taken a theory exam at an FCC office to do so upon upgrading; 3) the use of positive I.D. at examination time; 4) return of the license fees so the FCC has money to work with and thus can control the bands. I hope *QST* stays entirely amateur. It is an excellent magazine, with a lot of devoted people doing a fine job. — *Don Mulinix, WA8IMO, Freeport, OH*

OUR LEAGUE

☐ Although it is not likely that WB8TVD's solution to curing bad DX practices ("Correspondence," February *QST*) will find many supporters, Werner has an idea that could save ARRL many hours of needless work. I believe the League should issue the basic DXCC Award and continue endorsement that puts the station into the Honor Roll, but eliminate intermediate endorsements. This action would save space in *QST*, satisfy the basic award hunter, and satisfy the competitive urge of the top amateurs who should have their efforts noted when their country total approaches the limit. — *Vincent Biancomano, WB2EZG, Staten Island, NY*

☐ As a League member and avid *QST* reader for a year and a half, I would like to express a few opinions on various *QST* departments. As a traffic handler and manager of the Ohio Novice Net, I consider the "Station Activities" and "Public Service" columns most important. They let all traffic handlers know what is happening in our part of the hobby. "Public Service" is one of the reasons why Amateur Radio is still in existence today. "Hints and Kinks" and the construction articles are number two on my list of favorites. They always present meaningful projects, and I feel homebrewing is what ham radio is all about. "How's DX?" and "The World Above 50 MHz" are both very well written and help instruct all hams in the right and wrong ways of working these areas. I wish you continued success for *QST*. — *Gary Mikitin, AF8A, Mayfield Heights, OH*

☐ Just a quick note to compliment the editorial staff for its recognition of a vitally important and fascinating portion of the amateur spectrum. Bravo for "The New Frontier" and the efforts of W5KHT. I trust this is a signal of increasing support on the part of ARRL for the development of amateur vhf/uhf microwave endeavors. — *Mark Langenfelo, WA9ETW, Madison, WI*

LARSON DESERVES BETTER RAPP

☐ Ah, but sadly, how quickly we forget the pioneers of Amateur Radio and sidetrack them to the backwaters of the mainstream! With deep regret, I note Larson E. Rapp, W1OU, has been given a small bit of column in the lower left-hand corner of page 31, April 1979 *QST*, to tell of a new WAS award. How the mighty have fallen! Some of us yearn for the good old days when we could look forward to reading another new, sophisticated and intellectual write-up on state-of-the-art advances in electronics. Consider raising *QST* again to its past high stature and put Mr. Rapp's articles back on the front burner of the April issues! — *Jack Wichels, W7YF, Edmonds, WA*

☐ With regard to the new WAS trophy Stray, I have all of the necessary QSLs in hand, but I do have a problem. My problem is that 49 of the QSLs are of the regular postcard type, but the last three are on marble tablets and much too large and heavy for regular mail or the UPS. I called the local trucking service and they told me they are out on strike and could not make the delivery for me. If I gave you the exact time and frequency would that be acceptable as proof of my contacts? The three states that are involved are the state of Confusion, the state of Frustration, and the state of Solid. I can understand a marble QSL for the state of Solid, but the other two confuse me. — *Gerry Gervais, N2GG, Moira, NY*

☐ You boys at Newington have come a long way down the ladder. The old gang at West Hartford had much more respect for genius. I am referring to your debased treatment in the April issue of the lifelong friend and technical advisor of ham radio, Larson E. Rapp. Shame on you. For the benefit of you wet-eared Novice readers, Mr. Rapp would spend each year working on extremely technical research toward the improvement of the state-of-the-art. We would look forward to each April, because at that time he would deliver his discoveries to us in a most profound and inexplicable manner. He was regaled by many of the honored men in the ham fraternity as a fraud, but I among many believed him — no one has yet come forward to prove his systems didn't work. They all worked for me. It's a sad day for all of us that you have relegated him to a mere Stray, on page 31 (13 backwards). I am here and now calling on all old-timers — make your voices heard. L. E. Rapp deserves a better rap. — *Jim Lark, W5OYP, Austin, TX*

[Editor's Note: *QST* staff opinion is divided on the issue of bringing Larson out from under wraps. Your opinions regarding this time-honored tradition are sought.]

Washington Mailbox

Conducted By Michele Bartlett,* N1AGD

Those FCC VIPs (Very Important Papers)

Just like people, the documents that bear the FCC's imprimatur come in all shapes and sizes, each with a unique purpose. Here is a profile of the VIPs an amateur is likely to encounter.

The License Itself

Q. I lost my amateur license when my wallet was stolen. How do I go about getting a replacement?

A. In the event that your license is lost, mutilated or destroyed, you should send a *letter* to the FCC, P. O. Box 1020, Gettysburg, PA 17325, explaining the circumstances. If, after receiving the duplicate, you find the original license, either the duplicate or the original must be returned immediately to the Commission. (97.57)

Q. What if I change my name or address?

A. The procedure for changing your name or *mailing address* (not station location) is pretty straightforward. You must notify the Commission promptly of these changes. You don't need to make a formal application for modification on a form 610, but the FCC recommends the use of this form, as it is easier to process. However, all that is required by 97.13e is that you send a letter to the FCC at Gettysburg, including your name and address as they now appear on the Commission's records, your new name and/or address, your station call sign and class of operator license. Keep a copy of your letter for your records.

Note that if you use a form 610 to change your name or mailing address, your license will be modified and you will receive a new copy indicating the changes. At that time your license will also be renewed, even if you check the box marked "modification only." If, however, you merely send the FCC a letter notifying them of the changes for their records, you will not receive a corrected license, nor will your license be renewed at that time.

Q. What is the difference between changing a mailing address and changing a station location?

A. You must make an application for modification on a form 610 if you change your station location. But you *might* not need to change your station location when you move to a new address. If your station is presently licensed at a permanent land location (not a P. O. Box or RFD number) where a station *could* be located, such as the home of your parents or a relative, you may keep that place as your station location, even if your equipment is not actually set up on the premises.

But why would you want to do this? If you're an Advanced class licensee and a college student, for example, you can change your mailing address without changing your station location each time you move to a new dorm or take an extended leave of absence. When you *modify* your station location, your license is automatically renewed. If you're impatiently awaiting the day when you can apply for a Group B call sign under Phase II of the system (see "Washington Mailbox," May 1979 *QST*), you won't keep getting five years tacked on to your license every time you move, *if* you have a permanent station location on file. You may operate "portable" and need notify the FCC only of a change in your *mailing address*, using a letter instead of a form 610.

Q. If I apply for a renewal before my license expires, can I still operate my station?

A. You should apply for renewal of your license no later than 60 days before the expiration date. If you've made a "timely and sufficient application" (no later than the date of expiration of your license) then you may continue to operate until you receive your renewed license. (97.13c)

It is always wise to keep a photocopy of anything you send to the FCC: a form 610, a letter, your response to a notice of violation, etc. There are so many ways your communication could get sidetracked, even en route between the mailbox and the FCC, that you should always cover your bases.

The Interim Permit

Q. I've just upgraded and received my Interim Permit. Would you explain the portion of the rules that covers this situation?

A. Otherwise known as FCC form 660-B, the Interim Permit allows you to operate your station using your newly earned privileges. It must be kept in your personal possession or posted in a conspicuous place in the room when you're operating a station. This nonrenewable permit is valid for 90 days from the date of issue, or until you receive your permanent license, whichever is first. The Commission may set aside the permit if it finds that your permanent operator or station license cannot be granted for some reason. (97.32a-f)

Station identification under an Interim Permit is covered in 97.84f. If you're operating under your old privileges there is no need to use a special identifier. For instance, if you upgrade from Novice to General, you may continue to use your regular call sign in the Novice bands. But when you operate using General class privileges, you must sign your call followed by the special identifier indicated on your permit. On telephony it would sound like this: "KA9XYZ interim CG." On telegraphy you would send "KA9XYZ DN CG," the DN being, of course, the fraction bar and sounding like "dahdididahdit." You'll note that the rule doesn't say that you should sign "KA9XYZ interim Chicago."

Notice of Violation

Q. Recently I accidentally strayed out of my band but caught myself after a couple of minutes and corrected my mistake. This morning I received a notice of violation in the mail. Now what do I do?

A. The answer is contained in 97.137: "Any licensee receiving official notice of a violation . . . shall, within 10 days from such receipt, send a written answer direct to the office of the Commission originating the official notice: Provided, however, that if an answer cannot be sent or an acknowledgement made within such 10-day period by reason of illness or other unavoidable circumstances, acknowledgement and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay. The answer shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus, the answer shall state fully what steps, if any, are taken to prevent future violations, and if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and promised date of delivery. If the notice relates to some lack of attention or improper operation of the transmitter, the name of the operator in charge shall be given." You can see why it is important to inform the FCC of any change of mailing address. Ignoring a notice invites penalties from the FCC, a fine or revocation of license.

Dockets, NOIs and NPRMs

Q. There's a pending Notice of Proposed Rulemaking (NPRM) that I would like to respond to. What should I do?

A. First of all, are you sure you understand what the NPRM (or the NOI or the docket) is proposing? You should read up on what is involved in the issue before responding. *QST* mentions almost all notices and dockets, as soon as possible after they are released, in "Happenings" and "League Lines." A whole article may be devoted to an important issue like Docket 78-369, the RFI NOI. If you have access to the *Federal Register* you can find the complete text of the docket or notice, if you know when it was issued.

Your comments may be legibly handwritten, but printed or typewritten filings are preferred. The number of the notice or docket must appear at the top of the first page. You should submit an original and five copies of your comments, and if you want each Commissioner to receive a personal copy, you should enclose seven additional copies. Comments should be addressed to the Secretary, Federal Communications Commission, Washington, DC 20554.

If you're considering petitioning the FCC to initiate a docket or notice, you should make sure there is no similar filing on the books. ARRL-affiliated clubs periodically receive a list of all dockets and notices pending before the FCC. Check to see that your idea is not already on the list.

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by FCC staff. Numbers in parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KHT

People in Microwaves

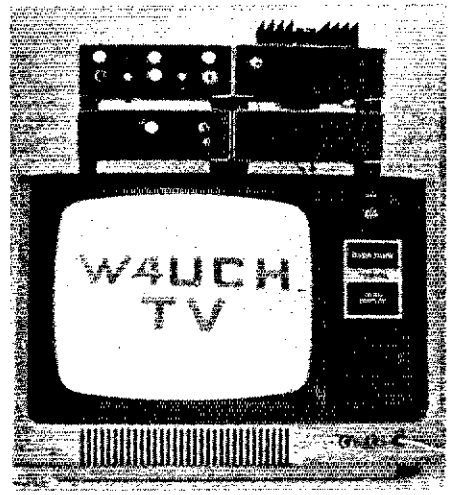
Amateur activity above 1 gig tends to be found in concentrated areas where the interest of one or two amateurs infects others to give a try to the centimeter-wave bands. However, without the incentive to work outside a local or regional area, equipment development often stagnates. It only takes a little bit of system efficiency to manage "local" QSOs at 10 GHz. To work considerable distances (out to several hundred miles) requires either improved equipment or the assistance of ducting conditions. Sometimes, amateurs working with our frequency assignments above 1 gig enjoy the challenge of the equipment and techniques and give little thought to communicating over great distances.

Bob Richardson, W4UCH/2, at Lake Chautauqua in western New York is one of the latter breed. Information relating to Richardson's innovative 10-GHz multimodulation-mode systems in operation at 10 gigs appeared in last month's column. This month a pair of photos complete the tale. Bob is dedicated to simplifying amateur microwave gear while still maintaining rock-solid reliable paths of out to 20 miles. In his mind, microwave assignments may offer some DX potential but they are best utilized for wideband information transfer in a local or regional area. He suggests that in the years ahead amateurs in metropolitan areas will design and install 10-GHz repeater stations with wideband (10-20 MHz) input and outputs capable of broadband translation within the 10-GHz band. Through these relatively wide passbands Richardson sees fast-scan television, hobbyist computers and various forms of digital communications passing. To make all of this work, Richardson is concentrating on developing exceedingly simplistic 10-GHz equipment. Those who attended the Dayton Hamfest possibly saw Richardson demonstrate some of this equipment. Future (but near-term at that) amateur microwave transceivers will be little larger than today's hand-held 2-meter transceivers with built-in 17- to 20-dB-gain horn antennas. Broadband amateur microwave communications is on the threshold of very rapid development.

A more traditional approach is employed at KØNG in Lincoln, NE. Paths to 55 miles have been covered on 2300, 5650 and 10,000 MHz. Chuck has found, as others have, that he often has to build two complete stations for an shf band and then "loan out" the second station to get into the QSO business!

G4BKI/G4EWI reports a two-year-old club in the Coventry area designed to stimulate amateur microwave activity. The club maintains shf test equipment to help members get gear running; by pooling efforts and technical expertise in this manner dozens of amateurs can get operational without each having to invest in complicated and often expensive test gear. Their primary project at the moment is a 1297.5-MHz-input to 10,368-MHz-output narrowband fm (±5 kHz) input/wideband (±200 kHz) output repeater. A special "data mode" operation will provide a continuous test tone on the output plus Morse code groups relaying barometric pressure, received signal strength, temperature and humidity on input command. In this way input signals will be able to receive automatic "machine response" and adjust their input band equipment for peak operating efficiency. Call sign will be GB3CV.

Robert M. Richardson, W4UCH/2, on the shore of Lake Chautauqua preparing to align his 10-GHz Gunnplexer terminal with the aid of a small telescope. Full duplex operation with TRS-80 microcomputers is one of the operational formats pioneered by Bob at 10 GHz.



10-GHz operational fast-scan television signal as received over four-mile path across Lake Chautauqua using Gunnplexers at 10 GHz for transmission and reception at W4UCH/2.

Peter Howse, son of Walter Howse, VK6KZ, with the portable station Wal put together to extend the 1296-MHz terrestrial record to 1308.1 miles in December 1978.

Briefs

K4KYO suggests that all users of (any) microwave equipment be mindful of the dangers associated with centimeter waves in close proximity to the power radiation point (i.e., the antenna). "Safe levels" for human tissue remains a hotly debated issue these days and Microwave Associates suggests keeping portions of the human body at least 12 inches back from the open end of a 10-GHz horn antenna (17-dB gain) and 36 inches back from a two-foot dish. With higher power (Gunn) diodes becoming available all of the time, these "safe distances" will increase measurably. It may be "interesting" to demonstrate hot-dog cooking with amateur microwaves but the message should be plain: animal tissue is animal tissue. We are supposed to be smart enough "animals" to protect ourselves from harmful technology.

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

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Those Calls and Letters Keep Coming

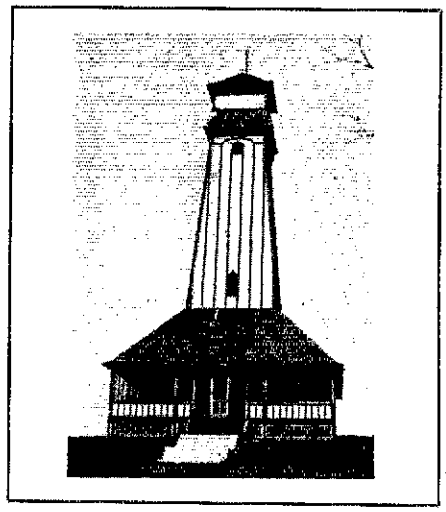
[Editor's Note: The new conductor of the fm repeater column is Stan Horzepa, WA1LOU. Holding an Amateur Extra Class license, Stan is active on 10 meters and works repeaters on 2 meters through 70 centimeters. At Hq., he is assistant in the Public Service branch of the Communications Department, editor of the *Repeater Directory* and VHF Repeater Advisory Committee liaison.]

Many calls and letters received at the ARRL Repeater Desk are concerned with the first steps that should be taken after deciding to put a repeater on the air. Some folks still believe that a special blessing from Gettysburg is required before a repeater may begin repeating. The fact is that the FCC no longer licenses repeaters nor renews expired tickets; no special permission is needed.

Any individual or club call sign may be used to identify a repeater. "/RPT" or "/R" must be appended to the call sign in Morse; "repeater," in voice. And, the holder of the call sign is legally responsible for the operation of the repeater. The repeater's specifications must be logged, as spelled out in Part 97.111(f).

Every repeater needs a pair of frequencies; how are they acquired? Throughout the states and provinces, individuals and groups have volunteered or have been acclaimed as frequency coordinators. Hams seeking frequencies for a new repeater should consult their coordinator for advice on how the coordination is handled in that particular area (the procedures are as numerous as the number of coordinators; consult the latest edition of *The ARRL Repeater Directory* to find the coordinator for your area).

Usually, the coordinator will use one of two methods for coordination: Either he will choose a frequency for you or he will acquiesce to a frequency you have chosen. Both methods require that the frequencies be researched to determine that there will be as little interference as possible with existing repeaters. The great majority of repeaters are coordinated and problems have been minimal. The problems that do arise are often caused by repeaters that are not coordinated.



Here's an old photo of an old repeater: W1AWW relayed signals on 5 meters way back in 1932 from this 90-foot tower near Springfield, MA. This column's conductor is looking for some new photos of some new repeaters, especially machines that are unique and of interest to *QST* readers — fm types and non-fm types alike. Eight-by-ten black and white glossies are the best, but others are acceptable. All input to this column is welcome!

Lately, the ARRL Repeater Desk has received complaints about the slow response of frequency coordinators. The workload of the average coordinator is heavy and it is easy to fall behind on the job. If, after a reasonable wait, your initial inquiry to the coordinator has gone unanswered, try again. But, rather than using the mails, try the telephone. By speaking directly with the coordinator, you will surely receive some response. Perhaps he is already working on your request. Or he has a legitimate reason for a delay. Whatever the answer, at least you'll know where you stand.

NEWS UPDATE

Since the last appearance of this column, two significant matters concerning repeater operation have come up. In case you missed them, here's a summary of what happened.

Autopatches on automatically controlled repeaters were eliminated by the FCC's interpretation of Part 97.79(d). Now, all repeaters with operative autopatches must be monitored by a "real live" control operator (see *QST*, December 1978, page 58 and January 1979, pages 64-65 and 68 for the details). This isn't a new regulation; it's an interpretation of an old reg and runs counter to the way nearly everyone had previously interpreted it. Automatic control of repeaters *without* autopatches is still permissible under Part 97.111(g).

The United States' "final" WARC proposal includes a change as to Amateur Radio's status in the 220- to 225-MHz band. As proposed, we would share these frequencies on a secondary basis with the Maritime Mobile Service (see February 1979 *QST*, pages 9 and 57). As of this writing, approximately 35 WARC proposals have been received at Newington and nary a one has mentioned Maritime Mobile for 220. So, for now, the U.S. bid stands alone.

INTERMOD LOCATOR

The locals recently installed a 2-meter link receiver on the 220 repeater. A quiet simplex frequency in the upper region of the band had been chosen. The link was turned on and all went well (for about two minutes) until two local 2-meter repeaters began transmitting simultaneously and, voila, both could be heard on the link . . . a classic case of intermod.

"Well, John, why don't you bring your copy of the *Repeater Directory* over here and we'll do some calculating and try to figure out where there's a clear freq' for the link." With over a dozen loud local repeaters in the area, "figuring-out" could take all night.

"Hold on, folks. I just worked out a program on the computer to do all the figuring for you." Sure enough, the program did the job and all of the potential trouble frequencies were pinpointed and an intermod-free frequency could be picked out from what was left. The program was written on a Radio Shack TRS-80 with Level II BASIC, but is adaptable to most computers running BASIC. An s.a.s.e. to this column will get you a hard copy of the program.

By the way, the locals weren't happy with the clear frequencies that were left to choose from, so they went the expensive route and installed some cavities and helical resonators and the intermod disappeared.

REPEATER DX

☐ WD4DJA reports the following: "K4SMX, in Atlanta, was taking a list for A51PN (Bhutan). Living 250 miles from Atlanta, the propagation was not right and I was unable to get on the list. So, I sat back in my chair and listened to the operation for awhile. Suddenly, I remembered that the Lake Toxaway, NC, repeater, up in the mountains, had coverage into Georgia. I made a call on the repeater and K4RWG/mobile answered. I told him that I wanted to contact SMX to get on the list. He said he'd move to another repeater to contact someone closer to Atlanta.

"Again, I sat back and listened. Shortly, I heard K4SMX say, 'WD4DJA, make your call.' I was caught by surprise, but managed to compose myself and made a good contact with A51PN!"

☐ If you are into low-band DX, there are a number of repeaters that are devoted to the ways of DXing. You can keep tabs on current low-band activity through these repeaters that may be found in *The ARRL Repeater Directory*. Look under the sponsor listing for groups with names such as the "Podunk DX Association" or some such.

☐ There's a group of locals who call each other on the repeater whenever some rare DX is around. This is not a formal group and the repeater is not sponsored by a DX club, but the system works so well that nowadays everyone keeps one ear tuned to the repeater, so they won't miss anything.

☐ And with summertime conditions around the corner, the vhf DX season will be opening and, at times, repeaters 500 to 1500 miles away may be heard. When that happens, move down to a simplex frequency; you'll be surprised what you can work . . . even with low power and a modest antenna.

Good DX! QST

*Hq. liaison, VRAC

How's DX?

Conducted By Clarke Greene,* K1JX

Ø3, What a Relief It Is

It is no news that Amateur Radio has changed dramatically in the past two decades. Perhaps the most profound advance has been the widespread acceptance of single sideband. The mode that brought the sound of Donald Duck to the ham bands also set the stage for another operational change, transceive operation. Once the concept was accepted, the logical move was toward combining transmit and receive functions into a single piece of equipment: the transceiver. Modern electronic technology means that the radio equipment of today can perform far better than the equipment of 20 years ago, while occupying only a fraction of the table space from years gone by.

The ham of 20 years ago did have a few advantages over today's breed. "Planned communities" were unheard of. Condominiums were the dwellings of a wealthy few in the large cities. Zoning restrictions with regard to ham antennas were as common as nuclear power plants. Stereo interference? What's a stereo?

Where does that leave us? Well, today's ham can have the finest equipment ever produced, but often can't put up adequate antennas to take best advantage of his electronics. The competition on 20 meters is worse than ever, so it's no wonder many hams forsake the joys of DX, for 2-meter fm operation from their automobile.

What if there was a band where everyone had nearly the same signal strength? How about nearly ideal propagation for everyone over a large area of the earth? Finally, would you be interested in a band you could work for over 16 hours a day, with an antenna system you could fit on your apartment balcony?

All these dreams, and more, will be answered early next year. On March 5 (if all stays on schedule) a new dawn will come to Amateur Radio. The first of a new series of amateur satellites, Phase III (Ø3, for short), will be launched from Kourou, French Guiana.

Many reading this probably feel betrayed, like they've been lead down the primrose path only to be let down. Another satellite. So what? The last few sped by a couple of times a day for a few minutes. Big deal. Under the right conditions you could work Europeans from the East Coast or Japan from the West Coast. That's not *real* DX.

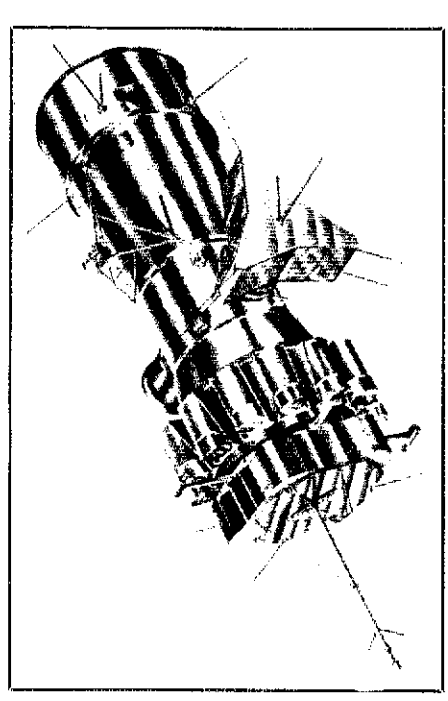
This satellite is different. The orbit will be 11-1/2 hours in length. That means that most stations in the Northern Hemisphere will be able to work through the Phase III Satellite for upward of 16 hours a day. The apogee (highest altitude point) will be so high that a large portion of the earth will be workable at once. A typical QSO might be around the table between a WBØ, a JT1, an OHØ, a VR3 and a CN8. Does *that* sound a little better?

The equipment to work through the satellite is available, off the shelf, *now*. Let's look, step by step, at what will be required.

The satellite has on board what is known as a linear transponder. In our case, that means that hams on the ground transmit up to the satellite on 435 MHz. There, the ground-originated signal is received and retransmitted on 145.9 MHz, back toward the ground. Since it is a *linear* transponder, what goes in comes out. Cw and single sideband will be the dominant modes, just as on 20 meters.

Since there is a highly sensitive receiver on board the satellite, transmitters on the ground don't have to be refugees from "Battlestar Galactica." When the satellite is at apogee, which is the worst case because the satellite is farther away, only about a kilowatt effective radiated power will be needed. The key words there are effective radiated power (erp). A transmitter power output of 100 watts fed into a 10-dB gain antenna yields a kilowatt erp. At 435 MHz, a Yagi with 13-inch elements on a six-foot boom yields gain well in excess of 10 dB. Larger antennas further reduce the transmitter output requirement.

The 145.9-MHz transmitter in the satellite has a peak power output of 50 watts. The power output is shared by all the users, but a new type of transponder design will prevent any one station from hogging all the power.



An artist's conception of the new amateur satellite still attached to the second stage of its ARIENE launch vehicle. A kick motor will place it in a highly elliptical orbit, making transcontinental communication possible for several hours at a time. *(European Space Agency photo)*

The high power output, combined with the spacecraft antenna gain, means that ground-station receive requirements are minimal. Again, an antenna of 10 dB gain or greater is desirable. Obviously, the bigger the antenna, the louder the signals. Because you won't be transmitting through the 2-meter antenna, you can mount your 2-meter receiving converter or preamp at the antenna to minimize losses.

Finally, there are two antenna considerations peculiar to working through satellites we have to contend with. The first is pointing the antenna toward the satellite. That means that two rotators, one for azimuth and one for elevation, are required. That isn't a terrible problem though, because many popular television antenna rotators can support the small antennas used here. The other necessity for our satellite antenna system is circular polarization. Rather than go into a big explanation, let's just say that because of spacecraft spin, we need to have circularly polarized antennas. Normally, that means we need a pair of antennas for both 435 MHz and 145.9 MHz.

All these station requirements sound pretty exotic and expensive. Not really, though. Let's suppose you already have a transmitter and receiver combination for the hf bands. What will you need? For the receiver end, you'll need a 2-meter receiving converter. On transmit, you'll probably want a transmitting converter so you can operate on both sideband and cw, along with a 100-watt amplifier. For antennas you'll need a pair of 2-meter antennas and a pair of 435-MHz antennas (total size: about 10 feet by five feet) as well as the rotators. Going by list prices (no discounts) printed in various advertisements in a recent *QST*, the total price for a deluxe station such as this is about $850. That assumes that you pay full price for everything, buy everything new, and start from zero. If you already have some of the gear, or are willing to do some of the work yourself, it is cheaper, of course.

The price just mentioned may sound steep, but suppose you want to put up a tribander on a 50-foot tower. You'll pay at least that much. That doesn't include the price of the land you need to put up the hf antenna system, if you can do it at all. What's worse, a tribander at 50 feet is only marginally competitive on today's bands.

To make the satellite even more appealing, several major manufacturers are either selling or developing equipment aimed directly at the satellite-users' market. Soon you'll be able to purchase a complete transmitting and receiving converter for both the 2 meter and 70 centimeter bands all in one box. Another company is producing a 2-meter/70-centimeter transceiver. Just add amplifier and antenna and off you go. The list doesn't stop there, either.

Even with the limited capabilities of past satellites, W2BXA achieved DXCC. The number of countries workable over the expected three years of life of the first satellite

*c/o ARRL, 225 Main St., Newington, CT 06111

will be limited only by activity. With the aid of a simple calculator, you'll be able to plan when to operate, when the band will be open to that rare country.

Skeptics in the audience might call out, "Yeah, well I can do that on 20 meters, when conditions are right." True. How often are conditions right? Can you predict with high accuracy, when they'll be right? That comment is a lot easier to make, too, when you have a five-element monobander at 130 feet.

Watch coming issues of *QST* for more details, and some how-to-do-it information. Help is on the way.

DX PORTFOLIO

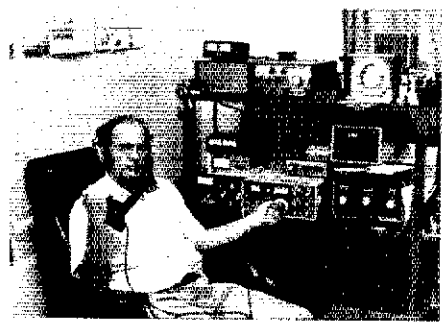
Notes from the F.U.M.[1] Department: Over the past few months we've listed some real phoneys. SP5GH recently wrote to say that he is *not* HV5GH, and the station is a pirate.

Remember VRØM? Remember the independence parades and the marching bands? Some yachtsmen visited there recently and found nary a human. It seems doubtful that a palm tree was signing VRØM.

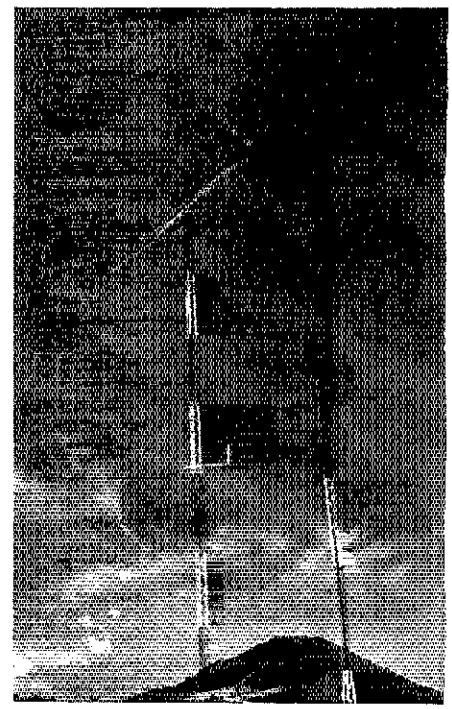
Others have been victimized as well. On April 1 (when else?) FOØMM, FOØMK and a few others ran up a big total on the bands. WB1ALW is still being besieged by QSL requests. Andy says he isn't manager for any of these stations.

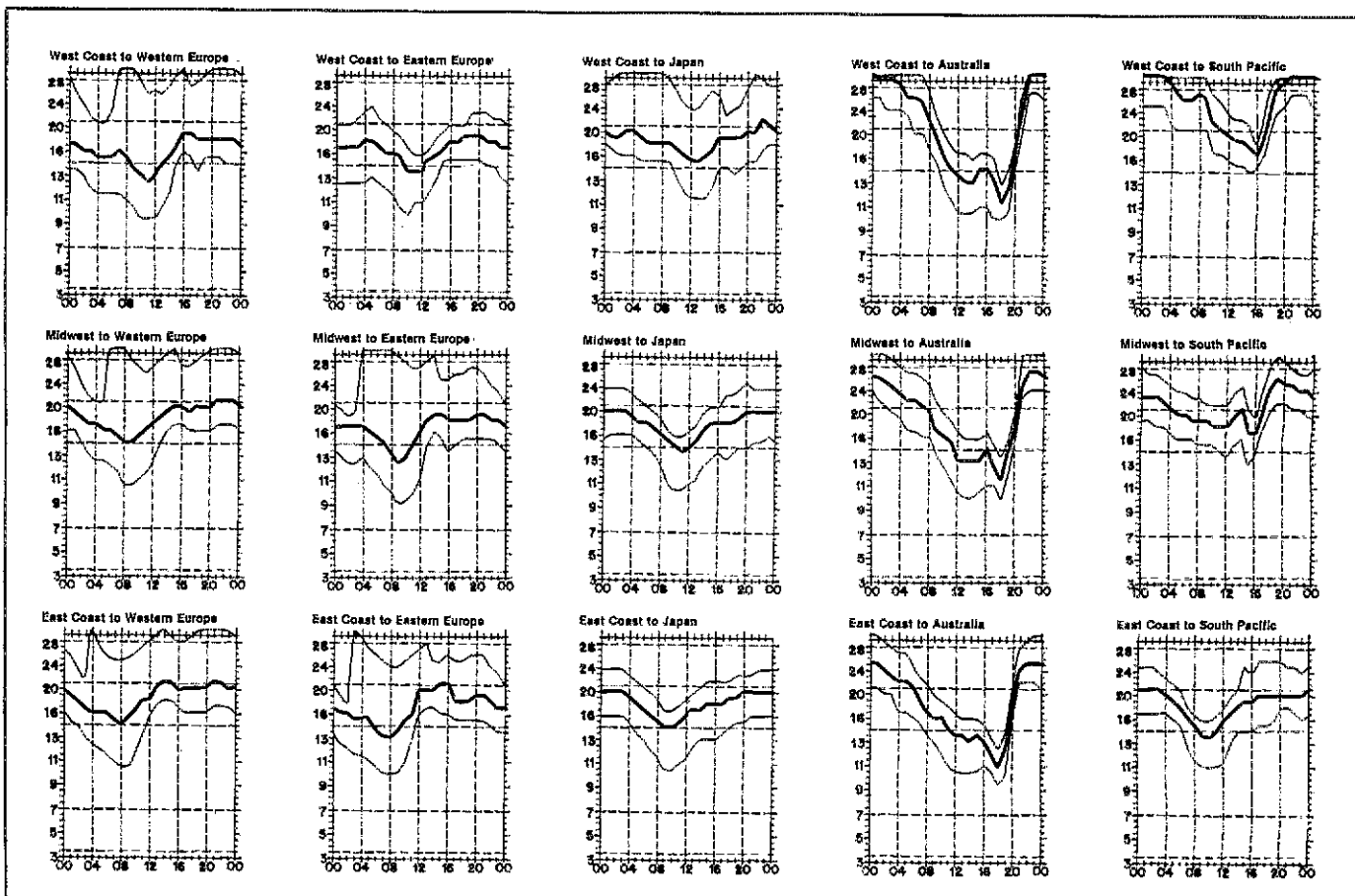
[1]Foot-in-mouth

The DX news travels in waves. There isn't a lot of news this month. Apparently, everyone was so busy working the likes of VR1B, 1S1, VS5, R1FJ, VR6 and the expected expedition to Abu Ail (we don't have information on that one, but it will probably happen before you read this) to report much, or even plan much. See you next month. QST



Bob, YS9RVE, has made quite an impact during his first year on the air. He is at the controls of his station on the left, while his quad antenna at 90 feet is pictured at right. *(Tnx WAØJYJ)*





When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 × 7-1/2-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

☐ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

☐ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

☐ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

☐ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

☐ Fourth Call Area: AA4, WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

☐ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

☐ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

☐ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

☐ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

☐ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

☐ Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

☐ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

☐ U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

☐ Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

☐ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

☐ Alaska: all calls — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

☐ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

☐ QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

☐ VE1* — L. J. Bader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

☐ VE2 — A. G. Dacmen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

☐ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

☐ VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

☐ VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, SK S4S 5E3.

☐ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K 0X2.

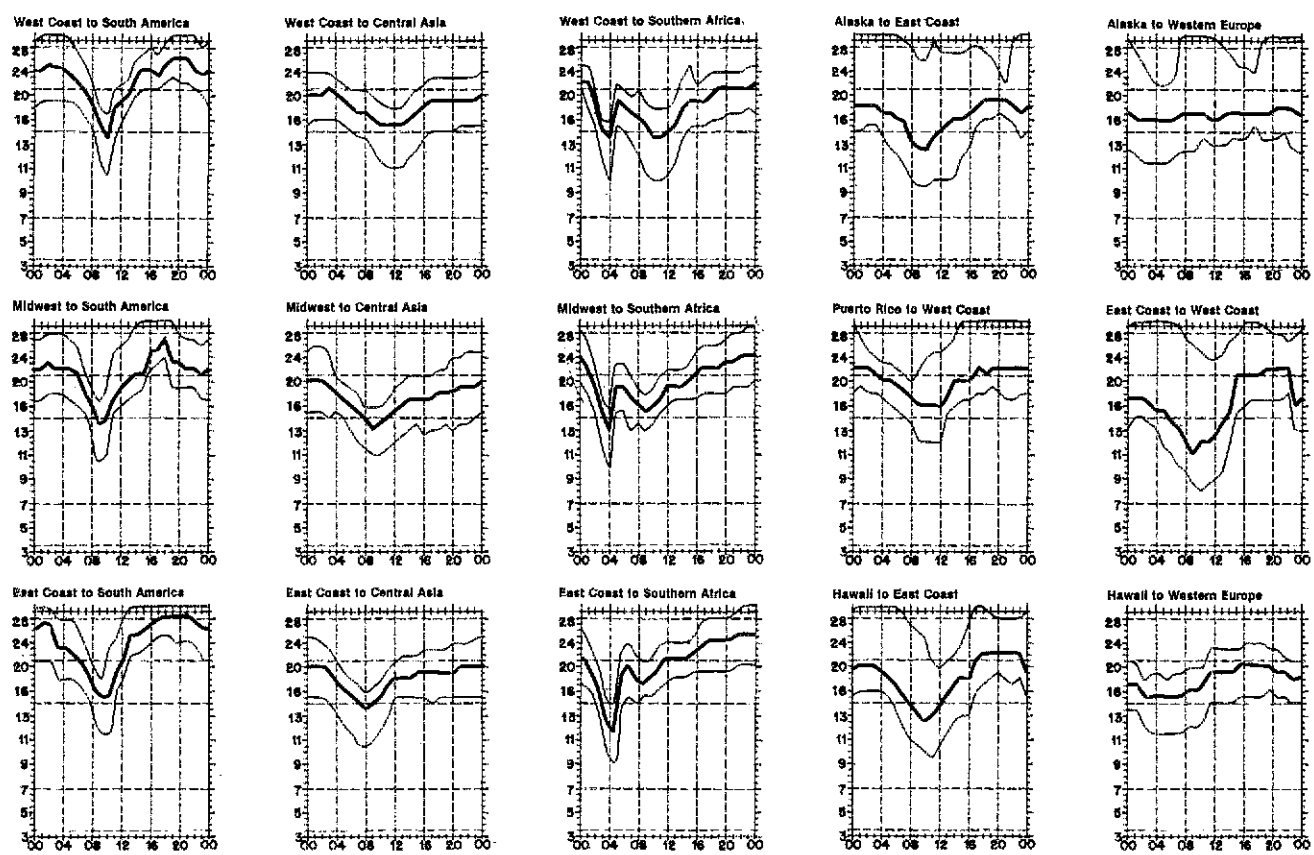
☐ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

☐ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

☐ VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

A direct descendant of Mr. Christian of *Mutiny on the Bounty* fame, Tom Christian, VR6TC, is the only active amateur based on Pitcairn Island. *(AH6H photo)*



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for June 15 to July 15, 1979, assume a sunspot number of 148, which corresponds to a 2800-MHz solar flux of 191.

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 January 1 through January 31, 1979. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DJ1TI/114
DF3BL/104
DK1II/175
DK2UB/109
F6CUK/262
G3GJX/101
GM3LYY/129
GW4CZK/102
HB9G/114
I5EFO/101
JA1ELY/306
JA1FIJ/185
JA1IDY/237
JA3BVD/120
JA5APG/105
JA5IE/108
JA6CRP/150
JE1CTA/108
JG1OQZ/163
KG6SS/102
KL7ITG/102
LA1ND/103
PT7AW/105
PY5EG/102
PY7VJZ/154
SM5CAH/106
SM7FYK/104
VE3CK/103
VE3HYI/103
VE7DTO/110
XE1OM/123
6Y5ED/100
K1HZ/253
W1TSP/185
W1TVF/101
WA1RGT/104
WA1TWN/100
WB1CTV/101
WB1GZE/105
K2AZ/105
K2MO/105
K2RXY/101
KB2EN/119
N2MF/100
W2KHQ/104
WA2UAJ/100
K3UC/100
K3WOK/205
WA3JID/101
WA3YXD/112
WB3AOY/100
WB3CFD/108
WB3KAM/101
AA4MW/103
AA4T/118
K4OAQ/119
N4FD/107
N4OE/104
W4VRO/128
WA4GHO/100
WA4PMU/108
WA4VXG/104
WA4WPO/103
WB4CSW/110
WB4UBD/107
WD4HPZ/101
WD4RCO/103
K5EOA/107
K5GK/172
K5IY/105
W5AYO/100
WB5TZZ/121
WB5ZKR/114
WD5CSK/107
AA6R/145
N6KM/107
W6JCE/114
WA6FUZ/101
WA6TLV/112
WB6FZR/101
WB6KOU/100
WB6OFM/105
WB6SRK/104
K7YY/103
W7IUV/199
WB7QXK/101
K8HV/101
K8KBB/124
K8TV/105
W8AN/109
W8FF/290
W8GLC/104
WD8DNG/108
WD8MGQ/122
AB9M/105
K9CM/103
K9MJA/101
K9MFI/118
K9UR/106
KB9DE/102
N9UN/101
WA9AEB/110
WB9EKM/124
WB9LFD/106
WB9RNF/101
WB9ZMA/109
WD9DKS/102
WD9GNZ/123
AAØT/107
KØFPC/102
KØJPX/102
WØPUD/109
WØULU/103
WAØPFZ/102
WBØKFY/101
WBØOWN/100
WDØBGY/100

Radiotelephone

DF1EG/103
DF8FD/104
EA4YL/118
G3NML/107
GM4AGS/109
GM4FIW/101
I2ZGC/262
I7KKS/123
I8JVK/123
IØMHP/131
IV3YRN/119
JA1ELY/304
JA1FIJ/123
JA1IDY/150
JA6CRP/142
JG1OQZ/133
JHØBQU/110
JR2XJO/117
KH6WF/151
KL7ITG/101
KP4AE/106
OK1VE/102
OZ2BM/107
PY2DMT/122
SM5DQC/234
SMØAJU/181
K1MEM/178
W1HSP/119
W1KFY/103
WA1JKK/110
WA1OUB/100
K2RXY/101
K2UVV/116
W2JU/101
W2ZZ/254
WA2LWM/102
WB2JBQ/103
WB2LCF/112
K3HP/107
W3IQS/174
WB3EFC/101
K4CKS/103
KB4BL/110
N4VM/101
W4KHW/106
WA4PMU/106
WB4DJO/102
WB4FQP/121
WB4GMD/100
WB4RRK/108
WB4UBD/107
K5QLH/119
K5VNJ/265
N5WH/104
WB5CYK/100
WB5DCY/100
WB5FLP/100
K6HNZ/162
N6AFD/100
W6CRE/102
WB6PLR/104
WB6RWJ/108
WB6SRK/104
K7EG/105
W7FDJ/221
WA7YBN/102
WB7TAZ/101
K8ES/102
WA8TRU/100
WB8QLV/102
WD8MGQ/122
AB9R/101
K9FYZ/181
W9KBV/142
WB9EKM/122
WB9LFD/106
NØRR/264
WØPUD/106
WBØLVW/102

CW

GM3LYY/122
JA1FIJ/110
JA1IDY/131
JA7JWF/124
KL7HMO/101
LA8GJ/121
LZ2DR/110
PT7AC/120
PY7VJZ/117
W2ZZ/105
WA2CDD/109
WA2ORX/105
W3KV/106
N5RF/106
W7IUV/100
W7TE/100
K8FU/100
WA8MOA/105
N9KW/100
WØJF/102

160 Meters

N4JJ

5BDXCC

JA4CIB K5NW VE3ATF W2FG I2ZGC OH6RC UK2BAS K5RW

Endorsements

Mixed

DJ4WP/154
DJ7CX/335
DK3VV/223
DL3BK/346
DL7AA/359
DL9PR/190
DL9TJ/261
G3JFF/241
HB9IK/300
HB9PL/339
I2DEZ/327
JA2IOD/300
JR6BU/193
KG6RT/160
KL7HCC/200
KP4RK/343
KV4FZ/329
KZ5FR/219
LA1KI/332
LA8LF/313
OE7III/319
OH2BC/335
OH6RA/252
OK1MP/326
OK3IF/151
PY2BKO/335
PY2DBU/263
PY5WD/242
SM5DQC/304
UA1CK/339
VE2NV/355
VE2UF/148
VE2UN/242
VE2WA/341
VE3BZ/271
VE3CTX/322
VE3PE/121
VE3WT/334
VE4SW/254
VE4XJ/315
VU2IJ/119
YU1QBC/251
YU2AAU/225
YU2CAL/239
YU2DX/332
YU2RTW/268
YU4HA/282
YU4VTU/219
YU5CZ/160
AB1A/140
AC1O/145
K1AWP/263
K1CV/254
K1EM/202
K1MEM/254
K1OT/246
K1TN/235
K1TO/202
K1ZSI/300
N1AC/240
N1RI/160
N1XX/321
W1AB/308
W1DA/309
W1DGH/222
W1FJ/326
W1GME/322
W1HSP/163
W1NG/313
W1OT/324
W1RED/280
W1SE/120
W1VH/203
W1WLW/250
W1YN/251
WA1UHA/155
WB1CGH/182
AA2F/125
K2BT/325
K2BXG/241
K2CHS/142
K2JMY/334
K2KA/230
K2OLG/242
K2ON/158
K2PXX/338
K2SP/236
K2UFM/274
K2UVV/204
W2BAI/307
W2BTG/242
W2GQN/339
W2GT/353
W2HAZ/260
W2PN/336
W2PPG/327
W2PV/340
W2QHH/358
W2ZZ/314
WA2CBB/301
WA2GEZ/227
WA2MTI/179
WB2HXD/335
AE3T/294
K3NN/299
K3RL/119
W3IBL/120
W3TEF/127
AA4MM/326
AE4Z/271
K4DDB/186
K4FYM/172
K4HJE/322
K4IBP/230
K4IE/320
K4NV/179
K4RD/295
K4YYL/337
KA4C/216
KC4G/161
N4CC/314
N4PY/141
N4SX/193
N4VM/139
N4WW/329
W4AVY/341
W4BAA/348
W4BBP/335
W4CLO/120
W4DRK/338
W4EEE/352
W4IO/278
W4MGN/341
W4NO/316
W4NZR/159
W4OGG/150
W4VPD/354
W4WEG/206
W4YV/299
WA4BEC/214
WA4DWN/188
WA4FFW/315
WA4GIQ/162
WA4JJW/181
WA4MAV/200
WA4MOQ/140
WA4TLI/259
WB4FJO/260
WB4FOT/180
WB4OSS/316
WB4PAB/250
WB4RUA/281
WB4ZUW/143
K5DUT/291
K5GL/147
K5GO/319
K5LIL/329
K5MK/180
K5NV/210
K5QEA/226
K5TSQ/240
K5VNJ/266
N5DX/326
N5IH/121
N5RQ/180
N5RR/320
W5CKT/299
W5CPI/270
W5EDX/319
W5HJA/343
W5JW/312
W5KC/360
W5KGX/345
W5LCI/345
W5MJQ/317
W5QIX/291
W5QKZ/344
W5SJ/326
W5UR/337
W5VX/263
W5XX/250
WA5IGD/160
WA5KTZ/140
WB5ZDO/209
K6AAW/260
K6AG/270
K6GA/344
K6JR/319
K6NN/152
K6RN/342
K6SP/270
K6XT/300
K6XW/327
K6YB/121
N6AV/336
N6CW/325
N6GM/320
N6VI/221
W6AE/320
W6ANB/328
W6BA/355
W6BVM/329
W6CAE/352
W6HJ/219
W6MI/324
W6MUM/322
W6OMM/199
W6QNM/343
W6SJC/121
W6SN/312
W6UQQ/344
W6YB/330
W6YHT/323
W6YQ/139
WA6OIU/254
WB6DXU/309
AD7Z/200
K7EG/140
K7MKS/220
K7WF/160
W7AQB/351
W7DQM/301
W7ETZ/313
W7IOG/217
W7IYW/259
W7JUO/280
W7JYZ/340
W7KH/360
W7UPF/264
WA7OSO/192
WB7OUL/176
K8NA/280
K8NN/276
K8VUR/330
K8ZE/190
K8ZR/296
N8DX/326
N8II/201
N8RA/160
W8BIP/258
W8CTR/259
W8DMD/355
W8ILC/326
W8LKG/160
W8QFR/304
WB8OBO/127
WD8EOJ/239
WD8IXV/160
AA9M/200
K9HQM/261
K9WA/200
W9DE/310
W9HE/181
W9JXN/151
W9LI/241
W9TKD/345
WA9AUM/240
WA9RAT/132
WB9SEJ/240
WB9TIG/181
WB9YXY/201
ABØS/140
KØBUR/323
KØIFL/300
KØLST/174
WØGKL/348
WØGNX/324
WØJIE/120
WØNB/245
WØPGI/355
WØPT/209
WDØBNC/140

Radiotelephone

A9XBD/221
CN8AK/200
CT2SH/223
DJ7CX/305
DL3RK/320
DL7AA/338
DL9TJ/140
EA1IY/300
EA3OJ/284
F5II/324
G3ZBA/318
I1LNU/200
I2DEZ/323
I5LZJ/165
I6AYS/200
IØLLZ/328
IN3ANE/275
KH6BZF/257
KL7AF/144
KL7HCC/160
KV4FZ/324
LA8LF/301
OE1UZ/325
OE7III/316
OK1MP/305
ON8KA/327
PY2PC/329
TI2HP/358
UA1CK/334
VE3CTX/322
VE3WT/333
VE4AS/271
VE4BJ/271
VE4SW/235
VK5MS/353
XE1GBM/152
K1CMI/250
K1CV/244
K1GX/180
K1GXU/241
K1RB/141
K1TN/192
K1ZSI/285
W1AB/210
W1FJ/282
W1NG/275
W1WS/180
W1YN/206
WA1GBA/160
WA1IRN/199
WB1DQC/143
K2CHS/105
K2IDF/161
K2JMY/333
K2KA/191
K2OLG/240
K2SP/234
K2UFM/270
K2ZGC/140
W2GBC/317
W2GHV/247
W2GQN/336
W2GT/289
W2MPI/220
W2PV/340
W2RS/204
WA2DXJ/262
WA2JTX/120
WA2LNL/125
WB2HXD/332
WB2VEG/316
WB2WOU/321
W3FZE/260
WB3DJS/134
WB3EJP/147
AA4MM/325
AA4R/249
AB4H/263
AE4Z/122
K4HJE/321
K4JC/336
KA4C/208
N4CC/290
N4SX/147
N4WW/316
K4PDV/320
K4YYL/334
W4AVY/311
W4CWV/338
W4DRK/328
W4EEE/352
W4UG/340
W4WEG/205
WA4BEC/213
WA4JDI/238
WA4MMO/271
WA4NIB/259
WA4TLI/239
WB4QVZ/180
WD4EYD/177
K5GK/170
K5GO/281
K5IH/199
K5JEA/341
K5MFA/199
K5TSQ/161
N5DX/282
N5IH/119
W5EDX/316
W5KC/321
W5KGX/340
W5SJ/317
W5UR/317
WD5DBV/142
K6GA/325
K6JR/317
K6NN/144
W6FQF/183
W6TGI/145
W6VZZ/141
W6YB/310
WA6DOB/297
WA6LFN/224
WA6OIU/246
WA6PJR/124
WB6DXU/309
AD7Z/190
K7AOZ/220
K7MKS/168
W7AE/251
W7DQM/300
W7IOG/201
W7JYZ/340
W7KH/332
WB7OUL/174
K8AO/311
K8AXG/290
K8NA/274
K8NN/240
K8VUR/328
K8ZR/294
W8CUO/339
W8ILC/312
W8JTD/327
W8MAW/280
W8SDV/200
WA8AEE/140
WB8HLI/160
WB8WZS/160
N9BA/190
K9HQM/255
K9MD/238
K9UAA/160
W9DE/275
W9IGK/139
W9KQF/305
W9QQ/305
W9TKD/326
KØBUR/322
WØGKL/347
WØIKD/154
WØNB/182
WØPGI/341
WAØMYM/4/121
WAØPVW/255

CW

DJ7CX/180
F3AT/239
I6AYS/140
JH1VRQ/241
OK1MP/124
PY5WD/176
YU2RTW/232
AC1O/141
K1TO/147
N1AC/204
W1AB/225
W1EWD/153
W1NG/240
W1YN/202
WA1UHA/141
K2KA/153
N2AC/177
W2TO/160
K4IEX/250
K4NV/180
K4UEE/175
N4PY/128
N4SX/149
N4WW/289
N4WX/231
K5TSQ/200
N5RR/122
W5UR/129
K6GA/290
W6RGO/183
W6YQ/120
W7OK/122
W7WN/192
W9IT/140
KØLST/151
WØBW/224
WØNB/134

Corrections: mixed W7DH/280, WB6RSE/169 Honor Roll listing: Missed. Mixed W5QK 318/349, WØZV 310/338 Phone: I5TDJ should be 313/336

Coming Conventions

June 15-16
Central Division, Milwaukee, WI
June 16-17
Georgia State, Atlanta, GA
June 30-July 1
West Virginia State, Jackson's Mill, WV
July 27-29
Oklahoma State, Oklahoma City, OK
August 4-5
Arkansas State, Little Rock, AR
August 11-12
Pacific Division, Reno, NV

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA
July 25-27, 1980
Seattle, WA
March 13-15, 1981
Orlando, FL

CENTRAL DIVISION CONVENTION

June 15-16, 1979, Milwaukee, WI

The West Allis Radio Amateur Club, W9FK, will host the 1979 ARRL Central Division Convention Friday evening and all day Saturday, at the Red Carpet Hotel, located at the southwest corner of Layton and Howell Avenues, just off I-94.

Activities on Friday evening will include a "dutch" style buffet dinner; an informal "Gemutlichkeit" open house, jointly sponsored by QCWA and the Milwaukee and West Allis Radio Clubs, featuring Milwaukee's finest; the traditional Wouff Hong initiation to induct ARRL members, and more.

Programs for each ham's interest on Saturday will include Lew McCoy, W1ICP; AMSAT; contesting; Don Miller, W9NTP, medium scan TV; ARRL's Bruce Johnson, WA6IDN, with the latest on 1979 WARC; fast scan TV; ARRL Communications Manager John Lindholm, W1XX, on ARES; a DX program by the Northern Illinois DX Association; Robert Suding, W0LMD, microprocessors; Gene Santoski, K9UTQ, traffic, and the ARRL forum, to name but a few. There will also be ladies activities. Another feature will be an exhibit and display area without a flea market. In the evening, Saturday's activities will be closed with a grand buffet-style banquet, featuring guest speaker Roy Neal, K6DUE, of NBC News, Los Angeles.

Advance registration general admission covering both days is $4 per person, and $5 at the door. Advance (only) banquet registration is $9.50, for all you can eat. Special combination advance general admission and banquet is $12.50.

Special hotel rates of $33 single and $39 double are available. A wide range of other hotel accommodations is also available in the area.

Further information and tickets available from WARAC, P. O. Box 1072, Milwaukee, WI 53201 or phone 414-462-5552.

GEORGIA STATE CONVENTION

June 16-17, 1979, Atlanta, GA

The ARRL Georgia State Convention and 51st annual Atlanta Ham Festival will be held on June 16 and 17 at the Downtown Marriott Hotel, corner of Courtland and Independence Boulevard, Atlanta. In keeping with its reputation for excellence, this year's convention will include an air-conditioned exhibit hall with over 140 commercial exhibit booths, covered flea market/swap shop for hundreds of cars, only steps from the exhibit hall. Technical sessions on all areas of Amateur Radio, including a special microprocessor forum, special hospitality, entertainment and prizes for ladies and children, on-site FCC exams, many prizes, unlimited automobile and self-contained RV parking and much, much more.

Special comedy entertainment preceding awarding of prizes will be provided by "The Mayer and Buford" beginning at 1:30 P.M. on Sunday. Registration fee is $3 per person in advance or $4 at the door. Children under 16 are free. Flea market/swap shop fee is $3 per space per day on a first come, first served basis beginning at 6 A.M. each day. Special Marriott Ham Festival rates are $32 per day single or double occupancy. FCC exams on Saturday morning begin promptly at 8 A.M.

For additional information or to pre-register send name, address and call (if any) along with $3 for each person you wish to register to: Atlanta Ham Festival, 100 Woodlawn Drive, Marietta, GA 30067. Hotel reservations should be made directly with the Marriott at 404-659-6500.

WEST VIRGINIA STATE CONVENTION

June 30-July 1, 1979, Jackson's Mill, WV

The 21st Annual West Virginia State ARRL Convention sponsored by the WV State Amateur Radio Council will be held at Jackson's Mill 4-H Camp, Weston, WV, on June 30-July 1. FCC exams will be given with no appointment necessary. Flea marketers and commercial exhibitors welcome — no charge. Major prizes include TR7/DR7 with power supply; UV-3 2-m xcvr; MN 2700 antenna tuner and a Wilson Mark II hand-held.

Program will feature an ARRL forum, FCC forum, cw contest and various net meetings. Guest speaker from the League will be Jerry Hall, K1TD, technical editor for *QST*. Registration fee, $5; $4 in advance. Dormitory-style lodging and meals available at a very reasonable rate.

For more information and ticket-ordering instructions, contact Karl S. Thompson, K8KT, 5303 Pioneer Drive, Charleston, WV 25312. Don't miss this fun-filled, family-oriented weekend in the beautiful hills of West Virginia.

PACIFIC DIVISION CONVENTION

August 11-12, 1979, Reno, NV

The Nevada Amateur Radio Association presents the 1979 ARRL Pacific Division Convention at the MGM Grand Hotel in Reno on August 11 and 12, 1979. Nestled in the foothills of the Sierra Nevada Mountains, Reno is an exciting locale for a weekend of fun and entertainment. The MGM hotel is truly Reno's grandest, providing total accommodations for the entire family. A shopping arcade, jai alai, bowling, tennis, swimming, a children's game room, and a recreational vehicle park are among the facilities offered at the MGM.

We will have ARRL President Harry Dannals, W2HD; Technical Department Manager Doug DeMaw, W1FB, and Communications Department Manager John F. Lindholm, W1XX, from ARRL hq., as well as many other excellent speakers. There will be forums for everyone and FCC exams.

We have many manufacturers and dealers coming and many, many prizes. Remember last year . . . this year promises to be even better!

We are offering two tours this year — a tour of the Carson City/Virginia City Comstock mining areas and a trip to beautiful Lake Tahoe and a fantastic luncheon cruise on the M. S. *Dixie*, a paddlewheel steam ship.

Hotel-motel reservations must be made *direct* and *early* . . . August is our busy season, so get your reservations in *now*. We are expecting at least 2000 to attend this gala convention.

Pre-registration/with banquet — $19 till July 15, $21 after. Pre-registration/without banquet — $5 till July 15, $6 after. Pre-registration/banquet only — $17 till July 15, $19 after. Registration only, $2. Tours on Saturday — leaving 9 A.M. Carson City/Virginia City, $7.50 each plus lunch. Lake Tahoe/Dixie Cruise, $12.50 each plus lunch.

For more information write: N.A.R.A.; P. O. Box 2534; Reno, NV 89505.

Strays

Rick Dill, WAØEDH/7, center, is presented with a $500 check from officers of the Hellgate ARC (MT). Rick's back was broken when he fell while removing an antenna from his garage roof. Pictured with Rick are, from left, Tom McGinley, K7QA, HARC president; Milburn Parker, W7NEG, club treasurer; and Dick Walton, K7CHY, vice president. Rick is undergoing therapy in Denver, CO, and plans to return to the University of Montana to complete studies for a Ph.D. in psychology. *(Missoulian photo)*

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

The Fireworks Have Commenced

The October 1978 column led off with the question, "Are we ready for the fireworks on 6?" Most people who follow the vagaries of 50 MHz know that the fireworks are well underway, although all parts of the world are not benefitting equally. As usual with ionospheric propagation, those areas in and bordering the Pacific Ocean have been getting the lion's share of the action. But other areas have been thrown a few plums too. It appears almost certain that we have seen only the beginning of what should erupt this fall. All indications point to this coming fall, winter and spring to produce the best 6-meter conditions since the peak of the famous Cycle 19, 22 years ago.

Are we properly prepared to take full advantage of the approaching bonanza in propagation conditions? Last October's lead posed this same question. Most of the thoughts expressed then concerning ways we can get ready still apply. It is suggested that the material in that column be reread. True, some of the specifics have changed. Most crossband work which took place this past winter was centered around 28.450 rather than 28.7. In addition, 28.885 has become the rallying place for those interested in what's happening on 6 meters. Use of that frequency to set up contacts at 50, 51 and 52 MHz has been invaluable and it has been fascinating, if frustrating, for those of us in parts of the country not so well blessed with DX to eavesdrop on the 10-meter liaison frequency. Those not able to listen on 10 and 6 simultaneously will be missing out on a lot of the fun of knowing what's going on and may well also miss making some rare 6-meter contacts. Use of the 10-meter frequency will probably fall off during the summer, but it will surely come back stronger than ever with the return of F2 propagation this fall.

Another point is the importance of being able to at least listen on 51 and 52 MHz. I have discussed this a number of times before but even I had no conception of the number of QSOs that would be made with ZL and VK stations. U.S. operators from CA to FL have taken part so far and the upcoming season should eclipse anything we have witnessed heretofore. Other parts of the country should be in for some fun too. Most contacts have taken place with both stations on 51 or 52 MHz but some have involved a crossband arrangement. The 10-meter liaison frequency has been used very effectively for setting up these contacts. If crossband is to be used, it is best to use as close as possible to an exact 1- or 2-MHz split since many of the new transceivers have provisions for switching in 1-MHz increments. Thus, if you are transmitting on 50.015, you should listen for ZLs on 51.015 or VKs on 52.015. However, many ZLs, because of TVI, use the VK assignment and venture below 52 MHz only during non-TV hours.

It's not too soon to get our stations ready for operation in these lofty portions of the band. Some may need new crystals. Maybe the old reliable "optimized" antenna won't hack it that high in the band. Maybe a broadband array would be in order, or possibly a separate antenna for working ZLs and VKs would be the way to go. Essentially all other parts of the world which have a 6-meter assignment, including Japan, can operate down to 50 MHz. Apparently an exception is Cyprus. I am told that 5B4AZ and others who might get on from that eastern Mediterranean island are allowed one frequency only, 50.499 MHz with emission limited to cw. Please note that, as well as representing another country, Cyprus counts as Asia. That fact may be very important to WAC-aspiring East Coasters. Another Asian country, one with no dearth of 6-meter activity, is Japan. There are literally thousands of JAs eager to work North American stations. Their band extends from 50 to 54 MHz and, as in the U.S., the first 100 kHz is restricted to cw. A set of proposed frequencies for working JAs was published in the February column.

As well as preparing for 51- and 52-MHz operation to work the ZLs and VKs, it might be very wise to equip oneself to listen between 70.25 and 70.7 MHz on the British 4-meter band. If mufs do get that high, it would be absolutely tragic to miss a chance at making transatlantic 6- to 4-meter contacts because no one on this side of the Pond is prepared.

There are several other things we can be doing this summer to get ready for this fall's fireworks. We can talk up 6-meter operation during our hf QSOs with stations in countries where the band is allocated. We can dig those 25-year-old rigs out of the attic, check them out, and send them to DX stations who will put them to use. We can contribute a few bucks to SMIRK's fund to buy equipment for overseas operators. Contact K5ZMS, 7158 Stone Fence Dr., San Antonio, TX 78227. We can learn or brush up on our Spanish. Many of the contacts we will be able to make will be with South American stations. It behooves us to try and meet them halfway and make some effort to at least be able to exchange greetings, calls and signal reports in their language. It may even make the difference between working a particular station or not. We can work on improving our operating habits. Short calls and short, but courteous, exchanges will make for more contacts for all. We should all remember that there are others, many with low and medium power, trying to take advantage of the rare propagation conditions too. We should learn to give everyone a chance. One way we can do this is by not hogging a particular frequency. Especially if the DX station was there before the contact, move off when the QSO is complete. There's no telling what one might encounter in terms of additional rare DX by scouting around the band rather than launching into a lengthy CQ. And let's learn to use 50.110 as a calling frequency and not a ragchew frequency. Local QSOs can surely be accomplished higher in the band, say above 150. The same is true of Es contacts when signals are strong. Many multihop opportunities are lost because of 40 over nine single-hop QSOs taking place in the first few kHz above 50.1.

There are great days ahead. Let's all make the most of them. GUD DX!

ON THE BANDS

6 Meters — Fully reporting, or merely summarizing, the events of late March and the first half of April would be difficult even if unlimited space were available, which it is not. Nevertheless, I will attempt to present at least a flavor of what the band has had to offer. The lower West Coast and Southwest have been partaking of far more DX than the rest of the U.S. but, toward the second week in April, there were signs that the good conditions were spreading out somewhat. No North Atlantic activity took place beyond March 2, when WB2RLK/VE1 made crossband contacts with SM6PU and DK1PZ, but the East Coast was thrown a bone in the form of a South American opening the morning after the big aurora. About 1425 UTC April 4, W2BN, SNJ, began hearing the PY2XB beacon. Dave said that it peaked S9 + 20 for about two hours. At 1525 he worked LU8DIN and heard several other unidentifiable LUs and PYs. W2UTH, WNY, is understood to have worked the LU as well. Also hearing the PY2XB beacon were CT stations K1BXC and W1HDQ. K1BXC, at 1544, worked LU8EEM, followed closely by LU4HLM. Signals ranged between S7 and 9. From WPA, WB3AIT made the grade with LU8DIN and heard the PY2XB beacon from 1515 to 1746 UTC. The Washington area was not so fortunate. K3HFV and WA3DMF were both listening that morning and heard nothing. But the real break for the East Coast, if only the southern portion, came the evening of April 7 (0200 April 8 UTC) when the magic Pacific propagation extended a finger as far east as central FL. On the spot ready to take advantage of this apparent anomaly were WB4GHA, W4YYS and WD4FAB. All three worked 3D2CM and heard the YJ8PV beacon. WB4GHA and W4YYS also worked VK4RO above 52 MHz. The entire southern tier of states has also been experiencing almost nightly TE into South America.

Another fortunate FL station was WB4OSN who, a few days before, made contact with KH6IAA completing WAS for Joe.

Trying to tell the story of what the West Coast has been up to would be like listing the contacts for a good weekend on 10 meters. W6XJ, with his excellent station on Mount Palomar, has certainly been one of the leaders. Monitoring 28.885 discloses this. His record of 27 countries worked since June 1977 is hard to top. Nevertheless, many more West Coasters have been getting in on their share of 6-meter DX too. WA6IFS mentions March 28 contacts with ZLs 1AVZ, 2CD, 3AQ, and 4LT, as well as VK4PU, all above 52 MHz. A few days earlier, Jim hooked up with ZL1BIQ. K, a good catch on any band. K6PHE passes along an impressive list of stations worked during late March and early April including ZLs 1AIC, 1AUZ and 1QI (3 watts from an IC-502), 3D2CM, FO8DR, DX8BE, KZ5NW and one worked by almost everyone in the country, including this conductor, K4ERO/HC1. A copy of the log from N6CT reveals such tantalizing finds as VK4ZNC, VK4DO, VK4ZEZ, ZL1AUM, ZL1AVZ, K4ERO/HC1, ZL1AQJ, W1QXX/KP4, PJ2DW, KP4EOR, KZ5NW, ZL2CD, ZL2HP, ZL2BJO, ZL2BGE, ZL2BFC, ZL3RW, ZL3AAD, ZL1AQS, ZL1ACL, ZL1MQ, ZL1AUM, ZL1QI, HI8WPC, VK3AQR, VK3AKK, VK4HD, LU8AHW, LU3EX, LU8DIN and 3D2CM. Somewhat to the east, WB7VVD, AZ, reports contacts with ZL1s QI,

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

6-Meter Beacons Believed to be Active Throughout the World

Call	Freq.	Mode	Location	Notes
W1AW	50.08		Newington, CT	4
K6FV	50.05		Northern CA	1
WA6MHZ	50.001		San Diego, CA	1,2
K7IHZ	50.100		Apache Jct., AZ	1
W7KMA	50.095		Phoenix, AZ	1
WA9FEF	50.055		South Elgin, IL	1
KG6JDX	50.110		Guam	1,2
KG6JIH	50.098		Guam	1
KH6EQI	50.104	A1	Pearl Harbor, HI	1
K4ERO/HC1	50.030		Quito, Ecuador	
CHØTS	50.100		Easter Island	2
FX3VHF	50.104		France	2
FO8DR	50.101		Tahiti	
HH2PR	50.023		Haiti	
JA2IGY	52.500	A1	Negoyo	
JD1YAA	50.110	A1	Minami Torishima	
PY1RO	50.008			
PY2XB	50.060			
TI2NA	50.080	A1	San Jose, Costa Rica	
VE1SIX	50.088	A1	New Brunswick	
VE6AHC			Alberta	
VE6NAB	50.050		Alberta	
VK2WI	52.450		Sydney, Aus.	
VK4RTL	52.440	fsk	Tounsville, Aus.	
VK5VF	53.000		Mt. Lofty, Aus.	
VK6RTT	52.900		Carnoran, Aus.	
VK6RTU	52.350		Kalagoorlie, Aus.	
VK6RTV	52.300		Perth, Aus.	
VK6RTW	52.800		Albany, Aus.	
VK6VF	52.006		Perth, Aus.	
VK7RNT	52.400		Launceston, Aus.	
VK8VF	52.200	A1	Darwin, Aus.	
VK9GA	52.001		Goroka, N. Guinea	
VKØGR	53.200		Casey, Ant.	
VKØMA	53.100		Mawson, Ant.	
VKØWI	52.160		Macquarie Islands	
YJ8PV	51.998	fsk	New Caledonia	
ZB2VHF	50.035	A1	Gibraltar	
ZK1AA	50.100		Cook Islands	2
ZL1BPW	51.002		Auckland, NZ	1, 3
ZL2MHF	52.510		Mt. Climic NZ	
ZL2VHF	52.500		Palmerstan N., NZ	
ZS5C	50.025			
ZS6PW	50.029		Pretoria, S. Africa	
ZS6LN	50.050		Petersburg, S. Africa	
ZS6VHF	50.040		Edenvale, S. Africa	
3D3AA	50.100, 52.500		Fiji Islands	
5B4CY	50.500		Cyprus	
5W1AR	50.100		Western Samoa	
6Y5RC	50.025	fsk	Kingston, Jamaica	

TV Sound Signals Within Band

VK2	51.740	Wagga, Aus.
VK3	51.760	Melbourne, Aus.
VK4	51.750	Brisbane, Aus.
ZL1	50.740	Auckland, NZ
ZL2	50.750	Kau Kapunake, NZ
ZL2	50.760	Waukapunake, NZ

TV Signals Below Band

French	41.25	A-M Sound
UK	41.48, .50, .52 and .547	A-M Sound
UK	44.993, 45.00, .007, .047	Video
NZ	45.25	Video
Australia	46.25	Video
UK	48.23, .25, .27	A-M Sound
Europe (many countries)	48.25 and .26	Video
Europe/Asia (Eastern Block countries, U.S.S.R. and China	49.75	Video

Notes: 1 — Attended. 2 — Present operational status unknown. 3 — During non-TV hours. 4 — See Operating Schedule (May *QST*, page 89).

BPW and ACL March 28 between 2145 and 2200 UTC. Ward notes that these contacts were at 51.110 and reports were generally 5×6. On April 1 he added three more ZLs, 1AVZ, 1MQ and 1BFH, as well as LU8DIN.

As an example of how difficult it is to chronicle this fast-paced period on 6 meters, while I am writing this material, early Sunday evening April 15, I am listening to the running commentary on 28.885 and hearing that WA5HNK is in contact with ZL3QK and WA5IYX has just worked ZL3RW and is hearing ZLs 3AAN and AQ.

Some really long-haul propagation has been noted, including that between Japan and Korea and southern South America reported last month. The ZS6LN beacon has been reported on several occasions in Japan and on two days, April 13 and 15 around 0700 UTC, ZS6LN heard the KH6EQI beacon. On the second occasion, the signal was quite strong and was in for about 45 minutes but no KH6s were available for two-ways. ZS6LN informed W6XJ of the reception via long path on 28.885 and even played the signal over the air. However, Gary and the others on the West Coast, despite tries by radio and telephone, could not alert any KH6s before the signal faded. Twenty-four hours later things were different and ZS6LN contacted KH6s HI, NS, IAA and ISI with signals ranging between S7 to 9. That's a path of about 12,700 miles.

Nor was F2 the only game in town. Several good auroras, including the big one the evening of April 3 (the 4th UTC time), provided some solace to the DX-starved northern tier of states. For the more northerly stations, this particular aurora produced some trans-auroral propagation with strong buzz-free signals. VE1ASJ worked two VE5s in this way. In addition there was considerable Es propagation. The Belize DXpedition VP1MF got in on at least one such session enabling them to work many 4s and 5s. They also partook of TE, providing a rare country to a number of stations in the southern portion of South America.

More and more countries will be getting on 6 meters as the word of the outstanding conditions spreads. Contributing to this are a number of avid 50-MHz operators who are supplying equipment to DX stations where a need exists and the operators have indicated a real desire to give the band a try. One such case is ZD8KG who is being sent a rig by WA1EXN. In addition, a group including WB6OKK, W6XJ, WA5HNK, K6JYO and K7GGU has dispatched a complete 6-meter station with spares to ZK1AA. Stewart should be on the band by mid-April. Both ZD8 and ZK1 are very hot areas for propagation and both were worked by northern U.S. stations during the last cycle. So they should supply a lot of contacts on Cycle 21 which has already exceeded the solar numbers reached 11 years ago. Another station that should be active well before this appears in print is FP8HL. He will be very popular on Es this summer and be a fine catch for many parts of the world come the return of F2 next fall.

2 Meters — The high solar activity that has made 6 meters come alive has also brought the shfers friend, aurora, to 2 meters. You can bet that the gang has been taking good advantage of these buzz-mode openings. Aurora offers the perfect opportunity for newer 2-meter operators to work some states which might otherwise be quite difficult to corner. One such is W3EP/9, Bloomington, IN. Despite his mere 10 watts to a 7-element beam, Emil managed QSOs with WØSD, SD; WB5CRK, OK; as well as stations in MN and WI, a half-dozen contacts in all during the April 3/4 session. One who is far from being a newcomer, W9VI, WI, hooked up with some 30 stations in 13 states plus VE3 during the same opening. Keith's best DX was W2EIF, SNJ. He says that the loudest signal came from WA4MVI who was using a 160-element collinear designed for EME work. K5CM, OK, reports working stations from NY to CO. K9SGD, IL, comments that this aurora was one of the best he has ever heard. Joe notes logging all U.S. call areas except the 6th. He also notes an aurora on March 18 in which WØSD was pinning his meter. Not to be outdone, WØVHQ used the April 3/4 buzz session to work 16 states as far east as PA and as far west as CO and MT.

Another old hand at aurora, WØRLI passes along a report of European success with the mode. Hank picked up the information in a letter from SM3CQI who he had worked on 10 meters. The Swede says that most 2-meter aurora work is done below 144.1 with that frequency used as a cw calling frequency and 144.2 as the ssb calling frequency. From Sweden, UA3, 4 and 9 sections of the U.S.S.R. have been worked to the east and G, GM and GW as well as TF to the west. That last one should make us sit up and take notice, as Iceland is well on the way to this side of the Pond! With higher solar conditions, the accomplishment of North America-to-Europe aurora contacts on 2 meters is not beyond the realm of possibility. Who will be the first to pull off such an exciting and historic feat?

Nor is aurora the only game that nature had to offer. From the year-round capital of tropo, the Gulf Coast, WA5TBE reports from Corpus Christi, TX, that the end of March produced some good bending conditions, resulting in contacts with WB5IBT, LA; W5UCY, MS; as well as W4CSS and W4ODW, FL.

Hardly a month goes by that I don't receive at least one piece of mail reporting reception of a strange "beacon" on one vhf band or other. They are usually described as bleeping signals which occasionally come on and stay for a few seconds and sometimes disappear for a few seconds and then resume bleeping. I am frequently asked to publish a list of these "beacons" along with their locations, powers and antenna characteristics. The source of these apparently strange signals was explained by WA8ULG in a note carried in this column long before I became its conductor. They are caused by radiation from the local oscillators of scanner receivers and, as the popularity of these little boxes steadily increases, we are certain to hear more and more of them. One wonders how these units pass the FCC rules governing such things. As an illustration of how ubiquitous the signals are becoming in our vhf bands, KA9ASH lists eight frequencies between 144.0 and 144.1 on which he heard bleepers in just one evening of listening.

For those needing WV, WB2DIN/8 is available for m.s. or other types of skeds other than EME. Bob can be reached at 304-263-6287. K2OVS, NY, is looking for m.s. skeds in MS, AR, ND and SD. Interested parties can call Jay collect at 516-584-7951.

70 Cm — Evidence that TE, or FAI if you prefer, extends 432 MHz is becoming indisputable. On the evening of March 20, the transmissions of ZE2JV were copied by both SV1AB and SV1DH. The signals were not strong but were detectable nevertheless. Intensive schedules were established to try to complete a two-way but I have not been informed of any success as of this writing.

The big aurora of April 3/4 produced its share of 70 excitement. W3IP, near Baltimore, worked K2YCO, K2LZF, WA8TTS and W3RUE while W3OZ, a few miles to the west, completed an ssb contact with WA8TTS, OH. The auroral propagation was present even as far south as OK, with K5CM reporting a 432-buzz-mode contact with KØPAY, NE.

The March 27 Gulf Coast tropo, mentioned in the 2-meter section, was felt on 70 also. WA5TBE, Corpus Christi, worked Pensacola, FL, stations W4CSS and W4ODW on 432 ssb while the latter station was running about 2 watts output.

A number of 70-cm EMEers were active during the solar eclipse of February 26. No contacts were reported but K5JL heard I5MSH testing during the event. At Jay's QTH in OK, 78 percent totality was reached causing his sun noise to drop from 16 dB to 5 dB. Pronounced drops in sun noise were also noted by VE7BBG and VE4MA, who were in the path of totality.

According to the *Northeast VHF News*, the authorities in Canada have decided to delete the 420 to 430 portion of the 70-cm amateur band and intend to implement a new amateur band from 902 to 928 MHz.

ATV repeater operators should be aware that no type of repeater is allowed between 431 to 433 and 435 to 438 MHz. FCC has recently denied petitions for reconsideration of this ruling arising from Docket 21033. QST

Silent Keys

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

W1DHA, F. Sherwood Harris, Holyoke, MA
W1FLJ, Raymond E. Hebert, Northampton, MA
W1GEA, Wendell B. "Bud" Ward, Waterford, CT
K1GPV, Edwin A. Smith, Presque Isle, ME
W1HZA, Norman J. Morrisson, Jr., Sudbury, MA
K1KVB, Fred H. Chase, Topsfield, MA
K1RP, Franklin M. Doolittle, Hamden, CT
W1TP, William L. Isherwood, Sr., Berlin, NH
*W1TRD, Edwin A. Hall, Maynard, MA
W2BJU, David B. Garrison, Glen Gardner, NJ
K2IVA, Dr. Jack London, Flushing, NY
K2KLG, John R. Shearer, Sr., Helmetta, NJ
W2LEZ, Thomas A. Doddridge, Snyder, NY
W2NBZ, Peter A. Swolak, Short Hills, NJ
W2NJR, Robert W. Ehrlich, Basking Ridge, NJ
W2OE, Walter B. Russell, Northville, NY
WA2RHS, Nicholas Nowaski, Southampton, NY
W2RUD, Frank Mazurkiewicz, Perth, NY
Ex-W2UJP, Gilbert W. Badger, Schenectady, NY
W3CC, Charles W. Weber, Langhorne, PA
K3SAD, Walter G. Davis, Aliquippa, PA
W3ZSP, David F. Barbour, Pittsburgh, PA
*WB4AMU, James H. Fisher, Charlotte, NC
W4CGL, Rogers C. Wade, Chapel Hill, NC
WA4FHM, Carlton T. Aherron, Danville, VA
K4GIG, Frank M. Gulick, Falls Church, VA
W4LXG, Philip N. Hunter, Winchester, VA
WB4MOT, Edree C. Wellmaker, Clinton, SC
WD4MXP, Jack McGary, Cocoa Beach, FL
WB4NQY, Albert Holler, Boca Raton, FL
W4PFT, Charles R. Crabtree, Lakeland, FL

*Life Member, ARRL.

WA4QQK, Frank Fitts, Jr., Tuscaloosa, AL
WB5CYS, Tom H. Barton, Center, TX
Ex-K5EKT, John R. Burross, Wichita Falls, TX
W5EOS, Kirk Jonas, San Antonio, TX
W5FKE, Favian M. Adair, Tyler, TX
W5FQI, Frank K. Russell, Houston, TX
W5GTB, Alva B. Howell, New Orleans, LA
W5NZA, Robrt B. Newcombe, Portland, AR
W5RIO, James R. Wilburn, Jackson, MS
K5TPS, Nathan E. Wilcox, Tulsa, OK
WA5TRA, Sam S. Gantz, Amarillo, TX
W5UCO, Eddie A. Reynolds, DeSoto, TX
WB5VUU, Andrew Gebbia, Tulsa, OK
W5WK, Robert E. Sorkness, New Braunfels, TX
W6BNH, George H. Smith, Livermore, CA
N6FQ, Russell C. Lietzow, Lancaster, CA
WB6FYF, George W. Cadmus, San Diego, CA
W6HEN, Maxwell H. Mizell, Los Angeles, CA
W6IHK, William A. Myers, Pasadena, CA
WA6NBJ, Arthur T. Keboit, Eureka, CA
N6NZH, Richard Nunes, Castro Valley, CA
WA6UPD, Raymond J. Larsen, Lake Isabella, CA
WB6VNF, Joseph Schneider, Ventura, CA
WB7AJR, Jack D. Haworth, Tacoma, WA
W7AWN, Keith K. Krotzer, Prescott, AZ
W7DHX, Don A. Smith, Portland, OR
W7JKU, Laurance A. Walworth, Salem, OR
W7JNI, J. Carroll Foster, Portland, OR
WA7KKE, Otto E. Coyle, Phoenix, AZ
K7OIP, Leroi P. Blaylock, Ogden, UT
WA7YWZ, Henry L. Dollard, Jr., Mesa, AZ
K8BJL, Charles M. Ham, Wauseon, OH
WB8IJV, Fred H. Passenger, Ithaca, MI
WD8IPP, James V. Barbone, Berlin Center, OH

K8IUH, Robert S. Birkett, Williamston, MI
K8KGF, D. Frank Curry, Findlay, OH
W8KMF, Harvey H. Amos, Canton, OH
K8KVR, Dr. William B. Blake, Jr., Huntington, WV
W8LTI, Carl L. Deweese, Newark, OH
WB8LTN, Carl N. Sheff, Cincinnati, OH
WB8NUX, Tierney M. Motter, Ashland, OH
WA8POB, Fred W. Bachr, Grand Blanc, MI
W8VBW, Arnold Badt, St. Joseph, MI
KA9BQU, James W. Currie, Antigo, WI
WB9CCO, Cecil W. King, Indianapolis, IN
K9DYD, Henry G. Cramer, Edwards, IL
W9GFM, William F. Johnson, Mundelein, IL
W9LZX, Clarence C. Moore, Elkhart, IN
W9MAP, Ernest H. Storer, Rockford, IL
W9MDZ, Leo Webb, Clinton, IL
WD0CPO, Robert M. Nickle, Lemay, MO
WD0FCF, Duncan D. McKeeby, Coleraine, MN
W0FHU, Laurence Lane, Kiowa, KS
W0HX, Lewis C. Baird, Independence, MO
W0LBB, Harris A. Frombold, Kansas City, MO
W0MFT, Kermith W. Trimble, Wichita, KS
WB0OQA, George Hoss, Ness City, KS
WA0PID, Stanley L. Krotz, Rushville, NE
W0RDU, Virgil R. Beck, Lees Summit, MO
W0TTU, Guy L. Eagle, Neodesha, KS
KH6EHR, Joseph A. Lacno, Waimanalo, HI
VE1AQG, Lila G. Banks, Annapolis County, NS
VE1OM, Douglas C. Johnson, Halifax, NS
DJ3GI, Dieter Mindhoff, Cologne, West Germany
HC2DX, Ivano Biasin, Guayaquil, Ecuador
VK2NS, Trevor F. Evans, Bathurst, Australia
XZ2KN, Tara Singh, Rangoon, Burma
9H1E, Robert F. Galea, Gozo Island, Malta

Club Notes

"Program ideas — we need 'em!" We receive more letters from club members asking that, than any other type. The program *does* make the club! Here are some unusual ones.

A quiz developed by Satellite ARC (CA) could make an interesting short program. The test required members to match Amateur Radio equipment companies and well-known amateur groups to their hometowns, i.e., *Ham Radio* — Greenville, NH.

The first Larkfield (NY) ARC computer chess game was held over club repeater, WR2ABA. Listeners and computer hobbyists in the club displayed enough interest to schedule tournaments. KB2CI drew up visual aids to help listeners to thoroughly enjoy the games.

Speakers you may not have thought of are ARRL elected and appointed officials. Your division director can discuss the whys and wherefores of the latest happenings of the League. Section communications managers know about ARRL-sponsored on-the-air activities and what's going on in your state. (Both of the above are listed on page 8, *QST*.) Your section emergency coordinator can speak on statewide or large-area coordination of emergency communications. The section traffic manager can likewise talk about statewide or large-area traffic handling. If these people are busy, try the net manager and official traffic station appointees (whose proficiency is message handling) and emergency coordinators and official emergency stations (whose specialty is emergency communications). If you don't know the names of these appointees in your area, contact your section communications manager (again, page 8, *QST*). Other appointees (enough for a half year of programs!) and their topics include: official observer — friendly policing of the bands for violations for which hams might receive "pink tickets" from the FCC. Official vhf station — perform experiments and keep track of on-the-air activity and phenomena. Official bulletin station — retransmit WIAW bulletins on any mode/band. Intruder Watch — police the ham bands and report illegal, non-amateur operations; remember the Russian woodpecker? Public relations assistant — handle all types of PR for hams. QSL Bureau personnel — how the bureaus run. Each of these appointees can tell interesting anecdotes and relay their day-to-day activities, how to become an appointee, etc. Ask them to come visit your club. — *Rosalie White, WA1STO*

Strays

CANADIAN AWARD

The Chilliwack (BC) ARC is sponsoring the Sasquatch Award. All band and modes can be used; only contacts made after March 1979 are eligible. For rules and a list of club members, send s.a.s.e. to Chilliwack ARC, c/o 317 Marshall Ave., Chilliwack, BC V2P 3J5, Canada.

HAMTOWN, USA?

Colebrook, CT, might hold the record for the highest ratio of hams to total town population. Four amateurs live in Colebrook — W1TBI, WB1HHQ, W1ALF and W1SUZ. With a town population of 1100, there is one ham for every 275 inhabitants. Can anyone beat that? [Editor's note: How about Newington?]

OPERATION GOODWILL

The Albany (NY) Rotary Club needs food, clothing and any other donations for its Operation Goodwill, a 20-year-old program that provides emergency aid around the world. In this "Year of the Child," contributions will be used to help orphans in Korea. For more information, contact Dave Marks, W2APF, 28 Cherry Tree Rd., Loudonville, NY 12211.

I would like to get in touch with . . .

hams interested in starting a repeater to provide emergency communications between Oklahoma City and Tulsa. Contact Rick Wilson, WD5ETD, 120 E. Sixth, Davenport, OK 74026.

hams interested in spreading the next Friendship Earthalite message, to be transmitted on June 22, 1979, the longest day of the year. Contact George H. Byer, 35099 W. Florida D-8, Hemet, CA 92343.

amateurs who were stationed on Ward Island at the Corpus Christi (TX) Naval Air Station in 1943. Urgent records confirmation needed. Contact Howard Griswold, K4FMJ, 5304 Cool Rd., Orangewood Village, Holiday, FL 33590.

hams interested in participating in long-delay echo experiments. Contact D. B. Muldrew, Department of Communications, Ottawa, ON K2H 8Z5.

several nonsmoking hams interested in flying a light plane from New England to Alaska and the West Coast in July. Pilot rating optional. For details, contact Gordon Pugh, W1JTB/W2GHR, 89 Trumbull Rd., Manhasset, NY 11030.

Scottsdale (AZ) Amateur Radio Club member Senator Barry Goldwater, K7UGA, left, presents a $50 check to ARRL Public Relations Assistant Bob Ney, KB7BU, for use in "Project Goodwill," a League-sponsored effort to supply Amateur Radio kits to hams in developing countries. At center is Dennis Reiley, WB7PXP, president of the club, which donated the funds.

YL News and Views

Conducted By Louise Moreau,* W3WRE

The Wide Choice

When the nervous moments of the General test turn into the pleasure of passing, we may begin to wonder what we would like to do now that we are allowed to use all forms of emission. For those of us who have caught the fever on 15 meters, there is the great opportunity of DX, catching the gals in the DX YL-to-NA YL contest, or the Anniversary Party each year. Here is an opportunity to get into the regularly scheduled sessions set up between CLARA and the DL YLs or to meet the members from many countries in the huge YLISSB system.

It is a chance to use newly acquired phone privileges to begin looking for the certificates of the local clubs or those offered by the larger national YL clubs. There are several just waiting, such as the Worked Italian YL of the YLRC Italiano, BRYLA from the ladies in Brazil, and three different kinds from the South African club SAWARC, including a cw award that takes time and patience to earn. The JLRL offers two beautiful YL certificates, while the Ontario Trilliums and CLARA have several that are available for proof of contact. And of course there are DX-YL, WAC-YL, WAS-YL, YLCC and DX-YLCC from YLRL.

There are a lot of other choices open to us. It is possible to work in the National Traffic System or take a complete jump from either phone or cw to join the gals who prefer to operate the "green keys" on RTTY, or see the women we are working through SSTV and be able to associate a smile and a voice with a call.

The newcomer to General or higher class privileges has the opportunity to find other YL operators on the many club-sponsored nets. She can check in on a different one every day of the week and be sure of meeting women in all parts of the country. If she likes the idea of working with a repeater but still wants to meet YLs, she will find that repeaters are beginning to appear more and more across the country.

There is almost no limit to the things available to the brand new General looking for a change from the rigid control of Novice cw. Experimental work, public service, on-the-air clubs, nets, contests on all bands with all modes of emission are available. All that she needs to do is make a choice, tune her equipment and plunge in, for that welcome mat is always out for all of us.

PENNSYLVANIA YLRL WEEK, JUNE 24-30, 1979

In conjunction with the International YLRL Convention that will be held in Philadelphia on June 29 to July 1, Governor Richard Thornburgh has declared that the week of June 24-30 will be observed as YLRL Week in Pennsylvania. In his proclamation, the Governor cited the many contributions of women Amateur Radio operators to the public in phone patches for the military, disaster operation, service to the handicapped, and furthering the education of young people through scholarships.

SPECIAL YL CONVENTION, W3YL

The call W3YL will be used at the official YLRL Convention station that will be set up at the Holiday Inn by Sandy Rutiser who is lending her station and call to YLRL for this convention so that it will be possible to permit all registered women to have the pleasure of using this very feminine call.

NEW WAS-YL CUSTODIAN

Phyllis Shanks, W2GLB, 1979 YLRL president, has announced the appointment of Stella McPherson, WA4WPN, to be the new custodian of the WAS-YL certificate. To obtain this award an alphabetical list of cards by state must be included with the cards as well as sufficient postage to return them. There is no fee for the certificate. The address of the new custodian is Stella McPherson, WA4WPN, 2029 Elbow Road, Chesapeake, VA 23320.

FIRST HONG KONG YL

Donna Convery, VS6DC, is the first and only YL in Hong Kong. Donna writes that she is most anxious to meet other women Amateur Radio operators on the air and is looking forward to schedules with anyone who is looking for another country to be able to qualify for the CLARA DXCC-YL, or YLRL's DX-YLCC awards. With her license from Hong Kong, Donna brings the YL world picture to well over 130 countries.

TRILLIUM WEEKEND RESULTS

Eva Colleck, VE3EVA, TOT contest coordinator, has announced the results of the Trillium Weekend Contest of last November. The results showed Sid Wheat, VE3CQY, in first place; Steve Bamber, VE3JPJ, second and Dave Adams, VE3HBF, in third place. The member of the Ontario Trilliums who gave the most contacts was Tess Hardie, VE3HIR. The results of the draw from all the logs sent in resulted in VE3JPJ first, VE4MG second, and VE3FXM third. The 1979 Trillium Weekend has been scheduled for November 3 and 4 from 0030 to 0030 UTC.

[Editor's Note: *QST* is sorry to announce the departure of Louise Moreau, W3WRE, from the staff of contributing editors. Since November of 1966, Louise has been YL editor and has conducted the "YL News and Views" column in *QST*. YLs and OMs alike are grateful to Louise for keeping us all up-to-date over the past 13 years with her reporting in this column.] QST

*YL Editor, *QST*

50 Years Ago

June 1929

☐ Unaware that some day it will become standard operating procedure, Editor Warner cautiously suggests that one station answer another *on the same frequency*, rather than remaining on his fixed wave and hoping he will be heard.

☐ The elaborate short-wave equipment aboard the ketch *Nomad* for its round-the-world cruise was designed by W7FD, and some of the ideas can be useful in our own shacks.

☐ President Maxim tosses us a bouquet for the high standards achieved in amateur self-policing, and the resultant prestige of our radio service among Washington officialdom.

☐ If you develop a glass arm in sending, says code teaching expert Walter Candler, it could be caused by bodily infection, or by simple muscle tension. For the latter, proper physical exercise is important.

☐ W9CYQ says the cost of a voltmeter for tube filament measurements and a milliammeter for the plate current will be less than replacement of tubes damaged through improper operation.

☐ W8BQ is featured in the station description contest; the op discarded his 25-watt bottle for a 50-watter, which he finds just as effective when used with crystal control and an effcient layout.

☐ The new 224 screen-grid and 245 power-amplifier tubes have considerable potential for amateur use, but right now are being featured in "hi-fi" broadcast sets such as Silver-Marshall.

☐ 9CRR says we can get a good photo of our ham shack even in a dark room by appropriate use of a Mazda bulb.

☐ *The Radio Manual*, by George E. Sterling (W1AE) is a new publication filled with necessary data for today's professional radioman.

25 Years Ago

June 1954

☐ With FCC no longer conducting Novice and Technician exams, it now becomes our responsibility to maintain high standards of integrity, as the Editor pointedly reminds us.

☐ Two teams of W7s on Oregon mountaintops used telescopes to locate each other 47 miles away, and to aim 10-kMc. beams for successful communication and a new distance record.

☐ Operation on 6 meters in Channel 2 areas has been a virtual impossibility, but W2IDZ and other northern New Jersey enthusiasts have gradually found partial solutions to technical problems and *are* using the band.

☐ W6FK and W6BV, utilities professionals, share with us their many years' experience in handling interference problems, particularly as concerns personal relationships or "diplomatics."

☐ Mobile antennas have received considerable attention from 75-meter ops, and W4IMM finds that a loop — from whip top to rear bumper — can be quite effective.

☐ W1PH always has economy in mind when building a receiver, and this month still sticks with a t.r.f. regenerative design and plug-in coils.

☐ W1DX continues his treatise on radiotelephony, this installment dealing with practical modulation systems.

☐ With some assistance from League counsel, W3LOE won his case in Baltimore County court to keep his 60-foot antenna tower, despite rulings to the contrary by zoning officials.

☐ For the beginner, W6CHB has a simple design of a transistor code-practice oscillator. QST

Public Service

Conducted By Robert J. Halprin,* K1XA

How to Send Traffic on Phone

How do you send traffic on phone? Sound like a silly question? You say the answer is that all you gotta do is modulate? How wrong you are. Ever since the microphone became permanently lodged in the esophagus and the key was wrenched from the clenched fist of amateur mankind, the proper handling of third-party written traffic has gone steadily down the proverbial tubes.

The key word here is *proper* handling. Anyone can talk, but not everyone handles traffic on phone properly.

If this intro seems to indicate some personal bias in favor of cw traffic handling, you are so right. This is true, in spite of the fact, that the majority of this writer's traffic handling is now done on voice. Cw traffic handlers, by and large, know how to follow correct procedure exactly according to the "book." But, I venture to say that less than 5 percent of the phone operators send traffic on phone in the proper manner prescribed in *Operating an Amateur Radio Station*.

Let's talk a bit about cw traffic handling first. How many savvy operators, even casual section net QNIs, send CK before the check? Or TO preceding the addressee? Or SIG prior to the signature? Practically nobody. Why? Because it is recognized on cw that there is a strict, correct formal procedure that must be followed. You can spot the neophyte on a cw net by the use of such nonstandard procedures. But fortunately, the Novice learns quickly by example.

But, unfortunately, there are as many ways to send traffic on phone as there are number of mouths. But there is a single correct procedure that should be followed. So how are you supposed to send traffic on phone? Exactly like you do on cw! If you have handled any amount of traffic on cw, then you probably know how to do it on phone. Since CK, TO, or SIG are not sent on cw, it is not done on phone. The message format is the same on phone as on cw. For example: "Number 7 routine W1XX 10 Avon Connecticut 1000 Zulu April 1 Sarah Emily Toggle 73 Sweetheart Lane Walla Walla Washington 99362 telephone 525 000 *break* Hi Emily X-ray Arrived safely in Podunk Hollow X-ray Love *break* Uncle Samuel Ezra *End of message, no more, over.*"

Note well. The word "routine" is used. The phone equivalent of the cw $\overline{AA}$ that separates the parts of the address is a pause, so the copying operator knows you are on a different line. Telephone area codes are not really needed. If the message is relayed to you with the area code, however, it is retained and relayed exactly as received. The word "break" is used after the phone number. You do not wait at this point for acknowledgement. Continue into the text. If you are getting wiped out by QRM, you should have been interrupted already, because you are pausing with VOX or listening between phrases with push-to-talk. Send the message in short phrases. Then pause while it is being copied. Pause before you send the zip code, phone numbers, and numerals in the text so the receiving station copies as you are talking. Use the standard phonetic alphabet only. But don't go into the overkill mode in the use of phonetics.

Avoid such superfluous expressions as "amateur call," "a married lady," "toggle like the switch," or "today's date." But do use the word "figures" before numerals that are not spelled out. Say the word "break" at the end of the text and proceed to the signature. Don't say "break and the signature." When completed say, "end of message." If you have no more for the station at that time, follow with "No more. Over." If you have three more to send at that time, say "End of message. Three. Over."

So you see, there is a standard way to send traffic on phone. And it's all spelled out in *Operating an Amateur Radio Station*, available free to ARRL members. Now wouldn't it be swell if everyone would conform to the example given so that phone traffic work would be as standardized as on cw?

A couple of things about changing other people's habits. Correcting someone else's procedure during a directed net leads to ill feeling. Special training net sessions to promote proper traffic handling on phone is FB. A telephone call can also work wonders. Or in-person net meetings. Net bulletins. But let's not embarrass a potentially good traffic handler by spouting off during a directed session. Such high and mighty pompousness is self-defeating. Coax (not RG-8/U) other net members along to handle traffic properly on voice. Refer them to this article. But by all means be patient.

A word of caution on the use of Q signals. They are primarily for cw use. They are not needed in phone traffic work. For example, don't QSL a message received. You can acknowledge receipt of a message with "roger message" or, even more simply, "roger." And, is there really any need to "roger message number 7"? If so, why not read back the whole message as well as the number? "Roger" is sufficient. That's the equivalent of "R" on cw or just "dit."

Yes sir, folks. You read it right here in these very pages of *QST*. Let's do it to it by cleaning up our phone traffic-handling act. Although this blurb is restricted to the actual *sending* of traffic on phone there are other vagaries involved with the correct *handling* of message traffic on phone. This will be further expanded upon in this column in the future. But for starters, we leave you with this parting pearl courtesy of K1BQB, stalwart Vermont traffic handler: "There are only three ways to 'get rid of traffic.' You can burn it, bury it, or flush it." Over. — *John F. Lindholm, W1XX*

ITU Phonetic Alphabet

Word List Adopted by the International Telecommunication Union

A	ALFA	N	NOVEMBER
B	BRAVO	O	OSCAR
C	CHARLIE	P	PAPA
D	DELTA	Q	QUEBEC
E	ECHO	R	ROMEO
F	FOXTROT	S	SIERRA
G	GOLF	T	TANGO
H	HOTEL	U	UNIFORM
I	INDIA	V	VICTOR
J	JULIETT	W	WHISKEY
K	KILO	X	X-RAY
L	LIMA	Y	YANKEE
M	MIKE	Z	ZULU

THREE MILE ISLAND

Pennsylvania amateurs played a key role in providing communications between civil defense and Red Cross shelters during the nuclear emergency at Three Mile Island. If an evacuation had taken place, amateurs would have provided primary communication in the moving of more than 600,000 people up to 100 miles from the reactor site. More details in an upcoming issue of *QST*. — *WA3PZO, Section Emergency Coordinator, Eastern Pennsylvania*

CALAMITIES CONTINUE

As this is being written, amateurs are directly involved in relief efforts connected with tornados in Texas and Oklahoma and flooding in Jackson, Mississippi. A chronicle of these events will also be appearing in these pages shortly.

QSP2 FOR EFFICIENT TRAFFIC ROUTING

Many favorable comments have been received concerning K2UL's suggestion that relay of message traffic via 2 meters can be indicated by using a modified Q-signal. Based on these comments, it is recommended that stations offering to relay traffic from hf cw section nets via 2 meters let the net control station know by using *QSP2*, which has the same meaning as QSP, except that the traffic will be routed to potential outlets on 2-meter repeaters. This will facilitate more effective traffic routing. — *W2XD, Section Traffic Manager, Northern New Jersey.*

SIMULATED EMERGENCY TEST RESULTS — THIS ISSUE

See page 77 for a review of the Simulated Emergency Test, the first of two in 1979. Your group's report should be listed, if it arrived by deadline. What you see is what we got.

INTERNATIONAL TRAFFIC — CAUTION IS ADVISED

In April 1976, all the member-societies of the International Amateur Radio Union (IARU) of North and South America met in Miami to resolve problems facing amateurs in the Western Hemisphere and to help shape policy in the years between then and WARC-79. One of the more helpful resolutions to come out of

*Asst. Communications Manager, ARRL

that conference is this: that phone patches — when legal — should be conducted in the *upper* portion of 14,250-14,350 kHz (preferably above 14,300 kHz) and the lower portion of 14,100-14,200 kHz. The 28 member-societies (including ARRL) recognized that the lower portions of the 20-meter band are reserved by gentlemen's agreement for DX operation and technical exchanges.

We'd like to stress once again that international traffic has turned into a threat to the very existence of the Amateur Service. Phone patches should be run *only* if the countries involved share a third-party agreement and *only* if the communication is noncommercial and of a personal unimportant nature. The word unimportant is actually used in the international regulations defining Amateur Radio and the privileges of the Service (see article 41, International Radio Regulations, ITU Geneva). For further information, please refer to June 1976 *QST*, page 61 and August 1977 *QST*, page 71. — *WA6IDN, International Services Officer, ARRL*

U.S. Amateurs May Handle Third-Party Traffic With:

Argentina	Honduras
Bolivia	Israel
Brazil	Jamaica
Canada	Jordan
Chile	Liberia
Colombia	Mexico
Costa Rica	Nicaragua
Cuba	Panama
Dominican Republic	Paraguay
Ecuador	Peru
El Salvador	Trinidad and Tobago
Ghana	Uruguay
Guatemala	Venezuela
Guyana	4U1ITU, Geneva
Haiti	

Canadian Amateurs May Handle Third-Party Traffic With:

Bolivia	Israel
Chile	Mexico
Colombia	Nicaragua
Costa Rica	Peru
Dominican Republic	Trinidad and Tobago
El Salvador	United States
Guatemala	Uruguay
Guyana	Venezuela
Honduras	

THE RACES EDGE

From a recent survey sent out to the ARRL Section Emergency Coordinators in the U.S., it is apparent that RACES activity varies widely. While ARES is not the same as RACES, there are at least two sections where the ARES groups have been recognized as RACES units. Roughly half of the responding sections have some form of RACES activity. In many of these sections, ARES maintains formal liaison with RACES.

By FCC regulations, RACES is comprised solely of Amateur Radio operators. As with other public service functions, many of the participating amateurs are also ARRL members. Thus, it seems appropriate for us to share information on this important public service function through ARRL publications. Perhaps, initially, the information needed is details of your RACES organization and its involvement with your local or state government agencies. Also of interest would be information on emergency plans, drills and liaison with ARRL-sponsored public service activities (ARES and NTS). Information of this nature should be sent to Bill Farone, N4NK, 210 Midfield Rd., Bon Air, VA 23235. The information will be collated and put in form for publication in these pages. It does not have to be sent in any specific form or even typed.

As an example of the general kind of information that might be of interest, I have detailed material on the Virginia section that can be condensed into a few sentences. In VA, the RACES program was reactivated in April of 1978 with a presentation by ARES to state officials. Since then, three drills have been held and the RACES/ARES units have indicated willingness to support four drills a year. As with many amateur communications activities, the VA officials look upon RACES as a formal message communications service with informal (tactical) emergency communications relegated to a secondary role. Many other groups exist which can also handle tactical communications (police, CAP, REACT, etc.). RACES is better equipped to perform point-to-point communications within the state and to outside points for formal official emergency traffic. Additionally, the section level NTS nets are used for RACES activity as well as for health and welfare traffic. A state communications plan which uses three separate hf nets and several 2-meter nets has been devised and tested. The plan allows traffic to flow into state headquarters in Richmond at the same time that instructions are flowing out on another net. The third hf net is a cw net, to handle all traffic that is deemed "sensitive;" it is thus afforded the partial security inherent in cw communications as far as the general public is concerned. It was this cw communications ability that was the key factor in the reactivation of RACES in VA.

There has been much confusion about the role and purpose of RACES. Many amateurs and some public officials still think of it as a "war related" activity, falling under "civil defense." This notion is no longer correct, however, as the war readiness aspect in most political jurisdictions has been incorporated into civil preparedness agencies ready to serve all types of emergency situations. This change in RACES scope has been recognized by all pertinent Federal agencies including FCC. RACES is now recognized as filling the complete range of emergency preparedness and if it does not exist in an area, it is simply that the amateurs in the area aren't aware of the "new RACES" or the officials involved have not been "sold" by the amateurs. The major difference between ARES and RACES in scope is that under RACES, the amateur group becomes a "semipublic" agency, under the direction of the local or state civil authorities. ARES, on the other hand, is an independent organization under ARRL auspices.

Information on RACES activity in your section would be greatly appreciated. Possibly an exchange of ideas and information will help us all with this important public service. — *N4NK*

A TIP OF THE HAT

Recent emergency traffic to Guam sent same time as a telegram. Radiogram beat telegram!! Congratulations to all concerned for a job well done. — *WB1CTJ*

PUBLIC SERVICE DIARY

☐ Cleveland, OH — December 1. The closing of the Highland View Hospital necessitated the transfer of all patients across town to the Metro General Hospital. Military personnel volunteered to provide transportation and communications. When it was discovered that the National Guard ambulances were without radios, members of the Lake Erie Amateur Radio Association stepped in as substitute communicators. See related photo. (WB8JYR)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Lake Isabella, CA — August 6. Forty meters was the means used by K6PNR to contact the emergency services after coming upon a traffic accident on the state highway. (W6DPD, SCM SJV)

A Lake Erie Amateur Radio Association member helped coordinate the transfer of patients between two Cleveland hospitals via 2 meters. *(WD8PYV photo)*

Adrian, MO — October 29. The Missouri Emergency Operations and Weather Net (MEOW) relayed priority traffic to the Kansas City office of the telephone company to inform them that phone service in Adrian had been disrupted and assistance was requested. (WBØFKY, SEC MO)

☐ Bossier City, LA — December 3. A tornado struck and local hams tracked the storm via SKYWARN, established communications for the Red Cross and police and activated an emergency hf net to relay traffic. (WB5WOE, EC Harrison Co. TX)

☐ Duncan and Winslow, AZ — December 20-24. Arizona hams provided assistance when extensive flooding occurred in eastern parts of the state. Vital messages were relayed for the governor's office and the various relief agencies. (WB7CDO, EC Coconino Co.; WA7KQE, NM ATEN)

☐ Salina, KS — February 2. WBØPED discovered a house fire and made an emergency call on the local repeater which was answered by WDØBNC. After the fire department arrived and broke into the house, they discovered a woman overcome by smoke; it took 12 minutes to revive her. (WDØCFZ, EC Zone 14)

☐ Astoria, OR — February 12-13. Clatsop County ARES members provided emergency communications between coastal fire stations, state police and road crews when winds of up to 100 miles per hour caused damage and power outages throughout the area. (W7YLV, EC Clatsop Co.)

☐ Greenwood, SC — February 18. In the wake of snow and ice storms, hams drove a total of 941 miles in four-wheel-drive vehicles to transport 156 nurses and doctors to the local hospital and nursing homes. (W4MTK, SCM SC)

☐ Owensboro, KY — February 23. After the Owensboro Radio Club's annual dinner, c.d. officials called requesting communications help in locating a downed aircraft. All night and into the next day, hams coordinated rescue squads, search parties, police and FAA officials. The plane was found by an Army helicopter with WB4NHO aboard. (W4OYI, Asst. Dir. Great Lakes Div.)

☐ Poughkeepsie, NY — February 24. The Dutchess County ARES Net was activated at the request of the Red Cross to provide communications for the imminent flood evacuation of a local trailer park. (N2ADJ, EC Dutchess Co.)

☐ ARRL Section Emergency Coordinators Reports. For March, 34 SEC reports were received denoting a total ARES membership of 14,602. This is nearly the same as the 33 reports received one year ago with 14,458 active members. Sections reporting were Alaska, Alta, Ariz, Ark, Conn, Del, EBay, ENY, EMass, EPa, Ind, Iowa, Kans, Mar/NFld, Mich, Mo, Neb, NFla, NTex, Ohio, Okla, Oreg, Que, SDgo, SJV, SCV, SFla, SNJ, STex, Utah, Va, WVa, WMass, WPa.

COMMUNICATIONS SERVICE OF THE MONTH

When the melting snows and upstream rains caused the Ohio River to overflow its banks between Portsmouth and Cincinnati, OH, in late February, the Queen City Emergency Net (QCEN) turned out in force for the manyfold communications operations.

As the official radio communications liaison for the Cincinnati chapter of the American Red Cross, QCEN members were called out on Tuesday night, February 27, to provide "eyes and ears" reconnaissance information to the disaster operation center located in the chapter house, downtown Cincinnati.

Four two-man Amateur Radio teams provided the first on-the-scene information Wednesday, working through two Cincinnati-area repeaters, WR8AKJ and WR8ADY.

The following Thursday brought the crest of the river and two hams took to the air for aerial survey work, photographing the river from Vevay, IN, to Portsmouth, OH. This activity was coordinated through the University of Cincinnati repeater, WR8AGB.

Mobile case work teams and supply vehicles moved out Saturday and Sunday to begin the task of cleaning up both the Ohio and Kentucky sides of the river. QCEN provided primary communications back to the chapter house both days.

A total of 57 hams handled 192 pieces of formal traffic and countless informal messages and the club's Red Cross station operated for 32 hours on 75 and 2 meters. — *KA8CRY*

REPEATER LOG

According to reports received between March 20 and April 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Miscellaneous	Total
WR2ADM	2	1	—	36	—	—	—	39
WR2AIS				5				5
WR3AFM	1		1					2
WR3AHI	1							1
WR3AHQ	1							1
WR3AJP	1							1
W3KUA	1							1
K3PSP	1			2				3
WR4ADZ			1					1
WR4AEX	1							1
WR4ALL				1				1
K4HY	1							1
WA4SWF							1	1
WR5ABA		2		7				9
WR5ABE				1				1
WR5ABY		1		39				40
WR5AIB				2				2
WR5AJG				6				6
WR5APK				1				1
WR5ARH	1							1
WR5ASW				1				1
WR7AMC				1				1
WR8ACN	1			1				2
WR8ACO				1				1
WR8ADC		1						1
W8WUX							1	1
WR9ABY				6				6
WRØACD	1							1
WRØACM				1	1			2
Simplex	4							4
Total	17	5	2	111	1	0	2	138

NATIONAL TRAFFIC SYSTEM

Welcome to Brian Burgess, WD8NKA, new manager of 8RN-D and Buzz Longstreth, WØKON, manager of RN6-E, who replaces W6INH after four years of dedicated service. KICE and WA1ZAZ are assistant first region managers and N4MD is now assistant on RN5-E.

March Reports

Area Nets

1	2	3	4	5	6	7
EAN	91	3278	36.0	1.150	86.0	
CAN	93	1965	21.1	.651	100.0	
PAN	61	1716	28.1	.728	97.8	

Region Nets

1RN	119	904	7.6	.480	85.6	91.4
2RN	120	1106	9.2	.600	85.5	88.2
3RN	93	719	7.7	.505	99.6	93.5
4RN	124	1563	12.6	.466	72.0	93.5
RN5	93	1680	18.1	.484	87.8	100.0
RN6*	31	235	7.6	.197	87.1	97.8
RN7	124	1021	8.2	.662	100.0	98.9
8RN	89	731	8.2	.453	87.1	95.7
9RN	122	899	7.4	.479	89.0	100.0
TEN*	62	647	10.4	.472	82.0	100.0
ECN	62	419	6.8	.498	—	53.8
TWN	93	619	6.7	.344	91.8	96.8

TCC

TCC Eastern	181[1]	1090	
TCC Central	208[1]	985	
TCC Pacific	119[1]	917	
Sections[2]	5673	33839	6.0
Summary	7050	54333	7.7
Record	6955	41288	18.1

*Incomplete report

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (168): ASN (AK), AENB AEND AENJ AENM AENS AENV (AL), OZK (AR), ACN ATEN HARC SWN (AZ), BCEN (BC), NCN SCN WCN (CA), CN CWN (CO/WY), CN CORN CPN WESCON (CT), FMTN FPON FPTN NFPN PBTN PEN QFN SPARC (FL), CGVHFN GASSBN GSN NGATN (GA), I75mE I75mN ICN TLCN (IA), IMN MTN (ID/MT), IEN ILN ILPN (IL), ITN QIN (IN), KPN KSBN QKS QKSS (KS), KNTN KSN KYN (KY), LAN LRN LSN LTN (LA), EM2mN EMRI EMRIPN HHTN RIEM2mTN WMPN (MA/RI), MEPN MMN MTN WRIN (MB), MDD (MD/DC), AEN MPSN PSET PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN MSSN PAW (MN), NEMOE (MO), APN (MR/NF), MN MSBN MTN (MS), CNCTN NCSSBN THEN (NC), CHN SHWN WNN (NE), GSPN (NH), MCN NJN NJPN OBTTN SPARTN UCETN (NJ), NMRRN (NM), NAS/SUF NYSPTEN (NY), BNR 06mN ONN OSN OSSBN (OH), NWOKSN OFON OLZ OPEN OTWN STN (OK), CMN GBN GBSSN LN ODN OLN OPN OSN (ON), 16/76 AREST BSN JCARES LBARES OARES PdxAARES (OR), EPA EPAEPTN PFN PTTN WPA WPAP&TN WPAP2mTN (PA), WQV/UHF (PQ), NJO SDEN SDN SDWXN (SD), SATN (SK), TNN WTVHFN (TN), TTN (TX), BUN UCN (UT), SVEN VFN VN VNTN VSBN VSN (VA), NWSSBN WSN (WA), BEN BWN WIN WNN WSBN (WI), WVN WVNN WNPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

K3KW now officially TCC-Eastern (evening) Director, after having served as assistant and acting Director for stalwart VE3SB.

1	2	3	4	5
TCC Eastern	190	95.3	2879	1090
TCC Central	217	95.9	1949	985
TCC Pacific	123	96.7	1838	917
Summary	530	96.0	6666	2992

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (March); Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM OD, WA1s VEI ZAZ, K1s BA EIR GN SSH XA, W2s CS FR GKZ MTA RQ, WA2s ICB SPL, WB2KDC, N2s TW YL, W3s FAF PQ YQ, WA3WQP, K3s KW NGN, N3HR, W4s JK MEE SQQ UQ, WA4s CCK, WB4PNY, WD4OVR, K4s BKX KNP, N4KB, W8PMJ, WB8WTS, K8KMQ, VE3s, GOL SB. Central Area (W5GHP/W9JUJ, Directors) — WD4HIF, WN4KKN N4MD, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s EDP MVR OXE SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND JIJ JUJ NXG, N9TN, WØs AM HI, WAØs TNM YVT, KØs EVH EZ. AFØ Pacific Area (W5KH, Director) — N5s MR NG, W5s JOV KH, N6s GW PZ WP, W6s EOT OA SX VZT WA6UAZ, K6OE, W7s AK DZX EP GHT LYA VSE. K7HLR, ADØA, WØKON, KØs BN TER, WBØTAQ, VE7ZK.

Independent Nets (March 1979)

1	2	3	4
Amateur Radio Telegraph Society	31	2394	329
Central Gulf Coast Hurricane	31	221	2516
Clearing House	31	248	542
Empire Slow Speed	27	134	430
Hit and Bounce	31	333	507
IMRA	27	453	1028
North American SSB Traffic	26	267	236
North American Traffic and Awards	31	94	1064
Washington Region PON	18	28	395
West Coast Slow Speed	31	193	418
20 Meter SSB	27	339	561
7290 Traffic	49	524	3190

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll March 1979

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.

72
WD4COL
66
WA1UUA
65
W5KLV
64
WA4CNY
WA6UAZ
W7VSE
W9JUJ
62
AA2H
WB2RMI
61
K1CE
W1RWG
W1TN
W2RQ
WA3PXA
WB4ZOJ
W5GHP
VE5HG
WD8NKA
WDØBFR
AFØ
60
WA2MFV
N5TC
W7LYA
59
WA2SPL
WA4JDH
WB5NKD
WB5SDD
58
WB3JGP
W4OGG
AA5J
K5QWK
K5TL
W7GHT
57
WB5NKC
WØOYH
56
W1GUX
WA1ZAZ
W2SQ
WB2TOM
W2XD
VE3FGU
VE3GT
K4BKX
N4NK
N4WA
VE5AE
WB5LAT
NØAHA
KØEZ
55
W1UD
WB2KDC
W2MTA
N2YL
W8VPW
WAØTNM
54
WA1TBY
53
K1BSO
W4WNY
W4YVG
K3SOR
WB8MTD
52
WA3NAZ
WB4PNY
N5ES
AJ5F
WB5MVR
WA5RKU
WA5RVT
51
WD4LUG
N5RB
50
K2VX
VE3GOL
W4NWM
W5BGE
WD8LRT
WB8PAV
NØACW
49
WA1VAB
VE1WF
VE3DPO
VE3GJG
W3YQ
WA4CCK
AJ5K
K5QEW
WD6EEN
K7GXZ
WA7MEL
K7NTG
AF8A
WØFT
WØOTF
WBØVHN
48
WA1MJE
K5DPG
47
WB2PJU
WA2ZJP
N3AKC
N4PQ
AE5I
K8AAZ
N8ABA
KB8GC
46
WB8WTS
W8YIO
W9HOT
WDØFBP
45
W1TM
VE3JIR
K5JGZ
VE5KS
N5WB
WAØYVT
44
W1BJ
AF1L
VE1RI
VE1RO
WB2MCO
VE3JRT
K3ORW
W4ANK
WD4CNQ
K4EV
K4JGW
WB4KSL
WA4PFK
W4PIM
WA4PIZ
AA4TT
K4VHT
W4WXA
K4XF
WB5LBR
W5VMP
AC5Y
N6GW
WB8YRY
WD9DMV
W9NXG
W9XD
WBØNIE
WBØPYD
43
N3AIU
WB6UZX
KØDJ
WØKON
42
WA4FKE
W4FMN
W4HON
W4JK
WB5GIT
W5SPD
WA5VBM
WB8KWD
WB8SYA
41
K1EIC
W2UEZ
WD4AWN
N4LE
W6JXK
WDØBMR
WØKJZ
AEØM
40
WB1EMU
N2CR
WA2EQW
AA3S
WA3WQP
WA4UYD
N8CW
KØPIZ
27
WA2HEB/T
22
WB1EYE/T
WB1EZT/T
KA2CHK/T
WB2RMJ/T
KA7AWH/N
WB7UFW/N
N8AKS/T
21
WA4MJT/T

Brass Pounders League March 1979

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WB1DXR, VE3GFN, WD4KPG, WB4WYG, K5JGZ, K5OUK, WØKON.

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	845	996	1610	39	3490
WØWYX	48	1388	495	893	2824
K3NSN	707	411	400	11	1529
WA4JDH	92	701	682	2	1387
KØYFK		623		623	1246
WA2SPL	3	575	593	38	1209
W9ZGQ		657	2	303	962
W9JUJ	21	474	408	5	908
W3VR	269	217	361	21	868
W7DZX	25	378	394	4	801
K8AAZ	13	379	375	24	791
W5KLV	6	398	329	29	762
WAØHJZ		436	42	284	762
WB8KWD	1	363	370	1	735
WAØRWM	50	396	21	258	725
WB5MVR	84	247	306	77	714
K1BCS	168	186	332	22	708
WØZWL	1	348		347	696
W4MEE	3	349	303	20	675
WØBMA	92	238	254	76	660
W5TI	55	277	255	69	656
W2ZOJ	19	276	277	54	626
WA3WQP	19	279	301	10	609
W4LX	287	17	294	2	600
WBØIBS	31	282	282		595
WA6UAZ	2	284	291	3	580
W7VSE	10	296	246	20	572
KL7JDI	5	278	5	270	558
K4TH	12	265	173	106	556
WB3GZU	110	156	236	46	548
WØMZI	24	262		262	548
WA4AVN	69	236	229	7	541
K5OWK	201	70	256	10	537
N4PQ		251	275	1	527
K5JGZ	63	198	259	3	523
W4JK	2	265	245	2	514
WB4PNY	11	259	233	6	509
WA2MFV	96	138	224	48	506

BPL for 100 or more originations plus deliveries.

K5OUK	193	WA2JCU	105
W3BBN	141	K4TXJ	105
WAØVRE	135	WD8KZX	105
WØFQB	131	WAØUEN	105
N3AIU	122	WB2RWW	102
K8KMQ	122	WD4COL	102
K9UTQ	117	WB0HZL	102
W9JIJ	109	KØFRP	101

Multioperator stations:

W1NY	167	W4IE	114

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Results, 1978 Simulated Emergency Test — Edition One

One down, one to go — double your pleasure in October.

By Robert Halprin,* K1XA

SET — big deal," the editor snarled, cigar clenched between his teeth. "What makes this SET different from those of previous years?"

"Uh, uh . . . well, sir, it's the first of *two* binational exercises this year, because of the move to October," we blubbered.

"Everyone knows that, dummy," he replied. "Bring me a story fast, or you're going to be singing 'By the Time I Get to Boise'."

We clicked our heels and nervously retreated. Gotta come up with an angle and quick. Lessee. Guess it must be true that everybody knows this was the last January SET and that by popular demand, SET returns to October. And everyone knows how important this massive event is to improvements in Amateur Radio emergency communications, especially the ARRL Amateur Radio Emergency Service and the National Traffic System. And the next SET will be held on the weekend of October 6-7, 1979, and annually in October henceforth. What else? Precious minutes were ticking away.

The bottom line must be that the difference this past January (and February in some areas) was that no major blizzards, ice storms or ring around the collar interfered with simulated emergency scenarios. At the same time, however, communications were rendered in a serious, competent manner. Newcomers continue to make their presence felt, honing up their operating skills to match their enthusiasm.

Because of the lack of "page one" events, numerical tallies decreased when compared to 1978, yet surpassed 1977, which had more than its share of real disaster situations. It is clear that statistics don't tell the story. The SET continues to be the subject of intense study by Headquarters and various advisory groups, so stay tuned for improvements. You ain't seen nothing yet.

For example, SET traffic was handled via satellite, with WB9FNR and WB9GCV communicating on OSCAR 8. 'FNR was on Mode A and his counterpart was on Mode J. Indiana Section Emergency Coordinator W9UMH indicates that this was the first SET message sent via OSCAR in the state of Indiana (purported to be a part of the United States). Satellites will

*Assistant Communications Manager, ARRL

Assistant emergency coordinator for district nine in Kentucky, Fred Jones, WA4SWF, is QRV for hf emergency power operation.

Amateur Radio Emergency Service Week was proclaimed in the state of Georgia in conjunction with the SET. Attending the signing ceremony were (l to r) SEC K4SWJ, EC WB4HXE, EC WA4PZD and assistant EC N4AVW. Seated: Georgia Governor Busbee.

Local Activity	*1979*	*1978*	*1977*
Reports submitted	378	404	340
Number of ARRL sections reported active	65	63	63
Total reported amateurs participating	8601	9524	7134
Emergency-powered stations	5832	5701	4725
Emergency-powered repeaters used	601	—	—
Total number of points	95,654	106,630	89,436

play an increasingly vital role in Amateur Radio emergency communications in the next few years.

Information received from the Onondaga County ARES in western New York shows that the ARES held nine traffic nets on 2-meter fm during the course of SET weekend and four net sessions on 3728 kHz (a frequency accessible to all licensees). Our correspondent, Emergency Coordinator WA2PUU, reports that a fantastic 70 percent of the net control stations were doing it for the first time, plunging right in after a short briefing. This is your basic case of good news and bad news, because SET is criticized in some quarters for bringing too many of the inexperienced out of the woodwork. But we take the positive approach that SET is an excellent occasion to recruit new blood, though admittedly not the only one.

Why not? Sure SET can bring out the worst in people, just like real emergencies can, but better during a simulation than during the real thing. But it also brings out the best when newcomers become regulars on traffic and emergency nets, so the supply of trained communicators continues to expand. Or, as K4SWJ (who, by the way, did an outstanding job in coordinating reports from Georgia) put it: "Since the SET, we have had two statewide weather emergencies. It was evident that we all got a lot of good training during the SET by the professional manner in which both of these emergencies were handled."

Some mention of stats is indicated. The average ARES group had 22 amateurs participating, 15 with emergency-power capability, and at least one emergency-powered repeater was used during the activities. In the net realm, the average net cleared 122 messages, had 28 stations aboard, 12 of them on emergency power. A whopping 86 percent of the nets were tied into NTS. Many of the reports received showed outstanding efforts as far as garnering publicity is concerned and cooperating with REACT.

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.

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. Last year's points are listed in parentheses.

The following sections achieved more than 2000 points: Ont, WPa, Ala, Ky, NC, NFla, SFla, Tn, Va, Mich, Ohio (in five figures) and Ind. Net totals exceeded 2k in the following states/provinces: ON, AL, CA, CT, DE/MD, FL, GA, KS, MI, NJ, NY, NC, OH (five digits again), PA, TN, TX and VA.

With only a few minutes to spare, we made our way humbly to the editor's office. Without a word, he grabbed the copy from our hands and began to read. So far so good.

Then there was an explosion.

"Don't you know that the weekend of October 6-7 is Canadian Thanksgiving, you turkey," he bellowed, stinging our face with a combination of saliva and tobacco.

Jeepers, we never thought of that. Too late now. But, we thought, maybe the editor would understand because after all, we were new in town and not used to the ways of the big city.

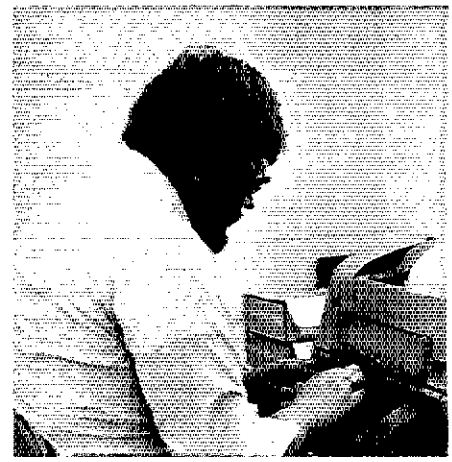
"But, Sir---"

"GET OUT OF HERE," he cried, "AND DON'T COME BACK!"

At this point, our dream of winning the Pulitzer seemed somewhat remote.

[Editor's Note: So as to not conflict with Canadian Thanksgiving or other special events or celebrations, a "leeway" procedure will again be utilized for the Simulated Emergency Test. In order to maximize efforts, all groups will be permitted to hold their SET activities on any two-day period between September 1 and October 31 and be included in the overall compilation.

Net Activity	*1979*	*1978*	*1977*
Nets reporting	281	278	256
States/provinces reporting	48	50	50
NTS liaison or affiliation	242	248	—
Number of messages handled	34,316	42,950	23,320
Stations participating	7853	8619	6562
Emergency-powered stations	3401	3279	1845
Total number of points	163,902	214,721	126,746



WD9DKA coordinated the RTTY link between K9TNV and W9UUU for efficient routing of traffic to the Indiana Traffic Net. *(WA9ZWA photo)*

Why Is There a SET?

For the uninitiated, the purpose of SET is

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, e.d, Salvation Army, etc.), to the public and to the media, Amateur Radio's value as an emergency communications service.

4) To provide operator training and experience in emergency communications practices.

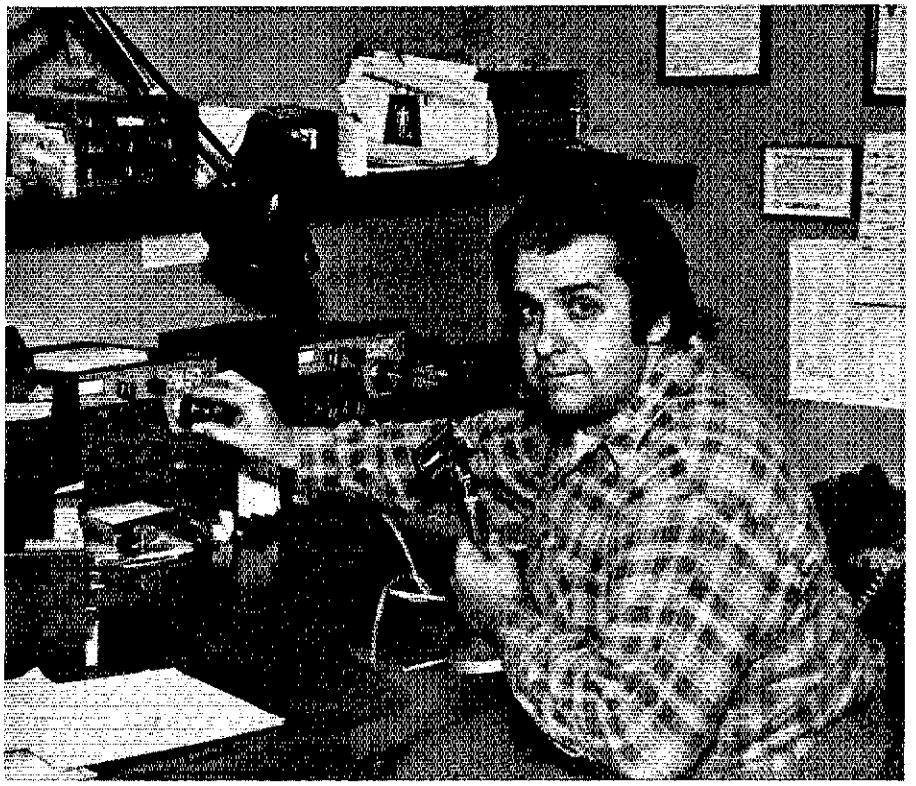
How to Get Involved

SET is the one annual event that involves thousands of amateurs in what they do best — providing public service. Any interested amateur can participate in this or any of a number of activities that will benefit your community in times of emergency or disaster.

A good way to get involved is to procure an application form for the Amateur Radio Emergency Service (ARES) from the ARRL. Ask for form CD-98. After it is filled out and returned, it finds its way to your local emergency coordinator. The EC, who is probably active on the local repeaters, can show you how to help provide communications during the next drill, walk-a-thon or real emergency.

If your commmunity doesn't have an EC, contact your section communications manager (SCM) listed on page 8 of each month's *QST*. Perhaps you might be the one for this challenging job. The Radio Amateur Civil Emergency Service (RACES), which operates under the direction of state or local government officials, is also active in many communities. Contact your local civil defense director for details.

Free literature on the various public service programs is available from Headquarters; a 9 × 12 self-addressed envelope with postage for seven ounces will get you a complete Public Service Package by return mail. The latest Net Directory will be included, but can be ordered separately for a large return envelope with 41-cents postage.



One intense participant in SET activities was Western MA Phone Net Manager Tom Jaworski, WA1MJE. *(W1KZS photo)*

SOAPBOX

We could have done more but 40 agencies did not respond to our invitation . . . Amateur Radio is virtually unknown (here) but I intend to change that! (WA4YCM). In addition to two newspapers giving us coverage, two local TV stations had camera crews on hand, giving us exposure on the Sunday night and Monday noon news (WB6TTP). Seminole County ARES new at this activity but learning fast (WA4VLX). Participation poor considering amount of planning. Can't convince people that there is no such thing as test routine traffic (WB4HXE). 1979 SET a success (N9GS). The biggest jam seemed to be at the area net level (WØFT). The move to October will help our participation (WØNYG). More emphasis and cooperation on/with Novice nets (WD8BHE). I thought the SET went very well; looking forward to October (WA8DHN). If this is not a contest, why all the paperwork? (K2QIJ). Several test messages containing ridiculous texts such as "City attacked by pink elephants — send Bromo Seltzer" were relayed to prominent people . . . I think such messages are inappropriate even during a test (AA2H). Support from Hq. ARRL magnificent. Support from SEC nonexistent (WA2GJI). Apathy (WB8SRK). First SET held; good turnout overall. We did find out several weak points that we thought would not be too big a problem but were (WA3UFN). This form must have been conceived by a Washington government bureaucrat (K4QZF). I think October is a much better time (WA7GTL). Our greatest asset was our new repeater (K4SPS). Virginia SET activities centered around state emergency plan for ARES/RACES. Very good participation for state as well as local ARES group. Looking forward to October SET (WA4RXY). Club station W4VTA operated portable at two public sites and on full emergency power for entire SET period (K4MVL). Local net functioned well; some difficulty in passing traffic out of our net. All participating enjoyed the activity and learned from the training. Local officials impressed with Amateur Radio (WA4CLC). Let's move on getting NTS out of the SET business; we practice every day! (WA3NAZ). I get the distinct impression that the growing apathy toward SET in general contributed to the overall confusion associated with these affairs (KØDJ). QST

LOCAL ACTIVITY

Jurisdiction	Reported By	Total Points
Maritime/Nfld.	**(1162)**	**1025**
Cape Breton	VE1IG	293
Halifax/Dartmouth	VE1ASW	562
Prince Edward Is	VE1AIC	140
Ontario	**(1074)**	**2080**
Hamilton	VE3FCU	263
Kemptville/Merrickville	VE3GNW	61
Oakville	VE3APK	297
Port Colborne	K8GMU/VE3	284
St. Catharines	VE3DVE	197
Toronto	VE3GFN	948
York Region	VE3HOI	—
Manitoba	**(—)**	**854**
Beausejour	VE4QK	60
Birtle District	VE4AAU	28
Boissevain/Killarney	VE4LB	40
Brandon	VE4XN	34
Dauphin	VE4NE	39
Interlake	VE4GM	7
Morris	VE4PG	57
Neepawa	VE4TE	35
Pembina, Stanley	VE4IW	9
Pinawa & Eastern Manitoba	VE4FK	77
Portage La Prairie	VE4NM	32
Winnipeg District 1	VE4PL	67
Winnipeg District 5	VE4QU	53
Winnipeg District 6	VE4IZ	69
Winnipeg District 23	VE4TK	52
Saskatchewan	**(1301)**	**570**
Saskatoon Area	VE5HG	225
S.W. SK.	VE5AQ	345
Alberta	**(412)**	**127**
Northern AB.	VE6XC	127

1		
Connecticut	**(3206)**	**1184**
Darien, New Canaan, Norwalk, Westport		
Wilton	WA1RXA	354
Eastern CT.	WA1RLV	183
Greater Bridgeport	W1VW	226
Meriden	N1AN	118
Northern CT.	WA1EMI	43
Southeastern CT.	WB1DHZ	136
Wallingford	WA1CCR	122
E. Massachusetts	**(951)**	**1545**
Bellingham	W1XA	161
Greater New Bedford	W1LE	275
Medford	WA1BLG	99
Shirley	W1IPZ	8
Wellesley	K1TK	196
Winthrop	W1RB	66
Maine	**(589)**	**1084**
Aroostock Co	KA1DM	660
Kennebec Co	W1JTH	130
Penobscot Co.	W1HDC	274
New Hampshire	**(318)**	**485**
Coos Co.	K1OIQ	63
Merrimack Co	WA1SRU	115
Rockingham Co.	KA1CB	307
Rhode Island	**(128)**	**193**
Newport Co.	W1JRF	193
W. Massachusetts	**(—)**	**337**
Berkshire Co	W1KZS	337

2		
E. New York	**(1406)**	**1245**
Albany Co.	WB2ZCM	456
Orange Co.	WB2SON	130
Westchester Co	WB2VUK	639
N.Y.C.—L.I.	**(603)**	**789**
Brookhaventown	WB2LOU	214
Huntington	W2GLE	313
Islip Township	WB2YUJ	219
Oyster Bay	K2MZ	43
N. New Jersey	**(620)**	**756**
Bayonne	W2KB	115
Chatham	W2UH	203
Englewood	W2CC	49
Union Co	N2NS	419
S. New Jersey	**(1329)**	**2139**
Atlantic/Cumberland/Ocean Cos	W2HOB	492
Burlington Co.	K2QIJ	494
Camden Co	WA2ONW	180
Cape May Co.	AG2O	91
Gloucester Co.	WA2SEA	247
Mercer Co	AA2H	376
Salem Co.	WB2ZJF	259
W. New York	**(1640)**	**1485**
Chemung Co.	WA2DHZ	448
Clinton Co.*	WA2HSB	—
Onondaga Co.	WA2PEA	717
Rome Area ARES	WA2GJI	320

3		
Delaware	**(161)**	**194**
New Castle Co.	WB3ENF	194
E. Pennsylvania	**(1663)**	**1507**
American Red Cross/SE PA	WA3PZO	510
Indiana Co	K3DWL	48
Lycoming Co.	K3ODA	190
Montgomery Co.	W3ID	95
Tioga Co.	WA3CSP	664
Maryland-DC	**(1067.5)**	**351**
Allegany Co.	W3DFW	191
Calvert Co.	W3ENW	43
St. Marys Co.	WA3VVV	117
W. Pennsylvania	**(852)**	**2485**
Allegheny Co.	WA3JBQ	582
Blair Co.	W3IEF	554
Butler Co	WA3FLR	287
Centre Co	WA3LJW	292
Clearfield Co.	WA3UFN	227
McKean Co.	W3OCR	212
Washington Co.	WA3OKK	231

4		
Alabama	**(2898)**	**2580**
Autauga/Elmore/Lowndes/ Montgomery Cos.	WA4YCM	702
Baldwin Co	K4JIE	112
DeKalb Co	WA4SNU	223
Etowah Co.	WA4QOW	520
Jackson Co.	WB4ZOG	88
Jefferson Co.	WB4GXD	669
Macon Co.	K4HJX	160
St. Clair Co.	WA4UKB	481
Tuscaloosa Co.	WD4HAT	125
Georgia	**(3520)**	**3132**
Athens	WA4FVT	258
Augusta	WB4EMV	143
Carroll/Haralson Cos	WB4ZOJ	269
Central Georgia	WB4BDP	260
Fulton Co.	WB4HXE	720
Heard/Coweta Cos /Peachtree City	WA4PUP	227
Rockdale/Newton Cos	WB4SLZ	137
Rome Area (8 Cos.)	K4YRL	964
State Govt. Liaison	WA4BZY	214
Kentucky	**(3695)**	**2019**
District 1	WB4NPD	291
District 3	WB4NHO	1203
District 5	WA4YPQ	127
District 6	WA4AGH	321
District 10	K4AJX	43
District 11	WB4IBO	34
North Carolina	**(3380)**	**3871**
Alamance Co.	WB4SGA	499
Burke Co	K4AI	78
Cabarrus Co.	W4DSU	255
Cherokee/Clay/Graham Cos.	K4AIH	127
Cumberland Co.	WB4TRW	417
Dare Co.	W4PCN	82
Guilford Co	KB4IZ	513
Iredell Co	WD4FFX	474
Mecklenburg Co.	WB4KOH	446
Pitt Co.	KE4I	129
NC Civil Preparedness Area E	W4OCZ	761
Stanley Co.*	W4EAT	—
N. Florida	**(5991)**	**4525**
Alachua Co.	W4ODX	243
Bay Co.	K4RZM	558
Clay Co.	N4AFJ	190
Dixie/Gilchrist Cos	WD4HXS/ WD4IHA	212
Duval Co.	WA4VZF	516
Escambia Co.	WB5KI	881
Jackson Co.	W4BKD	275
Marion Co	WA4HHC	185
Orange Co.	W4UJL	922
Pasco Co	WB4TZR	231
Seminole Co.	WA4VLX	179
Volusia Co.	WB4GHU	224
Walton Co	WB4WOO	38
South Carolina	**(482)**	**656**
Aiken Co.	WA4WTY	147
Colleton Co.	N4AKO	240
Florence Co	WD4OLV	128
Lancaster Co.	WD4DOM	141
S. Florida	**(4198)**	**4275**
Dade Co.	WA1YT	917
Eastern Palm Beach Co.	WB4RLU	627
Hendry Co	AA4BN	85
Hillsborough Co.	AA4WJ	685
Lee Co.	WD4CHP	105
Martin Co.	K4ZK	209
Pinellas Co.	K4SCL	1178
Polk Co.	WB4YFW	317
St. Lucie Co	WB4NOZ	242
Tennessee	**(3044)**	**3121**
Bradley Co	WB4BKF	312
Coffee/Franklin Cos.	W4WJH	495
Cumberland Co.	WB4PHW	168
E. Sullivan Co.	WA4WVW	387
Harnett Co.	WA4FKI	181
Knox Co.	WA4ZBC	109
Johnson Co.	WA4DFS	48
Marshall Co.	WB4VXW	48
Montgomery Co.	WA4LNL	—
Roane Co.	K4TKO	224
Shelby Co.	WA4KHN	510
Sullivan Co.	N4AEO	283
Washington Co.	K4QZF	353
Virginia	**(2779)**	**2707**
Alexandria	K4BAV	168
Augusta Co	WA4EGW	151
Central Virginia	W4WMO	401
Chesapeake	W4YVG	251
Chesterfield Co	W4NWM	—
Franklin/Southampton Co	K4SPS	116
Hampton	W4PRO	153
James City Co.	WB4LAB	164
Montgomery Co.	AB9I	—
Norfolk	N4SD	120
Norton/Wise Cos	W4CFV	24
Richmond	N4UY	252
Rockingham Co.	WA4RXY	186
Shenandoah Co.	WA4STO	68
Suffolk	WA4JMO	53
Warren Co	W4JR	52
Washington Co.	K4ITV	387
York Co.	WB4UHC	161

5		
Louisiana	**(593)**	**245**
Region II	K5DPG	245
Mississippi	**(1573)**	**292**
Lafayette	WA5OKI	79
Tate Co	WA5TOD	213
N. Texas	**(1717)**	**1505**
Brown Co	WD5AFP	141
Castro Co	WA5WYI	39
Collin Co.	K5MWC	296
Lamar/Red River Cos.	WA5KZA	255
Montague Co	WB5QRE	74
Panhandle Cos	WA5GYP	326
Tarrant Co.	K5DOI	334
Oklahoma	**(1160)**	**1151**
Bryan Co.	WB5MVR	64
Carter Co	W5BLW	—
Commanche Co	K5BYF	340
Kay Co	W5ZWM	100
Payne Co	WB4JIV	149
Pottawatomie Co	K5KXL	191
Stephens Co	W5GQZ	387
S. Texas	**(2084)**	**1993**
Angelina Co.	W5QPH	47
Bexar Co.	WA5RNV	456
Brazoria Co	WA5RVT	422

Calhoun Co.	W5OXQ	144
Harris Co.	W5CKC	578
El Paso Co.	K5UYH	216
West Cameron Co.	W5OEN	130
6		
East Bay	**(254)**	**652**
East Bay	K6ZR	171
Contra Costa Co.	W6LKE	252
Napa Co.	N6XN	229
Solano Co.	WA6FDB	—
Los Angeles	**(0)**	**—**
Los Angeles	W6RHS	—
Orange	**(453)**	**1166**
Inyo Co.	W6DQR	15
North Orange Co.	WB6ARK	512
San Bernadino Co.*	K6GGS	—
Western Riverside Co.	W6LKN	639
San Diego	**(1850)**	**1238**
City of San Diego	W6INI	687
East District	WA6UFY	270
Southern District	WA6UAZ	301
San Francisco	**(217)**	**105**
Sonoma Co.	W6CYM	105
San Joaquin Valley	**(855)**	**591**
East Kern	WA6KZV	141
Kings Co.	WB6TTP	450
Sacramento Valley	**(—)**	**85**
Yuba/Sutter Cos.	WB6GFJ	85
Santa Clara Valley	**(1600)**	**1238**
Half Moon Bay	WA6EEP	206
Saratoga, Los Gatos	WB6LVD	140
Palo Alto, Mountain View, Los Altos	W6ASH	556
Monterey Peninsula & Big Sur	WD6COH	152
San Jose Red Cross	WA6JQC	184
7		
Alaska	**(729)**	**161**
Kodiak	KL7HIX	161
Arizona	**(669)**	**1454**
Coconino Co.	WB7CDO	142
Maricopa Co.	K7JWB	278
Mohave Co.	W7KAX	439
Pima Co.	K7NTG	360
Yavapai Co.	K7ZJY	235
Idaho	**(994)**	**459**
Ada Co.	K7CXG	184
Boise Co.	WA7MXN	150
Cassia Co.	WA7NRP	75
Kootenai Co.	WA7WXI	50
Payette/Washington Cos.*	W7TYG	—
Montana	**(381)**	**1094**
Butte Silver Bow	WA7FLG	253
Gallatin Co.	WB7AZJ	140
Laurel	W7LBK	65
Missoula Co.	K7IMZ/K7QA	580
Philips Co.	K7OZU	7
Powell Co.	W7IXO	49
Nevada	**(—)**	**828**
Henderson	KA7AGM	202
Western Nevada	K7WLY	626
Oregon	**(1541)**	**343**
Columbia Co.	WA7OOB	144
Jackson Co.	W7VSE	199
Utah	**(995)**	**128**
Weber Co.	WA7GTL	128
Washington	**(3510)**	**1778**
Cowlitz/Wahkiakum	K7SH	283
Clark/Skamania Co.	WB7FDE	287
Grant Co.	W7GB	87
King Co.	WA7EBH	403
Kitsap Co.	WA7KGT	224
Spokane	WB7FGC	330
Whidbey Island/Island Co.	K7VSZ	164
Wyoming	**(—)**	**(—)**
Wyoming	WB7EIN	—
8		
Michigan	**(10066)**	**7216**
Alpena Co.	K8OBZ	100
Barry Co.	W8FRC	70
Emmet/Charlevoix Cos.	WA8AXF	109
Clinton/Ingham Cos.	WD8JRT	1098
Delta Co.	WB8OIY	219
Dickinson Co.	WB8EBS	117
Genesee Co.	K8ZIS	870
Jackson Co.	WA8QEF	142
Kalamazoo Co.	K8OQB	346
Kent Co.	K8JH	642
Marquette Co.	WD8CSZ	241
Mason Co.	K8AXL	192
Midland Co.	WB8WNF	213
Monroe Co.	WB8SEZ	1248
Oakland Co.	WB8SIW	624
Ottawa Co.	WB8VVF	31
Sanilac Co.	W8CUP	180
Van Buren Co.	WB8BNN	116
Washtenaw Co.	W8LMT	658
Ohio	**(13012.5)**	**12690**
Allen/Auglaize Cos.	K8EIJ	301
Ashtabula Co.	WB8SRK	52
Belmont/Monroe Cos.	K8IP	608
Central Ohio	W8BKO	1236
Clark Co.	W8VZE	396
Clermont Co.	WA8TSX	424
Crawford Co.	K8ZES	125
Cuyahoga Co.	AB8P	309
Darke Co.	WA8KZR	419
Erie/Huron Cos.	WB8PHO	158
Fairfield Co.	WD8OEX	163
Guernsey/Noble Cos.	WB8TRK	142
Hamilton Co.	K8JE	806
Hancock Co.	W8TNI	228
Hardin Co.	W8OQL	81
Harrison Co.	N8TF	44
Highland/Fayette/Clinton Cos.	K8CKY	71
Jefferson Co.	WB8KPS	152
Lake Co.	WA8HEB	280
Licking Co.	WB8VEG	115
Lorain Co.	W8KRF	351
Logan/Champaign Cos.	WB8ZOL	153
Marion/Wyandot Cos.	WB8EDO	371
Medina Co.	W8GSR	121
Montgomery/Greene Cos.	W8ILC	4316
Muskingum Co.	WA8GZS	221
Ottawa Co.	WA8HGH	182
Portage Co.	WB8MEK	
Richland Co.	WB8GGR	321

St. Clair Co.	K8UPE	233
Tuscarawas Co.	WD8DMF	—
Van Wert Co.	W8SGX	171
Wayne/Holmes Cos.	WD8LLO	340
West Virginia	**(174)**	**492**
Hancock Co.	K8QEW	187
Marshall Co.	W8CAL	—
Monongalia Co.	WA8GYU	305
9		
Illinois	**(1020)**	**1120**
Cook Co.	W9HPG	913
DuPage Co.	WA9WXC	207
Indiana	**(4237)**	**5476**
Allen Co.	WB9PXT	457
Benton Co.	WB9WHU	135
Clark Co.	K9TE	467
Clinton Co.	WB9WWB	88
Crawford Co.	WB9ZHL	37
DeKalb Co.	W9AMH	103
Fayette Co.	WB9SBI	52
Dubois Co.	N9AHP	112
Fulton Co.	WB9RLE	103
Grant Co.	WB9NOE	212
Jackson Co.	W9RTH	89
Jay Co.	WA9KWH	51
Jefferson Co.	WD9FPA	34
LaPorte Co.	K9ET	190
Marion Co.	W9UMH	678
Martin Co.	WA9ZLM	40
Miami Co.	WB9FNR	150
Monroe Co.	K9KTH	86
Owen Co.	WD9BKA	57
Parke Co.	K9LMH	—
Pike Co.	WB9NCE	109
Pulaski Co.	WD9BHR	16
Putnam Co.	K9VMG	100
Ripley Co.	WB9OTX	207
Steuben Co.	N9WW	102
Vanderburgh Co.	WA9QCF	533
Vigo Co.	WA9ZWA	613
Warrick Co.	K9TKE	266
Washington Co.	WD9FIC	98
Wells Co.	N9GS	203
White Co.	WB9SOY	99
Wisconsin	**(1530)**	**624**
Calumet Co.	WA9FBO	175
Fond Du Lac Co.	WD9DUE	120
Jefferson Co.	N9TD	48
Manitowoc Co.	WB9LAM	159
Outagamie Co.	KB9CT	96
Sawyer Co.	AB9L	26
Ø		
Colorado	**(769)**	**855**
Arapahoe Co.	K3PUR	174
Boulder/Gilpin Cos.	WØONF	426
Clear Creek Co.	WAØREX	86
Garfield Co.	WAØYED	51
Larimer/Jackson Cos.	WBØUWE	129
Iowa	**(1114)**	**266**
Johnson Co.	WBØMCX	138
Zone 8	KØCNM	128
Kansas	**(785)**	**1330**
Leavenworth Co.	WØNYG	106
Reno/Rick Cos.	WØPSN	88
Zone 1	WAØSRR	46
Zone 6B	WAØLXI	240
Zone 7	WBØYWZ	427
Zone 12	WØOAG	101
Zone 14	WDØCFZ	322
Minnesota	**(305)**	**439**
Anoka Co.	KAØAPR	84
Brown Co.	WBØENX	27
Olmsted Co.	KØTS	326
Winona Co.	NØVV	—
Missouri	**(1118)**	**926**
Adair Co.	WØOTF	122
Barton/Dade Cos.	WØVLB	106
Boone Co.	WBØKUW	245
Clay/Platte Cos.	WAØKUH	111
Johnson Co.	WBØFND	322
Saline Co.	WØVZK	120
Nebraska	**(743)**	**252**
Lancaster Co.	KØGND	140
York/Polk Cos.	WAØBOK	112
North Dakota	**(33)**	**184**
Richland Co.	WBØOAJ	64
Ward Co.	WØHVA	103
Wells Co.	KØAIK	17
South Dakota	**(115)**	**—**
Lawrence Co.*	KØJV	—

*reported by radiogram only.

NET ACTIVITY

NATIONAL TRAFFIC SYSTEM AREA/REGION NETS

A — messages handled
B — minutes in directed session
C — stations participating
D — stations on emergency power
E — net control stations
F — liaison stations

Net Name, Manager	A	B	C	D	E	F	TOTAL
Eastern Area, W2JJ	854	344	60	2	6	17	1479
Eastern Area, WB4PNY	714	365	70	2	6	13	1315
Central Area, WØHI	684	305	84	1	5	13	1250
Central Area, W5KLV	139	199	29	—	3	6	449
Pacific Area, W7EP	582	317	32	—	4	15	1058
Pacific Area, WAØYNP	128	262	33	—	2	—	469
First Region, K1BA/WA1VEI	413	443	76	5	9	17	1153
Second Region, W2MTA/W2RQ	777	824	76	5	13	23	1948
Third Region, W3NEM/WA3THT	253	401	45	5	11	18	904
Fourth Region, W4SHJ/WA4CCK	470	761	119	3	6	19	1623
Fifth Region, WB5CDX	184	258	31	—	8	18	634
Sixth Region, W6INH/WA6ZZL	401	790	37	5	13	15	1420
Seventh Region, W7VSE/WA7IHS	426	335	102	1	4	12	1048
Eighth Region, W8PMJ/WD8NKA	356	486	34	1	8	14	1025
Ninth Region, W9FC/W9HOT	348	293	36	3	9	20	867
Tenth Region, WØSS/WBØHOX	221	333	66	3	8	16	535
Eleventh Region,							
Twelfth Region, WØHXB	212	305	43	1	7	18	726
Totals	7164	7044	992	37	121	257	18,361

SECTION/LOCAL NETS

State/Province	Reported By	Total Points
Alberta	**(513)**	**196**
Alberta Public Service	VE6XC	196
British Columbia	**(605)**	**401**
British Columbia Emergency	VE7FB	401
Manitoba	**(1604)**	**1235**
Manitoba H.F. ARES	VE4TR	376
VE4HS Repeater ARES	VE4IW	119
VE4MAN Repeater ARES	VE4TR	223
VE4PIN Repeater Emergency	VE4FK	168
VE4WPG Repeater ARES	VE4TR	349
Maritime/Nfld.	**(3207)**	**1711**
Atlantic Provinces	VE1WF	413
Cape Breton Emergency	VE1IG	687
EMO	VE1FO	611
Ontario	**(1441)**	**4326**
Champlain Mini	VE3AJN	440
Laurentian	VE3IFP	591
Oakville ARES	VE3ITN	353
ONT (GMN/OSN)	VE3DPO/VE3ISW	1210
Ontario Daytime	VE3GJG	152
Ontario Phone	VE3PQ	394
Open Line	VE3GFN	1186
Saskatchewan	**(383)**	**702**
ARES Fone	VE5HG	336
Saskatchewan Amateur Traffic	VE5AE	366
Alabama	**(3277)**	**3433**
Alabama Emerg. B	N4MD	447
Alabama Emerg. M	W4BU	1758
Alabama Emerg. Z	WA4SNU	166
Central Alabama ARES	WA4YCM	458
Macon County ARES	K4HJX	444
West Alabama Emerg.	WD4DAI	160
Arizona	**(—)**	**872**
Hualapai Amateur Radio Club	WA7OPQ	872
California	**(3007)**	**4044**
Half Moon Bay	WA6OEY	176
Indian Wells Valley Emerg.	WA6KZV	353
Mission Trail*	WA6WZQ	227
Northern California	W6IPL	637
Santa Barbara Section ARES	N6WP	702
Southern California	N6WP	1344
Southern San Joaquin Valley FM	WB6TTP	394
West Valley Amateur Radio Emerg. Service	WB6LVD	201
Colorado/Wyoming	**(1688)**	**1178**
Boulder & Gilpin Counties ARES	WØONF	429
Clear Creek ARES	WAØREX	86
Colorado-Wyoming	KØDJ	377
District 22 ARES (75 meters)	K3PUR	110
District 22 ARES (2 meters)	K3PUR	176
Connecticut	**(4088)**	**2217**
Connecticut (CW)	K1EIR	373
Connecticut Phone	K1EIC	825
Eastern Connecticut Emerg.	WA1RLV	243
Meriden Emerg.	N1AN	78
Wallingford Emerg.	WA1CCR	203
WESCON	WA1LOU	495
Delaware/Maryland/DC	**(2656)**	**3018**
Delaware Emergency Fone	WB3ENF	1097
Maryland/Delaware/DC	W3PQ	263
Maryland Emerg. Phone	K3ORW	863
Tri-State 2-Meter	W3DFW	614
Florida	**(8254)**	**3623**
BAREC	WA4NKA	160
Escambia County Emergency Corps	WB4SKI	686
Florida Phone Traffic	WB4WYG	287
Florida Public Operations	WB4FUV	67
Gainesville Amateur Radio Society	W4OQX	136
Martin County ARES	K4ZK	341
Nassau Emerg.	W5IJU	100
N. Florida Phone	WB4PGB	477
Polk County ARES	WA4ADP	143
QFN (Florida CW Net)	WA4JPV	68
Seminole Co. ARES	WA4VLX	209
South Florida Amateur Sideband	WD4ISN	136
Tampa Bay Repeater Association	AA4WJ	813
Georgia	**(24080)**	**30137**
Central Georgia VHF	WB4BDP	2074
Clayton Co.	WA4DIW	1314
Cobb ARES	WA4VMF	745
Confederate Signal Corps	K4MVL	1796
Coosa Valley Emerg. No. 1	K4GNK	1046
Coosa Valley Emerg. No. 2	WA4CCY	930
Douglas Co. ARES	WA4CLC	543
Georgia RTTY Emerg.	WA4BZY	4508
Georgia SSB	WA4BZY	5649
Georgia State	WA3NAZ	1481
Georgia Training	WB4ZOJ	225
Metro Atlanta Emerg.	WB4HXE	1484
NE Georgia ARC Emerg.	WA4FVT	308
Newnan Emerg. Service	WA4PUP	1571
SCM Traffic	WB4RTP	1555
SKYWARN VHF	WA4UWI	2074
West Georgia ARES	WB4ZOJ	633
State Civil Defense ARES	K4SWJ	2301
Idaho	**(341)**	**98**
MiniCassia Emerg.	WA7NRP	98
Indiana	**(15492)**	**11774**
Clark Co. Emerg.	K9TE	1025
Clinton Co.	WB9WWB	79
Indiana Code	W9JUJ	1974
Indiana Traffic	K9CGS	2431
Jay Co. ARES	WA9KWH	74
Marion Co. ARES	WB9BAA	1153
Miami Co. 2-Meter Emerg.	WB9FNR	368
Monroe Co. ARES	K9KTH	115
Putnam Co. ARES	K9VMG	257
SET	N9AHP	2307
Steuben Co. Emerg.	N9WW	642
Vigo Co. Emerg. Service	WA9ZWA	625
Warrick Co.	K9TKE	462
Wells Co. ARES	N9GS	174
White Co. Emerg. and Weather	WB9SOY	58
....	WB9WHU	10
Iowa	**(624)**	**152**
West Central Iowa ARES	KØCNM	152
Kansas	**(2781)**	**3680**
Chippewa ARC (Zone 6B)	WØIXA	259
Kansas ARES Zone 1 75-Meter	WAØSRR	77
Kansas ARES Zone 7	WBØYWZ	308
Kansas CW Section Net (QKS)	WØFT	457
Kansas Phone	WØOYH	163
Kansas Sideband	WØOYH	1364
Kansas Slow (QKS-SS)	WDØFBP	535
Leavenworth Co. ARES	WØNYG	497
Kentucky	**(6497)**	**470**
Kentucky Fifth District ARES	WA4YPQ	117
Kentucky Sixth District ARES	WA4AGH	110
Pennyrile Area Weather	WA4ZVL	243
Louisiana	**(607)**	**990**
Area 1 ARES	K5DPG	317
Louisiana Traffic	N5ES	673
Maine	**(2396)**	**1290**
Aroostook Emerg.	KA1DM	1017
Pine Tree	W1RWG	273
Massachusetts/Rhode Island	**(3251)**	**1207**
Aquidneck Island Communications	W1JFF	258
Bellingham ARES	W1XA	145
Berk Co. ARES	W1KZS	312
Eastern Mass/Rhode Island	K1CE	408
Eastern Mass/Rhode Island Slow Speed	WA1YMN	96
Eastern Mass/Rhode Island Phone	W1FJI	566
Heavy Hitters Traffic	K1CE	84
Western Mass Phone	WA1MJE	347
Michigan	**(9586)**	**6695**
Alpena Co. ARES	K8OBZ	206
ARES E. Two Meter	AF8V	281
ARROW/Washtenaw Co. ARES	W8LMT	785
Char-EM 2-Meter	WA8AXF	320
CMARA Emerg.	WB8WNF	248
Jackson Co. SET	WA8QEF	169
Kent Co. ARES	K8JH	195
MACS	K8LNE	893
Marquette Co. ARES VHF	WD8CSZ	308
Michigan Thumb 2-Meter	W8CUP	574
Michigan Traffic	K8KAI	495
Michigan QMN	K8RV	548
St. Clair Co. ARES	K8UPE	715
Upper Peninsula	WA8DHB	777
Van Buren Co. ARES	WB8BNN	181
Minnesota	**(1683)**	**1358**
Anoka Co. Emerg. Service	KØHJC	170
Minnesota Section No. 2	KØPIZ	79
Piconet All-Day Watch	WAØYVT	1109
Mississippi	**(114)**	**51**
Capital Area Emerg.	WB5SNB	51
Missouri	**(2839)**	**1587**
Central Missouri Emerg.	WDØFZJ	201
Indian Foothills ARES	WØVZK	69
Johnson Co. Emerg.	WBØFND	202
Missouri Emerg. Operations and WX	WBØVHN	617
Missouri Emerg. Training	WØHH	273
NE Missouri Emerg.	WØOTF	205
Montana	**(831)**	**749**
Missoula Area Emerg.	K7IMZ	396
Montana Traffic	KB7BI	347
Phillips Co.	K7OZU	6
Nebraska	**(842)**	**247**
York/Polk Co. ARES	WAØBOK	247
New Hampshire	**(668)**	**1546**
Coos Co. Emerg.	K1OIQ	92
Granite State FM	W1TN	719
New Hampshire Emerg. Phone	K1RSC	735
New Jersey	**(3337)**	**6069**
Bayonne ARES RACES Traffic & Emerg.	W2KB	128
Burlington Co. Emerg.	K2QJ	796
Camden Co. 2-Meter Emerg.	WA2ONW	532
Mercer Co. Traffic	AA2H	543
New Jersey (CW)	AE2L	678
New Jersey Phone	K2VX	1270
Oldbridge Traffic	KA2BWR	811
Union Co. ARES Emerg. & Traffic	WB2RMI	1311
New York	**(4419)**	**5129**
Albany Traffic & Emerg.	WB2ZCM	895
Chemung Co. ARES	WA2DHZ	235
County of Niagara ARES	WB2DDJ	265
Empire Slow Speed	W2WSS	140
Huntington ARES	W2GLE	428
New York State CW	W2CS	517
Rome Area ARES	WA2GJI	953
VCARES No. 1 & No. 2 SDN	WB2VUK	904
Western District	WA2AIV	793
North Carolina	**(7176)**	**6823**
Alamance Co. ARES	WB4SGA	596
Cape Fear ARS	WB4TRW	744
Central NC Traffic	K4VHT	1838
Cherokee, Clay, Graham EC	K4AIH	56
Guilford Co. Emerg.	K4BVH	287
Harnet Co. ALERT	WB4ETY	262
JFK	WB4WII	1959
Metrolina 2-Meter Emerg.	WA4OJU	325
Piedmont Traffic & Training	KB4MK	199
Stanly Co. Emerg.	W4EAT	318
North Dakota	**(—)**	**256**
Richland Co. Emerg.	WBØOAJ	101
Ward Co. E.D.	WØHVA	155
Ohio	**(49295)**	**13739**
Ashtabula Co. Emerg.	WB8SRK	91
Buckeye	K8QZ	489
Burning River Traffic	WA8GMT	260
Champaign and Logan Co. Emerg.	WB8ZOL	354
Clark Co. Emerg.	W8VZE	381
Eastern Ohio Traffic	WA8ZNC	562
Fairfield Co. ARES/RACES	WD8OEX	163
Firelands Red Cross Emerg.	WB8PHO	179
Guernsey/Noble ARES	WB8TRK	272
Harrison Co. ARES	N8TF	523
Jefferson Emerg.	WB8KPS	160
Licking Co. SET	WB8VEG	173
Lorain Co. Emerg.	W8KRF	1524
MASER	WB8GGR	192
M2M Group	W8GSR	1368
Muskingum ARES	WA8GZS	367
Ohio Novice	AF8A	195
Ohio Single Sideband	W8DIL	3893
Ottawa Co. ARES	WA8HGH	190
TSRAC Emerg. Training	K8IP	1264
Washington Co. ARES	WB8UHP	310
Wayne Co. ARES	WD8LLO	1560
....	WB8AYM	141
Oklahoma	**(1235)**	**619**
Bryan Co. ARES	WB5MVR	326
Kay Co.	W5ZWM	165
Pottawatomie ARES	K5KXL	128
Oregon	**(314)**	**360**
Columbia Co. ARES	WA7OOB	360
Pennsylvania	**(2921)**	**2903**
Blair Co. SET	W3TEF	395
Central Counties ARES/RACES	WA3LJW	202
EPa (CW)	K3KW	419
Indiana ARES	K3CWL	8
LVN	N3AIU	23
Montgomery Co. ARES	W3ID	56
Quad-County FM	WA3UFN	236
Pa Training & Traffic	K3NGN	113
Tinga Co.	WA3KZH	348
Washington Co. ARES	WA3OKK	350
WPa (CW)	W3YQ	298
WR3ABZ ARES	WA3PZO	444
South Carolina	**(738)**	**310**
South Carolina SSB	WA4SJS	310
Tennessee	**(4077)**	**2829**
Bristol 2-Meter ARES	WA4WVW	426
CARC	WB4BKF	561
Clarksville Amateur Public Service	WA4LNL	171
Mid-Tenn ARS SET	WA4WJH	401
Plateau Emerg.	WB4PHW	192
Sullivan Co. Emerg.	N4AFO	350
Tennessee CW	AF4I	124
Washington Co. Public Service	K4QZF	324
Texas	**(3838)**	**3127**
Brazoria Co. ARES	WA5RVT	372
Lamar-Red River Co. Emerg.	WA5KZA	469
Tarrant Co. ARES 2-Meter	K5DOI	150
Tarrant Co. Emerg.	K5DOI	996
Texas Traffic	K5QEW	1082
....	WA5WYI	58
Utah	**(472)**	**316**
Beehive Utah	W7OCX	141
Weber Co. ARES	WA7GTL	175
Virginia	**(5840)**	**6622**
Bristol 2-Meter ARES	K4ITV	426
Central Virginia 2-Meter	W4WWQ	771
Chesapeake Emerg.	W4YVG	597
Chesterfield ARES	W4NWM	—
Franklin Southampton	K4SPS	166
Norfolk ARES	N4SO	283
Norton & Wise Co.	W4CFV	73
Richmond WB4ADI	N4UY	107
Rockingham Co. ARES	WA4RXY	167
Shenandoah Valley Emerg.	W3BBN	379
Special SET	K4BAV	453
STARES	WB4ZKN	933
Virginia Noontime Traffic	WA4FUV	1012
Virginia Sideband	W4JK	795
Williamsburg Disaster and Emergency	WB4LAB	191
York Co. ARES	WB4URC	274
Washington	**(1409)**	**1751**
Clark/Skamania	WB7FDE	582
Island Co. ARES	K7VSZ	158
Kitsap Co. ARES	WA7KGT	481
Puget Sound Emerg.	WA7EBH	465
....	K7SH	265
West Virginia	**(277)**	**136**
Hancock Co. RACES	WC8AAK	
....	K8QEW	136
Wisconsin	**(1959)**	**687**
Badger Emerg.	W9IEM	224
Wisconsin Intrastate	WB9KPX/K9LGU	349
WHARC	AB9I	114

*reported by radiogram only

Results, Sixth Annual ARRL 10-Meter Contest

10-Fourever

By Tom Frenaye,* K1KI and Bill Jennings,** K1WJ

Why does this contest continue to grow in popularity? One reason surely has to be that with the increased solar activity, 10 is "open" longer to those areas of the world not usually heard in years of the sunspot minimums.

Probably a much more fundamental reason for the increased interest in 10-meter contesting and 10-meter operating in general is the "Walter Mitty" who lives in all of us. How many of us acquire our hf transceivers specifically for the 10-meter capabilities? Not many. Mostly we get our gear to work DX on 20 meters, handle traffic on 80 meters, or keep in touch with friends on 40. All well and good. Then comes that time, between skeds, or just after failing to get on the list for the DX station, when we decide to turn the bandswitch down to that "unused" portion of our band allocation above 28 MHz. A little bit of listening and we know that we've found a home.

Right here on 10 meters we can sample some of those exotic modes of propagation that the avid vhf ops make an art of utilizing: scatter, backscatter, and so on. We find that the old-time ops were correct; you can "work the world when 10 is open using 10 watts of power and a wet string for an aerial." In fact, the "average" station, running 200 or so watts to a small beam antenna at 40 or so feet does not give all that much away to one of those giant kilowatt stations, with multi-beam arrays at staggering heights, that dominate 20 and 15 meters. Fact. The operator of the "average" station can grab and hold his share of the 10-meter band during a contest and experience QSO rates pretty near those of the operators of the "super" stations.

So, here we are on 10 meters, able to play some of the games of the prominent vhfers, able to "compete" in the "pileups" and contests with the big kilowatt, megabuck stations, or just be able to find enough space in the vastness of the 10-meter band to casually QSO with whomever we choose. Imagine, all this is possible for the owner of the average station with 10-meter capabilities. That's the name of the game in Amateur Radio — something for everyone and fun for all. In this respect 10 meters fills the bill.

"Walter Mitty" is content.

Of the 1450 logs received for this contest, 1040 were from the U.S. or Canada and 410 from DX stations, a 14 percent increase in domestic entries and a 225 percent increase in DX entries over the 1977 totals. Anyone who played both the 1978 and 1977 contests can attest to the better band conditions and higher scores of the 1978 contest. This increase is quite noticeable especially in checking the DX entries. In 1977 the top-scoring JA log had just a shade over 180 QSOs and 28 multipliers while the number one Japanese log in 1978 had almost 1200 QSOs and 102 multipliers. Half a world away, the best European entry had slightly over 50,000 points in 1977, while the top European entrant in 1978 scored well over 366 kilopoints. It is safe to say that the entries from the rest of the world followed the upward trend of the JA/European entries just mentioned.

If you are a certificate hunter, the 10-Meter Contest is where the action was. You could have worked (as many entrants did) all 50 United States, all Canadian Provinces, all continents. And there were at least 103 different countries that were on the air during the contest and found in the logs of various entries (U.S., Canadian and DX).

The contest couldn't have been at a better time, propagation-wise, this (last) year. For the first time in this sunspot cycle the solar flux edged above the 200 mark, reaching 211 on the second day. Coupled with that was a minimum in the magnetic index. Together they produced excellent propagation from just before sunrise until a couple of hours after sunset.

A couple of interesting comparisons can be made which may help you in your strategy in the next contest. The far West (CA, OR, WA, BC) was able to work into Japan for four hours on Saturday afternoon, while East Coast stations had a much more limited time period, giving about 30 minutes to those in Maine and about two hours in Ohio. The JA opening began at 2145Z (sunrise in Japan) and within 30 minutes all of the U.S. and Canada (except VE1) could have snagged one. The opening ended about an hour and a half after local sunset — 2230Z in Maine, 0215Z in the far West.

The opening to the east was a little different. Those in extreme eastern Canada (VE1/VO1) began to work Europeans almost an hour and a half before sunrise, the W1, W2, W3 and eastern W4 crowd began to work Europeans about an hour before sunrise, and the rest had to wait until sunrise to catch them. This meant an exceptionally long opening for those in the far eastern U.S. and Canada. Sunset in western Europe is at about 1600Z and by 1730 the band had closed for everyone. The VE7s worked no Europeans, Texas had a four-hour opening and the VE1s had seven hours.

So if you missed out on the openings, you need to learn sunset and sunrise times. Find yourself a table from an almanac or astronomy book. If you have a small station, you may not be able to make it at the beginning and end of the opening but halfway through it you should

Division Leaders

Single Operator		*Division*	*Multioperator*	
Call	*Score*		*Call*	*Score*
W3RJ	678,720	Atlantic	K3EST	358,924
K9HMB	584,508	Central	W9ZRX	411,184
WØSD	306,726	Dakota	KØSR	212,200
N4ZZ	394,910	Delta	N5AN	266,430
W8FF	421,800	Great Lakes	AA8U	486,288
W2YV	536,804	Hudson	N2OL	100,580
KØSCM	253,120	Midwest	WØGM	213,636
K1VTM	672,030	New England	WB1HIX	394,750
W7EJ	509,534	Northwestern	N7AMZ	167,904
AI6V	443,744	Pacific	WA7KNK	318,768
W4DR	328,800	Roanoke	K4VX	396,804
W5JW	394,910	Rocky Mountain	KØRF	602,400
WN4KKN	253,344	Southeastern	N4WW	268,478
N7DD	648,796	Southwestern	W6VLD	432,648
K5RC	429,284	West Gulf	N5FF	214,632
VE6WQ	523,908	Canadian	VE1DXA	680,720

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

find some workable stations.

From the hodgepodge department, a few kudos and some comments on this contest in general.

Congrats to WD4AHZ, WA1YWW, WD9DVO, KP4CGB, KA9AOD, WDØGXR, WDØAZA, WB1DED, WD9IFW and WD6CKT, for turning in the top single-operator Novice scores. Same to WB1DMM, WBØTGA, and N2AOK for taking high honors in the single-operator Technician category.

Certificates will be awarded per the contest announcement in the November 1978 issue of *QST*. If you have an award coming, look for it after the 15th of the month in which this report appears in print. Good luck.

SOAPBOX

Besides the QRAnswering, QRLost 'im, QRDeafness, QRZiltch again, and QRTerminated tired, I enjoyed yet another 10-Meter Contest. No problems arose in the contest other than the peanut butter that gummed up the VFO and the folks sending out a search party for me. Hi! But once again I emerged with that feeling of satisfaction for having been part of the QRMurder. After five days of incessant thoughts of diddy dah dah diddy, finally, herewith my entry (WB9JKI). Lacked the Es condx of last year, so missed a lot of the states that I couldn't get on backscatter (WA5IYX). When 4 watts and a mini-quad can make over 100 QSOs in 63 sections in a contest, you know that condx had to be good. I had worked 49 states with my little Argonaut some time ago and when I snagged Alaska during this contest, it not only made my 50th state (running 5 watts or less), but my 90th country running the same power. I guess the biggest thrill was slipping up into the phone band and snagging EL2T right out from under a bunch of the higher power stations who were piling up on him (W1PWK). Due to a recent change in address, I was only using a simple mobile whip antenna, which was hung out my window at the 5th-floor level (F6BEE). There should be more incentive to use cw. Why should I go 60/hr on cw when I can go 160/hr on ssb? Cw should get two - three times the points/QSO (G5CMX/N8ET). About five hours into the contest, I blew up the plate xformer in my homebrew 3-500Z amp. Guess what? It apparently wasn't needed as the contacts kept coming my way with good reports! Who needs high power? (K1CZ). Operating in a contest using 20 watts input, a high SWR, and a strep throat isn't impossible, just very hard (WB1CPW). My biggest thrill was working more stations during the first day of the contest than I had made total in nine months of Novice operation. Hi! (WBØYUI). First DX QSO was with "Lamar University" (BR, LU1BR for those who can't figure it out. Hi! (W5PXZ — Lamar University Club Station). Worked GU5CIA for my 100th country. A fun contest (WD8RIN). I would like to see the 10-Meter Contest period rolled back to 36 hours. The extra evening is just too much of a drain on other activities, especially with major contests on five of the preceding six weekends. Those of us who go out for SS and CQWW get in enough trouble at home as it is . . . or how about moving the contest to February, since that month is now open? (WØUC). Good DX available if you listened a lot. (N2AOK). Held the frequency using QRP! Thrill was working K1XA at 3 A.M. local time. No other scatter signals for two hours before or after that QSO. My QRP signal couldn't open up the band. (AL7Z/K6UMV). Perhaps the contest should be renamed the 10-Meter DX Contest during sunspot peaks (WB2AMU). At times on 10-meter cw, it sounded like RTTY (WB9VXZ/WD9GSO). Next year, I definitely go multiop. Single op is for the birds (WB4TKJ). Best condx ever in the Novice band. DX pileups both mornings (WA2IAU/N). Perhaps the contest period could be split up so that phone and cw parts are not on the same day. This would encourage people to do both modes (KA8AZN). It's not every day that you can work a ship at sea one minute and an airplane at 37,000 feet the next. Fantastic (N8ACQ). An itemized bill for 10-Meter Contest operation: (A) one dozen number 3 pencils — used, 4 at 64¢. (B) two six-packs of cola at $2.78. (C) postage at 45¢. (D) one pound of coffee at $2.49. (E) new antenna tuner at $119. (F) YL grief and lost sleep at ??. See you next year (KA7AHK). I knew my vertical just wasn't enough. Decided that I needed the *best* antenna that I could muster. Came up with a dipole at *12* feet. It was enough to work those U stations (WA2SEL). Would love to see a 15-Meter Contest next year! (WB1CRH). Great contest, but wouldn't it be nice if we got back to giving real reports instead of 59 to everybody (N4UH). Something needs to be corrected. Novices have very little to gain by entering this contest. Maybe we should increase the point value to such a figure that it would be possible to score well by working only Novices. I spent over two hours in the Novice band and only worked 14 stations. High power and beams are OK for Sweepstakes, but I feel that helping beginners is just as important (WBØUFB). Was I the only a-m station in the contest? (WB2GJD). It would be nice if the PA input power were limited to 200 W. Those "Super Growlers" are very loathsome on the band (W7DWJ).

QSO Leaders

Single Operator

Call	*No. of QSOs*
KP4RF	3033
N7DD	2659
VE6WQ	2646
K1VTM	2564
W3RJ	2422
W7EJ	2381
KL7IRT	2364
N7ZZ	2337
W6RR/7	2335
KH6WF	2318
Multioperator	
VE1DXA	2540
KØRF	2503

Multiplier Leaders

Single Operator

Call	*No. of Multipliers*
K9EGA	141
KP4RF	141
W3RJ	140
K9HMB	134
W2YV	134
K1UO	132
W9RE	132
K1VTM	131
WA3FET	129
WA1TFF	128
Multioperator	
VE1DXA	134
AA8U	132

Top Ten — Single Operator

U.S./VE		*DX*	
Call	*Score*	*Call*	*Score*
W3RJ	678,720	KP4RF	855,306
K1VTM	672,030	KP4KK	477,456
N7DD	648,796	KP4WI	471,752
K9HMB	584,508	KZ5JM	462,280
W2YV	536,804	KP4DSD	431,858
W9RE	534,864	JA1PIG/PZ	369,600
VE6WQ	523,908	G3FXB	366,758
K1UO	514,536	PJ2FR	303,710
W7EJ	509,534	G4BYB	293,944
N7ZZ	500,118	KP4EEH	289,920

Continental Leaders — Single Operator Stations

Continent	*Call*	*Score*
Africa	EL2AV	261,820
Asia	JR1IJV	243,780
Europe	G3FXB	366,758
North America	KP4RF	855,306
Oceania	VK3IL	39,858
South America	JA1PIG/PZ	369,600

FEEDBACK

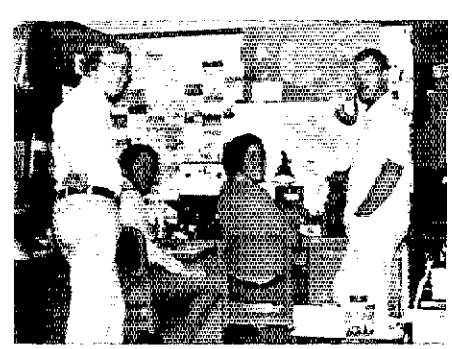
Please note the following changes to be made in the results of the 1977 10-Meter Contest found on page 73 of the June 1978 issue of *QST*.

In the Arizona Section, N7AK should have been listed as a multiop with N7RK as second op. This makes WA7BPF the single-operator Section Certificate winner for Arizona.

WB5OAD, operated by W5WMU, should have been listed as the Delta Division leader as well as the Louisiana Section winner.

Three of the five ops at N7CW. From left are K7BHM, K7JVR and N7CW. Missing in this photo are N4QS and W7JCW. Number one multiop station in AZ; number five multiop station in the U.S.; number six multiop station worldwide.

Mose (left), WA6EUM, club president and Ken (right), WA6DPQ, club vice president, contemplate their 10-Meter Contest entry at the club station of the McDonnell Douglas Radio Club, W6VLD, multioperator — Orange Section.



From the left: KØVBU, WBØLFY, WBØUZJ and KØRWL all of the KØRWL multiop from Missouri. KØRWL sez that the above are all that is left of four-dozen doughnuts, one pound of bacon . . . 10 six-packs of beer and a vat of homemade vegetable soup. What contest?

Scores

Scores are listed by section within each U.S. call area, by Canadian call area, and by country alphabetically, according to prefix. The highest single-operator station in each ARRL section and country receives a certificate. The highest multiple-operator station in each section and country and the highest Novice score in each ARRL section receive certificates, if there are three or more entries listed in that classification or if, in the opinion of the Awards Committee, the entrant displayed exceptional effort. Read the listings (left to right): call, score, QSOs, multiplier, hours of operation.

DX

Region 1

PA9MIR/M 39,480- 272- 70-17

Region 2

W1PH/AM 112,812- 714- 79- 7

Easter Island

CE0AE 3366- 51- 33-

Portugal

CT4NH 20,996- 181- 58-
CT1TM 4514- 61- 37-
CT1DW 4292- 58- 37-

Federal Republic of Germany

DL1BU 228,592-1071-104-
DL8PC 202,572- 993-102-
DJ3HJ 188,700- 850-111-
DL9HN 89,280- 480- 25-
DF3OE 36,308- 323- 56-
DJ5GG 31,080- 210- 74-
DF4TD 29,436- 223- 66-
DF2HL 24,966- 219- 57-
DK8JB 10,848- 113- 48-
DJ2YE 7000- 100- 35-
DL1OM 5880- 84- 35-
DK5RY 3136- 50- 28-
DJ6XB 1794- 39- 23- 3
DK5KJ 286- 13- 11-
DL0VK(DJ5BZ,OJ7ZG,DK4ZL, DK5ZK,DK6FT,oprs) 103,888- 604- 66-21
DA1PO(+DA1PN) 14,600- 146- 50-18

German Democratic Republic

DM3RMO 64,216- 349- 92-
DM3SBM 45,030- 284- 79-
DM4OLG 35,112- 266- 66-
DM4WZA 21,976- 164- 67-
DM2FIL 21,240- 175- 60-
DM2BTO 15,846- 139- 57-
DM2GDL 11,730- 115- 51-
DM3VLO 10,340- 110- 47-
DM4XOM 7326- 99- 37-
DM2YLO 6916- 90- 38-
DM4WEK 6880- 86- 40-
DM3ZNN 5250- 75- 35-
DM3LDA 4640- 80- 29-
DM5TGL 54- 9- 3-

Spain

EA1TA 25,632- 178- 72-
EA2LY 13,104- 126- 52-
EA2OJ 8372- 91- 46-
EA2HW 2496- 48- 26-

Republic of Ireland

EI2BB 90,610- 533- 85-12

Liberia

EL2AV 261,820-1233-106-

Iran

EP2IA(G3SXW,opr) 167,664- 998- 84-
EP2ER(WB4QBC,opr) 21,168- 196- 54-

France

F9IQ 93,912- 574- 78-
F6EEM 76,000- 475- 80-
F6BEE 34,668- 212- 81-14
F6BVB 28,700- 205- 70-
F6KJI 21,168- 196- 54-
F6CYV 20,280- 156- 65-
F6CXJ 17,766- 156- 47-
F6AKZ 11,092- 118- 47-
F6EQV 8642- 127- 37-10
F6DNR 7524- 114- 33-
F9OJ 5328- 72- 37- 2
F6DXH 3596- 62- 29
F2RA 3300- 50- 33-
F2VO 1960- 46- 20-
F8TM 126- 9- 7-

England

G3FXB 366,758-1522-119-24
G4BYB 293,944-1267-116-
G5CMX(N8ET,opr) 123,662- 802- 77-15
G2RD 87,932- 494- 89-18
G4COA 61,462- 397- 79-
G5CRF(W6TWT,opr) 49,086- 289- 81-20
G3DME 43,120- 280- 77-21
G3HRY 27,872- 208- 67-
G3ESF 22,176- 167- 66-
G3TKR 21,172- 158- 67-18
G4DLB 19,184- 218- 44-
G2AJB 10,560- 114- 44- 9
G3CWL 3234- 49- 33-
G4CSB 2300- 46- 25-
G3TCP(G4s BWL CLY DBL FES, G8PAZ,oprs) 53,280- 331- 80-20

Northern Ireland

GI4FUM 19,716- 159- 62-

Scotland

GM3YOR 101,200- 565- 92-18
GM4CHX 13,144- 124- 53-
GM4FSA 10,388- 106- 49-
GM3RAO 5320- 76- 35-

Guernsey

GU5CIA(K5MM,opr) 170,488- 852-101-18

Switzerland

HB9BRQ(K3KWJ,opr) 6630- 82- 39-10
HB9BOW 5696- 86- 32- 7
HB9G(HB9AW,opr) 3484- 67- 26- 2

Colombia

HK3AFD(+HK3s AXT TF) 457,840-1940-118-36

Thailand

HS1ABD 9504- 144- 33- 4

Italy

I4JCC/5(W3US,opr) 257,866-1141-113-20
I3XCE 54,312- 439- 62-
I8ZLW 41,172- 282- 73-
I4CSP 15,582- 147- 53-
I2LVN 4428- 54- 41-
I1POR(+I1RJP) 255,420-1161-110-20
I1UTV(+I1s BLX EVJ) 74,648- 434- 86-

Japan

JR1IJV 243,780-1195-102-30
JR1WHW 210,732-1033-102-28
JH1BBT 204,120-1030-105-27
JF1SEK 45,152- 332- 68-
JA7DAH 40,590- 368- 55-
JA7NVF 37,736- 356- 53- 9
JF1RPZ 30,240- 234- 60-15
JA3EQC 28,440- 235- 60-17
JA2IU 14,580- 135- 54-
JR3CVO 11,782- 137- 43-
JR3COZ 11,172- 133- 42-
JI1PCN 10,800- 120- 45-13
JA6PL 9922- 121- 41-
JA1OP 9240- 105- 44-
JI1KUV 7956- 115- 34-10
JA8SW 7176- 92- 39-
JA1GKB 6840- 90- 38-
JA7UFZ 5920- 74- 40- 4
JF2DIB 5610- 85- 33-
JE2PKD 4048- 88- 23-
JH5EYD 3456- 54- 32-11
JA5BLF 2668- 58- 23-
JR1BMU 1656- 46- 18- 4
JG1RNK 968- 44- 11-12
JH7JDB 840- 30- 14-
JE2MDE 238- 17- 7-
JF3ACK 2- 1- 1-
JA2YKA(Multiop) 131,100- 690- 95-
JA1YYE(JK1LUY,JA5KJD,oprs) 40,950- 314- 65-

Mongolia

JT1BG 1350- 45- 15-

Puerto Rico

KP4RF 855,306-3033-141-34
KP4KK 477,456-2058-116-25
KP4WI 471,752-2164-109-27
KP4DSD 431,858-1981-109-26
KP4EEH 289,920-1510- 96-25
KP4CGB/N(WB5YYI,opr) 42,126- 326- 59-19

Canal Zone

KZ5JM 462,280-1778-130-30

Norway

LA9ZV 91,600- 458-100-
LA5SH 78,474- 409- 87-
LA9GV 5180- 70- 37-
LA2IJ 5180- 74- 35-
LA7EO 4800- 75- 32- 3
LA3UG 4576- 89- 26-

Argentina

LU7EGE 5760- 80- 36- 6

Luxembourg

LX1ML 4960- 80- 31- 6

Bulgaria

LZ1IA 11,616- 120- 48-
LZ1KKZ(Multiop) 66,732- 401- 83-

Finland

OH2BA 159,000- 789-100-
OH2EE 135,824- 638-104-
OH3RU 10,914- 107- 51-13
OH2BN 1768- 34- 26-
OH5PA 1240- 31- 20-
OH4UR 200- 10- 10- 1

Czechoslovakia

OK1TA 116,820- 587- 99-
OK3EA 91,520- 509- 88-
OK3KTY 72,250- 425- 85-
OK1MPP 66,240- 368- 90-
OK2BDP 29,946- 216- 69-
OK3KFF(OK3YDZ,opr) 17,220- 210- 41-
OK2YAX 10,404- 101- 51-
OK1KZ 7744- 88- 44-
OK1DVK 7544- 92- 41-
OK2BPK 5440- 67- 40-
OK2BBJ 3740- 55- 34-
OK2KJT 3520- 55- 32-
OK1DKR 3100- 50- 31-
OK2BKR 3100- 50- 31-
OK2PAE 2160- 36- 24-
OK1JST 1386- 33- 21-
OK3BA 1280- 32- 20-
OK1DKS 960- 30- 16-
OK1CIJ 850- 25- 17-
OK2SPS 128- 8- 8-
OK1DKW 40- 5- 4- 1
OK1KPU(Multiop) 70,280- 502- 70-

Belgium

ON6JG 110,544- 658- 84-23
ON4XG 104,178- 537- 97-20
ON6GB 79,840- 499- 80-14
ON8WD 18,696- 164- 57-21
ON5TZ 18,200- 190- 65-17
ON5WL 10,668- 127- 42- 6
ON6NL 10,396- 113- 46-
ON6AH 3480- 60- 29-

Denmark

OZ5EV 154,752- 806- 96-
OZ6PI 99,308- 671- 74-
OZ5DX 36,068- 254- 71-
OZ1BUR 32,490- 361- 45-
OZ7BW 31,228- 211- 74-
OZ1LO 25,596- 237- 54-
OZ1BII 24,000- 200- 60-
OZ1ZO 19,584- 194- 51-
OZ7YL 16,218- 159- 51-
OZ5WQ 16,188- 142- 57-
OZ1CGW 12,084- 114- 53-
OZ8T 12,036- 118- 51
OZ1CCB 11,270- 115- 49-
OZ5VT 7548- 102- 37-
OZ5JR 5478- 83- 33-
OZ8E 2448- 72- 17-
OZ4HW 2244- 34- 33-
OZ8ZB 1760- 40- 22-
OZ6XR 1656- 36- 23-
OZ7SG 126- 9- 7-

Netherlands

PA2TMS 73,200- 488- 75-
PI1PT 46,498- 347- 67-
PA0NIE/A 46,170- 405- 57-11
PA0UV 29,402- 241- 61-
PA0GN(PA0GIN,opr) 26,550- 295- 45-10
PA0GT 20,874- 147- 71-
PA0VST 11,440- 104- 55-
PA0INA 11,388- 130- 39- 8
PA0INE 11,336- 109- 52-
PA0TA 8064- 84- 48- 8
PA0TUK 5460- 70- 39-
PA0YN 5040- 70- 36-
PA0IJM 3720- 60- 31-
PA0TO 3000- 60- 20-
PA0DIN 2816- 44- 32-
PA0SMS 2548- 49- 26- 9
PA0PHK 2024- 46- 22-
PI1ARS(PA0HTR,opr) 1820- 35- 26-
PA0KDM 900- 25- 18-

Netherlands Antilles

PJ2FR 303,710-1255-121-25

Brasil

PY3CB 59,334- 347- 87-10

Surinam

JA1PIG/PZ 369,600-1523-120-

Sweden

SM0AQD 167,960- 884- 95-
SM0GMG 124,852- 626- 98-
SM0DJZ 63,080- 332- 95-
SM3DXC 51,084- 387- 66-
SM5CAK 21,414- 249- 43-
SM6FKF 13,200- 158- 40- 9
SM5AKT 9516- 122- 39-
SM0JHF 8930- 95- 47-
SM0ATN 8690- 79- 55- 7
SM5BOE 5046- 87- 29-
SM7TV 3416- 61- 28-
SM2HZQ 3120- 65- 24-
SM0FY 2762- 39- 23-
SM5CCT 2244- 49- 22- 4
SM0CHA 960- 30- 16-

Poland

SP5GRM/9 110,400- 599- 92-
SP9CAV/9 15,390- 129- 57-
SP6BAA 12,180- 105- 58-
SP2AVE 9540- 104- 45-
SP9AKD 8366- 89- 47-
SP9DH 8280- 92- 45-
SP9ADU 7138- 86- 43-
SP7ASZ 5082- 61- 33-
SP9HWN 5040- 83- 35-
SP2AYC 4030- 65- 31-
SP9DO 2300- 45- 25-
SP9DFH 1974- 47- 21-
SP5SIP 1224- 34- 18-
SP6HRK 992- 31- 16- 2
SP9FSH 928- 25- 16-
SP6BFK 798- 19- 14-

Iceland

TF3CW 119,700- 797- 75-

European R.S.F.S.R.

UW1AE 42,632- 292- 73-
UW3RR 32,940- 270- 61-
UA3TN 23,569- 209- 49-
UA3TDP 16,328- 157- 52-
UW6MP 14,098- 133- 53-
UW3EQ 13,356- 159- 42-
UA4ACD 10,486- 107- 49-
UW3UO 8360- 109- 38-
UA4ACP 7896- 141- 28-
UA1WCX 4888- 95- 26-
UA3AAH 3472- 56- 31-
UA1AWO 2860- 55- 26-
UA4BI 2256- 47- 24-
UW1YY 2068- 47- 22-
UA3GO 1680- 40- 21-
UA4HAU 1326- 38- 17-
UA4CO 800- 40- 10-
RA1ARX 702- 27- 13-
UA1WEA 700- 25- 14-
UA3AEX 528- 24- 11-
UA3DEA 234- 13- 9-
UA6AKT 84- 7- 6-
UA6AJG 14- 7- 1-
UK3AAC(RA3ACE,UA3AGX,oprs) 81,934- 577- 71-
UK3ABO(Multiop) 56,448- 448- 63-
UK3DAU(Multiop) 11,352- 128- 44-
UK4AAW(Multiop) 10,360- 148- 35-
UK6HAR(Multiop) 9452- 139- 34-
UK3DCT(Multiop) 3720- 62- 30-

Kaliningradsk

UA2FCB 29,640- 224- 65-

Asiatic R.S.F.S.R.

RA9CIU 34,176- 356- 48-
UA0LFK 24,180- 186- 65-
UA0SGL 21,120- 264- 40-
UA9HBH 15,480- 215- 36-
UA9AED 14,282- 193- 37-
UA0ACM 13,416- 172- 39-
UA9FU 8294- 143- 29-
UA9UTF 5000- 100- 25-
UV9AX 4730- 86- 55-
UA9CMS 3472- 62- 28-
UK9UAO(RA9UDB,UA9UOB, oprs) 51,816- 508- 51-
UK9OBI(Multiop) 40,880- 511- 40-
UK9QAA(UA9s QAP QH,oprs) 7320- 122- 30-
UK9CBZ(Multiop) 8052- 122- 33-

Ukraine

UB5VAZ 89,956- 624- 72-
UB5EDU 80,928- 539- 76-
UB5VCD 25,920- 216- 60-
UB5ABJ 20,844- 193- 54-
UB5IER 12,880- 161- 40-
UB5QDU 5120- 80- 32-
UB5JIM 1600- 40- 20-
UK5IFM(Multiop) 107,690- 605- 89-
UK5WBG(Multiop) 81,162- 501- 81-
UK5MAF(UB5MOC,UY5LK, oprs) 61,336- 451- 68-
UK5QAV(Multiop) 49,700- 355- 70-

White R.S.S.R.

UC2OAZ 11,234- 137- 41-
EU2ACA 9906- 127- 39-
EU2LBE 2860- 55- 26-
EU2BF 2160- 45- 24-
EU2WAZ 400- 20- 10-

Azerbaijan

UD6DLJ 1080- 36- 15-

Armenia

UG6GAF 95,906- 607- 79-

Uzbek

UI8LAF 11,392- 178- 32-

Tadzhik

UJ8JAS 5150- 103- 25-

Kazakh

UL7TA 22,422- 303- 37-
UL7DBA 7560- 135- 28-
UL7GAV 5200- 100- 26-
UL7CBS 2068- 47- 22-
UL7NAF 928- 29- 16-
UL7TAC 378- 21- 9-
UK7LAF(Multiop) 9702- 148- 33-

Kirghiz

UM8NNN 5200- 100- 52-

Lithuania

UP2BAR 33,320- 238- 70-
UP2BAO 32,000- 250- 64-
UP2BAE 26,752- 206- 64-
UP2BFR 19,592- 158- 62-
UP2BCD 18,768- 146- 54-
RP2BCV 13,280- 166- 40-
UP2BEA 3780- 60- 30-
UK2PAP(UP2s BCI OX,oprs) 251,064-1268- 99-

Latvia

UQ2GBW 68,174- 383- 89-
UQ2DZ 10,120- 110- 46-
UQ2PP 1680- 40- 21-
UK2GKW(Multiop) 352,240-1480-119-

Estonia

UR2OI 24,960- 195- 64-

Australia

VK3IL 39,858- 273- 73-35

Mexico

6G1J 83,460- 535- 78-13
XE1MDX(XE1s GBM LCH OD OW OX,oprs) 326,904-1542-106-25

Romania

YO6AWR 82,688- 544- 76-
YO4ATW 27,136- 212- 64-
YO3CR 5676- 87- 33-
YO6OO 3050- 61- 25-
YO8KGV 1120- 28- 20-
YO6AFP 504- 18- 14-

Yugoslavia

YU3DJK(YU3TXU,opr) 110,722- 659- 83-16
YU9RTW 74,048- 402- 89-
YU1NZW 10,332- 123- 42-
YU2CCB(Multiop) 66,248- 364- 91-

Venezuela

YV1TO 199,472- 950-104-

Cayman Islands

ZF2AG(N8AG,opr) 174,528-1212- 72-22

New Zealand

ZL2AH 8976- 102- 44-

Israel

4Z4MB 82,584- 551- 74-19

Lesotho

7P8BH 32,340- 193- 70- 8

Barbados

8P6FD 7568- 88- 43-10

Malta

9H4G 9790- 89- 55- 8

U.S.A.

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Connecticut

K1VTM 672,030-2564-131-36
K1ZZ 204,930- 886-115-14
WA1DER(WA1UUA,opr) 200,850- 968-103-27
W1WEF 182,000- 910-100-25
WA1LOU 162,384- 796-102-25
WB1DUI 79,212- 524- 69-15
WA1VOA 66,868- 445- 73-27
KA1BDI 54,756- 351- 78-24
WA1YEC 53,352- 351- 76-24
K1KTB 51,356- 347- 74-14
N1YL 50,544- 324- 78- 8
WA1YWW/N 42,966- 278- 63-19
K1NYK 39,816- 316- 63-15
W1CNU 39,618- 275- 71-15
WB1DLA 37,596- 241- 78-11
WA1FCN 31,000- 250- 62-
AC1Y 25,440- 197- 60-11
AD1S 22,504- 194- 58-12
WA5OFJ/1 21,680- 140- 76-17
W1VH 17,664- 128- 69- 8
W1BIH 15,616- 125- 61-
W1IVB 12,792- 164- 39- 6
WA1RLY 11,468- 94- 61-12
N1CC 6600- 100- 33- 4
WB1AFZ 3634- 75- 23- 5
WA1STO 2958- 51- 29- 2
WB1CRH/N 2640- 41- 20-10
W1VZ 2346- 51- 23- 3
W1QV 1728- 36- 24- 3
WB1CRI/N 1290- 30- 15-14
K1AH 520- 25- 10- 3
WB8PBC/1 416- 16- 13- 2
K1XA(+K1TO) 393,008-1686-116-31
W1LJ(+K3KH) 308,440-1402-110-34
WA1GBA(+WA1HYN) 267,332-1258-106-26
WB1FNA(+WB1FKO) 71,996- 437- 82-26
WB1FTQ/N(+KA1BFC) 5664- 86- 24-21
KA1BKM(+KA1BKK) 3360- 47- 24-12

Eastern Massachusetts

AB1A 336,622-1391-121-28
WA1UZH 312,256-1392-112-33
K1VV 77,736- 465- 82-10
K1VUT 56,588- 322- 86-19
WB1ANT 56,240- 380- 74-10
W1GXT 50,150- 295- 85-21
W1FM 48,472- 329- 73-15
K1VXB 43,216- 291- 73-21
KA1CC 41,720- 298- 70-18
W1DC(K1UR,opr) 31,164- 294- 53- 5
WB1GIT 27,240- 225- 60-14
WA1ZXB 27,090- 312- 43-10
WA1KDL 17,630- 201- 43-10
WB1EXD 15,390- 166- 45-21
W1PLJ 12,300- 150- 41-16
KA1AMR/N 12,000- 124- 40-29
WB1CPW 9102- 111- 41- 6
K1GVW 9100- 91- 50-14
WB1DMM/T 9072- 94- 36-22
WA1EOT 6116- 113- 27- 2
W1ZR 5934- 69- 43- 3
K1GRB 5460- 76- 35- 9
WA1PLK 4186- 91- 23- 6
WB1DUT/N 4056- 87- 26-13
N1CW 3942- 72- 27- 8
WA1NME 2120- 37- 20- 5
W1WMH 198- 11- 9- 1
K1RB 162- 9- 9- 4
W1MX(K1MK,W1XG,WB2CWQ, WA4TTG,oprs) 196,976- 946-104-32
WB1FGN(+WB1FGI) 109,922- 899- 61-24
N1AEQ(+KA1s AAD AAG BUI BUW,N1NA,WB1HFM) 70,550- 424- 83-32
WA1AGT(+WB1FLA) 39,530- 268- 59-20
W1TKZ(K1s PDX UR,WA1s HVS PCY,WB1FCO,oprs) 15,200- 190- 40-16
KA1AHQ/N(+WB1DKL) 9686- 125- 29-28

Maine

K1UO 514,536-1949-132-32
K1CZ 174,236-1012- 86-25
N1AFC 137,256- 817- 84-24
K1SA 93,288- 507- 92-11
WB3HYD/1 37,820- 293- 61-17
WB1DED/N 19,665- 168- 45-
W1GKJ 18,382- 100- 91-17
KA1BFK 3534- 57- 31- 4
WB1HKG/N 56- 6- 4- 3

New Hampshire

K1LL 456,876-1810-126-35
WA1OUB 354,144-1487-119-32
WA1FSZ 189,582-1078- 88-18
AC1J 64,894- 455- 71-17
WA1YIV 44,784- 311- 72-17
K2DWR/1 26,784- 215- 62-16
W1CHA 20,790- 189- 55- 7
W1ICU 12,078- 99- 61-
K1SWT 2600- 50- 26-10
WA1YIO(+WA1VVX) 27,376- 236- 58-19
WA1YRW/N(+WA1YTW) 20,094- 155- 51-26

Rhode Island

WA1TFF 488,192-1906-128-26
K1JA 94,644- 469- 99-22
W1YNE 19,448- 187- 52- 5
WB1EQO 17,880- 149- 60-12
K1GZM 6688- 76- 44-10
WB1HIX(+WB1EJI) 394,750-1579-125-35

Vermont

WA1KPJ 259,074-1167-111-26
WB1GQR(WB2JSJ,opr) 227,520-1264- 90-23
K2LE/1 177,000- 750-118-23
K1IK 175,224- 893- 98-18
WB1BZH 43,310- 305- 71-10
W1AIM 6800- 85- 40- 8

Western Massachusetts

WB1CJS 289,336-1226-118-27
N1YY 251,664-1282- 98-28
K1SF 126,600- 633-100-20
WA1ZAM 63,804- 409- 78-24
W1PWK 13,860- 110- 63-13
WB1DZK/N 7998- 59- 43-20

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Eastern New York

W2YV(N2NT,opr) 536,804-2000-134-33
W2AZO 115,948- 571-101-14
W2HES 76,500- 510- 75-16
K2GBH 75,932- 459- 82-13
W2XL 49,700- 350- 71-11
WB2SNT 33,434- 213- 73-16
WA2OTC 25,420- 187- 62-10
N2WR 17,864- 154- 58-13
WB2KHE 17,500- 175- 50-16
WA2KTR 14,444- 142- 46- 9
WB2MJQ 10,530- 133- 39- 7
WB2THN 10,140- 130- 39-10
WA2KCL 8736- 112- 39- 4
KB2FS 8686- 80- 43-19
N2FS 7524- 114- 33- 8
WB2OFV 7192- 116- 31-10
WD2ABL 7006- 89- 31-18
WA2KLV 6720- 80- 42- 7
AG2X(+KA2APN) 100,464- 550- 91-25

New York City - L.I.

K2PE 260,208-1090-117-28
WA2MUA 109,410- 519-105-26
W2DKM 92,232- 550- 84-13
WB2AMU 68,730- 376- 87-26
W2KDI 66,240- 557- 92-23
W2KZE 65,570- 395- 83-
WA2SUH 63,840- 377- 84-22
K2OVS 56,784- 312- 91-16
K2SX 43,296- 259- 82- 7
WB2KVO 28,884- 249- 58-13
WB2VPV 25,870- 199- 65-20
WA2SEL 15,980- 170- 47-12
WB2IBE 15,640- 169- 46-19
W2HAE 14,000- 118- 50-
N2ALD 12,788- 139- 46-15
WB2TYR 12,220- 130- 47- 5
AC2P 8856- 123- 36-11
WB2HTW 6650- 95- 35- 6
K2HTO 5440- 80- 34- 6
WB2FWF(WA2RFL,opr) 4752- 54- 44-
KB2DY 3384- 47- 36- 6
N2WX 1360- 34- 20- 4
WB2PXA 1320- 33- 20- 2
W2UAL 1024- 32- 16- 2
W2GFF 798- 21- 19- 3
KA2AEV/N 620- 23- 10- 9

Northern New Jersey

WB7EME/2 212,568-1027-102-29
WB2QYT 189,544- 817-116-25
K2BK 159,396- 716-111-24
WB2WIK 124,692- 599-104-18
N2AA 77,600- 383- 97-25
WB2LDN 60,960- 375- 80-30
WA2VUY 51,772- 301- 86-22
AE2A 48,300- 350- 69- 8
WB2VYA 47,892- 300- 78-24
WA2VUN 44,616- 338- 66-
WA2POW 37,120- 290- 64-16
W2FJ 31,920- 168- 95-26
WB2FEP 29,436- 222- 66-15
N2BQ 28,892- 230- 62-15
WA2YLA 17,020- 185- 46-20
WA2TJF 14,520- 132- 55-19
WD2AJJ 12,948- 166- 39-31
WA2DFC 12,330- 132- 45- 7
W2GNW 7298- 89- 41- 7
WA2JHN/N 6844- 75- 29-25
WB3JON/N 5022- 67- 27-17
WA2PQU 4732- 90- 26- 7
WB2GXT 4608- 48- 24-
WB2UTO 3960- 66- 30- 4
WA2WSD 3564- 77- 22- 7
KA2COY/N 2992- 46- 22- 9
AB2N 2842- 49- 29- 5
WB2GJD 2688- 58- 21- 9
WB2NCF/T 1802- 38- 17-20
WA2JSG 1200- 40- 15- 4
W2UL 740- 37- 20- 5
N2OL(+N2HE)
100,580- 584- 94-23
W2TIW(+N2s AIH LA WT,WA2s OFI ORU RSL,WB2s CKD HUS UVU) 76,912- 437- 88-24
KA2ACM(+WB2KYE)
43,212- 272- 78-30
WB2PKV(Multiop)
27,200- 271- 50-27
K2MBZ(K2LP,KA2CYH,N2ADH, WB2CAM) 21,120- 215- 48-25
K2OP(+WA2DKJ)
3640- 70- 26- 7

Southern New Jersey

W2BHK 145,628- 743- 98-24
WA2WJL 74,534- 449- 83-25
AA2Z 73,470- 460- 79-11
WB2YOF 60,984- 396- 77-28
N2HF 47,360- 296- 80-17
W3BFC/2 47,200- 295- 80-24
K2BWR(K2ZRJ,opr)
44,696- 302- 74-17
WB2ZEU 30,114- 239- 63-11
N2AOK/T 7280- 77- 35-20
WB2SJA 4292- 73- 29- 9
W2FGY 4100- 50- 41- 7
W2GTN 2688- 48- 28- 5
WA2IAU/N 2392- 39- 23- 7
W2CCO(+WA1NGR)
111,078- 560- 99-

Western New York

K2GBC 252,252-1078-117-32
N2MF 204,960- 909-112-23
K2IGW 182,820- 831-110-25
WA2UUK 89,300- 475- 94-32
WA2MNM 69,160- 380- 91-28
W2FTY 58,900- 310- 95-29
WB2RXS 55,626- 372- 73-19
W2RR(WA2AOG,opr)
53,960- 350- 76- 9
WA2PHA 33,840- 228- 72-25
WA2HRL 33,794- 277- 61-17
WA2RBJ 32,508- 258- 63-26
WD5BYI/2 28,396- 224- 62-21
W2FUI 24,072- 188- 59-23
KA2AAM 23,004- 213- 54-13
WA2EYA 19,706- 162- 59-13
WB2RWW 18,616- 179- 52-14
N2CU 16,940- 153- 55- 7
WA2FBE 15,510- 165- 47-15
WB2QAX 15,340- 130- 59-18
WB2OZS 13,230- 133- 49-19
K2MGR 10,976- 112- 49- 7
WA2YRL 8320- 130- 32-13
WB2AIO 6992- 92- 38- 2
WA2IMG 2400- 50- 24- 6
W2IOG(+K2VWI,W2AV,WA2ZKD)
147,528- 682-108-31
WA2IKO(+K2FU,WA2s BSN QEL ZJP,WB2PGU)
145,948- 677-107-32
KB2EE(+KB2GD,KA2CKX)
28,900- 281- 50-27
WB2JXF(+KA2s AFW BJP,WA2s RUK VEZ,WB2AIB)
14,018- 162- 43-14

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Delaware

WA1SQB/3 195,800- 890-110-19
K3HBP 68,112- 396- 86-14
N3AIS 26,368- 196- 64-18
N3AHA 2832- 59- 24- 5

Eastern Pennsylvania

W3RJ 678,720-2422-140-35
K3RL 341,040-1419-120-34
K3UU 170,718- 768-111-33
K3UC 101,568- 528- 96-21
K3VW 92,928- 484- 96- 8
W3ARK 61,236- 357- 81-15
KA3AGX 56,544- 367- 76-20
N3GW 56,900- 375- 75-20
WA3VJU 50,912- 296- 86-22
N3AR 47,854- 337- 71-12
WB3KHF 38,924- 258- 74-28
K3ND 31,450- 185- 85-12
N4HX/3 31,360- 224- 70-16
KB3BW 27,938- 221- 61-17
W3ETB 27,140- 230- 59-21
WB7UMT/3 25,080- 220- 57- 9
WB3EVL 13,356- 126- 53-11
W3GPR 10,218- 104- 39-10
W3GKF 7600- 90- 40-19
KA3BOD/N 4872- 61- 29-11
W3BNQ 4418- 47- 47-23
WA3YTI 3640- 65- 28- 5
K3QQ 1290- 42- 15- 4
W3HMR 480- 17- 12- 2
N3IK(+WB3EFI)
68,352- 345- 96-28
W3AJ(AC3V,K3QM,WA3YYG, WB4DNF,KA8CST,oprs)
41,600- 318- 64-28
WB3FJC(+WB3IKP)
23,436- 189- 62-20
WB3JZE(+WB3JYY)
5452- 55- 47-30

Maryland - D.C.

K3ZJ 236,622-1047-113-34
K3EW 213,344- 944-113-32
K3KA 159,840- 740-108-19
W3GN 94,024- 500- 92-28
W3FDP 76,632- 372-103-24
WB3CGI 76,330- 449- 85-23
W3UJ 68,510- 402- 86-15
WA3ELE 68,432- 376- 91-31
K3SA 65,824- 374- 88-11
WA3EEE 61,320- 355- 84-15
W3HVM 56,980- 365- 77-18
WB3CFD 48,506- 300- 79-23
W3PWO 45,760- 260- 88-21
K3AHB 31,740- 230- 69-20
W3MZG 30,940- 238- 65-19
WB3EGT 18,560- 160- 58-15
N3AGH 12,500- 125- 50-13
W3CM 12,420- 138- 45-14
N3OS 11,232- 116- 48-12
WA3RSG 8066- 109- 37-13
WB3AXP 5040- 72- 35-17
K3ZZ 3960- 82- 22- 4
WB3FWD/T 3000- 35- 30- 9
K3AA 2680- 67- 20- 5
WB3FAF 2184- 52- 21- 3
W3MSN 1760- 44- 20-
WB3BXU 1170- 39- 15- 4
W3FQE 648- 25- 12- 5
WB3GWM 570- 19- 15-
WA3ORU 480- 20- 12- 5
K3EST(K3TW,WA3ZAS,oprs)
358,924-1463-122-36

Western Pennsylvania

WA3FET(K3UA,opr)
400,416-1550-129-27
K3DE 76,704- 370-102-30
W3KBZ 28,602- 227- 63-17
WB3DKT 22,320- 179- 60-12
KA3AJZ/N 12,080- 119- 40-21
K3OV 10,302- 99- 51- 8
WN3CWW 9030- 102- 43- 6
N3NR 7296- 93- 38- 6
W3YI(AC3C,opr)
5832- 81- 36- 4
WB3FKC 4408- 58- 38- 5
WB3KAF/N 3468- 41- 34-
WB3HMA/N 1272- 33- 12-12

4

Alabama

WN4KKN 253,344-1122-112-18
K4ZGB 76,908- 492- 78-18
AC4X 56,536- 378- 74-14
AA4TG 31,680- 264- 60-16
WA4MGJ 4784- 104- 23- 8
WD4NYL 210- 15- 7- 9

Georgia

K4BAI 124,478- 568-109-17
K4EZ 105,152- 493-106-19
WD4HER 74,340- 590- 63-33
K4KG 45,552- 584- 78-30
WA4IBI 39,780- 277- 70-15
KB4HZ 29,820- 201- 70-14
WB4YBE 20,640- 215- 48- 8
WD4IBO 14,260- 155- 46-17
K4KKJ 14,224- 127- 56- 4
K4LDI 1666- 38- 22- 5
W4GXW 40- 4- 4- 1
WD4ALD(+AA4U,N4s HH SF, K4IRJ,WA4FVT,WB4EDD, WD4LPQ,oprs)
225,344-1006-112-31
W4IKR(WA4TEX,WB4s FMJ NMA oprs) 54,498- 586- 93-36
W4CVY(AK4T,N4s ATI BGN, oprs) 13,366- 163- 41-26

Kentucky

AA4RR 137,000- 679-100-24
WD4IHR 101,520- 564- 90-24
AA4A 74,034- 457- 81- 8
WA4QMQ 48,510- 315- 77-13
WA4PVV 46,800- 323- 72-20
WB4OSS 27,209- 299- 91-11
WB4UVV 26,718- 219- 61-12
N4XM 20,448- 213- 48- 7
WB4TKJ 9042- 137- 33-22
WB4FOT 1760- 39- 22- 1
WA4QAL 414- 23- 9- 2
WD4ARM(+WD4ARN)
142,032-1614- 88-21
WB4ASW(+WB4HNH)
63,648- 440- 72-26

North Carolina

N4UH 177,156- 769-114-25
WA4SWY 88,736- 472- 94-28
WD4AVY 75,650- 445- 85-28
K4JYS 36,112- 213- 74-11
WB4KHJ 30,080- 231- 64-33
WB4WXA 22,072- 177- 62-10
WA4LWO 18,000- 123- 72-11
W4UW 12,870- 117- 55-12
W4OMW 12,408- 125- 47-10
WB4HCC 4900- 64- 35- 9
WD4DUS/N 704- 16- 16- 4

Northern Florida

N4SA 211,344- 951-111-21
W4LUN 83,886- 451- 93-31
WA4ESH 48,840- 370- 66-29
K4LAN 28,800- 300- 48- 8
WB4OKY 26,064- 181- 72-22
WA9WZV/4 7200- 80- 40-13
WA4NDO 3816- 51- 36- 5
WA4WVY 2204- 58- 19- 7
WB5YLT/4 2024- 44- 23- 6
KA4ESB/N 1596- 33- 19- 9
N4WW(+AA4NA,N4s AWK EF)
268,478-1049-127-30
WD4MDW(+N4BAA)
85,680- 356-120-20
WD4IIO(W4ILE,WD4s EGR FNX, oprs) 864- 27- 16- 3

South Carolina

K4SWF 214,448-1031-104-28
WB4TLX 102,818- 502-101-23
WB4AFP 78,320- 428- 89-19
WA4RYN 74,400- 487- 75- 7
WD4NNP 11,782- 137- 43-15
WD4BUE 7676- 101- 38- 8
WD4DPU 7452- 81- 46- 6
WB4DQJ 5848- 86- 34-13
WD4BHM/N 5100- 64- 30- 5
W4BFB(AA4SC,WA4s VCC ZQQ, WB4YFD,oprs)
233,928-1026-114-31
KB4IU(+WA4WYT,WB5SGH, WB8TCT) 42,340- 290- 73-27

Southern Florida

W4OO 110,774- 545- 97-23
WB4WDK 80,676- 496- 81-20
K4XB 46,574- 319- 73-20
WD4AHZ/N 44,872- 261- 71-20
K4HMD 18,644- 158- 59-10
WD9GL1/4 15,744- 157- 48-19
N4APF 10,080- 120- 42-14
WD4AVE 5250- 75- 36- 9
KA4EKA/N 2090- 35- 18-11
WA4YOS 50- 5- 5- 7
N4BP(+WB4UFF,N8RC)
265,216-1177-112-25
KB4KJ(+WA4QKX,WB4DWD)
188,152- 807-116-28
W4GKF(+KD4M)
104,328- 561- 92-29
WB4BIM(KB4FW,N4BBQ, WA4OUB,WB4FSZ,WD4HSP, oprs) 68,890- 409- 83-27

Tennessee

N4ZZ 394,910-1717-115-26
WB4NDX 278,698-1170-119-30
WB4BFS 164,936- 775-106-23
N4NT(WA4BTK,opr)
135,168- 704- 96-21
AG4V 75,576- 402- 94-18
K4CXY 68,376- 407- 84-28
WD4LFD 43,248- 318- 68-26
WA4MFS 42,760- 279- 76-13
K4HVC 30,492- 242- 63-18
WD4EPX 24,318- 193- 63-22
WD4HUT 22,600- 226- 50-14
W4OGG 18,600- 186- 50-
WD4CFN 12,144- 138- 44-12
WD4PEQ 5280- 64- 33-33
WB4WHE 4836- 93- 26- 4
KB4EX 2720- 62- 20- 9
KA1AIX/N 224- 12- 7- 8
WB4ASA(+WA4NIV,WB4JGG)
224,914-1051-107-33

Virginia

W4DR(WB4BVY,opr)
328,800-1367-120-29
N4NW 256,060-1071-118-29
AA4VA 215,250-1036-104-34
WA4CYR 109,800- 610- 90-22
WD4AXM 81,718- 449- 91-31
N4CD 73,206- 439- 83-21
W4YE 63,410- 369- 85-10
W4ZEI 57,960- 343- 84-22
W4OEL 51,300- 262- 95-18
WD4PIH 37,128- 273- 68-27
N4MM 36,582- 201- 91- 5
AA4D 34,128- 237- 72-19
WA4NTP 31,624- 258- 59-18
W4DHZ 27,744- 269- 51-30
N4AGS 26,208- 208- 63- 8
W4KFC 22,436- 158- 71-
K4JM 19,698- 195- 67-10
W4KMS 19,400- 114- 50-11
WA4FPT 19,240- 148- 65-14
K4ZA 15,860- 130- 61-
WB4DNL 12,600- 112- 50-22
W4IQ 10,208- 116- 44-
W4DM 8034- 103- 39- 4
WD4IAG/N 5408- 52- 26-13
WD4JHY/N 2944- 47- 23-11
WA4YTL 2772- 63- 22- 6
WD4JHW/N 2684- 40- 22-12
WA4KGH 2040- 33- 30- 7
N4HB 1520- 38- 20- 1
AG4D 1410- 40- 15-24
WA4SNR/T 924- 23- 14-12
WD4MTL 70- 5- 5- 5
K4VX(+K4YEP)
396,804-1538-129-31
WA4YBV(+W4THU,WB4GVU, WD4GXN,N5BA)
294,644-1234-119-31
WA4OHX(+N4s ABZ XQ, WB4ZHQ,WD4s LKQ PGW)
164,226- 811-101-29
WB9NPT/4(+WA4OIJ)
18,432- 144- 64-14
WD4RCA/N(+WD4LUE)
2156- 36- 22-

5

Arkansas

N5DY 10,064- 148- 34-11
WB5ZCW 5800- 100- 29- 4
W5EIJ 3068- 61- 26- 6
WB5WOQ(+WD0s APC APD)
132,246- 707- 93-31

Louisiana

W5WMU 293,904-1254-117-35
K5KLA 255,960-1185-108-22
WB5SKQ 200,304- 936-107-29
WD5BUA 44,720- 344- 65-26
WD5DUD 37,632- 294- 64-13
WB5UPH 16,236- 198- 41-26
N5AN(+N5AUO)
266,430-1239-107-22

Mississippi

N5GW 82,450- 483- 85-20
WB5VFE 61,884- 382- 81-23
AF5V 47,272- 311- 76-18
AE5H 35,588- 287- 62-11
W5AQ 18,400- 214- 80-18

New Mexico

W5JW 394,910-1955-101-29
K5TA 49,504- 442- 56- 3
WB5OWL 14,770- 198- 35- 6
K5QQ 3200- 50- 25- 2
K8TE/5(+W5VBO)
210,820-1270- 83-16
W5GB(KB5EZ,WB5QLR,WD5s DHR JES,oprs)
37,830- 485- 39-14

Northern Texas

K5JA 361,790-1493-121-27
WD5EWD 145,888- 746- 97-29
WD5EWP 141,792- 844- 84-26
K5NW 123,144- 732- 84-14
WB5DUQ 89,782- 847- 53-21
WA5UBK 69,984- 728- 48-23
AF5K 60,480- 432- 70-10
WA5TKU 37,856- 338- 56-15
W5QF 25,056- 204- 58-15
KA5CDZ 23,226- 237- 49- 8
WD5ABF 19,964- 208- 46-36
WD5CHD 14,008- 183- 34-16
WD5FJW 13,766- 196- 34-19
KA5ATY 12,408- 127- 47-15
N5BT 10,160- 121- 40-10
WD5JLF 9408- 112- 42-13
WD5HEP 8040- 134- 30-15
W5SOD 7956- 153- 26- 3
WD5AIW 5340- 89- 30- 4
WD5JCF/N 2040- 41- 15-13
WD5HPK/N 110- 9- 5- 3
K5FUV(+N5TR,WD5GNJ)
85,910- 605- 71-12
WD5BIK(+WB5VZL)
62,790- 470- 65-24
W5CEG(+K5JQG)
50,310- 387- 65-17
K5BWU(AG5B,WD5GXO,oprs)
46,300- 459- 50-15
WB5HPG(+KA5BXU)
20,748- 266- 39-17

Oklahoma

K5GL 197,676- 969-102-22
N5CG 193,920- 960-101-23
K2GKK/5 140,580- 709- 99-28
AE5Y 69,810- 523- 66-24
K5CKQ 63,024- 404- 78-22
W5KI 18,720- 204- 45- 8
WD5HTT/N 17,568- 139- 48-15
N5EO 12,348- 147- 42- 7
K5DEC 7680- 128- 30- 8
WD5DYT/N 1624- 42- 14-13
N5AFV/T 580- 19- 10-12
N5FF(+K5QEA)
214,632-1084- 99-20

Southern Texas

K5RC 429,284-1819-118-34
K5TM(K5ZD,opr)
366,282-1539-119-26
K5KG 130,694- 643-101-17
WA5IYX 102,720- 856- 60-21
N5APQ 82,008- 612- 67-20
N5AEP 79,872- 624- 64-23
WD5CAY 45,936- 348- 66-26
AE5E 42,408- 338- 62-24
WB5TUF 33,400- 334- 50-24
WA5RNV 29,356- 358- 41-14
WB5MCD(WB4ASZ,opr)
19,272- 219- 44-19
KA5ALL 14,350- 169- 35-13
AC5R 11,060- 154- 35-11
WA5OOB 10,224- 142- 36-11
WD5HRC 9768- 148- 33-19
WB5UQU/N 8352- 118- 29-17
KA5BYF/N 7700- 92- 25-21
WA5FOE 7688- 124- 31- 8
WA5GYX/5 7402- 121- 31-10
K5WA 5040- 90- 28- 1
WB5URH 3818- 83- 23- 6
K5HIM 2200- 50- 22- 7
WD5FJZ(+WD5s FJX FKA)
82,600- 826- 50-22
WB5ZCK(+KA5AJP)
44,268- 434- 51-21
N5RU(N5AMI,WD5BWM,oprs)
31,392- 309- 48-16
W5PXZ(WB5ITT,WD5s IXA JUD, oprs) 21,840- 258- 42-16
N5AF(+WB5LVL)
6800- 130- 25- 9

6

East Bay

AI6V 443,744-2263- 98-28
N6RO 441,840-1955-112-28
K6XO 89,320- 578- 77-14
WA6ZPL 46,900- 350- 67-24
K6CSL 18,270- 187- 45-
N6ASO 17,010- 189- 45-10
WD6EIZ(WD6FGA,opr)
15,120- 180- 42-15
K5GOE/6 10,578- 129- 41- 8
WB6VGC 2964- 57- 26- 4

Los Angeles

W6TPJ 145,152- 860- 84-25
WB6GHB 133,344- 923- 72-24
W6CN 104,412- 678- 77-23
W6GNS(WB6RXW,opr)
56,730- 458- 61-24
AI6K 44,016- 389- 56-18
WB6WQA 38,976- 348- 56-13
K6SE 32,352- 337- 48- 4
WA6POZ 29,268- 271- 54-21
N6HE 28,050- 237- 51- 6
AI6Z 24,486- 228- 53-10
WB6ZEP 22,950- 219- 51- 9
N6GL 19,928- 168- 53-10
KB6FN 17,202- 183- 47-17
WB6OWD 16,650- 172- 45-16
N6OB 8460- 86- 47-10
WA6RVY 5530- 79- 35- 5
W6LUL/6(+K6OKW)
160,632- 873- 92-20
KB6FT(+KB6FP,N6IB)
141,712-1042- 68-28

Orange

WA6FIT 206,720-1088- 95-22
N6KF 133,280- 833- 80-26
WB6AKR 60,416- 470- 64-15
WD6GKS 53,466- 399- 67-19
WA6BHR 46,150- 355- 65-20
N6AXL 39,284- 322- 61-19
WA6JWE 31,200- 287- 48-20
WA6NOL 25,984- 232- 56-18
W9UI/6 14,628- 159- 46- 8
W6TKV 7616- 112- 34-
N6PE 3132- 54- 29- 1
WD6CUT/N 2948- 52- 22- 5
W6VLD(W3CEQ,K6TXA,N6KM, W6WBP,WA6s DPQ GAT HJK, WB6ZSU,oprs)
432,648-2002-108-35

Santa Barbara

N6VR 53,582- 360- 73-10
WB6DNN 28,202- 191- 59-20
WD6CWJ/N 25,608- 219- 44-18
WA6NHB 24,750- 225- 55-17
WA6IJZ 19,890- 221- 45- 8
W6TKF 13,464- 153- 44-10
W6MUL 10,836- 120- 42- 6
WB6TJW 10,578- 129- 41-15
WA6VNO 5040- 78- 28- 5

Santa Clara Valley

W6MSF(WA6VEF,opr)
381,598-1966- 97-33
K6HNZ 285,296-1621- 88-29
K6KLY 174,408-1111- 78-25
K6ITL 130,368- 775- 84-18
K6RU 100,050- 667- 75-25
N6OI 77,140- 551- 70-19
W6SXD 63,756- 475- 66-24
WB6CQS 58,804- 478- 61-26
N6AN 57,070- 439- 65-12
N6UW 56,166- 394- 69-20
N6NF 47,520- 436- 54-10
WB6MDF 42,108- 350- 58-16
WB6SWH 38,822- 329- 59-17
WD6CKT/N 18,732- 148- 42-19
KA6DLS/N 10,530- 81- 39-16
WA6EKJ 5928- 78- 38-
N6RZ 3200- 40- 40- 2
K6MO 1548- 38- 18- 2

San Diego

N6ND 256,320-1411- 90-23
WA6WSI 85,260- 609- 70-25
W6ZMX 62,444- 466- 67-20
W6PNT 56,250- 375- 75-20
WA6VCE 51,750- 375- 69-25
W6UQF 35,028- 276- 63-11
K6GKU 28,842- 249- 57-15
W6ZT 23,986- 177- 67-15
WA6NEL 10,360- 140- 37- 2
WA6VNR 4698- 66- 27- 7
K6NY 2728- 62- 22- 4
WD6HCO(+WD6CZR)
53,424- 422- 63-22

San Francisco

N6CT 394,402-2028- 97-
WB6FCR 90,432- 625- 72-27
AA6DX 59,220- 470- 63- 9
AF6F 53,400- 411- 60-15
N6QC 40,176- 324- 62-13
WD5KEW/6N 13,760- 119- 40-15
K6JFY 11,766- 131- 37-14
N6KM 3432- 60- 26-
WD6EEQ(Multiop)
35,964- 333- 54- 8

San Joaquin Valley

AA6R 148,080- 880- 83-18
WA6CTW 137,088- 865- 84-25
K6YK 85,624- 503- 77-16
WD6AQJ 26,550- 225- 59-18
WD6BLH 14,382- 153- 47-14
KA6BIM/N 10,062- 93- 39-26
KB6CC 2160- 45- 24-
WB6PGJ 1804- 41- 22- 1
W6BYH 180- 18- 5- 1
WB6LBR(+WA6ALA)
71,736- 427- 84-31

Sacramento Valley

WB6POQ 67,284- 534- 63-29
W6YMH 36,096- 282- 64-20
W6AMW 34,760- 316- 55-16
WA6FFI 30,210- 279- 53-19
WB6OHV 26,786- 227- 59-23
K1FJM/6 23,124- 246- 47- 7
N6JM 19,008- 171- 54- 4
WA6BRV 8502- 109- 39- 4
KA6CDP/N 6206- 75- 29-12
K6XB 5612- 53- 52-12
W6SX 5100- 75- 34-

Hawaii

KH6XX 443,520-2309- 96-
KH6WF 403,332-2318- 87-20
KH6GMP 275,268-1582- 87-36
KH6IJ 66,000- 600- 55- 5
KH6H 23,980- 209- 9-
KH6CP 9000- 92- 36-14
K7SS/KH6 2- 1- 1-

7

Arizona

N7DD 648,796-2659-122-24
K6LL/7 481,632-2044-116-24
N7US 374,556-1903- 98-23
WB7PST 132,130- 905- 73-21
K7RDH 93,152- 568- 82-20
W7YS 83,328- 647- 64-14
WB7AWQ 26,096- 233- 56-22
N7MW 25,986- 200- 61- 7
WB7PGR 22,268- 293- 38- 8
K7TX 22,134- 217- 51-19
W7GZY 20,304- 216- 47-14
WA7YUL 19,928- 212- 47- 7
WB7BRB 6696- 93- 36- 4
WB7UDJ/N 5824- 63- 26-11
WB7PNZ 2714- 58- 23- 9
N7CW(+K7s BHM JVR,N4QS, W7JCW) 419,120-2014-104-27
WB7DDQ(K7s RMJ UOP,N7AQS, WA7s DXQ NIY,WB7ASR,oprs)
100,864- 742- 64-
WA7YON(+N7DS)
40,044- 387- 47-11

Idaho

K7NHV 434,520-2105-102-22
K7TM 188,024-1237- 76-27
N7SU 170,343-1044- 81-21
W7GHT 89,304- 732- 61-14
K7FR 86,940- 614- 70-22
AC7P 64,050- 507- 61-12
WB7NHS 28,620- 318- 46- 5
WB7URE 19,350- 195- 43-12
W7KXA 2014- 53- 19- 4

Montana

W7JYW 152,152-1001- 76-15
N7ALX 95,038- 779- 61-18
K7CPC 38,192- 423- 44-22
N7AKP 20,160- 240- 42-16
KA7AHC/N 9424- 100- 31-13
N7AMZ(+W7TYH)
167,904-1151- 72-30

Nevada

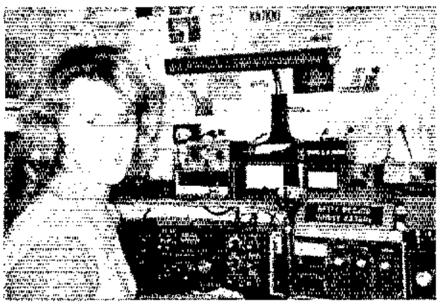
AD7Z 324,244-1574-103-25
K7TRG 84,546- 541- 77-25
W7LHE 22,300- 223- 50-15
AE7K 18,432- 236- 36-
KA7AVB/N 8064- 94- 28-36
WA7KNK(+K7SFN)
318,768-1832- 87-23

Oregon

W7EJ 509,534-2381-107-29
WA4HRG/7 283,694-1709- 83-24
WA7IHN 247,350-1649- 75-31
N7SC 163,680- 930- 88-22
AE7W 140,760-1016- 69-21
WB7QYI 137,614- 829- 83-26
W7QMU 132,320- 827- 80-30
W7TC 87,348- 753- 58-20
WB7ROE 83,790- 735- 57-22
N7EG 62,900- 425- 74-22
W7GVR 50,680- 362- 70-17
W7MLJ 42,921- 339- 57-20
WB7RKT 40,188- 387- 51-22
WB7VZP 32,242- 329- 49-
K7EAU 26,820- 288- 45-23
W7TWL 18,768- 199- 46-27
K7AA 17,630- 205- 43-
KA7BSJ/N 3358- 54- 23-17
W7LT 1596- 38- 21- 3
KA7BVG/N 1312- 25- 16-12
WB7WVK/N 484- 14- 11- 9
W7VW(AD7L,AE7U,K7TDX, WA7YPR,WB7s CXW DDH OUQ, oprs) 93,086- 760- 61-22

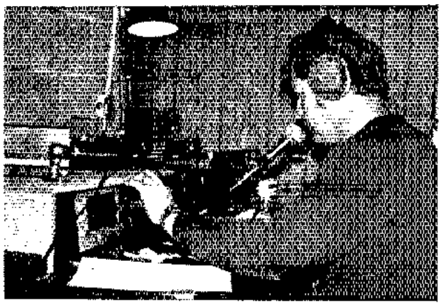
Utah

WA7ADK 211,680-1260- 84-21
WB7SVQ 169,084-1031- 82-21
W7GKC 79,356- 778- 51-13
WB7VDH 12,160- 185- 32-24
W7LGG 11,040- 136- 40- 9
K7EA 3400- 85- 20- 2



Betty, WD8JRG, number six in Ohio, put her 180 watts and 4-element homebrew beam to good use.

XE1OX, XE1OD, XE1GBM, XE1OW, XE1OK (l to r) multioped XE1MDX to the tune of 326k pts.



The top single-operator score from Alaska belongs to this gent. He's Bert, KL7IRT.

Washington

N7ZZ 500,118-2337-107-28
W6RR/7 434,310-2335- 93-30
K7RI(W7WA,opr) 426,690-2155- 99-33
WB7BNP 257,520-1480- 87-
WB7BFK 210,938-1159- 91-22
K7CR 145,854- 999- 73-27
K7YR 40,600- 406- 50- 6
K7ND 37,520- 318- 56-
W7GB 34,980- 330- 53- 6
W7ISX 26,800- 200- 67-14
WB7CSM 25,026- 289- 53-11
WA7LQQ 19,800- 165- 60-13
K7IDX/7 15,570- 173- 45- 5
WA7SLB 14,996- 163- 46-10
AA7W 14,726- 160- 37-13
W7DFO 9810- 102- 45- 6
W7DWJ 9280- 116- 40- 8
WB7SXF 2552- 58- 22- 2
K7EFB 1892- 43- 22- 5
W7BCS 1102- 29- 19-
AC6D/7(+WB7EHM) 83,096- 792- 52-26
WB7OVA(+K7OZ,WA7ZRP) 7062- 99- 33- 5

Wyoming

N7CG 138,320-1234- 56-24
WA7ZZV 58,406- 546- 53-14
WAØLJN/7 2688- 64- 21-14

Alaska

KL7IRT 354,600-2364- 75-24
KL7BV 272,300-1945- 70-14
KL7IVL 208,906-1559- 67-22
KL7JDH 109,244- 881- 62- 9
KL7AF 105,266- 721- 73-14
KL7MF 78,934- 647- 61-10
KL7IUJ 74,898- 657- 57-18
KL7IWF 7344- 108- 34- 8
KL7JEF 4704- 84- 28- 4
AL7Z(+KL7JIZ) 82,584- 662- 62-25

8

Michigan

W8FF 421,800-1850-114-26
WB8ALP 321,598-1423-113-25
KB8EC 199,576- 988-101-35
W8FJ 178,752- 795-112-20
WB8SIB 76,680- 421- 90-15
N8ACD 73,272- 426- 86-15
WA8RRR 72,312- 524- 69-11
N8AKY 50,912- 344- 74-27
WB8UKR 42,000- 250- 84-16
K8KF 25,800- 215- 60-
WB8MDG 23,900- 233- 50-25
W8WVU 20,696- 195- 52-10
WB8VCC 15,800- 158- 50-12
K8LIX 11,750- 125- 47-10
WD8MCN 11,692- 158- 37-15
WD8RIN/N 11,136- 100- 48-
WB8AAX 8976- 131- 33- 8
WD8EIA/T 7770- 82- 37-16
WD8EEK 6784- 106- 32-15
K8OT 5832- 81- 36- 4
WD8AHO 4176- 87- 24-10
WB8ZME 2380- 70- 17- 2
K8CV 2318- 61- 19- 4
WB8DSG 2100- 69- 14- 7
WD8KXN 1302- 31- 21- 3
K8NG 969- 21- 17- 4
AA8U(+K8s DMG LF MJZ SMC, KA8s AEE BXD,N8AW,WD8BDK) 486,288-1824-132-35
K8ZE(+W8MNL) 339,226-1500-113-36
WA8RUF(+K8MS,KA8BPY, WB8BUQ,WD8CIN,WN8PEE) 228,072-1109-102-36
WA8BUG(+K8NKB,WA8RNB, WB8s SBI UGI,WD8BMR) 48,990- 355- 69-25
WD8JZQ/N(+WD8IEX) 2242- 50- 19-10

Ohio

W8WPC(N9AG,opr) 256,450-1112-115-33
WB8IGY 215,514- 918-117-34
WD8ALG 153,924- 740-101-
K8FU 150,480- 750- 99-
WB8KKI 113,928- 564-101-30
WD8JRG 89,096- 514- 86-19
W8CBR 86,912- 448- 97-24
KA8BAC 59,488- 338- 88-27
K8KR 43,800- 292- 75-16
WB8TJS 41,600- 319- 65-15
K8DDG(WA1TWD,opr) 29,884- 241- 62-20
WB8SRK 29,394- 213- 69-32
K8IC 29,232- 232- 63-18
W8GOC 27,392- 206- 64-11
KB8EZ 21,924- 174- 63-
N8ARA 21,712- 184- 59-
W8LCY 21,700- 158- 62-13
AA8S 21,692- 187- 58-15
WB8APJ 16,092- 149- 54- 6
WD8PZL 14,842- 181- 41-12
KA8AZN/N 14,758- 132- 47-23
K8BL 13,572- 170- 39- 7
WA8UNP 13,530- 165- 41-15
KA8ATD/N 12,320- 115- 44-33
K8HV 11,544- 148- 39- 6
AC8R 11,316- 123- 46-14
WD8LJZ 10,480- 131- 40-16
WA8WLO 7004- 103- 34-12
W8NPF 5040- 64- 35-11
WD8DKJ 4590- 79- 27-24
WD8OHC 3848- 74- 26- 6
W8EAO 3328- 58- 26-11
K8AAZ 3024- 52- 28- 5
WD8PUH/N 2550- 44- 25-21
WD8JTG 1976- 52- 19- 6
K8MR 1938- 57- 17- 2
W8IDM 1364- 31- 22- 3
WD8MOV 676- 26- 13- 4
W8LXP 130- 13- 5-
WA8RCN(+K8III) 432,300-1635-131-36
WB8JBM(KA8DFL,N8DH,WB8s DQP JMP LSN YQJ,oprs) 326,118-1438-113-33
WA8PKB(+K8WW,WA8DXB) 296,478-1266-117-34
K8OCL(+K8ND,KB8s AC AH, W8CCW,WB8s MMW VLR YIJ) 152,852- 721-106-33
WD8OYO(+WD8PMW) 16,800- 175- 48-24
N8AFY(+W8IYA) 10,912- 124- 44-12
WD8MAF(+WD8MAI) 4524- 68- 29-15

West Virginia

N8II 256,036-1058-121-26
N8ACQ 21,970- 169- 65-11
K8BS 18,944- 148- 64-10
W8TN 14,040- 130- 54- 5
K8SR 2900- 50- 29- 4
W8JWX 1806- 41- 21-
W8MIF(+K8HUH,N8AK) 109,172- 557- 98-28

9

Illinois

K9HMB 584,508-2181-134-34
K9EGA 481,374-1707-141-34
KB9DU 199,704- 942-106-26
N9CQ 153,900- 855- 90-
WB9JKI 149,530- 786- 95-31
K9BG 124,644- 619- 94-19
W9IL 118,464- 612- 96-21
W9RW 115,900- 610- 95-16
W9OA 86,580- 481- 90-
K9HDE 66,068- 398- 83-
W9SE 63,448- 406- 77-19
W9CA 53,576- 360- 74-25
W9WY 51,576- 300- 84-15
WD9IIX 48,008- 353- 68-25
WD9EMI 46,900- 335- 70-24
AB9M 46,170- 405- 57-11
WD9FBE 40,820- 314- 65-17
N9UN 36,920- 257- 71-10
K9JDV 34,860- 249- 70-20
WD9INS 31,152- 255- 59-29
WB9VLM 28,618- 337- 41-13
KB9CZ 28,304- 244- 58-21
W9JZE 25,800- 255- 50-17
WD9AWG 25,326- 201- 63-28
K9BQL 24,100- 237- 50- 8
W9HPG 21,824- 171- 62-13
WD9HZK 20,160- 180- 56-25
AD9K 19,448- 221- 44-24
WD9IFW/N 18,868- 158- 53-24
WD9AEU 18,768- 184- 51-10
WD9FGN 14,100- 150- 47-23
W9REC 13,400- 134- 50-14
K9UQN 11,224- 122- 46- 6
K9BK 10,682- 109- 49-
WD9EGW 10,336- 130- 38-16
WD9GUF 8160- 136- 30-10
W9FSD 6592- 100- 32-22
WD9GGY 6206- 107- 29- 5
W9NU 5472- 66- 38-
WB9UKL 4224- 96- 22- 9
KA9AEK/N 2040- 39- 17-13
WB9KTQ 1920- 60- 16- 9
WD9FJF/N 1890- 37- 21-
WB9OVV 1760- 80- 22-13
WA9SVZ 1666- 49- 17- 2
W9WR 780- 56- 13- 9
WB9OTE 608- 38- 8- 3
W9GSB 588- 21- 14- 1
AA9F 496- 30- 8- 2
WA9EOD(+WB9VJB) 289,542-1353-107-31
W9NIN(+K9HV,N9AIH,WB9IUR, WD9DCL) 244,644-1094-111-
W9YH(K9s GL PW VV,W9IP, oprs) 198,856- 929-106-19
K9JU(+K9LA) 66,924- 429- 78-17
WD9APJ(+WB9ZNK) 50,256- 349- 72-25
WD9GKF(+WD9GVY) 47,880- 336- 70-32
WD9DPT(+WD9AVF) 36,064- 319- 56-30
W9WJ(+K9EG) 23,970- 235- 51-18

Indiana

W9RE 534,864-2019-132-33
N9BW 220,930- 968-114-20
W9NSO 172,620- 822-105-23
WB9FOL 57,904- 329- 88-18
N9AFU 49,280- 350- 70-14
WA9PKL 48,300- 333- 70-30
WD9DVO/N 42,560- 277- 70-26
KA9AOD/N 39,296- 252- 64-26
WB9FNR 20,720- 185- 56-
WD9EWT 20,608- 184- 56-16
WB9VXZ(WD9GSO,opr) 14,014- 141- 49-15
WB9LUG 13,000- 100- 65-21
WD9EME 12,320- 135- 44-15
AA9S 9030- 129- 35- 7
KB9CO 8262- 79- 51-15
KA9CDE/N 7888- 99- 34-16
N9NS 7784- 139- 28-
WD9JES 7000- 100- 35-20
WB9ZPK/N 5432- 79- 28- 9
W9LT 3520- 88- 20- 2
N9ACD 2014- 53- 19- 5
W9ZRX(+W9VNE) 411,184-1655-124-34
W9NAA(WD4RQM,N8RK,K9PS, oprs) 69,020- 493- 70-27
K9IU(WA2BIJ,W3EP,WB9VVV, oprs) 33,588- 311- 54-14
WD9DZR/N(+KA9BJG/N) 9044- 89- 38-

Wisconsin

K9DAF 230,904-1061-108-
W9OP 94,416- 562- 84-14
WD9DEE 71,288- 469- 76-20
WB9VOZ 52,216- 420- 61-15
WB9SVM 38,994- 290- 67-15
WB9YLR 33,120- 276- 60-15
W9WI 28,620- 257- 54-15
WB9QCY 28,296- 262- 54-20
N9AU 27,240- 227- 60-12
WD9CQC 25,092- 246- 51-13
W9HE 20,736- 162- 64- 9
KA9ACO/N 20,696- 153- 52-26
WA9FWD 15,496- 149- 52-14
WB9SVN 9834- 149- 33-15
N9AHY 6144- 128- 24-14
K9GDF 6138- 99- 31- 4
WB9PUZ 5346- 99- 27- 8
WB9KZI 5076- 85- 27-10
WB9OBX 4104- 108- 38-23
WD9DTF/T 2244- 55- 17-10
K9VSY 1248- 39- 16- 3
WB9LSR(+KB9BV) 127,424- 724- 88-32
WB9UBM(+KA9CHZ,WB9ZEN) 69,720- 417- 83-24
K9EAM(K9VCN,WA9SWX,WD9s BGA EGE,oprs) 56,414- 421- 67-25

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Colorado

NØCP 310,692-1523-102-27
KØPVI 217,294-1309- 83-20
KØJW 201,960-1120- 90-26
WØPEL 167,494-1009- 83-22
WØYK 61,410- 439- 69- 9
WØWT 45,808- 409- 56-17
ADØO 39,078- 501- 39-14
NØDV 30,952- 290- 53- 7
NØZA 26,784- 337- 36-11
WDØAKR 25,174- 303- 41-17
WØDK(WØPWS,opr) 24,064- 256- 47-14
WDØAZA/N 22,680- 246- 36-26
KØYBX 22,480- 281- 40-11
WBØGXR/N 21,560- 253- 35-24
WBØTGA/T 8424- 113- 26-13
WBØBWJ 652- 16- 11- 1
WDØDRA 24- 4- 3- 1
KØRF(+K6RF,KØGU,WDØDSU) 602,400-2503-120-36
WØCP(+WØUA) 408,450-1943-105-30

Iowa

WØSI 221,490-1032-107-32
WBØPYD 135,408- 803- 84-23
WDØEJQ 50,250- 375- 67-22
WBØRWM 46,916- 317- 14-22
WØPPF 29,520- 246- 60-29
WBØUCP 13,520- 130- 52-14
WBØJTH 7168- 112- 32-12
KØSRL 6432- 132- 24-11
NØBB 6360- 100- 30-13
WDØFGY/N 2176- 52- 16-10
WBØFPE 930- 82- 15- 4
WAØDWL 520- 20- 10- 6
WØGM(KØIMO,WBØs SEL YUI, oprs) 213,636- 937-114-24
WDØBLD(+WDØBKX) 48,880- 367- 65-24

Kansas

WBØBMB 239,360-1084-110-31
KØVGB 84,480- 528- 80-23
K9BLY/Ø 42,612- 288- 67-28
KØUSC 10,230- 155- 33-
KØFPC 5292- 87- 27- 7
WBØWZE 3888- 71- 27- 7
KAØBUT/N 2924- 62- 17-15
KØCS 1254- 33- 19- 1
WBØZAW(+WBØs ZAN ZAR) 3360- 73- 20-14

Minnesota

WØUC 136,032- 654-104-26
KBØBU 110,330- 649- 85-21
AFØQ 97,600- 605- 80-22
KØMPH 91,348- 557- 82-17
KØIR 68,400- 450- 76- 9
KØIJP 55,754- 455- 61-10
KØSVW 51,626- 311- 83-14
WBØUKI 37,752- 358- 52-18
KØSE 31,244- 213- 73-10
WBØVAZ 19,936- 178- 56-18
WAØCQG 16,992- 177- 48-10
WAØGNO 14,892- 219- 34-24
KØILI 6864- 104- 33- 8
KAØASU/N 6180- 81- 30-16
WDØFCX 4140- 114- 18-10
KØVW 4048- 88- 23- 4
WAØVHX 3876- 102- 19- 3
WØEI 3520- 72- 20-
NØDS 464- 24- 8- 4
WAØQWY 420- 23- 12-
KAØCSE/N 80- 8- 4- 2
KØSR(+WBØHCH) 212,200-1050-100-23
WBØNHD(+WBØSNH) 187,110- 944- 99-26
ACØW(+WBØLTH) 25,502- 311- 41-23
WDØBDA(+KAØCHG) 23,368- 237- 46-
WDØGPF/T(+AEØM) 4364- 168- 26- 8
KAØCRO/N(+WAØQWY) 416- 16- 8- 4

Missouri

WØXK 235,668- 958-123-26
WØMJ 212,368-1021-104-26
WDØGSY 27,020- 188- 70-33
WBØWAD 24,000- 200- 60-10
WBØUFB 20,384- 194- 49-18
WBØVHN 10,944- 152- 36-10
K4ZLE 9620- 130- 37-10
KØUQV 5600- 100- 28- 5
KAØCHK/N 4416- 73- 24-24
WBØWQZ 4080- 81- 24- 7
KØRWL(+KØVBU,WBØs LFY UZJ YBA) 135,108- 830- 81-23
WDØCPS(+WBØWSO) 39,168- 369- 51-28

Nebraska

KØSCM 253,120-1130-112-29
WBØWNH 32,760- 546- 30- 9
WBØGOB 25,532- 246- 52-10
WDØBQG/N 17,176- 163- 38-15
KØSW 1638- 39- 21- 3
WB4BWG/Ø(+NØAJU,WØEKB) 205,440- 960-107-30
KØUP(+WBØSIN) 175,626- 871- 99-22
KØKP(+WDØHBP) 135,470- 692- 95-26

North Dakota

WDØCCL 153,816- 986- 78-20
KØFRP 131,516- 854- 77-13
WDØBMG 86,496- 848- 51-20
WA6FUZ/Ø 26,376- 311- 42-
WØRIB 25,912- 316- 41- 7
WBØSCD 11,840- 185- 32- 6
WØHSC(WDØAJS/N,opr) 4000- 58- 25- 16

South Dakota

WØSD 306,726-1403-109-28
WBØMWJ 97,174- 631- 77-16
KBØAF 86,904- 639- 68-16
WAØARZ 30,928- 329- 47- 8
WBØYMR 28,408- 268- 53-13
WDØHWX 19,646- 418- 47-10
WDØBWH/N 13,616- 137- 37-21
KØJV 3086- 59- 21- 2
NØACL(+WBØs OQZ PJB) 151,864- 926- 82-19
WDØEMB(+WDØCXU) 74,060- 529- 70-18

VE

Newfoundland

VO1AE 111,540- 715- 78-19
VO1AW 5460- 61- 35- 4

Maritimes

VE1TG 324,800-1450-112-
VE1BPY 111,708- 642- 87-16
VE1AGE 22,448- 184- 61-15
VE1DXA(VE1s AIH BNN, WB2RLK,oprs) 680,720-2540-134-34
VE1BUG(+VE1s BGE BKF BKH BOW BUF) 326,308-1682- 97-33

Quebec

VE2WA 80,546- 381-103-14
VE2BSB 46,150- 325- 71-
VE2XL 16,638- 177- 47-17
VE2FMH 8938- 109- 41-20
VE2KW 6596- 97- 34-10

Ontario

VE3ECP(VE3BXY,opr) 160,174- 673-119-25
VE3KQT 104,104- 570- 91-30
VE3FAC 98,010- 495- 99-23
VE3OLR 93,324- 462-101-25
VE3JAY 92,586- 553- 78-
VE3IKN 85,120- 448- 95-24
CH3GCO 79,968- 476- 84-
VE3KME 59,130- 363- 81-26
VE3DAP 53,890- 316- 85-21
VE3FIU 48,100- 325- 74-27
VE3ITA 35,112- 231- 76-22
VE3JHU 26,130- 194- 65-
VE3ARL 26,112- 191- 68-16
VE3FEA 25,200- 196- 63-10
VE3KIU 19,000- 184- 50-25
VE3KPL 10,980- 122- 45-15
VE3BTJ 3752- 63- 28- 6
CF3GXZ(+VE3EJE) 100,620- 585- 86-28
VE3HU(+VE3HLP) 46,020- 347- 65-36
VE3SC(+VE2SD,VE3HJV) 12,012- 132- 42-

Manitoba

VE4SW 65,262- 447- 73- 7
VE4UX 32,824- 373- 44-15
VE4GN/4 27,146- 277- 49-20

Saskatchewan

VE5QY 70,440- 587- 60-15
VE5AAD 46,552- 485- 46-15
VE5JQ 24,384- 252- 48-19

Alberta

VE6WQ(VE6KW,opr) 523,908-2646- 99-23
VE6JA 325,416-1788- 91-26
VE6APH 225,984-1282- 88-22
VE6BKO 160,680-1236- 65-21
VE6RW 78,774- 691- 57-16
VE6BCC 75,600- 630- 60-21
VE6AGV 64,422- 529- 59-10
VE6TY 2744- 49- 28- 3
VE6CJD(+VE6ARB) 2204- 40- 19-15

British Columbia

VE7CMK(VE7CML,opr) 332,100-1845- 90-30
VE7BTV 248,844-1398- 89-30
VE7EL 80,160- 501- 80-22
VE7CGN 52,864- 442- 59-17
VE7EML 15,300- 170- 45-10
VE7CXC 1800- 50- 18- 2
VE7SAR/7(VE7s ACZ ARL AYY CBM CFC CJG CLC CLE,oprs) 62,944- 527- 56-23

Yukon - N.W.T.

VE8AW 107,712- 816- 66-18

Check Logs

CG6LB,DM2ARA,DM2DEO, DM2DGE,DM2DPD,DM2EVH, DM3VBE,DM3XM,DM4XCE, DM5XIG,EA7VT,F2RO,F6BJA, HA5AM,K6FM,K8RNM,K9UJ, N1NN,OK2BJU,OK3CAW,OK3TOA, OX3AK,OX3RA,OZ1AIK,OZ2MN, OZ9PP,PA3AAV,PAØGBY, PAØMVD,PAØTQL,SM5BAX, SM6AYM,SM6JZ,SM7HCW, SMØBDS,SP4GHT,UA1OCT, UA3ACD,UA3DDF,UA3DFV, UA3DGI,UA3DL,UA3DNK, UA3PDA,UA3TAM,UA4CDC, UA4ZA,UA6AIB,UAØAGI, UB5HBT,UB5LAW,UB5QFJ, UD6DHC,UK3XAA,UK5JAO, UK5QCL,UL7LCQ,UO5WB, UP2BCG,UT5JD,UW9DZ,VE2PJ, VE3KYX,VE4AED,W3CV,W9IGK, WA3HDU,WD5BCK,5T5CJ, DM-EA-9278/G

Disqualifications

WB6KOU

Operating News

Conducted By John F. Lindholm,* W1XX

Novice Roundup Revisited

Ever look at an old yearbook or old letters? It all seems so unimportant, even juvenile, now. That's sort of the feeling I had when I referred to old contest logs in order to prepare this write-up on the ARRL Novice Roundup. Nevertheless, I trucked down to the vault and poured over the records. See the table for a summary.

For the past four years, my goal has been to make at least 300 QSOs in the Novice Roundup (which is now actually the Novice/Technician Roundup). Why devote a significant investment of time in this activity? Beats the heck out of me.

I suppose the primary motivation is to help the beginner by providing the contacts and help toward Worked All States and improved operating ability, which ultimately leads to the General license. And I know that the recipients appreciate the contacts more than those in other competitions, where one is just a piece of meat in a log. I feel this way because I follow up the NR QSO with my QSL card and the enthusiastic responses resulting bear this out. It makes you feel that you are indeed making a contribution, however small, to the betterment of the Amateur Radio community.

The NR comes along in February and as luck would have it, it is one of several fun activities to indulge in during a blizzard. (Other magazines can fill you in on activities of a different scope.) But more to the point, the purpose of the NR is, of course, similar to other hf contests, but the goals of better operating and station design are more vital to the beginner.

First the good news. I've noticed the level of operating competence to be steadily increasing. The ball game is different now, because Novice tickets are permanent, so they have more time to get it together. My colleagues across the hall in the Club and Training Department would hasten to add that improved operating skill is the result of the fine ARRL training program. This is hard to dispute. Representation from ARRL sections has shown excellent growth as well, as the table will reveal. This past NR I missed only three sections, two of which I heard.

Now the bad news. My big gripe is with those Generals-and-above who insist on calling CQ NR. Yes, *you*. In my operating, the "rate" (QSOs per hour) is poor, because I go around the band answering Novices, not trying to run them. Believe me, this is a time-consuming process. However, I feel it violates the spirit of the NR for "upperclassmen" with big suckermasters (triband beams) and other stuff, to invade the relatively small Novice segments like carpetbaggers, and start CQing. After all, the contest belongs to Novices and Techs; others are only the supporting cast.

The rules of the contest don't say anything about this matter and I'm not saying they should, because we all know what rules are made for. Common sense and fair play should rule. In '76, I fired up on 40 meters late one night to entice the California sections I needed. It worked; all I missed in W6 was SCV. But it shouldn't be necessary.

So, Novices, don't be bashful. If you are participating in the contest, call CQ NR. Let it all hang out, even if you don't have the loudest signal in the world. There are many of us tuning the bands looking for you. So I eventually decided that I would just answer stations in the NR. Believe me, 300 Qs is quite an accomplishment under the circumstances. Guess it's the so-called "thrill of the hunt" that keeps me going. I'll just take my chances with the section multipliers.

Okay, here are some suggestions for Novice on-the-air conduct for future roundups (applicable to other contests too):

The contest exchange — Once *is* enough. For example, K1XA DE KA1BUQ 599 CT $\overline{BK}$. That's all there is to it. If he needs it again, you have my personal iron-clad guarantee that you will be the first to know.

Year	Contacts	Sections Worked (Maximum 67)
1976	300	56
1977	321	59
1978	344	61
1979	337	64

Calling CQ — Now that you're convinced to do it, don't *overdo* it. There are plenty of stations waiting for you; brevity will make you very popular.

Ten meters — This band was underutilized during the Novice Roundup. Ten was wide open, yet contest activity was minimal. Everyone seemed to congregate on 15. With the ease of getting on 10, converted CB verticals and such, a golden opportunity exists for unlimited QSOs. Keep it in mind for next year.

Technician participation — My records indicate that only five percent of the stations worked in 1979 were Technicians. The figure was eight percent in '77 and '78. Two-meter fm can't be that exciting.

DX stations — I know it's difficult, with all the bizarre United States call signs lurking around, but you will possibly be called by stations whose prefixes are *not* a variation on W, K, N or A. These will be DX stations, often some pretty rare and juicy ones. Don't frustrate them by making them repeat their calls 18 times; they are definitely out-of-towners. And they could be calling you on sideband, since most foreign hams can operate phone just about anywhere.

Also on the subject of calls, please be sure to sign /N or /T during the contest; you can't tell status by call anymore. It's a bummer not being able to tell what's what.

The other stuff is the usual; listening before transmitting, making sure you are zero beat, properly adjusted keying, wax removed from ears, y'know. But like I say, the consensus is that the majority of the ops are pretty decent.

Then again, I could be looking at the NR with a slightly jaundiced eye, because my Novice career did not include this contest, or much of anything else. With an HW-16 and a joystick (no kidding) in a first-floor apartment, I was your basic local QRPer. With today's advances, it tends to make one want to go back and start all over. It would be a blast.

Will I operate a fifth consecutive time? Well, if I can even come close to the zeal exhibited by most new hams, you may hear me in there. A clean sweep would be nice. . . . — *Robert Halprin, K1XA*

SCM ELECTION RESULTS

The following election was conducted for a two-year term of office beginning April 1, 1979:

Balloting Results: In the Orange Section, Roy C. Zukerman, AC6H, received 883 votes and Fried Heyn, WA6WZO, received 363 votes. Mr. Zukerman is declared elected.

The following were elected for two-year terms of office beginning July 1, 1979:

Uncontested:

NF	Rex P. Greenwell, KØKP
NV	Ralph E. Covington, Sr., W7SK
Alberta	Sydney T. Jones, VE6MJ
RI	John Titterington, W1EOF
NNJ	Robert E. Neukomm, WA2MVQ
SJV	Charles P. McConnell, W6DPD
UT	Royce Henningson, K7QEQ
MD-DC	Karl R. Medrow, W3FA
NH	Robert C. Mitchell, W1NH
Sask	Norm Waltho, VE5AE

Appointments: In the Georgia Section, Edmond J. Kosobucki, K4JNL, was appointed to complete the term (until September 30, 1979) of A. H. Stakely, K4WC (resigned).

In the Maine Section, Edward B. Bristow, Jr., WA1MUX, was appointed to complete the term (until June 30, 1980) of Bill Mann, W1KX (resigned).

In the Pacific Section, J. P. Corrigan, KH6DD, was appointed to complete the term (until March 31, 1980) of George H. Morton, N7HR/KH6 (resigned).

*Communications Manager, ARRL

DATE (UTC)	OSCAR 7 Ref. Orbit	OSCAR 7 Time (UTC)	OSCAR 7 Long. W.	OSCAR 8 Ref. Orbit	OSCAR 8 Time (UTC)	OSCAR 8 Long. W.	SOVIET RS Ref. Orbit	SOVIET RS Time (UTC)	SOVIET RS Long. W.
1 June	20775	0002:24	64.0	6310AJ	0133:46	68.6	2606	0031:53	228.9
2 June	20788	0056:41	77.6	6324J	0138:46	69.9	2618	0136:33	231.7
3 June	20801	0150:58	91.1	6337J	0000:54	45.4	2630	0141:13	234.4
4 June	20813	0050:18	76.0	6351A	0006:05	46.7	2642	0144:54	237.1
5 June	20826	0144:35	89.6	6365AJ	0011:15	48.1	2654	0150:34	239.8
6 June	20838	0043:55	74.4	6379X	0016:26	49.4	2666	0155:15	242.6
7 June	20851	0138:12	88.0	6393A	0021:37	50.7	2678	0159:55	245.3
8 June	20863	0037:32	72.9	6407AJ	0026:47	52.0	2689	0004:12	217.8
9 June	20876	0131:49	86.5	6421J	0031:58	53.3	2701	0008:52	220.5
10 June	20888	0031:10	71.3	6435J	0037:09	54.6	2713	0013:33	223.2
11 June	20901	0125:27	84.9	6449A	0042:19	55.9	2725	0018:13	225.9
12 June	20913	0024:47	69.8	6463AJ	0047:30	57.2	2737	0022:54	228.7
13 June	20926	0119:04	83.3	6477X	0052:40	58.5	2749	0027:34	231.4
14 June	20938	0018:24	68.2	6491A	0057:51	59.8	2761	0032:14	234.1
15 June	20951	0112:41	81.8	6505AJ	0103:02	61.2	2773	0036:55	236.8
16 June	20963	0012:01	66.6	6519J	0108:12	62.5	2785	0041:35	239.5
17 June	20976	0106:18	80.2	6533J	0113:23	63.8	2797	0046:15	242.3
18 June	20988	0005:39	65.1	6547A	0118:33	65.1	2809	0050:56	245.0
19 June	21001	0059:55	78.7	6561AJ	0123:44	66.4	2821	0055:36	247.7
20 June	21014	0154:12	92.3	6575X	0128:54	67.7	2833	0100:17	250.4
21 June	21026	0053:33	77.1	6589A	0134:05	69.0	2845	0104:57	253.2
22 June	21039	0147:50	90.7	6603AJ	0139:15	70.3	2857	0109:37	255.9
23 June	21051	0047:10	75.6	6616AJ	0001:12	45.8	2869	0114:18	258.6
24 June	21064	0141:27	89.1	6330AJ	0006:23	47.1	2881	0118:58	261.3
25 June	21076	0040:47	74.0	6644A	0011:33	48.4	2893	0123:38	264.0
26 June	21089	0135:04	87.6	6658AJ	0016:43	49.8	2905	0128:19	266.8
27 June	21101	0034:24	72.4	6672X	0021:54	51.1	2917	0132:59	269.5
28 June	21114	0128:41	86.0	6686A	0027:04	52.4	2929	0137:40	272.2
29 June	21126	0028:02	70.9	6700AJ	0032:15	53.7	2941	0142:20	274.9
30 June	21139	0122:19	84.5	6714J	0037:25	55.0	2953	0147:00	277.6
1 July	21151	0021:39	69.3	6728J	0042:35	56.3	2965	0151:41	280.4
2 July	21164	0115:56	82.9	6742A	0047:46	57.6	2977	0156:21	282.8
3 July	21176	0015:16	67.8	6756AJ	0052:56	58.9	2988	0000:38	254.8
4 July	21189	0109:33	81.3	6770X	0058:06	60.2	3000	0005:18	257.8
5 July	21201	0008:53	66.2	6784A	0103:17	61.5	3012	0009:59	260.8
6 July	21214	0103:10	79.8	6798AJ	0108:27	62.9	3024	0014:39	263.0
7 July	21226	0002:31	64.6	6812J	0113:37	64.2	3036	0019:19	265.8

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz
RS			
Mode A	145.880-145.920 MHz	29.360-29.400 MHz	29.401 MHz

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Have you listened to OSCAR 8 yet? It is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

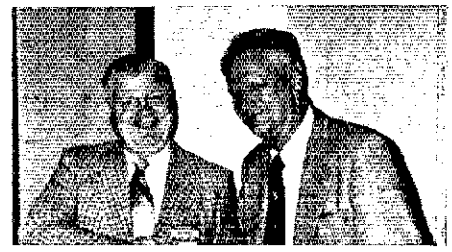
Notes

1) The times and longitudes are for the satellites' first equator crossing each day, which is called the reference orbit.
2) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
3) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL. At no time exceed 10 W erp using Soviet RS.
4) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
5) O 7 progresses an average of 28.737642° W. per orbit in a period of 114.944826 minutes. O 8 progresses an average of 25.807848° W. in a period of 103.226830 minutes. RS period is 120.3894 minutes. RS progresses 30.227° W.
6) O 8 modes of operation are Mondays and Thursdays Mode A. Tuesday and Friday Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. OSCAR locators for O 7, O 8 and Soviet RS are available in the new *Satellite Communications* package at your dealer or direct from ARRL; $4.75 U.S., $5.50 elsewhere.

Strays

Since making his first transatlantic contact with 8AB in France in 1923, DX has been a challenge for Bob Morris, W2LV, shown here after qualifying for his satellite DXCC no. 2 certificate. Bob participated in the first transatlantic Deloy-Schnell-Reinartz contact and listened to the first historic message. The Sparta, NJ, resident is an honorary member of the Sussex County ARC, a charter member of the North Jersey DX Association, and an Honor Roll DXCC member. *(W2GK photo)*



ARRL President Harry Dannals, W2HD (left), received the keys to Charlotte, NC, from City Councilman George Sheldon at the recent ARRL North Carolina State Convention and Metrolina Hamfest. Dannals was the key speaker at the hamfest banquet in March. *(photo by Ervin Jackson, Jr.)*

I would like to get in touch with . . .

☐ hams interested in joining the Northwest Astronomy Net, which meets Sundays at 10 P.M. Pacific Local Time on 3.925 MHz. Forrest W. Smith, WB7AEA, P. O. Box 531, Gearhart, OR 97138.

☐ anyone interested in starting a U.S. Novice European Net. Contact Bernie McClenny, WB3JRU, 1014 Gadsen Ave., Silver Spring, MD 20904.

☐ hams interested in starting a 20- or 10-meter cw WAS net on weekends. Contact Kendall Addison, WDØCPS, 616 Spring Meadow Dr., Ballwin, MO 63011.

☐ hams who use Amateur Radio in search and rescue operations. Contact Jeff Howell, EMT-A, WB9PFZ, Director, Pulaski County Search and Rescue, P. O. Box 737, Francesville, IN 47946.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

JUNE

2-3

Nebraska QSO Party, May *QST*, page 91.
Minnesota QSO Party, May *QST*, page 91.

7

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z. The run takes place at 9 P.M. PDT the night of May 6. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any), and complete mailing address. A large, self-addressed envelope will help expedite your award/endorsements.

9-10

VHF QSO Party, May *QST*, page 87.
Diploma Altamira Contest, sponsored by the Santander and Province Group of the Spanish Radioamateur Union (URE). Commemorates the 100th anniversary of the discovery of prehistoric caverns with cave paintings. A 48-hour period, phone and cw. Work EAØ stations only. Phone or cw QSOs on each band. Repeat QSOs each day permitted. Send signal report and time in UTC for the exchange. Santander stations will use EAØ prefix. Count one point for cw and two for phone QSOs except two for cw and three for phone for special station EAØURE. The Diploma Altamira will be earned with 30 points for European and North African stations, 20 points for North and South Americans, and 10 points for South Africa, Asia and Oceania. Logs must be accompanied by QSLs for each EAØ station worked per band. Special QSLs will be sent by all EAØ stations. Send by July 10 to: Diploma Altamira Contest, P. O. Box 1, Santillana del Mar, Spain.

13

W1AW Qualifying Run, 10-40 wpm at 0200Z (10 P.M. EDT, June 12). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.55 MHz. May *QST* (page 89) carries the complete W1AW schedule of code practice and bulletins, or send an s.a.s.e. to ARRL for a copy. Other details per the June 7 listing.

16-17

West Virginia QSO Party, sponsored by the West Virginia State Amateur Radio Council. 2300Z June 16 until 2300Z June 17. The same station may be worked on different bands. Exchange QSO number, signal report and county (WV only), state or country. WV stations may work each other. Out-of-state stations multiply QSOs by WV counties for final score. WV stations multiply QSOs by WV counties, states and countries worked. Those running 200 watts or less multiply by 1.5 for final score. Only single-operator stations eligible for awards. Suggested frequencies on cw are 35 kHz from the bottom and on phone 10 kHz inside the General portion of the band. To be eligible for awards, logs must show 50 QSOs (20 for Novices). Logs must be RECEIVED by July 15. Send to West Virginia QSO Party, Box 36, Seneca Rocks, WV 26884.

VK/ZL/Oceania/RTTY DX Contest, 1000Z June 16 until 1000Z June 17. 3.5 through 28 MHz. Single or multioperator entry classes. Multiop entries must be signed by all operators with call signs listed. Exchange signal report, ITU zone, time in UTC. Points per QSO based on CARTG Zone Chart (s.a.s.e. to VK2EG for a copy). Multiply points times countries times continents for score. 40-meter QSOs on other continents count double, 80-meter triple. Add 100 points for each VK/ZL QSO on 14/21/28 MHz, 200 for each on 7 MHz and 300 for each on 3.5 MHz. Use ARRL countries list except that VK/ZL/JA/W call areas count separate. Logs must show date, time (UTC), station worked, serial number received, s/n sent, points claimed. Logs must be received by the contest committee no later than August 18. Send to: Bill Storer, VK2EG, 55 Prince Charles Rd., Frenchs Forest, 2086, NSW, Australia.

*Assistant Communications Manager, ARRL

All-Asian DX Contest phone, sponsored by the Japan Amateur Radio League, the 30-hour period from 1000Z June 16 to 1600Z June 17 (cw will take place August 25-26). All bands below 30 MHz may be used. Entry classifications: single-op, single band; single-op multiband; and multi-multi. Note cw only on 160 meters. W/VEs call CQ AA. Exchange RST plus two figures denoting the age of the operator, YL operators use 00. No crossband contacts permitted. Only one signal per band regardless of category. Scoring: Non-Asians count one point for each complete contact with an Asian station. The multiplier is the number of different Asian *prefixes* worked on each band. Note: Only JD1 stations on Ogasawara (Bonin & Volcano) count for Asia. Contacts with KA stations do not count. (They are considered military rather than amateur.) Scoring: Multiply the sum of contact points on each band by the sum of multipliers on each band. Log separately for each band and use a complete summary, note the first time a new prefix is worked on each band. Awards. Usual disqualification procedures. The JARL Asian countries list: A4 A51 A6 A7 A9 AP BV BY CR9 EP HL/HM HS HZ/7Z JA/JE/JF/JG/JH/JI/JJ/JR JD1 (Ogasawara) JD1 (Okino Torishima) JT JY OD5 S21 TA UA/UK/UV/UW/9-0 UD6/UK6C-D-K UF6/JK6F-O-Q-V UG6/UK6G UH8/UK8H UI8/UK8A-G-I-L-O-T-Z UJ8/UK8J-R UL7/UK7 UM8/UK8M-N VS6 VS9M/8Q6 VU VU (Andamans) VU (Laccadives) XU XV XW8 XZ YA YI YK ZC4/5B4 1S (Spratly) 4S7 4W 4X/4Z 7O (Yemen) 7O (Kamaran) 8Z4 9K2 9M2 9N1 9V1 and Abu Ail. Contest results may be obtained by enclosing one IRC and an addressed envelope with your entry, which must arrive no later than September 30 (for phone) or November 30 (cw). Send to: JARL, Box 377, Tokyo Central, Japan.

23-24

Field Day, May *QST*, page 85.

27

W1AW Qualifying Run, 10-35 wpm at 1300Z (9 A.M. EDT). See June 13 for more details.

30-1

Seven-Land QSO Party, sponsored by the NAS Whidbey Island Amateur Radio Club, open to all, from 1200Z June 30 through 2400Z July 1. Categories are single transmitter, either single operator or multioperator. Stations outside of the seventh W/VE call districts QSO as many seven-land W/VE stations as possible in a maximum of 30 hours out of the total 36-hour contest. The same station may be worked on each band. Seven-land stations will be located in Alaska, Arizona, British Columbia, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming. Seven-land stations score one point per valid QSO (including QSOs with other seven-land stations). All others get five points per valid QSO with a seven-land station (nonseven-land QSOs do not count). All W/VE stations (including KH6/KL7) transmit RS(T) and state or province. Others transmit RS(T) and consecutive serial number starting with 001. On each band, seven-land stations get one multiplier for each of the 50 states and one for each VE province. On each band all others get one multiplier for each state or province worked on the seventh W/VE district (see above). Power multiplier: 500 watts dc input or more × 1, 300-499 watts × 1.25, 100-299 watts dc × 1.5, less than 100 watts dc input × 2, five watts or less × 5. QSOs times points times sum of all multipliers times power multiplier equals claimed score. Entries must include logs, summary with usual info. Dupe sheet required for each band for those making 100 or more QSOs. All entries must include a business-size s.a.s.e.; DX stations enclose two IRCs. Entry deadline is August 1. Mail to NAS Whidbey Island ARC, Lloyd Vancil, WB7NVM, 3541 Appian Way, Oak Harbor, WA 98277.

JULY

4

Straight-Key Night, the full 24-hour period. This is a friendly meeting on the air, using straight keys; from 0000-2400Z. Suggested areas of operation on 80, 40 and 20 are 60-80 kHz up from the bottom edge of the cw band; 10 kHz up from the bottom of each Novice segment. When participating, please use SKN in lieu of RST, preceding the three-digit report, to clue in "passersby." Following SKN, send a list of the calls of the stations you worked plus your vote for the best fist heard that period (not necessarily one you've worked). This is not a contest and we aim to keep it that way! Vote too for the most interesting QSO of the period. With your report include any interesting, appropriate photos for consideration.

5

West Coast Qualifying Run, 10-35 wpm at 0400Z (9 P.M. PDT on July 4). See June 7 for more details.

12

W1AW Qualifying Run, 10-35 wpm at 0200Z (10 P.M. EDT on July 11). See June 13 listing for more details.

14-15

IARU Radiosport Championship, May *QST*, page 84.
Colombian Independence Day Contest, sponsored by the Colombian Society, the LCRA, commemorating the 169th anniversary of the independence of Colombia, the full 48-hour period UTC. Categories are single-op single band, single-op multiband, multi-multi (one rig); 80-10 meters. Modes are phone and cw. Call CQ HK. Exchange serial number of report plus consecutive QSO number starting with 001. HK stations will transmit report plus HK prefix (i.e., 57HK3 or 589HK4). Each QSO with an HK station counts 5 points, with stations on another continent 3 points, with a station in another DX country (same continent) 2 points, same country 1 point. The multiplier is the sum of different countries worked on each band. This times points equals final score. Log each band separately, in UTC, note new multiplier the first time it is contacted. Include a signed summary sheet. A minimum of 50 QSOs must be shown to qualify for an award. Only one contact per band with the same station. No crossband or cross mode. Club stations participate as multioperator multiband (single transmitter). Usual disqualification criteria. Entries must be postmarked by September 30 and sent to LCRA Contest, Apartado Postal 584, Bogota, Colombia, S.A.

21-22

VHF Space Net Contest
QRP Summer Contest
SEANET Contest, cw

28-29

Danubian Bent Contest (HA)
County Hunters Contest
New Jersey QSO Party
Rhode Island QSO Party

31

W1AW Qualifying Run

AUGUST

4-5: UHF Contest;
Illinois QSO Party;
YO DX Contest
11-12: WAE, cw
18-19: SEANET, phone;
SARTG RTTY
25-26: All Asia, cw

SEPTEMBER

8-9: VHF QSO Party
16: Frequency Measuring Test

OCTOBER

6-7: Simulated Emergency Test

Station Activities

SCM ≤ ARES ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤ CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ RCC ≤ WAS ≤ STM ≤ OES ≤ OTS ≤ NM

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Mgr. (APSN): VE6AFO. Net Mgr. (ACWN): VE6BBL. It is with regret that we report the passing of two more amateurs: VE6US and VE6YZ. A new repeater, sponsored by the Camrose Group, will be on the air shortly using the call VE6WW on a freq. of 146.16-146.76 (this is Walter Watson's old call). For those who may be interested, there is an award available for working stations through the various satellites from the Northern Alberta Radio Club. Contact VE6SF or any of the uht group for details. Word has been received from ARRL Headquarters confirming my reelection as your SCM and I would like to express my appreciation to all those who so kindly signed my nomination papers. I shall continue to do my best for amateur radio. Traffic: VE6HO 64, VE6VZ 37, VE6ABC 25, VE6BBL 21, VE6MJ 5, VE6CJT 3, VE6YW 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — British Columbia Emergency Net, 3650 kHz at 0300Z reports it has reached the highest month in March with Check-Ins and QTC. Slowing cw down to 10 to 15 wpm is the facts of life to increase nets activities. BC phone net 3755 kHz at 0200 is still maintaining its high check-ins. VE7QC still our phone manager. Last report they have drilled through 160 feet of granite and no well water for the house. Nice report from Shuswap ARC. Sure have active plans for the summer. Dogwood Chapter QCWA, June 30, GAM and evening party in Vernon. All are welcome. Traffic: VE7ZK 130, VE7FB 47, VE7COA 37, VE7DFY 34, VE7BLO 20, VE7CDF 16, VE7BLS 10.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR. NMs: VE4s NM VJ IZ TE. The Carman Fair this July is creating a lot of interest, not only in Manitoba. Much traffic originated and a lot of rusty operators got their feet wet. Ice in March took a heavy toll in antennas. Mostly quads, but also a few dipoles. The slow CW net is again operating on a 2 day a week basis, with good results. MEPN QNI 1345, QTC 190, 31 sess. MMN QNI 602, QTC 136, 31 sess. MTN QNI 242, QTC 158, 31 sess. WRIN QNI 116, QTC nil, 4 sess. Traffic: VE4PG 224, VE4IW 219, VE4JA 216, VE4RO 188, VE4LS 123, VE4JK 110, VE4IZ 88, VE4QJ 57, VE4HR 42, VE4CR 32, VE4AAD 31, VE4TE 26, VE4ID 25, VE4AED 24, VE4OE 22, VE4LU 19, VE4NM 19, VE4AEJ 17, VE4AEA 16, VE4AX 12, VE4EJ 12, VE4NE 12, VE4FK 11, VE4LB 6, VE4AGS 5, VE4IF 4, VE4ACX 3, VE4BD 3, VE4GW 3, VE4PA 3, VE4JP 2, VE4LN 2, VE4XN 2, VE4MG 1.

MARITIME/NFLD.: SCM, Aaron D. Solomon, VE10C — A/SCM: VO1FG. STM: VE1WF. SEC: VE1ASW. NMs: VO1JN, VE1WF. Silent Keys: VO1BZ, VO1LO. Hosp. VE1NZ VE1RO. Fifty NS Am attended EMO Seminar at Debert, NS. Band condx poor due to Aurora Borealis activity. VE1 call books dist by HARC. VO1 call books by SONRA. Bull Editors VE1s FQ RI RY UT WB BKH to be commended for their efforts in keeping fraternity informed. New amateurs Sydney area: VE1AER VE1AA VE1BLP. Stories of Month: "When Disaster Strikes" by VE1IG in CB Am. "The Good Old Days" by VE1CK in NB Ham. VE1ASJ rpts. 6 Meter Activity in NB Ham. VE1AIC has been appt to ARRL VHF Advisory Board. VE1WF writes abt. "Traffic Handling" in NSARA & CB Am. ARCON ex. VO1PR, pres.; VO1IT, vice-pres.; VO1AL, treas.; VO1FJ, secy.; VO1DF, treas. DA: SONRA Ex. VO1FX, pres.; VO1IM, vice-pres.; VO1MG, secy.; VO1CR, treas.; CA HP JN, dir. Latest Nfld Repeater info. In SONRA VO Call Book. Reunion Naval Comm. July 20-22 Info. Box 2755 Dartmouth NS APN; Sess. 31, QNI 231, QTC 132/120. NPN: Sess. 30, QNI 1231, QTC 1. Traffic: (Mar.) VE1WF 265, VE1RO/LCR 106, VE1BSE 99, VE1OC 48, VE1RI 37, VE1BOT 21, VE1KR 14, VO1PR 9. (Feb.) VE1RO/LCR 85.

ONTARIO: SCM, Larry Thiverge, VE3GT — SEC: VE3APK. STM: VE3GOL. The Atmospheric Environment Service (AES) of Environment Canada provides a system of monitoring and tracking severe local summer storms in Ontario. They have requested the assistance of amateur radio operators to participate in their program by acting as weather watchers. Volunteers who do participate, look for severe weather events such as hail, funnel-shaped clouds, damaging winds, etc. and send their reports as quickly as possible to the Ontario Weather Centre in Toronto. A special hot-line will be set up for the purpose of collecting data from weather watchers. Further details will be made available and issued through Ontario Traffic nets. VE3PQ spoke to the Scarboro and South Pickering ARCs on phone traffic handling. Congrats to VE3HAJ on accepting an Asst. Directorship with the CRRL. VE3CYR has organized a high school/college net for the purpose of exchanging general communications and technical data. Cw or ssb is used with contact being made on 3755 kHz and QSY to 3790 kHz on Tues. and Fri. at 3:15 PM local time. VE3s SRC TSS and UDO have been active. If your school has a station, why not join in. OTSer VE3KX, celebrates 60 years in amateur radio and 50 years as a League member. VE3CZX now VE2BM. VE3FGT has a new Yaesu FT-227R. VE3JIR moves to Toronto and a new position. New appointees: OTS, VE3s DUK ITN and JHE. EC: VE3ITN and VE3JHE. VE3ILK has his Advanced. VE3APK doing a super job as the SEC and promoting the ARES. VE3HSF back on the air. VE3ILN has a new MN2000 tuner. VE3AC busy running phone patches from the Far East into the Sudbury area. VE3ISW, OSN NM, zone winner on cw IARU radiosport championship. Bill Orr's new handbook contains one of VE3GFN's receiver designs. Regretfully I announce that VE3s BQI EPF IHM and PK have become Silent Keys. AMSAT celebrates their 10th anniversary. Hamilton ARC operates repeaters VE3DRW and VE3MBR. VE3OU pleased with net attendance for the Southern Ont. chapter QCWA. Have a safe summer and don't forget FD June 23 and 24. Traffic: (Mar.) VE3GOL 448, VE3ISW 208, VE3JIR 204, VE3KK 204, VE3HGJ 198, VE3JRT 197, VE3GFN 163, VE3DPO 162, VE3FGU 150, VE3FZG 117, VE3CYR 116, VE3GT 110, VE3SB 85, VE3GJG 73, VE3GYD 65, VE3DVE 61, VE3GNW 61, VE3ATR 42, VE3FHZ 41, VE3ANJ 35, VE3BVG 34, VE3IMR 28, VE3APK 24, VE3DUK 24, VE3AWE 23, VE3IFP 22, VE3JRO 21, VE3EBC 20, VE3WM 15, VE3IZC 14, VE3FRG 13, VE3JHE 11, VE3FGV 10, VE3AJN 8. (Feb.) VE3JIR 277, VE3AWE 12, VE3IMR 7.

SASKATCHEWAN: SCM, Norm Waltho, VE5AE — NM VE5HG VE5DC. The outgoing SCM, Percy Crosthwaite VE5RP, has had this position for the past six years and has done an outstanding job for the amateurs of the Sask. Section and for the betterment of Amateur Radio. I hope you will give me all the co-operation you did him. Saskatoon Club will be doing the communications for the up-comming summer games. VE5RPR repeater was down for repairs to the windcharger, working fb now. SATN (Mar.) QNI 322, QTC 21. Traffic: VE5AE 28, VE5HG 18, VE5DC 15, VE5TT 14, VE5QY 11, VE5WM 11, VE5OL 6, VE5RP 5, VE5RB 4, VE5LC 2, VE3AAT 1.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3QO W3WD. PSHR N3AKC 47. It is with sincere regret that we note another "Silent Key," W3ZNF. He was a Life Member, Asst. Director, and 2-Meter Pioneer on am and fm in Downstate Delaware. His "News from Newington" column appeared in most state Ham Bulletins. He will be missed by all of us. The Spring Del. Ham Campout is scheduled for June 9 & 10 at Tuckahoe Acres near Dagsboro. Contact WA3QLS for reservation information. K3HBP is v. pres. of DARC. New Generals are KA3BOH and KA3BOI. DTN-QNI 391, QTC 89, DEPN-QNI 69, Tfc. 21. Traffic: (Mar.) W3PQ 366, N3AKC 204, W3QO 52, WA3GAY 38, W3DKX 36, WA3WIY 25, W3WD 18, WB3GXD 12, WB3DUG 10, K3JL 10, AC3T 10. (Feb.) AC3T 12.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. STM: K3NGN. NMs: K3KW W3VA WB3BKV K3AIZ. Net repts.: EPA QNI 685, QTC 442; EPAEP&TN QNI 338, QTC 111; PFN QNI 362, QTC 1212; PTTN QNI 419, QTC 176; LVN QNI 15, QTC 23; ARECI(2) QNI 16; LCARES QNI 148, QTC 27, OOs K3RDT W3CL W3KEK K3NSN. OBSs: W3CL W3AVJ K3EBZ N3AIU. W3ID W3VA K3NSN WA3JZA WB3ELA. OVSs: WB3CTU WA3BJQ N3CP W3CL K3YD WB3JZA W3GOA. BPL: W3CUL W3VR K3NSN WA3WQP WA3ATQ N3AIU. PSHR: WA3WQP N3AIU AA3B W3DP WB3JGP WA3JYZ WA3TAV W3GOA. We have a new STM, K3NGN. K3KW now mgr. TCC! New NM for PTTN is WB3BKV. NOTICE: When giving info re others or a club, indicate your position or authority. I have gotten some bum dope and don't want to offend anyone with mis-information, OK! Most everyone reports summer will get here before spring. W3CUL and W3VR planning on wintering in Fla again. Good luck to WA3PXA as new mgr. of WPAP&N. WB3BKV now big E. NMs rpeort tfc. down this month. W3BUR reports 2M FM kept him company on trip to Texas. Lots of good reports on EPA hams coming to the fore during recent high water and the TMI incident. Anyone with details should forward to headquarters. OO reports are slim. Are we that good? Congrats to K3YL who tied the knot recently. Don't forget to work a Novice once in a while. Sign up for AREC, so your EC knows who he has to work with in an emergency. Get those reports in on time. Traffic: W3CUL 3490, K3NSN 1529, W3VR 868, WA3WQP 609, WA3ATQ 516, K3KW 420, WB3JZA 377, N3AIU 303, K3NGN 239, W3BI 184, W3FAF 175, W3IPX 155, WB3BKV 142, AA3B 131, AD3X 130, W3DP 125, WB3JGP 113, W3VA 78, N3CD 69, WB3JYZ 35, W3ID 33, WB3CAI 27, W3ADE 24, WA3TAV 24, N3CP/4 23, WA3AIB 20, WA3VIL 15, W3CL 14, WA3YDC 11, K3EBZ 10, WA3YOE 9, K3YD 7, W3AVJ 6, WA3CKA 4, W3HK 3, WA3BJQ 2, W3BNR 2, K3AI 1, K3AIZ 1, W3BUR 1, WB3ELA 1, W3EU 1, W3GOA 1, WB3CTU 1. W3KEK 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — W3HJH moves to FL this July to be near his kids and grandchildren. W3YOZ becomes active after a seven-year layoff. March BPL, WB3GZU, made it both ways, congrats. WB3ANV is an LM. WB3JRW and W0VJD/3 make lotsa deliveries in WDC area. K3RXK moves to Walkersville from PA. W3EOV was ZF3CO. W3JPT is close to Oscar WAS. WB3GEJ teams up with WA3EOP to keep the Hagerstown 34/94 net going Tues. at 7 PM local. W3CDQ vacationed 3 weeks in FL and now trying 15 meters. W3ECN survived the winter in good shape. KB3AP keeps MARCO net skeds. K2HXT/3 eyes a new antenna. OO rpeorts from W3WBY and W4MLR/3. W3IK was spotted at the Baltimore Hamfest. N3RL coaching soccer to keep in shape. W3ZNW had a busy month. N3IT saw lots of friends at the Hamfest. WB3IVO is looking for Boheme tape. WA3HEM is in the market for a new beam. W3FZV finds 10 meters a joy with Ogasawara Islands in the log. N3SJ covers those hard to get Eastern Shore places. K3YUC becomes senior director of the MEPN with WB3JRW and WB3BFK on the board. N3AMA volunteers for secy. K3ORW loses an antenna support — his neighbors tree. N3QA relays his reports. WB3CES splurged on a remote hf VFO and a new 11 element 2-mtr. beam. WB3FGF joins the CW traffic men. AA3S has been traveling this month. With the nets: Net/NM/Sessions/Tfc./QNI Avg. MEPN/AA3S 28/124/27.6. Toppers W3ADQ WB3BFK and WA3HIW. Others were WB3JRW and WA2YFM. WR PON/W3DVH 18/28/21.9. MDC PON/W3OYY 5/24/25.6. MDD/W3PQ 61/270/8.5. Top Brass: N3AKC W3PQ W3FA and K3IU. Feb. MDD/W3PQ 56/226/9.2 with N3AKC and W3FA Top Brass. A sad note, the Mountain ARC in Cumberland, lost its clubhouse in a fire. Gutted the building and much equipment lost according to WB3BHE and K3OMN. The Anne Arundel ARC has their clubhouse almost refurbished. They have started a 2-mtr. weather net with WB3GQR and help from the MD Mobileers rptr. as well. Freq. 705/105 at 11 AM local and 10/70 at 1400 PM local on weekends and holidays. The MDD-MEPN picnic will be held in conjunction with the Federick Hamfest June 17th. Traffic: (Mar.) WB3GZU 548, WB3JRW 126, W0VJD/3 122, W3FA 76, K3ORW 72, N3SJ 29, AA3S 28, KB3AP 22, WB3FGF 22, N3QA 19, W3FZV 14, N3IT 12, K3RXK 10, W3ZNW 10, W3ECN 9. (Feb.) WB3IVO 110, WA3HEM 25, K2HXT/3 10.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB.

Net	Freq.	Time (PM)	Sess.	QNI	QTC	Mgr.
NJN/E	3695	7:00	31	584	287/237	AF2L
NJN/L	3695	10:00	31	353	187/150	AF2L
NJPN	3950	6:00	35	634	529/276	K2VX
JSARS	91	8:30	30	356	61/56	WA2HEB
MCN	.075	10:30	31	260	98/88	AA2H
SJVN	.27	10:30	31	145	91/79	WB2LCC
SPARTN	.94	10:30	31	201	70/63	KB2EV

Summer is here again and the hamfest spirit has gripped the section. By the time you read this, the DVRA hamfest will be history, but there is plenty more to come. SPARC will be holding their's in Pomona this month, followed by GCARC and WJRA in August and SJRA in September. I'll be at them all. Why not come out and join the fun. And while we're on the subject of clubs, many are currently running Novice training classes, among them GCARC, JSARS, SJRA and WJRA. Between these groups almost 200 students are learning code and theory. Best of luck to those teaching and those learning. Not involved in club activities, but would like to be? Drop me a line for the name of your local club. Traffic: KB2EV 184, AA2H 155, WB2LCC 150, W2IU 98, WA4RDI 87, W2SWE 71, N2AFN 69, N2AJG 59, K2UL 46, WA2HEB 36, WB2FJE 31, W2HOB 28, WA2GTJ 24, WA2GXU 22, WA2UNJ 20, WA3YGZ 16, N2ALS 15, WD3AHO 10, WA2GYF 10, WB2AIQ 8, WB2UGA 7, AG2O 5, W4NLC 4, WA2TRJ 4.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. SEC: WB2FTX. BPL to W2ZOJ WA2MFV WA2JCU and WB2RWW. PSHR to WA2MFV W2MTA WB2PJU and WA2ZJP. Don't forget the new formats for PSHR effective with June's reports! Glad to have seen so many of you at the Rochester Hamfest. Thanks to W2HG and RaRa for their most gracious hospitality! Also hope to have seen you at Rome at their Family Day Hamfest! AD2X AA2S N2DI KA2DQF visited ARRL Hq. over Easter recess from Syracuse U. (ARS WA2SDY). Congrats to WB2AOI on getting DXCC country no. 300 before losing his four-element quad to the wind. WA2SON has a new four-element 15-M Yagi. Congrats to the impressive showing of RaRa in the VHF SS with over 225 entries! Good RTTY stations are needed in the section for the upcoming 1980 Olympic Games in Lake Placid — if you're interested, drop a line to K2TTI or K2GDX. 73 to our appointees in Sullivan County, as they now become part of Eastern New York. ARATS annual auction was a huge success, as was the Tompkins County ARC's. OCTEN mgr. WA2MFV really stirring up the troops on the Oneida .19/.79 machine. RAWNY now holding its meetings 2nd Tue. of the month. Contact W2KX for details. Buffalo Area DX Club is looking for Contest and DX minded bodies. Contact WA2AOG for details. Please note my new address on page 8 for mailing! Traffic: W2ZOJ 626, WA2MFV 506, WA2ELD 455, WB2RWW 224, WA2PJU 222, WA2JCU 218, W2RUF 151, W2MTA 93, N2APB 83, WB2OMZ 76, WA2ZJP 75, WB2OTC 71, W2PZL 68, W2FR 63, WA2AIV 47, K2GWN 45, W2TZ 36, KA2BGX 12, AF2K 12, K2VR 8, WB2NAO 3.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM. SEC: WA3VUP. Asst. SECs: WA3LJW and WA3JBQ. NMs: W3NEM W3KUN W3MML and WA3PXA.

Net	Sess.	QNI	QTC	Freq.	Time/Day
WPACW	31	496	165	3585	7:00 P Dy
WPAPTN	31	502	127	3983	6:30 P Dy
WPA2MTN	31	544	130	146.28/88	8:00 P Dy

PA traffic & training 3610 kHz, 6:30 PM Dy. WPA RACES 3090.5 kHz 9:00 AM Su. I regret to announce that W3KBY and W3USJ are Silent Keys. They will be missed and our sympathies are extended to their families. New Novice is KA3CNO. New Techs are KA3AKG and KA3BRP (XYL of WA3PGL). General is KA3AJZ. New Advanced are WB3KJH & WB3AMR. Call chances are WB3KYD to N3AQZ; KA3ALV to N3ARA; W3UGV to AF3V; WB3GZK to AF3W. Congrats to all. Beaver Valley ARA's newsletter new title is Beaver Valley QRM. Best wishes to the Foothills ARC on their twentieth anniversary. I hope to be able to visit some of the field day sites on June 23 & 24 this year. N3FM and I had a pleasant evening at the March meeting of the Fort Venango Mike and Key Club. The clubs are all very active in WPA and most have Novice classes set up. In Allegheny County, four of the largest clubs are providing NCS for the County Public Service Net. All amateurs are invited to participate. ARL 48 to WB3ATC and OM W3IBW. Also ARL 48 to WB3BBP and XYL. All amateurs should get involved in Public Service in their communities. It helps keep up the amateur image. 73's. Traffic: (Mar.) W3EGJ 323, WA3PXA 304, N3EE 181, W3NEM 170, W3YQ 63, K3HCT 59, K3SMB 54, W3SMV 53, W3MML 49, N3WS 46, WB3JDI 43, WA3UNX 42, N3FM 41, WB8PAV/3 34, W3UHL 33, N3KB 32, WA3QNT 22, W3ATQ 21, WB3GWJ 17, W3KUN 16, W3EXC 15, W3SN 15, W3RUL 13, WA3BOB 12, N3NR 11, W3AS 10, AF3B 10, WB3IAB 10, AB3X 8, W3LOD 7, W3IJT 6, NØDR/3 6, K3UA 3.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times(Z)/Days	Tfc.	Sess.
ILN	3690	0030/0400 Dy	336	62
ILL Phone	3915	2245 Dy	904	31
NCPN	3915	1200/1700 M-S	143	41
IEN	3940	1400 Su	7	5

W9VEY Memorial Station had a traffic count of 19. W9KDR, ARRL staff OSCAR 8 operations manager, was guest of the Synton (Champaign) ARC March meeting. W9GSB received his WAC on ten meters. The ILN will meet at 2330/0300 UTC starting April 29th (Daylight Savings Time). Our sympathy to the families and friends of W9MTW W9KWA W9BAV and W9YXN who recently passed away and have joined the ranks of the Silent Keys. KA9CMT is now a Tech. The new officers of the Chicago Chapter of QCWA are W9LC W9RK W9HPG K9PZD W9TLJ W9RUK and W9NXP. The Starved Rock Amateur Radio Club's annual Hamfest will be held June 3rd at Princeton, Illinois. N1AGD of ARRL Staff will be guest. The 6-meter Hamfest will be held at Santa Fe Park in Willow Springs Sunday June 10th. Both promise a great time for all. W9UCW N9AHN AD9Y K9PRB K9FJP WB9ACQ and WB9WHB were elected as the new officers of WR9AAA/WA9EAT, The Gypsy Amateur Radio Society of Joliet, IL. The March Convention sponsored by various Southern Illinois and St. Louis area radio clubs was a crowd gathering event with a 300 to 400 attendance. This was held in St. Louis on March 31. K9AOJ was guest speaker at the March 7th meeting of the Metro ARC. Make plans to attend the Central Divi-

sion's ARRL Convention in Milwaukee on June 15 and 16. Contact K9KR for details. The ARRL National Convention will be held in Baton Rouge, LA on July 20, 21 and 22. The St. Clair Amateur Radio Club newly elected officers are VE7CBV WA9SQE W9TRO WB9GSR AA9V and WB9IGB. New officers of the Schaumburg UHF ARS are: K9SA K9GTV and WB9USD. W9HOT reports that the 9RN with 60 sessions, passed 159 traffic messages and the Illinois participation was 100% with W9YGE W9JIJ W9NXG WB9NVV and W9HOT checking in. Sympathy to WB9HZG on the death of his father on March 2. Last minute reminder, not too late to plan Field Day. The Wheaton Community Radio Amateurs announced that their 1980 Hamfest will be held at the Arlington Exposition Center at the Arlington Park Race track. Date to be announced later. K9NR has been promoted to chief engineer of radio station WKAN-AM. W9JIJ is the only BPL recipient for the month. Traffic for March: W9JIJ 410, W9DMC 251, K9DAC 205, K9PNG 181, WB9JSR 179, W9HOT 169, W9NXG 144, N9PN 115, K9BVE 106, W9YCE 98, WA9KFK 96, WB9PUK 91, K9EEA 88, N9MX 79, WD9BEX 75, W9OK 72, W9KR 64, W9OBS 53, WD9DSG 45, W9LNQ 44, WA9AQN 30, WA9JJE 27, W9PRN 26, K9SW 20, W9HPG 6, K9BK 2, W9VY 2, WB9SGK 1.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. NMs: K9CGS (ITN) W9JUJ (QIN) WB9YXN (ICN) W9PMT (VHF PAM). March Net Reports, Times in UTC and freq. in kHz.

Net	Freq.	Time/Days	QNI	QTC	Sess.
ITN	3910	1330/2130/2300 Dy	3319	359	93
QIN	3656	1430/0000/0300 Dy	911	369	92
ICN	3708	2315 Dy	156	36	26 (Feb.)
IPON	3910	1300 Su	97	2	4

March VHF nets from W9PMT; QTC 4. QNI 254. Ind was 100% on 9RND again this month. Anderson will have their hamfest on June 3. The Central Division convention will be held on June 15 and 16 in Milwaukee, WI. Field Day is June 23, 24. 911 only autopatch is being put on the Boonville repeater. An ATV repeater is being put together in Indy with hopes of transmitting the weather radar picture from a local TV station during severe weather alerts. Converters for TV sets are available for under $10 which allows one to use the home TV set for ATV reception. The Fort Wayne Radio Club and the Ft. Wayne Repeater Assn. have agreed to merge. On July 8th is the 1979 Indianapolis Hamfest. Bigger than last year, Indy is rapidly becoming one of the major hamfests in the midwest. Again this year W9UMH's popular Emergency Communications forum. Talks by Central Division Director, and an ARRL official will be there to talk about WARC 79. 2 meter antenna measuring and HT ERP contests are new and the Outstanding Amateur Award will be announced also. See you there. Traffic: W9JUJ 908, WB9UYU 121, W9QLW 85, W9XD 66, W9DLF 39, WA9OKK 26, N9AEI 23, W9CMT 23, KA9BSF 17, N9PS 17, WA9OHX 15, K9RPZ 14, W9HUF 12, WB9PIR 12, K9CGS 10, K9FG 10, W9PMT 8, W9RTH 8, W9WEI 6, K9TKE 4, W9BDP 4, (Feb.) W9TG 108, WB9IHH 32, W9BF 23, W9CM 10, WA9GJZ 10.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. NMs: W9AYK WB9ICH W9IEM WR9ZRE W9DM K9LGU. Nets, freq, time, QNI, QTC, Mgr. BWN 3985, 1245Z M-S, 801, 728, W9AYK. BEN, 3985, 1800Z Dy, 771, 150, W9IEM. WSBN, 3985, 2300Z Dy, 1210, 399, WB9ICH. WNN, 3725, 2315Z Dy, WB9ZRE. WIN-E, 3662, 0100Z Dy, 363, 182, W9DM. WIN-L, 3662, 0400Z Dy, 291, 107, K9LGU. Wi EX PO, 3925, 1801Z M-F, 482, 32, WA9NIX. WB9MPF has Extra. BWN get together at WB9YPY-YPZ Rhinelander July 22. Participation in Governors conference was very good with 582 check-ins. W1SYL net is doing fine. Don't forget WNA picnic July 8, Woodlawn Park in Hartford. Central Division Convention June 15-16 at Red Carpet Inn, Milwaukee. Hope to see many of you there. W9IHW is now in Arkansas. Have heard him on the BWN. We do have some poets on our nets. I have read and seen some of them, pretty good too. Sheboygan swaptest July 12 at Wilson Hall. WB9QCY has Advanced. KA9ARW has Tech. New Novices La Crosse area: KA9DXS KA9DXT KA9DXU KA9DZN. WSBN certificate to N9AOZ. KA9AAD is Gen. KA9CUN has Tech. New Novices Oshkosh area: KA9EAC KA9CKY is Tech. W9SDH WB9YOK have Advanced. KA9CPA WD9HLI have General. K9UTQ W9ZGQ made BPL. Sorry to hear WB9BRE in hospital. We wish him a speedy recovery. It is really good to hear K9CPM back on the air. Hope you all have a very good summer. I'm sure everyone is fed up with the winter of '78-'79. Traffic: W9ZGQ 962, K9UTO 251, W9IEM 233, W9DND 224, WD9BCM 157, WD9DHF 135, W9YCV 120, K9FHI 112, AD9X 108, AF9T 96, WD9EAQ 79, WB9YPY 68, W9UCL 64, WB9ICH 61, W9AYK 58, W9DM 52, K9UU 50, K9LGU 46, WB9MPF 46, W9FDY 43, K9JPS 42, WD9ESZ 39, WB9JSQ 38, K9AKG 37, WB9RRU 37, WD9AJA 37, K9AQ 36, N9GP 36, W9UW 36, W9LDO 35, W9SFL 33, WB9ESM 31, W9YYL 31, WB9BRE 28, K9HDF 27, K9ANV 26, WA9WYS 25, KA9CYG 23, K9CPM 18, KB9FM 18, KA9CPA 16, WB9YPZ 16, WD9BKT 15, WB9LKC 6, W9ZBD 5.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: KØHJC. STM: AFØO.

				QNI	QTC
MSPN N	3945	12/05 P	KØZBI	510	110
MSPN E	3929	5:45 P	WØDUW	691	206
MSN 1	3685	6:30 P	AFØO	748	81
MSN 2	3689	10:15 P	KØPIZ	133	51
MSSN	3710	5:30 P	WDØBFR	207	55
MWX	3925	6:15 P	WBØUKI	380	275
PAW	3925	9-12 1-5	WAØYVT	3137	344

There are no signs of spring for most of us, however, NØJP thinks it's spring and is getting all of his model airplanes ready to fly. The National Weather Bureau wishes to thank all of the stations in the MN. Section who helped in the snow depth program which ended April 1. They also remind us that the Sky Warn Program starts soon and they solicit help. Some of the radio clubs have taken the 8-hour course given by the Weather Service and will be giving the instructions to other members of their respective clubs. KAØAIP, Stearns County; WDØCJM, Beltram County; KØUSR, Blue Earth; KAØBQA, Hubbard County; KØDEG, Goodhue County; are the latest ECs added to our list. Welcome fellas. ECs are still needed for a number of counties in the Minn. Section. Any person or persons who would like to become an EC in their county or an ARES member please get in touch with me KØHJC, SEC Minnesota. I'm

Novice, QRP, 200 w, deluxe — good, better, best — $299, $369, $399, $699, $869, $899, $1069. TEN-TEC has them all. A choice of seven HF transceiver models — a choice of power levels — a choice of operating features (and accessories) for beginner or old timer. Best of all, there's a wide choice of prices to fit every amateur budget.

TEN-TEC "OMNI" TRANSCEIVERS — REALLY CHOICE. Top of the line. Deluxe in every respect. Deserving of a place in the finest of operating positions. All solid-state 100% duty cycle 200-watt final amp.; 8-bands (160-10 m plus convertible 10 MHz and "Aux" band positions); broadband design for no tune-up; built-in VOX and PTT; built-in Squelch; 4-position CW-SSB filter and 8-pole crystal filter with separate mode switch to permit using all filters in all modes; 2-speed break-in; 2-range offset tuning; optimized sensitivity from 2 μV on 160 m to 0.3 μV on 10 m; greater dynamic range (typically better than 90 dB) plus PIN diode switched 18 dB attenuator; WWV at 10 MHz; front panel control of linear/antenna bandswitching; phone patch jacks; "timed" crystal calibrator (on "A" model only); zero-beat switch; SWR bridge; adjustable ALC and sidetone; dual speakers; plug-in boards; "clamshell" aluminum case with black vinyl covering plus warm dark metal front panel; full shielding, optimum size for convenient operation: 5¾"h x 14¼"w x 14"d. Model 545 OMNI-A with analog dial, only $899; Model 546 OMNI-D with six 0.43" LED digital readouts, $1069. Model 645 keyer, $85, Model 243 Remote VFO, $139, Model 248 Noise Blanker, $49, Model 252MO AC Power Supply, $119.

TEN-TEC "ARGONAUT" TRANSCEIVER—QRP CHOICE. The challenge and excitement of working the world on 5 watts. And every feature you need: all solid-state; 5 bands (80-10 m); full amateur band coverage SSB/CW; sensitivity less than 0.5 μV; offset tuning; 4-pole IF crystal filter, 2.5 kHz bandwidth; analog dial; vernier tuning; automatic sideband selection; built-in speaker; 5-watt input to broadband push-pull final amplifier; PTT; full CW break-in; adjustable sidetone volume and pitch; built-in SWR bridge; TVI filter; plug-in boards; small and light weight enough to go anywhere (4½"h x 13"w x7"d and 6 lbs.). World beating price, too: Model 509 only $369; Model 210 AC Power Supply just $34.

TEN-TEC 540/544 TRANSCEIVERS—POWER CHOICE. 200 watts from the bottom of 80 m to the top of 10 m — SSB or CW. No compromise from the leader in solid-state HF technology. Instant band change without tune-up; sensitivity 0.3 μV; offset tuning; 8-pole crystal-lattice filter; WWV at 10 & 15 MHz; push-pull solid-state final amp.; 100% duty cycle; adjustable ALC with LED indicator; built-in SWR bridge; PTT; full CW break-in; adjustable sidetone pitch and vol.; zero-beat switch in Model 544. Choose the value leading Model 540 with analog dial and built-in 25 kHz pulsed calibrator for just $699 or the Model 544 with six 0.43" LED digital readouts for $869. Model 240 160M converter, $110; Model 262M AC Power Supply with VOX, $145; Model 252M AC supply only, $119.

TEN-TEC CW TRANSCEIVERS—BUDGET CHOICE. The "Century 21" series. Unique. Modern technology with old-fashioned value. Fine performance, reliability, and simplicity of operation, all at low cost. Win raves from novices and confirmed brass pounders alike. All solid-state; 5 bands (80-10 m) full amateur band coverage; receive CW and SSB, transmit CW; sensitivity 1 μV or less; offset tuning; 3-position selectivity (2.5 kHz, 1 kHz, 500 Hz); 70 w input to push-pull Class C final amp.; broadbanded for no tune-up or resonating; full break-in; adjustable side-tone level; built-in AC power supply. Choose Model 570 with analog dial for only $299; Model 574 has a 5 LED digital readouts for only $399.

The choice is all yours when you choose TEN-TEC HF transceivers; see your nearest dealer or write for full details.

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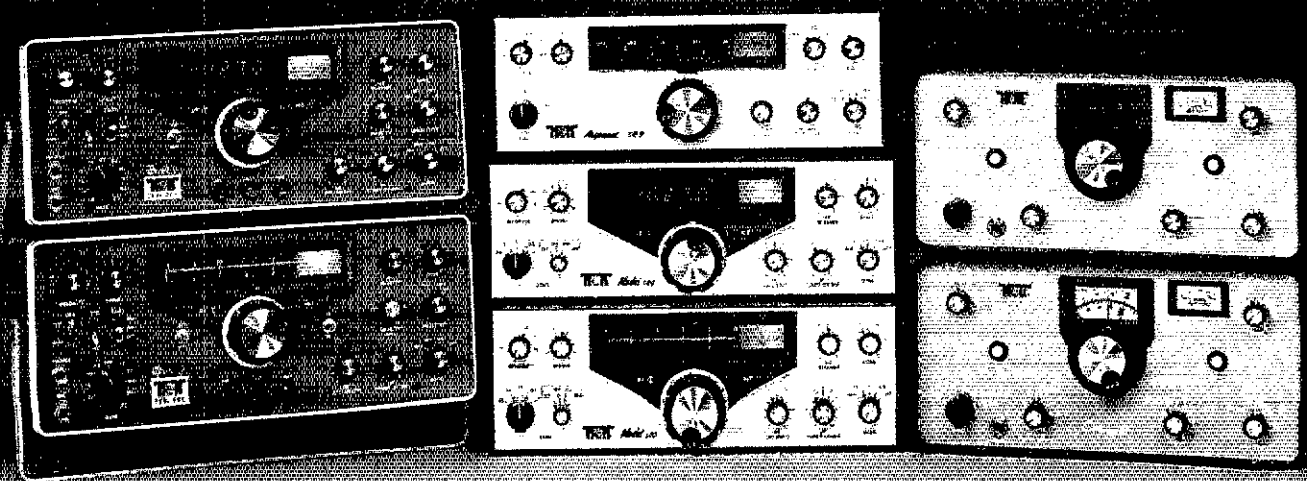

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- Advanced microcomputer technology developed and manufactured in the U.S.A.
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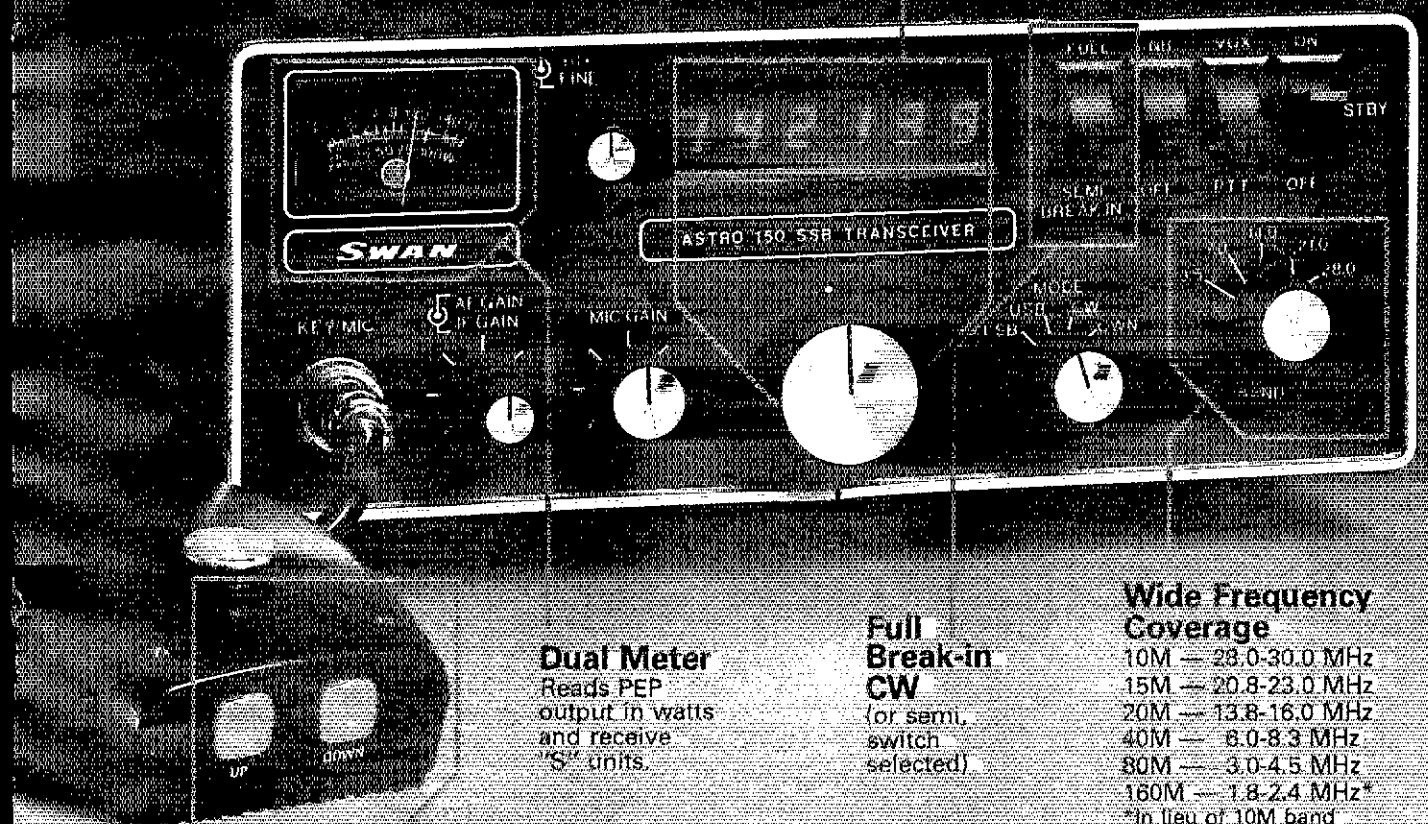

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Reads PEP output in watts and receive "S" units.

Full Break-in CW
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Wide Frequency Coverage
10M — 28.0-30.0 MHz
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20M — 13.8-16.0 MHz
40M — 6.0-8.3 MHz
80M — 3.0-4.5 MHz
160M — 1.8-2.4 MHz*
*In lieu of 10M band on Model Astro 151

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For accurate 100 Hz steps or fixed rate scan.

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looking forward to seeing many of you in the Northern part of our state at the Bemidji Hamfest in June. Upgrades are: KAØCSB Novice to Tech; KAØBZP General to Advance and new Novice KAØCBV. Congrats, fellas. WAØYVT has turned over the reins of the Pico Net All Day Watch to WAØEPX. We wish you luck and congrats WAØYVT on a job well done. WAØYVT will be the morning capt. and WAØYTZ will be the afternoon capt. As these notes go to press we are in the middle of the Rochester Hamfest. Traffic: WAØVYT 361, WBØHOX 270, AFØO 207, WAØTFC 200, WBØOEU 171, WBØUKI 112, WØDUW 112, WDØCGM 109, WDØBFR 105, KØPIZ 88, NØAHA 80, KØHJC 65, WØNZB 58, WØOPX 51, WØHZU 48, WØRIQ 46, KAØAIT 38, KØCSE 31, KØZBI 29, WAØLVG 28, AEØZM 27, WBØZBJ 24, WBØLRK 19, KAØBZP 16, KØRMX 14, WBØJYT 9, NØJP 8, KØBDD 7, KØFLT 5.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCHR. Congrats to Novices KAØDPL, KAØDOX KAØCWT KAØDLH and KAØDXC. WDØDFT has worked 150 countries on 10 meters. WØCDO got a 50-yr. pin and certificate from QCWA and also a Department of Commerce Award for 30 yrs. as weather observer for NWS. Congrats to WAØCSL for 1st in ND on the VHF-QSO Party. The annual Peace Garden Hamfest is July 14-15. Minot Radio Club working with VE4 on the Hamfest this year. Hawknest Club held appreciation party for KØPVG for his help getting 2 meters working. Thanks to all who worked ND-QSO Party. This is the last of YLWX net till Nov. Thanks to all who participated. WDØCLB, WDØBLY and WDØBMG received the ARRL Public Service Award.

Net	kHz	GST/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990	0900 Su	4	52	0	WØCDO
DATA	3996.5	1830 S-S	26	81	309	WAØCRH
YL WX	3997	0730 S-S	31	587	594	WAØRWM

Traffic: WAØRWM 725, KØFRP 184, WBØOAJ 136, WAØCRH 134, WØCDO 76, NØAFP 74, WBØWIB 59, WBØJGM 24, WØDM 5.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB. SEC: WAØTNM. NMs are WØs WE MZI ZWL WAØs TNM UEN VRE NEO. Congrats to BPL earners WØs MZI ZWL WAØs UEN VRE. PSHR went to three: WAØTNM 55 points, WØKJZ and WDØBMR each 41 points. EC Roberts County, WAØBZD, reported Tri-State Emergency 2 mtr. net had 40 QNS, meets Wed. nites. WAØZXV passed Extra Class. After successful eye surgery, KØFRE back on SDN/TEN. HUB City ARC newly elected officers are: WDØFEF, pres.; WDØBIA, vice-pres.; WBØVGN, secy-treas. WBØWON elected mgr. of 3900 Club Novice net 3.725, meets Sun. at 1400 UTC. WAØTNM and KWYR provided service to Winner area during ice storm when the micro relay tower for telephone company was taken out, with no long IT DX Service. WBØGTY new QTH is Colome. Traffic: (Mar.) WØZWL 696, WØMZI 548, WAØVRE 208, WAØUEN 167, WØDVB 142, WØHOJ 142, WAØTNM 86, WDØBMR 72, WØKJZ 44, KØZMA 22, WØIG 12, WBØEVQ 9. (Feb.) WBØBGN 28.

DELTA DIVISION

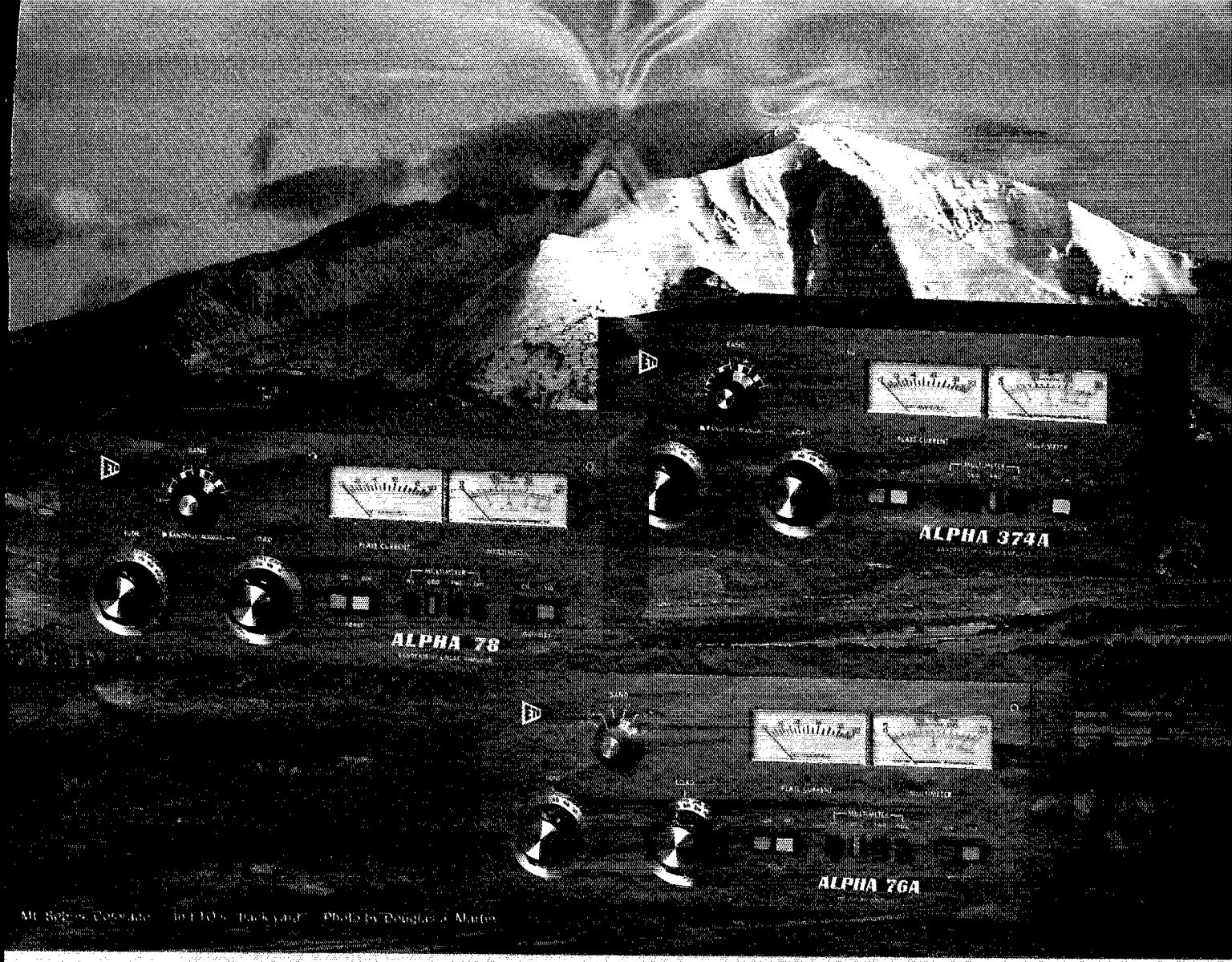
ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. NM: AD5D W5MYZ W5POH WA5ZWZ. Nets, Time/Day, QNI, QTC, Mgr. OZK, 3760, 0000/Dy, 243, 26, W5MYZ. ASN, 3740, 0030/T/S, 124, 24, WB5WPV. NEAWN, 146.28/8, 0030/T/S, 161, 10, WA5YWJ. SCARC, 28.765, 83, 9, WD5HJC. APN, 3937, 1100/M-S, 1053, 56, W5POH. M-Bird, 3928, 2130/M-F, 752, 36, WA5ZWZ. ARN, 3995, 2330/Dy, 1451, 95, AD5D. ARN net certificates issued to W5LHN K5MEA WB5NZM WB5OFN WB5PAG WA5RNG W5RWJ WB5QVE K5RO. CAREN Hamfest Aug 4/5 at Little Rock. For more info contact CAREN, P. O. Box 2844, Little Rock, AR 72203. W5KL lost 40 M beam in ice storm in March. W5KL took part in QCWA QSO party. OBs WB5WWA 4, W5UAU 3. Traffic: K5QO 44, W5BLP 40, AD5D 36, W5POH 26, W5UAU 21, K5BIL 18, WA5YWJ 12, W5KL 10, WB5GWU 8. PSHR W5POH 27.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM: K5DPG. SEC: WB5IYH. STM: N5YL. Net Mgrs.: W5GHP N5ES N5IB WD5CMA N5RB WB5IYH, W5YZL active on CAND, WB5CDX WD5CMA WB5LBR K5DPG K5BLV WA5TQA all active on DRN5. W5VMY and N5FJ have been busy on Shreveport SKYWARN NET. They need help from other stations in North LA. Attended Lafayette Hamfest in March. LARC HAM OF THE YEAR won by WA5AWM and CA 9 was presented to WA5MPW, congrats to both. N5RB new LAN NET MGR. The section thanks W5GHP for his fine efforts as interm Net Mgr. New Orleans Hamfest-Computerfest planned for October. New officers for MTA are WB5IOE, pres.; N5ARU vice-pres.; N5AYW, secy.; K5HAN, treas. K5ARH new LTN Net Mgr. — he needs your help on LAN and DRN5 Reps. also a spot open for NCS, if interested contact him. Good news for Shreveport hams. The Shreveport FM Society and SARA have merged and are looking toward bigger and better activities for members of both these fine clubs. See you in Baton Rouge.

Net	Freq.	Time(PM)/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 Dy	331	173	W5GHP
LTN	3910	6:30 Dy	609	119	N5ES
LSN	3703	7:30 M-F	144	17	N5IB
LRN	3587.5	6:30 Su	6	13	N5RB
RACES	3993.5	8:00 AM Su			WB5IYH
LEN	3910	9:00 AM Su			WB5IYH

Traffic: (Mar.) WD5CDX 215, N5ES 208, W5GHP 181, N5RB 108, WB5LBR 91, K5TL 86, WD5CMA 40, K5BLV 33, N5IB 30, K5DPG 17, K5ARH 13, WB5OOM 12, WD5CWK 9, WD5FMD 8, W5YN 8, WA5ULJ 8, WB5LKT 6, WD5DBH 5. (Feb.) WA5IQU 109.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Good club meeting and nice time at Delta ARA (Greenville); also enjoyed Natchez Hamfest and fine eyeball QSOs this past month. More upgrades; WD5FXW Tech. to Gen'l and KA5BMP Novice to Gen'l. Congrats to new Novice KA5EDW (WB5SNB's XYL). Delta ARA has message box at Greenville mall to generate ttc. Good idea! WA5JWD working 10M Mobile DX/ZK1! MTN and MSN still need CW support — please. Info from MS Coast ARA reports good club activity (tnx WA5FDP and WB5LAI). CAND (K5KLV) sess. 62, MS, rep. by WD5BEV WD5GNR. DRN5 (WB5CDX) sess. 31, QTC 545 with Ms. Rep. 83% by K5DMD W5EDT W5GRU W5VMC. CGCHN (WB5PGB) sess. 28, QNI 2531, QTC 267. MSBN (K5WSC) sess. 31, QNI 2431, QTC 110. MTN (K5OAF) sess. 31, QNI 150, QTC 61. MN (WA5JWD) sess. 31, QNI 708, QTC 23. MS RACES (N5AMK) sess. 4, QNI 172. Capital AEN (WD5IKD) QNI 83, QTC 9. NEMs. FMN (WB5PDP) QNI 253, QTC 4. Traffic: K5OAF 195, WD5GNR 191, WD5EDT 109, K5AKM 47, WB5TRZ 30, WB5SNB 26, W5XT 24, WA5OKI 15, N5XA 7, WD5DCK 6, K5MK 6, WD5EYM 2.



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The HF-200A is the finest expression to date of a high quality, uncomplicated solid state transceiver, designed by American hams for amateurs around the world.

But, as ever, the finest expression of any transceiver is in the performance. We are proud of the superior receiver incorporated within the HF-200A. One example: the receiver signal passes through 4 individually tuned shielded band-pass coils before it ever reaches the mixer. The result is a superior immunity to front end over load and out of band interference.

It's a ham's basic nature to explore and tinker. We invite you **to tinker to your heart's content** with the HF-200A. There are no critically adjusted circuits, no sections labeled "do not touch" or "factory only."

The HF-200A was designed for you! You'll even be able to service and align the radio without the addition of expensive test equipment.

The HF-200A by DenTron. Doesn't it sound like the radio you designed?

Specifications:

General:

- Frequency coverage:
  3.450 MHz - 4.050 MHz
  6.950 MHz - 7.550 MHz
  13.950 MHz - 14.550 MHz
  20.950 MHz - 21.550 MHz
  28.000 MHz - 30.000 MHz
  *28.500 MHz - 29.000 MHz
  *standard from factory (crystals available for entire range)
- Modes of operation: USB, LSB, CW, RTTY, SSTV
- Frequency stability: PTO; total drift is less than 100 Hz after warm up. Total frequency change is less than 100 Hz over 11 - 16 V-dc input supply change.
- Frequency readout accuracy: better than ± 4 KHz between 100 KHz calibration points.
- Power supply requirements:
  13.6V nominal
  13.6V-dc regulated 2A
  13.6V-dc unregulated 20A
  750MA receive-full audio
  16A transmit
- Weight: 11 pounds
- Size: H4"W10"D15" including heat sink extrusion.

Receiver:

- Sensitivity: less than o.25μ V for 10dB S/N
- Intermodulation: intercept point + 20dBm
- Selectivity: 2.4KHz at -6dB and 4.4KHz at -60dB (1.8:1 shape factor)
- Ultimate selectivity: greater than 100dB
- Agc: I-F and A-F derived — less than 4dB output variation for 80dB input signal change 191 milliseconds rise time, 3.285 second decay time.
- I-F frequency: 9 MHz
- Image and I-F rejection: greater than 50dB
- Spurious response: greater than 60dB down
- Audio output: 1 watt 8 ohm load

Transmitter:

- Power input:
  SSB - 200 watts PEP
  CW - 200 watts
  RTTY and SSTV - 100 watts
- Load impedance: 50 ohms, nominal
- Spurious output: greater than 50dB down
- Harmonic output: greater than 40dB down
- IMD: 30dB below PEP
- Carrier suppression: greater than 50dB
- Undesired sideband suppression: greater than 50dB @ 1KHz
- Microphone input: low impedance — dynamic
- CW keying: requires a closed circuit to ground
- VSWR: no internal shut down of power amplifier at any SWR ratio. Recommend 2:1 SWR maximum for continuous operation.

- **Suggested Retail Price $699.50**

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. Asst. SCM: WB4PRF. STM: W4ZJY. The 1979 officers of the ORARC are WA4EHR, pres.; KB4KU, vice-pres.; WB8TTL, secy./treas.; WA4CRS, tech. chmn.; WA4HGP, pub. chmn. Also this club is starting a Novice class March 19 under the direction of WD4GYI. Everyone plan to attend the Plateau Amateur Radio Club's Crossville Hamfest on June 30 & July 1. This will be a great event as usual. Please note the change of Sponsor. Contact W4RRE for further details. The final results of the TN. QSO party are not in, but it appears to have been successful. The members of the METWN want to thank WB4HAP & WB4OAH for use of WR4APU & WR4AGJ. Net certificates have been awarded to K4XE W4PIM AJ4T WB4BKF WB4DYJ WA4FMQ WA4FMR WB4KSO WB4WOG & WB4BAA. WB4CHS has been appointed NM of the MTTMN. KB4G has been appointed NM to head up the newly formed TLC. Anyone interested in slow cw & RTTY nets please contact W4ZJY. TN. was 100% on DRN5. Net summaries: Phone-Sess. 136, QNI 5648, QTC 765; CW-Sess. 69, QNI 471, QTC 207. There are still some undesirable regulations for repeater operations. I am urging everyone to join the CVRA; a group this size will have some persuasion upon the policy making agencies. Traffic: WA4CNY 390, W4OGG 308, WB4BKF 158, WB4PRF 139, K4CNY 109, K4XE 69, K4JGW 68, K4WWQ 63, N4UC 56, KB4G 52, K4WOP 47, WB4ZSZ 46, WA4GLS 40, WA4FMR 33, K4AMC 29, W4ZJY 23, W4PFP 20, WA4DKC 19, W4TYV 19, W4EDZ 12, W4EWR 12, WB4GWA 12, WB4YPO 12, W4RUW 11, W4VJW 10, K4FSK 9, W4PSN 7, WA4WVW 6, WA4EAV 4, K4UMW 3, K4MZE 2, WB4RHQ 1, WB4YBL 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joe Miller, K4DIM — SEC: WB4ZML.

Net	Time/Day	kHz	QNI	QTC	Mgr.
KRN	6:30 AM M/F	3959	449	41	W4BEJ
MKPN	8:30 AM Dy	3959	930	95	WA4JTE
KTN	5:45 PM Dy	3945	1385	135	WA4AVV
KNTN	7:00 PM Dy	3727	292	96	KB4OZ
KYN	8:00 PM Dy	3600	—	—	WA4IGS
KSN	10:00 PM Dy	3600	113	29	WA4IGS
KPON	1:00 PM Sa	3945	53	—	WA4AVV

4-ARES 28/4, 5-ARES 62/17, CARN 222/25, PAEN 420/21. Thanks to W4CID for his help during the SCM change. KYN needs NCS and 9RN reps. New club, River Cities Amateur Radio Association will be handling communications for the Valvoline Cup boat races at Ashland, 1st weekend in July. WA4UIH now with the Merchant Marine. WA4QEJ now has 160 mtr. WAS. New repeater in operation at Halls Gap on 146.295/.895. Traffic: K4TXJ 254, WA4AVV 138, K4DZM 132, WA4UIH 86, KB4OZ 81, WA4EBN 65, WB4NPD 61, W4CDA 50, W4CID 50, WA4JAV 29, WA4EFG 27, WD4CQF 26, WA4FAF 22, WB4AUH 20, K4HOE 12, WA4AGH 3, WA4YPO 3.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: K8LNE KB8AI K8RV K8KMQ WB8YDZ WD8LSV WA8DHB.

Net	Freq.	UTC*/Day	QNI	QTC	Sess.
QMN	3663	2200/0200 Dy	1340	380	93
MiTN	3953	2300 Dy	655	354	30
GLETN	3932	0100 Dy	1148	332	31
MACS	3953	1500 Dy	1035	180	31
UPN	3922	2100 Dy	930	109	35
MNN	3722	2130 Dy	404	90	31
WSSBN	3935	2300 Dy	843	53	31
ARES	3932	2130 Su	71	11	3
SVARA	21130	2300 Tu	36	0	4
VHF local nets: 17 reports.			1260	56	17

*Summer schedule. The Motor City Radio Club presented the annual Michigan Field Day Award to the Cherryland ARC at the Muskegon Convention. The award is presented each year to the top Mich. Affiliated Club Field Day score. Which club is going to take the honor this June? W8SS is celebrating his 50th year in Amateur Radio . . . congratulations! The new address for the Mich. Repeater Council is: 309 E. Gordonville R 12, Midland MI 48640. Coordination requests should go to that address. Field appointments: EC for Berrien County is WB8WLS. OTS: WD8EGQ. OO reports from K8JH & K8RGT. OBS reports: N8AG WB8DJS AC8Y W8SOP. I am very sorry to report the following Silent Key: WD8OSN. The Section Traffic Manager is making presentations at radio clubs about public service communications and traffic work. If your group would like to learn more about this important aspect of Amateur Radio, let him know. WA8EOW made 50 MHz WAS. Only took 12 years! Congratulations! Upgrades: WD8OUP WD8CEG, Extra. WB8FOK, Adv. K8IFE WD8CUQ, Gen. Get extra Field Day points . . . send a message to the SEC or SCM. W8MRM/8 will take FD ttc. for me. Traffic: (Mar.) W8VPW 457, WB8MTD 381, K8KMQ 329, K8DTG 324, WD8KZX 236, AF8V 189, K8RV 189, W8MPD 149, WB8YRY 139, WD8NKA 132, WD8EGQ 122, WB8ITT 98, WD8LRT 95, WA8DHB 92, K8LNE 90, KB8AI 83, WD8RSE 82, N8KAY 80, W8NOH 70, KB8GC 55, WB8ZIY 55, WD8DMX 50, WD8OSE 50, W8VIQ 50, K8GXV 48, WD8LSV 46, AC8Y 44, KB8BZ 38, W8CUP 37, WA8WZF 37, N8ABA 36, KA8CPS 36, WD8CSA 33, W8SOP 33, W8VIZ 33, WB8SYA 32, WD8IBW 30, WB8TTA 29, WD8IEW 25, W8IHX 25, WA8QAF 25, WB8YIG 25, K8DYI 24, WD8AAE 23, WB8DJS 21, WB8IEK 21, WB8QYU 21, W8JJX 20, W3GQJ/8 20, WD8OKU 19, WD8PAF 18, W8LDS 17, K8ZJU 16, W8SCW 14, WB8HNB 13, WA8AXF 12, W8PBO 12, WB8YDZ 12, K8AIT 11, W8JUP 10, WA8VBF 10, KB8GT 9, WA8IXZ 9, WB8AFO 8, WB8BEZ 8, WB8BNN 8, WB8PLO 8, WB8TBP 8, W8WOJ 8, N8AQL 7, W8QFO 7, W8HKL 6, W8IOI 6, K8JED 6, WB8NDB 6, N8AOA 5, W8DCN 5, WD8NJO 5, K8QBZ 5, K8UPE 5, WA8FXR 4, W8WVL 4, WA8WVV 4, K8DD 3, KB8FK 3, WD8MJB 3, W8RNQ 3, WD8ROK 3, N8AFS 2, WA8AWU 2, WD8BUT 2, WB8HSN 2, W8NCD 2, WB8UZM 2, AC8F 1, WB8VVF 1. (Feb.) WD8IEW 33, K8DD 1.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: WA8MCR W8TP N4VY. SEC: K8AN. NMs: AF8A N8CW W8DIL WB8KWD K8OZ WB8YGW. Net reports (Mar.)

Net	QNI	QTC	Sess.	Time (EST)	Freq.
BN	506	264	49	6:45/10 PM	3.577
BNR	120	360	31	6 PM	3.605
ONN	131	71	30	6:30 PM	3.708
OSN	260	124	31	6:10 PM	3.577
OSSBN	2877	805	93	10:30 AM/ 4:15 & 6:45 PM	3.9725
O6mN	394	37	31	9 PM	50.160

The first attempt at a joint ARPSC workshop was held March 17. Attendance overall was somewhat less than hoped for, but participation was good. Would like to urge more traffic handlers to attend the next session — as yet unscheduled. K8AE became Buckeye Net

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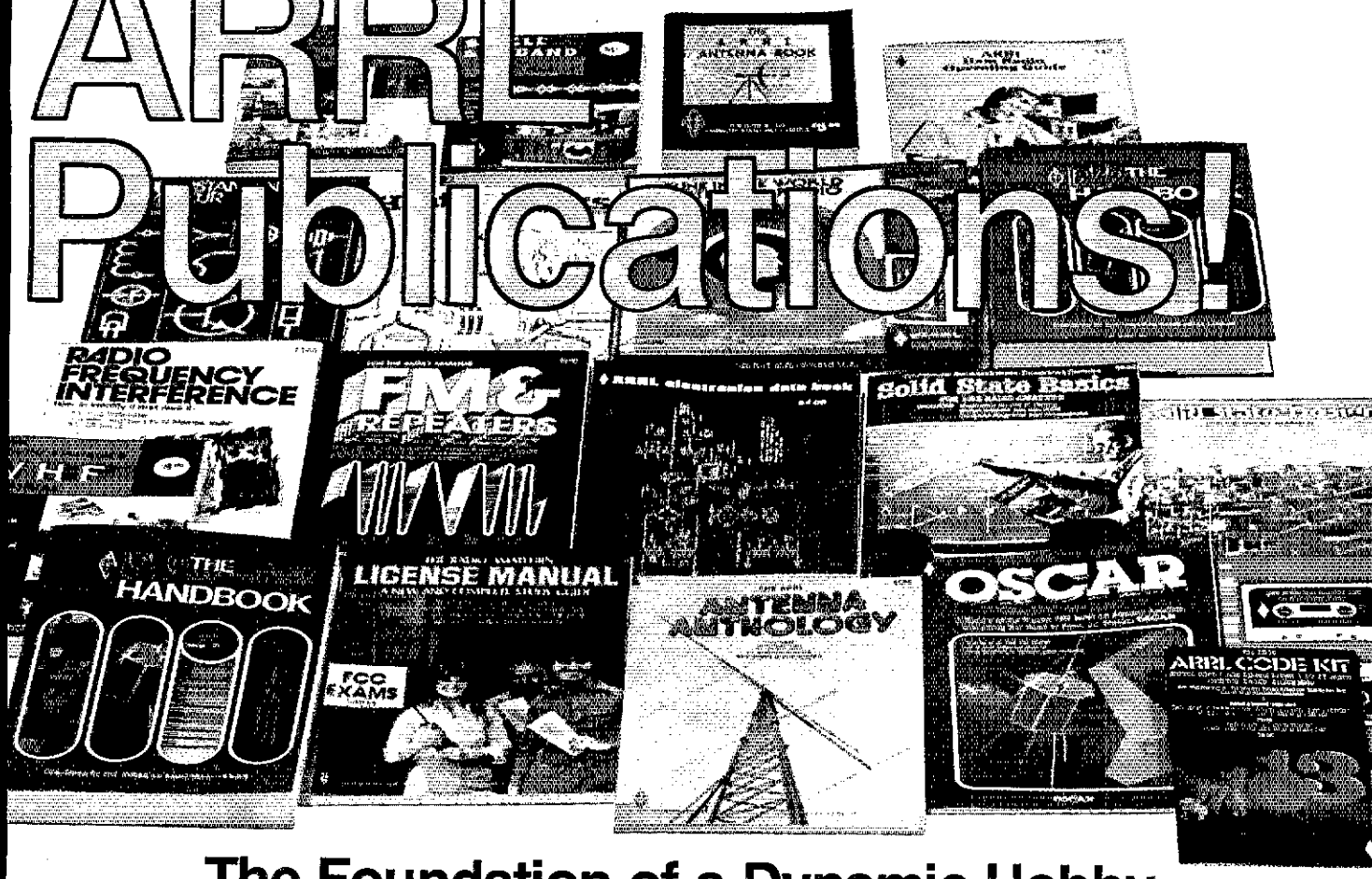

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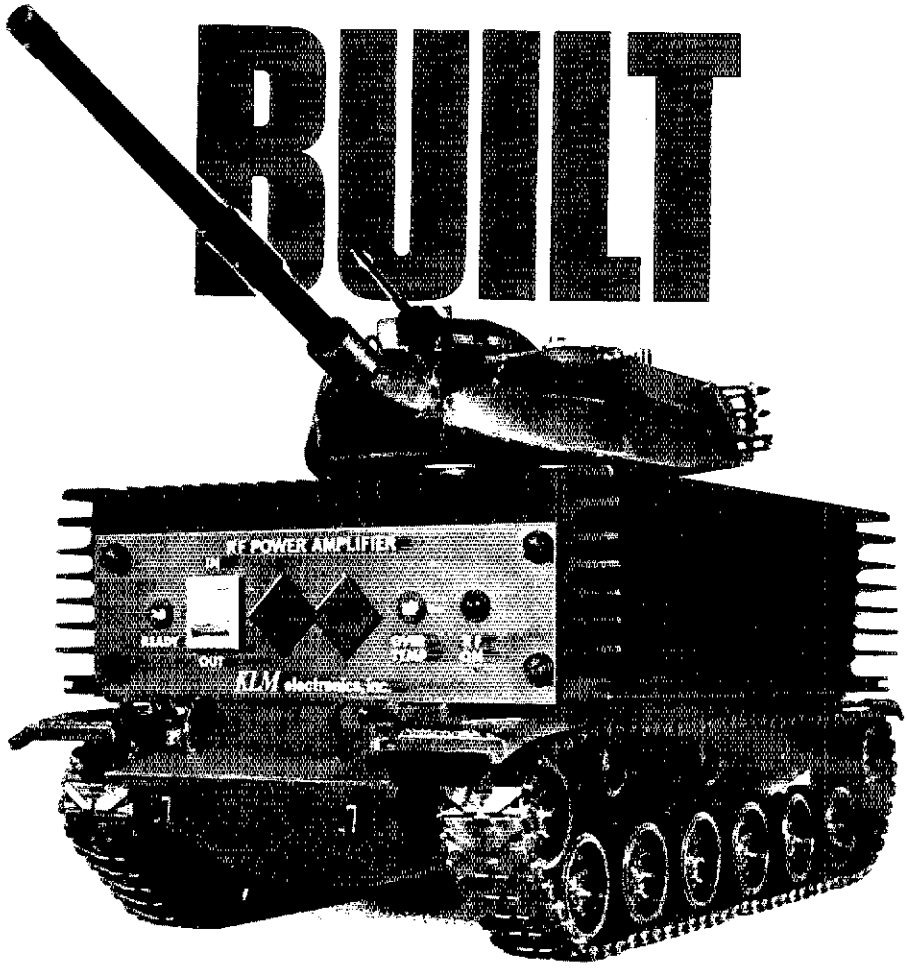

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45-120BC	15-45	45	120	15
	"C" Series 420-450 MHz			
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manager effective April 1. Thanks to K8OZ for a fine job the past few months. Effective May 1, WD8KBW took over as Ohio Slow net manager replacing N8CW who is commended for his fine job over the past year. Net control stations for any of the Section nets are urged to get their reports to the Net Mgr. as soon as possible following the session in order that the mgr. can complete his reports. The hamfest season is on us again and it's encouraging to again meet all the old-timers and newcomers that we have seen so far this year. For all of you ECs making plans for the October SET: with chances of better weather than during January, let's plan for a simpler, less involved simulation to insure that the SET is fun as it should be and realistic as it must be to show up any flaws which might exist in our plans. Please encourage participants to send more realistic messages to the SEC rather than the canned "participating in SET" type. Good luck! New Farout ARC officers: WD8NVY, pres & treas.; WB8KWC, vice pres.; WB8OFR, secy. Upgrades: N8ATX KA8BEQ WD8LLD WD8LLK WA8QYJ WD8RXH WB8TJS/AI8P KA8WEB WB8ZZJ. Congrats to all. Appointments: NM: K8AE WD8KBW. OES: WB8FMW. OO: K8ND K8RT. OTS: WD8QZM. Local net reports: BRTN-QNI 293, QTC 60, sess. 31; EOTN-QNI 175, QTC 49, sess. 31; TSRAC-QNI 699, QTC 70, sess. 31. Traffic: (Mar.) K8AAZ 791, WB8KWD 735, W8PMJ 414, W8ENI 222, WB8WTS 160, WB8OMQ 126, K8BYR 116, WA8GMT 115, W8TH 102, W8MOK 99, K8OZ 93, W8QZK 89, WD8QMP 88, WD8CDA 83, WB8UBR 80, AF8A 75, W8DIL 73, WA8HGH 68, WD8KBW 66, WB8SIQ 62, K8AN 58, WD8LLD 58, WB8VLR 58, N8CW 56, W8TP 55, WB8LPP 46, N8TM 46, K3RC 43, W8QEM 42, WB8JGW 41, WD8JTT 41, W8WEG 41, W8GGX 40, WB8MEK 40, WB8SRC 40, WD8QZM 39, W8JMD 36, W8LZE 36, WD8DTG 34, WB8PIY 32, WA8MAZ 31, WB8TRK 31, WB8YGW 30, WA8SED 23, K8CKY 22, WD8MKC 22, WD8PEI 22, WD8RNM 22, K8AE 21, WB8MRL 21, WD8PUH 20, W8RG 20, K8PE 19, WA8MHO 18, WA8TSX 18, WB8CJU 17, WD8JIK 15, N8JR 15, WD8RIH 15, WD8INK 14, WD8OYK 14, K8DHJ 13, WB8NAD 11, AB8P 11, WA8SSI 11, N8AKS 10, N8AUC 10, KB8FU 10, WB8QHV 10, W8MGA 9, WA8MIH 9, K8CYX 8, WD8JIL 8, W8EMK 7, N4VY 7, WB8VZX 7, WB8YTQ 7, N8AUH 6, WB8DMF 6, W8IM 6, W8QCU 6, K8YUW 6, K8DL 5, W8KN 5, WD8LOL 5, WD8PYV 5, WD8DOS 4, WB8HMI 4, WB8INY 4, WD8KFN 4, AI8P 4, WB8WNH 4, WD8EKI 3, KB8GG 3, K8ND 3, WD8PPQ 3, W8UPH 3, WD8JKX 2, WB8KKI 2, W8XT 2, W8ZM 2, WD8DIP 1, WD8OTO 1. (Feb.) WD8DIP 12, K8DHJ 10, WB8RUW 3.

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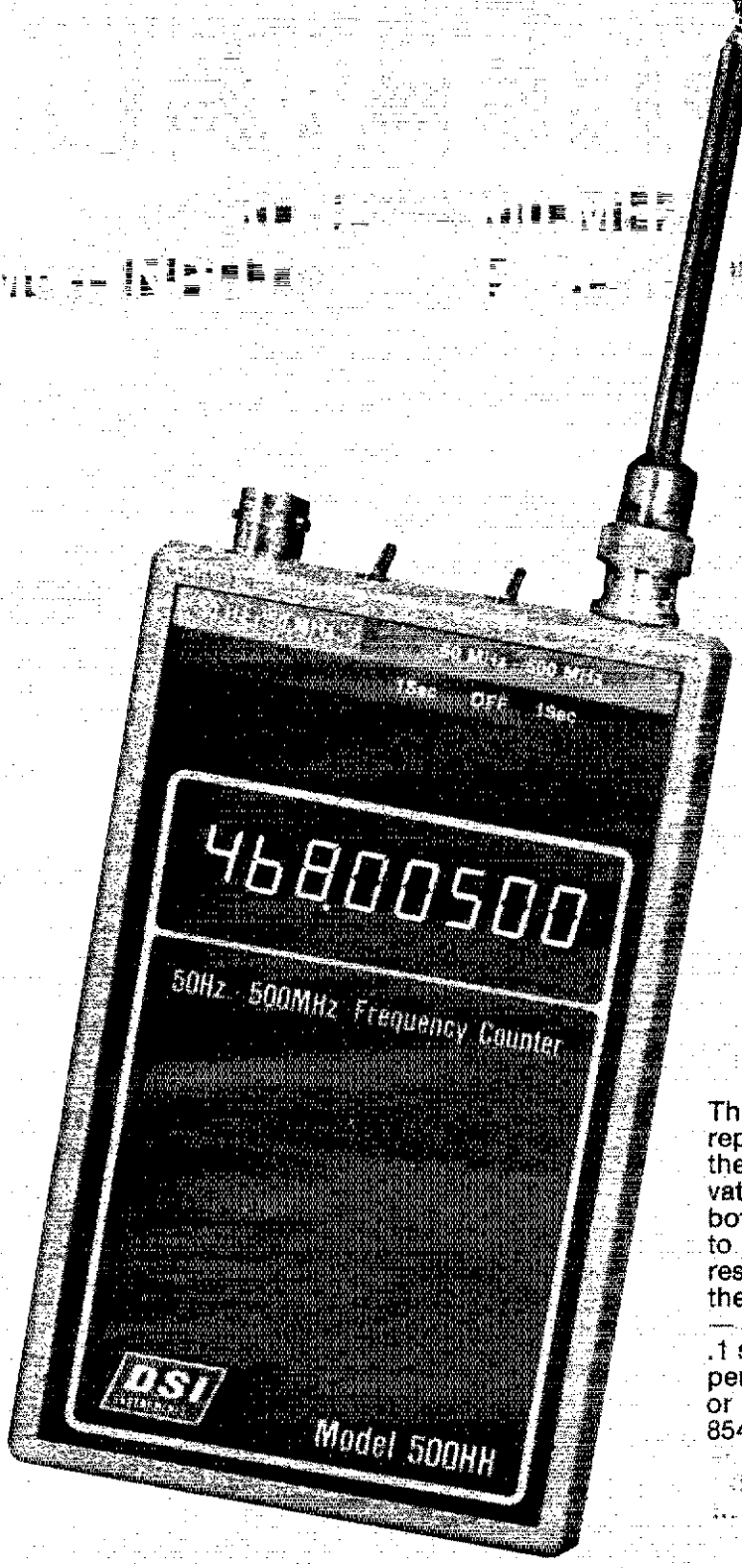
EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCMs: WB2VUK WB2COY W2IT WB2KDC. NMs: W2CS W2WSS WA2MKQ WB2QOH. Nets: NYPON 5 PM 3913, ESS (slow) 6 PM 3925, NYSPTEN 6 PM 3925, NYS 7 & 10 PM 3677, HVN 7:30 PM M/F 37/97, SDN 9:30 PM M/F 66/06. Congrats to new Asst. SCMs WB2COY (who will administer OES appointments) and WB2KDC (who will provide a much needed Northern counties liaison for the leadership appointees in the section). Along that line, an eyeball meeting of ENY leadership appointees was held at Shrub Oak. Had a near perfect attendance. Established a schedule for a regular on-the-air staff meeting: Fourth Sundays 9 AM-10 AM 3930 kHz. Freq. will be turned over to informals at 10 AM, so if you want to catch the "brass" . . . About meetings . . . SARA held an "Equipment Night" and jammed the hall with over 200 attending. March meeting of CCNR was largest crowd ever. Heard K1POK speak on bugging and their detection. Only trouble was that all the chairs were locked up and no one had the key. Newsletter didn't say whether the whole thing was done standing up. Notable quote tnx W2OOJ: "My vertical has 16 radials buried under it." (a conservative, maybe?) March PSHR: WA2SPL N2YL WB2KDC WA2EQW. Traffic: (Mar.) WA2SPL 1209, N2YL 279, WB2KDC 269, W2BIW 107, K2AV 92, WA2MKQ 79, WA2ZSG 73, AD2X 49, WA2OTC 48, N2EF 37, WA2CJY 30, WB2SON 24, WB2SPK 24, WB2ZCM 24, WA2MZJ 13, N2JK 13, AA2Y 9, K2HNW 8, K2RRR 2. (Feb.) WB2ZCM 12. (Jan.) N2JK 302.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Stephen H. Bloom, WB2IDP. STM: WB2BNY. NM: WB2LIG. NM/ASCM: WB2EUF. The following are traffic nets in and around the section.

Net	Time/Day	Freq.	Manager
NLI*	1900 Dy	3730	WB2EUF
NLI*	2200 Dy	3630	WB2EUF
NLIPN*	1730 Dy	3928	WB2LIG
ESS	1800 Dy	3590	W2WSS
Clear House	1100 Dy	3925	WB2EAG
Mike Farad	1300 M-S	3925	K1PZU
NYSTPTEN	1800 Dy	3925	W2GLH

*Denotes section net, all times local. Here is a list of currently appointed ECs. Please contact one of them for more information on your local ARES net. Queens: WA2ZHA; Brooklyn: W2XY; Nassau: N2EM; Western Suffolk: W2NN; Central Suffolk: WA2KKJ; Eastern Suffolk: WA2IJWA; Oyster Bay: K2MZ; Huntington: W2GLE; Smithtown: WB2GUB; Islip: WB2YUJ; Babylon: WA2SUB; Brookhaven: WB2LOU; Riverhead: W2LYH; Shelter Island: WA2LBJ. Congrats to Suffolk County Radio Club on their 32nd anniversary in March. New officers for Middle County Radio Club WB2DCJ, pres; WB2FEB, v.pres; WB2LOU, secy; WB2ADF treas. New hams in the WB2YUJ family are KA2EMF and KA2EMH. W2LH gave talk on antennas at April Suffolk County Radio Club meeting. WB2HIQ up to 80 countries in his quest for DXCC. Crack CO N2NT, successfully tracked down the Brooklyn jammer, congratulations. W2DBQ received new TR-7. Nassau County ARES handled the communications for March of Dimes walkathon April 29th. K2GCE spent 2-1/2 weeks with son and wife in Texas. Early session of NLI moving to 3730. Late session will remain on 3630. RTTY autostart group on 146.55 simplex going strong. For information contact either W2GLE or WA2INJ. New appointment WA2SLY as OVS. He runs a net every Sun. morning on 144.250 SSB and all are invited to check in and get involved with 2 meter SSB which is an enjoyable and different mode. WB2IDP would like to get in touch with any section members interested in starting a Computer users net to exchange ideas on programming and computer applications. Congratulations to N2EM who is the new EC for Nassau County. We need more ECs throughout the section. If you can help, please contact the SCM. Congratulations to WB2LOU who obtained General and WB2TYR who received Extra. Many new Novices in the section this



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month. Too numerous to mention, but congratulations to all. New PSHR rules effective June 1. Make sure you read them. Best wishes to everybody for a successful Field Day (maybe this year we will get only one foot of rain!) Club bulletin editors please put the SCM and the Assistant SCM on your mailing list for your bulletin. The traffic nets need your support. We have one of the most populous sections in the country and the traffic nets have not reflected this. Please support them. Thanks for your support and remember to mail in your reports before the 8th. Traffic: WA2UWA 227, WB2BNY 48, WB2LIG 48, WB2IDP 23, N2LI 22, K2GCE 21, KA2CNN 15, W2DBO 15, WB2DCJ 13, K2IZ 10, WB2HIQ 8, K2LIE 7, N2EM 4 N2NT 2.

NORTHERN NEW JERSEY: SCM, Robert E. Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NM: AF2L K2VX WA2LHV WB2RMI WA2OPY & WA2UEZ.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	AF2L	3695	7 P Dy	31	584	237
NJN	AF2L	3695	10 P Dy	31	353	150
NJPN	K2VX	3950	6 P Dy 9 A Su	35	634	320
UCEN	WB2RMI	146.085/ 685		31	330	88
OBTTN	WA2OPY	147.72/ 12	8 P Dy	31	360	75
NJSN	WA2UEZ	3735	6:30 P	7	24	12
NJVHF	WA2LHV	49/49	10 P	30	195	89

New Novices: KA2CXG KA2EPL KA2EPM KA2EPN KA2EOP KA2EUK KA2ERI New Call: K2MWH. Novice to Tech.: WA2WFL WB2WFL KA2COQ. Tech to General: WA2OFI WD2AAL. Tech to Advanced: WA2INW. Novice to General: KA2AJR now N2ATI. General to Advanced WA2UGI and WB2GCC now KB2GO. W2LVT has retired. WA2UDT operated in Tennessee and Wisconsin QSO parties. The New Jersey QSO party is from 2000Z July 28 to 0700Z July 29 & 1300Z to 0200Z July 30. See QST coming events. At the recent BARA meeting WB2EQG spoke on converting 11 meter rigs to 10. N2NS made a presentation on "Antennas" in April to the Cranford ARS. W2TCA reports that many members of NJVHF recently trained handling traffic on the Morris County CD repeater 146.895. It's good to hear K2ZFI back again on CW and recuperated. Net certificates for NNJ sent to the following: W2CQB N2CR W2GD W2GWS AA2H N2IC WA2KWW K2LA WA2LHV WB2MCO WB2NSV WB2RMI W2RQ WA4RDI W2SQ W2SWE WB2TOM W2UEZ K2UL K2VX W2XD and W2ZEP. I'm sure that AF2L, the NM, qualified too! NNJ/SNJ held their semi-annual Confab at Rutgers University and the SECs are to be congratulated along with W2XD at setting up an excellent 2-meter network throughout most of New Jersey. WA2MVQ was at the University of Maryland Medical School of Family Practice for 2 weeks. WA2HSB a new SB 220. WA2OVE a new SB220. W2MJA and staff did themselves out in a new club newsletter named the "Forty-Niner". It's really a knock-out — even with 3-color printing. K2SJO, Hudson Director, spoke on our out-going QSL Buro at the League. The 550 Club has had several successful transmitter hunts. They were also quite active in the UHF Sweepstakes with considerable YLs working it. Traffic: (Mar.) WB2RMI 450, W2COB 336, W2RQ 220, WA2MVQ 149, W2SQ 142, WB2TOM 139, W2XD 134, W2UEZ 112, K2VX 111, WB2MCO 80, N2CR 58, N2NS 66, W2TCA 63, WB2RMJ 56, KB2HM 55, WB2HSG 40, WA2OVE 38, WB7UQO 37, W2ZEP 31, WB2CNF 30, W2ONL 30, WB2AIU 24, KA2CHK/T 15, W5DTR/2 19, W2UH 19, WA2MLY 16, K2ZFI 16, KA2CHK/T 15, KA2CNN/T 15, K2SE 7, W2CC 6. (Feb.) W2RQ 182.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. Sioux City gang had a bang-up Hamboree. KØIIR has joined Intruder Watch. AEØR and WDØGDL in 6-Land for the summer. Congrats for upgrade to: KAØCSI and KAØCLJ Tech. WDØAQC WDØFGY WDØAFM KAØCLQ WDØFMF KAØALM WDØGEM and WDØAXD General. NØAHO Extra. The WAØLUD/WBØSNL team caught the bunny in 46 minutes. KØVJO has Golden Alligator award. New equipment dept.: WDØBFE — 227R, WDØGEM — FT-101, WBØNMW — TS-700SP, WDØAFM — 901DM plus 80-10 vertical, WBØRMT — 180W homebrew amp., with 4-14 elements on 2M. WBØSEL — TR4-CW. WBØYUI now DX-CC, has 248 since 9/77. Anamosa ARC officers: WBØENL, pres.; KAØBPR, vice-pres.; KAØBPT, secy-treas.; WØNPG, advisor; WDØEYU, trustee. Humboldt ARC officers: WDØBPR, pres.; NØAPC, vice-pres.; WDØDCD, secy.; KAØARN, treas. WBØSEL left his appendix at hospital. WBØOUP has moved to Humboldt. Iowa 100% on DTRN via WAØAUX WBØPYD and WØUPX. Gypsum City Chapter of 10-10 Net meets Tues. & Thurs. at 7:30 PM on 28,840. Chapter Head is WBØYKJ; WBØNSS, Awards Mgr. and WBØYWW WBØYNA and WBØYKJ NCs. Holstein welcomes KAØDVF. Humboldt net on 7.78/18 7 PM Sun. WBØYWW converted a Sears SSB CB to 10 and helped WBØYNA convert a Cobra 139. Send FD msg. to me.

Net Mgr.	Freq.	Time(Z)/Days	QNI	QTC	Sess.
Iowa 75M WAØVZH	3970	1730 M-S	1444	120	27
Iowa 75M WØYLS	3970	2300 M-S	999	36	27
TLCN WØYLS	3560	2330 Dy	454	148	62
Iowa Code	3713	2359 M-W-F	85	26	14

Traffic: (Mar.) WAØAUX 485, WØYLS 177, WØSS 149, AEØR 128, WØUPX 96, WDØGDL 69, WBØPYD 48, WBØKHO 44, KØGP 40, WBØNSS 36, KØOFI 13, WBØUPF 12, KAØBYI 9, WØBW 7, WDØHND 3. (Feb.) WØBW 8.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. Well after a fashion, the ole typewriter is back to normal, well almost anyway. WØNYG has joined the list of us changing our occupations recently. He is now selling insurance. WØKL reports the ARES membership now 868 members strong, but going rather slowly since the SET. We missed seeing a lot of you at the recent PRATT hamfest. All attending had a good time and LOTS of chili. Is your club exchanging club bulletins with others?? Let's look at the WARC buletin from Wichita — very active the past few months providing communication for the Boat Races in El Dorado and putting on a HAM demonstration for the Boy Scouts at a recent JAMBOREE. Getting ready for FD. Designing a new club patch. Fighting for a new TOWER ORDINANCE. Lots of ideas — worth exchanging!!! Net reports for MARCH — QKS QNI 509, QTC 195. QKS-SS QNI 152, QTC 48. KWN 923, QNI and 498 QTC. KSBN QNI 1409, QTC 254. KPN 248 QNI and 47 QTC. Congrats to KØFPC on his recent DXCC award using 200 watts and a trapped vertical and

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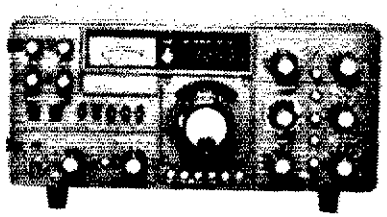

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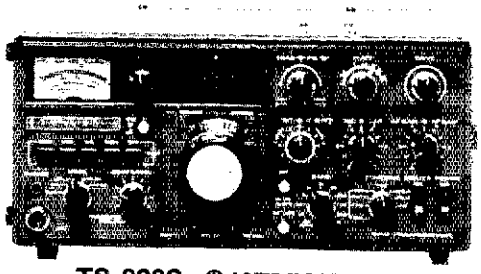

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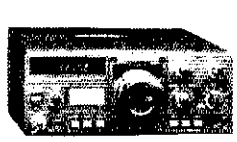

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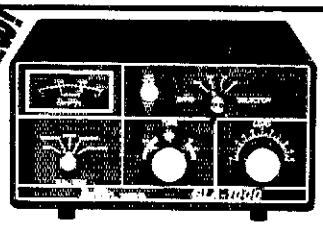

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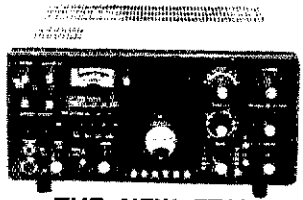

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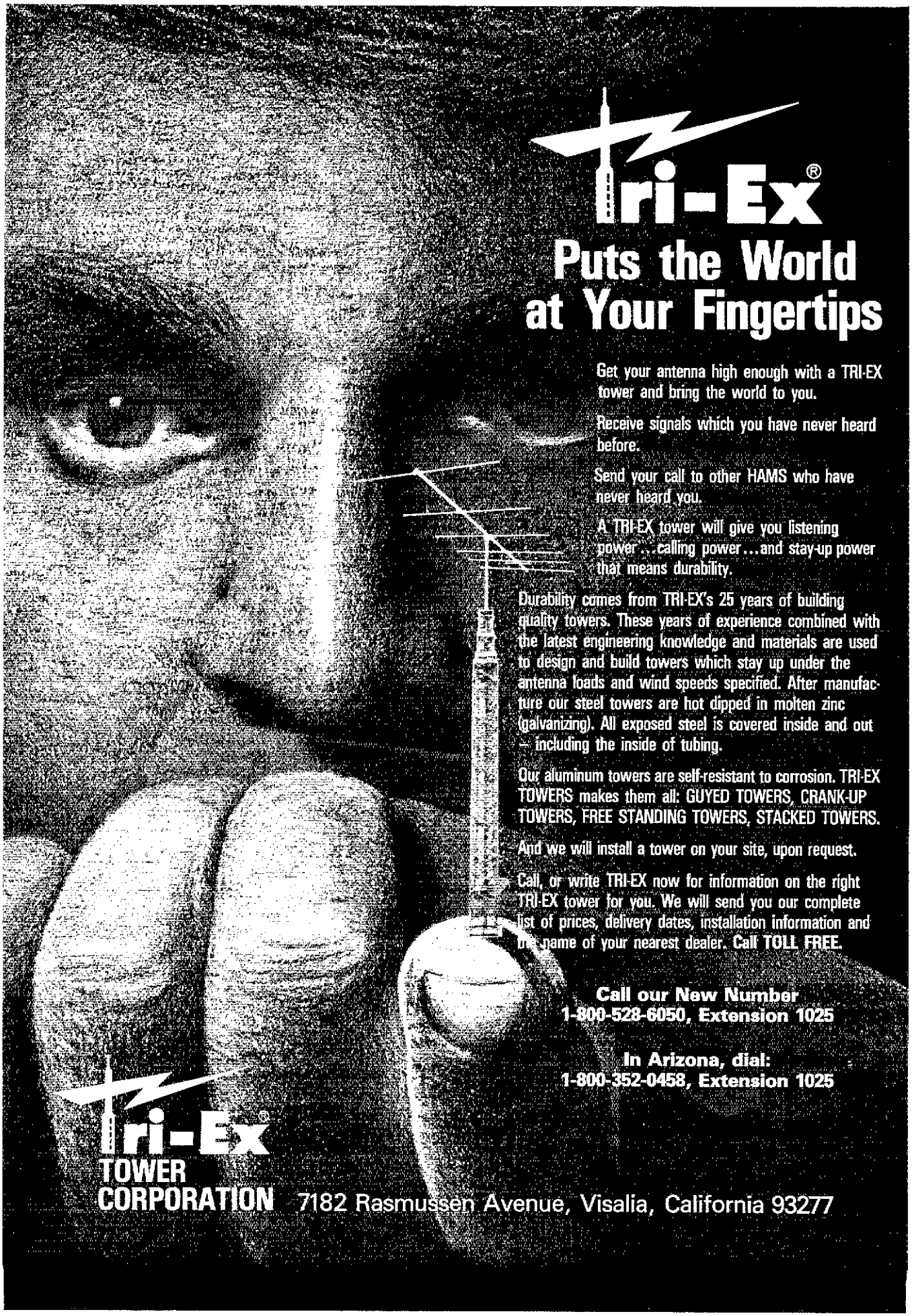
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MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM: Joe Flowers, WØQTF. SEC: WBØHKY. The recent hamfest sponsored by the Mid-Mo ARC was a success. Happy birthday to WØCKK, who is celebrating his 83rd birthday. Congratulations to WØAIB and WBØYBA who spearheaded the recent March of Dimes Walk-a-thon. Again this year it was a huge success and thanks to all who participated and helped make it so.

Net	QNI	QTC	Net	QNI	QTC
METN	232	105	HBN	361	32
MEOW	507	36	NEMOE	130	0
AGE	28	0			

Many Kansas City area hams combined their efforts and did an outstanding job during the recent tornado which struck Liberty MO, in Clay County. An impressive set of scores for the recent DX contest were submitted by the Kansas City DX Club. Traffic: WØBMA 660, WØHH 347, WØOTF 132, WØOUD 131, WBØNIE 78, WØWM 67, AEØL 62, WBØVHN 59, WDØEZJ 43, WØQAU 41, WØBVL 35, KØSI 32, KØBM 31, NØJL 30, WØVTF 22, WBØOMC 18, AGØK 16.

NEBRASKA: SCM, Ed O'Donnell, WBØGWR — Congrats to all Nebraska hams who upgraded during the annual Midway Ham Convention in Kearney. The Omaha ARC held their annual auction which was very successful. The 160-Mtr. WX Net closed for the summer, March 31st. We need net controls for the various nets throughout the state. Already, we have had tornado disasters, so again check your emergency equipment and be prepared for emergency nets. Check with your local ECs. NET Reports: 160 Mtr. WX Net: QNI 525, QTC 0; Nebr. Cornhusker Net: QNI 870, QTC 70; Mid-Nebr. ARES 2 Mtr. Net: QNI 284, QTC 5; Nebr. Morning Phone Net: QNI 1110, QTC 44; Nebr. ARES 75 Mtr. Net: QNI 153, QTC 0; Nebr. Storm Net: 1177, QTC 72; Pawnee ARC 2 Mtr. Net: QNI 134, QTC 1; Platte Valley 2 Mtr. Net: QNI 54, QTC 0; PM Net: QNI 227, QTC 38; QCWA Net: QNI 62, QTC 0; Sandhills WX Net: QNI 187, QTC 1; Western Nebr. Net: QNI 597, QTC 57. Traffic: WØFOB 262, WØVEA 115, KØAIE 85, KØBRS 65, WØEUT 65, WAØCBJ 60, WØVYX 32, WØGEO 29, WAØOOX 24, WBØROG 18, WAØPCC 14, WBØGWR 11, WAØQEX 8, WØYFR 7, WØDJU 6, WØHTA 6, WØNIK 6, WBØMKD 2, KØSFA 1, KØZAM 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William Pace, W1ID — STM: WB1AIU. SEC: W1SY. NMs: K1EIC K1EIR W1EH WA1LOU WA1ELA. Net reports:

Net	Freq.	Time/Day	Sess.	QNI	QTC
CPN	3965	1800 M-S 1000 Su	30	432	182
CN	3640	1900/2200 Dy	61	354	325
Nugmeg VHF	28/88	2130 Dy			
WESCON	78/19	2030 Dy	31	656	121
CORN	75/15	2100 Tue	3	3	22

The CN-CPN Dinner in March was, as usual, a great success, and a lot of fun for all. W1ID was unable to attend due to illness. Section saddened by tragic accident that claimed the life of K1YGS. We will all miss him. Spring and summer mean work on the farm. Antenna farm, that is! Please remember safety rules. Field Day is at hand. Good luck to all! STM WB1AIU, reminds traffic handlers that PAN-AM games in July means opportunity to extend good will by helping to handle traffic for athletes attending from 33 countries, 27 of which have 3rd party agreements! More info on section nets. If you'd like to discover RTTY, but don't know where to begin, try picking on K1DFS. DXers are reporting good luck on 20, 15 and 10 meters. Converted CB rigs are enjoying much popularity on 10. And inexpensive CB beams work great on 10. Those of the 3-element variety, are light enough to be turned with light duty TV rotators. 160 interest seems to be on the upswing. Simple transverters or am rigs in the 100-watt class (try class AB RF section with old-fashioned cathode modulation), might be a fun group project for your club. W1ID unable to do column due to illness. Please excuse any omissions — WB1AIU. Traffic: WA1UUA 217, W1OD 198, WB1CPF 175, K1EIC 112, WB1ASH 107, K1XA 103, WB1DQP 99, W1BDN 94, WB1DGR 88, WB1AIU 87, W1DFT 70, WA1UAX 66, WA1LOU 61, W1XX 51, K1AQE 50, WB1AIE 44, W1KV 31, W1HMJ 23, W1JA 22, K1DM 10, K1BY 8, K1EUW 6.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. STM: WA1TBY. EC Brockton, WB1KZT; EC Maynard WB1AQA; EC Bedford, N1ACA; OTS: WB1FSD. STM: WA1TBY, EC reports received from K1FM W1III W1UQ W1ALP W1ZMO W1LE WA1IGL and W1XA. OO reports received from K1LWI W1NF WA1NAE and W1AUQ.

Net	Freq.	Time/Day	QNI	QTC
EMRI	3.66	19/2300 Dy	669	402
EMRIPN	3.898	1730 Dy	441	320
HHTN	04/64	2230 Dy	385	147
NEEPN	3.945	0830 Su	50	18
EM2MN	90/30	2000 MWF	28	38
EM2MN	145.8	2000 TTh		

All clubs preparing for Field Day. Your SCM will be on EMRIPN from N1RR/1 to take your FD traffic Sat. Send me your FD totals as well as to the League and I will list all EM Clubs here. Which club will make the most contacts per transmitter!? Norwood Club has net on 2 and 10. Cape and Islands Club had a banquet in Hyannis. Lexington and Concord Clubs merging. Watch out contesters. Quannapowitt Radio Assn. runs photos of activities from many years past. Chelmsford ARA members sending comments on RFI Bill to FCC. Massasoit members W1ECK and WB1FMA received Certificates of Merit from ARRL Vice Director W1JFF. Wellesley and Southeastern Mass Clubs held successful auctions. Capeway Radio Club planning a Ladies Night. Billerica Club had W1HZ speak on the Double Eagle Balloon crossing and their communications via ham radio. W1ALP thanks all those sending good wishes on his retirement as SCM. Items for this column must be received by the 7th of the month, otherwise held 'til next month. Catch me on the nets if you like, our previous STM, WA1ZAZ, stepped down due to school pressures and I have appointed WA1TBY. SEC WA1BLG, was planning to move into his new home when it was destroyed by fire. Moving in with K1UAQ until it can be rebuilt. W1JR has been served with a suit by the town to remove his towers. He is going to fight it. Local hams will help as needed. WA1YMD's XYL, WA1YLY, home from hospital. WA1VKB active from UMass on W1PUO. W1MX was heard in UK on 6 M.

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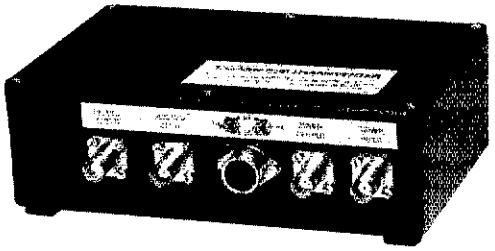

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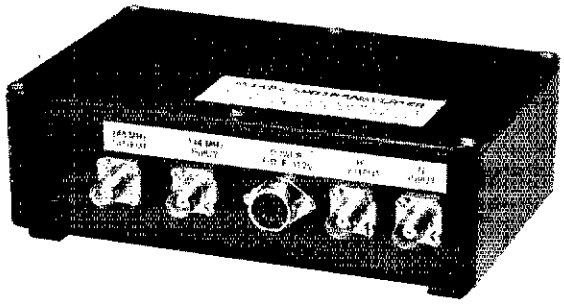

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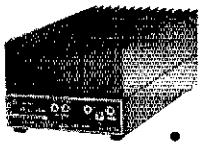

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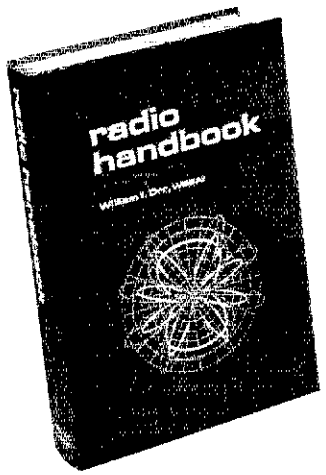

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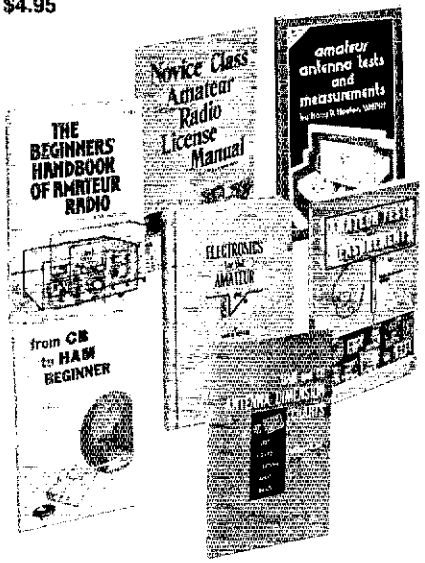

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W1BHD writes that Yankee Chapter of QCWA meets on 3.903 Sun at 0830. 40 M WAS net on 7.250 at 1500Z Sat. K1FB net control; K1PZU/WA1DJC to be ordained a Priest June 9, then moving to PA. W1MPT in hospital. Bellingham, Billerica and Chelmsford ARES groups active with marathon coordination. Traffic: (Mar.) WA1ZAZ 421, WB1DXR 339, WA1TBY 337, WA1VAB 335, K1BA 213, WA1EYY 182, K1GN 167, K1CE 152, W1FJI 111, W1TR 111, WB1EMU 100, K1BSO 86, W1DMH 81, WA9NEW 58, WB1EZT 56, KA1CC 39, WA1FNM 32, WB1GEX 21, WB1EYE 18, WA1IFE 18, W1MX 17, W1CE 15, WA1YMD 15, AD1F 10, K1BZD 8, K1CLQ 6, W1PL 6, N1EE 4, WA1KSF 4, W1ALP 3. (Feb.) WA1YMN 127, WB1DXR 127, WB1FSD 31, WA1VKB 18, WB1GEX 8, N1FE 2. (Jan.) K1BSO 143.

MAINE: SCM, Ed Bristow, WA@MIX — SEC: WA@YUW. NMs: W1RWG K1GUP W1WCI WA1YUW WB1ACD. Aroostook ARA mbrs provided communications for snowsled race in chill factor of −55°, with 18 members involved. Comm. at Sugarloaf Mtn. Ski races were handled by W1s HTG KR WYX K1SEV K1YXO N1AAQ WA1JZP & WB1EYS. Equip. furnished by W1WXI & W1HUT. Androscoggin ARC sponsoring Gen'l & Adv. classes. K1IVJ & W1SSH both hospitalized — quick recovery boys. Somerset ARA will launch its first hamfest in Cornville July 22nd. Abbot hamfest at Irv's Eden is Aug. 12th. I regret the necessity of taking over from W1KX, but necessary. I solicit your help & contributions from this column. Good luck in your new job, W1KX. PSHR: W1BJ W1RWG & AF1L. Sess./QTC/QNI. PTN 31/146/264. SGN 27/136/1240. MPSN 4/12/65. AEN 4/0/51. SPSN 10/10/31. BYN 26/29/935. Traffic: N5YX 130, W1RWG 102, W1BJ 94, AF1L 78, W1HDC 62, K1GUP 47, WA1MUX 40, W1KX 37, WB1BYR 36, W1ISO 36, N1RP 33, WA1JZP 26, WA1JCN 21, WA1YNZ 18, WA4UJJ 14, W1BMX 10, W1IXC 7.

NEW HAMPSHIRE: SCM, Robert G. Mitchell, W1SWX/W1NH — SEC: K1RSC. NMs: N1NH & W1TN. Welcome new appointees. OO: K1GW & WB1FPG. OTS: W1QYY & K1GO. EC: AC1Z. OES: W1TN. Amherst ARC new officers: W1FMK, pres.; K1GW, vice-pres.; W1IBI, treas.; & W1ETC, secy. W1OKA has new Yaesu FT-101E, MT2000A & tribander. W1GUX retired from TWA. Rockingham County EC KA1CB's son is now N1AMK. The Deery 85 machine has new control unit. WB2DIT now AF1B. Port City ARC members WA1UTO W1GGA WB1DSW & WB1EHV answered phones for NH Public TV fund drive. WA1NUU moved to Franklin. K1BH & WB1EHV hosted and demonstrated ham radio to Cadette Girl Scout Troop 404 of Kittery. WB1HFI now on Board of Directors Kearsage Chapter American Red Cross. W1GGA WA1UZJ WA1TND WB1EKD WB1EKE N1AJU & WB2EHV of Port City ARC gave demo of amateur radio to Portsmouth Cub Scouts. Your SCM acknowledges excellent bulletins received from the Nashua, Amherst, GBRA & GSARA Clubs. N1JH has new Yaesu FT-227. W1NH is rebuilding his 80 meter array. Welcome new ham KA1CLI. N1CB is pushing canoeing for his maritime mobile. Everyone have a good summer. Traffic: K1BCS 708, W1TN 316, W1GUX 80, KA1CB 47, WB1HFI 46, K1UOX 32, W1CUE 28, WB1ASY 13, WB1CTJ 9, WA1SRU 7, W1SWX 6, WA1PEL 4.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: K1DT. STM: N1TI. Fidelity ARC holding a competition for building best-looking YY receiver from Jan. QST. N1AAD is new General — congrats. EBAWA sponsoring RI QSO party again this year on July 28 and 29. KA1CSC KA1CSU and KA1CSE are new hams at Sub Signal — welcome aboard! NMs WA1CSO reports the RIEM 2-Mtr ttc. Net had great month — sess. 22, QNI 226, Tfc 88. This net is worthy of your support. K1DT is new SEC and N1RI is our first STM. They both need your help. Any one who has any thing to contribute on the Emergency or Traffic scenes, should get in touch with them. All clubs getting geared up for Field Day. K1UNW now a Silent Key. Traffic: WA1YUH 69, W1EOF 56, N1RI 38, WA1CSO 19, AE1S 8, WA1VIZ 3.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB. STM: W1KK. NM: WA1MJE and W1UD. Congrats to WB1EHS on upgrade to Advanced. Also to KA1ARN and KA1BND to General and KA1ARO to Technician. Very fine publicity article about W1GAJ in the Hampshire Life, copy mailed to SCM by K1NWE. K1IJV scheduled to conduct the YL News and Views column in QST effective July issue. SEC at new QTH in South Hadley. W1NY (Club stn. of HCRA) operating from Springfield Science Fair qualified for BPL with 187 tfc. originations. Operators were W1KK 4C1T and N1YY with K1IJV W1NLE K1NWE and W1TM receiving. W1UD took many QSP from W1TM. Several clubs making plans for FD. Traffic: (Mar.) W1TM 321, WA1MJE 243, W1UD 230, W1NY 227, W1NLE 70, WB1EHS 28, W1KK 25, W1BVR 23, K1IJV 21, WA1OPN 20, K1JHC 19, W1EFC 16, W1UKR 16, W1ZPB 15, K1BE 10, W1GQP 6. (Feb.) W1UD 114, K1BE 10.

VERMONT: SCM, Bob Scott, W1RNA — WR1AEA will be changing to W1KOO early summer. Border ARC Hamfest July 29, Prouty Beach, Newport, VT 0900 — 1600. BYO refreshments. VT QSO Party, from 2100 GMT May 5 to 0100 GMT 5/7. Emer. Motorist assist WR1ACA 2, WR1AFA 2, WR1AEA 3. WA1GPU is now AD1K, in U.S. Navy in Philly area. K1LEC runs patches for KC4AAA & others. WB1GTO now General. WR1ACA officers: AB1O, pres.; WA1FRE, vice-pres. 20 Burl. ARC mbrs. took part in communications for Young Farmers of America Feb. 23, 24 & 26, between NCS, airport, registration desk, hotel desk & vans, via 2 mtr. fm. Wx condx added 'spice' to the well plans — many changes! Operation was vy successful. Congrats to all who helped or were ready to. Please forgive net and ttc. reports omission.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — I am sorry to report the Silent Key KL7FON. He was an old time Alaskan and was active in all circles of amateur radio including Army MARS. I am advised that the Fairbanks Club and the Eilsen Club are going to sponsor a Hamfest and Flea Market May 19-20th. Hope to see you there. KL7HOV and XYL are back from KH6 land. KL7ITW acted as NM for the ASN while he was away, tnx JJ. Many stations supported the communications effort for the Iditarod Dog Sled Race. We are approaching time of bad propagation, so communications is spotty. KL7FSE, our new SEC is concerned about missing reports from ECs. Please cooperate and make ARES something to be proud of. No reports from Juneau this month, so do not know what they are doing in the Capitol City area. The Kodiak Club is making plans for the King Crab Festival which requres considerable amount of communications, which they perform each

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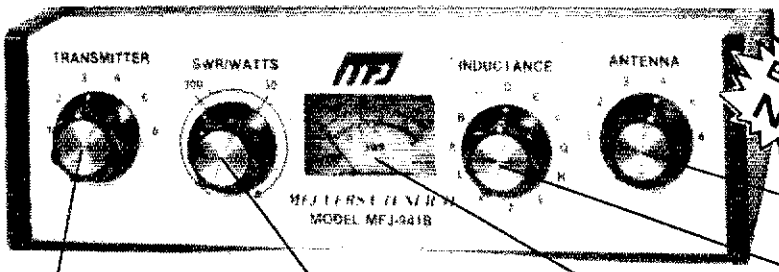

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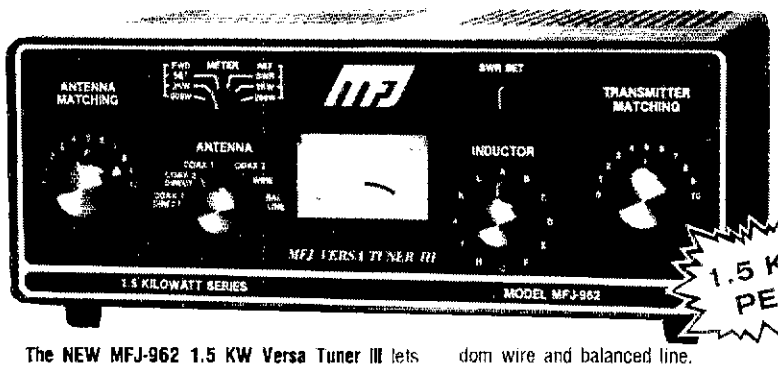
For $159.95 you can run up to 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun. SWR, dual range forward and reflected power meter. Flexible six position antenna switch. Outstanding value.



Where else can you get a 1.5 KW Tuner with SWR, dual range forward and reflected power meter, antenna switch and balun for only . . .

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The NEW MFJ-962 1.5 KW Versa Tuner III lets you run up to 1.5 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

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A flexible six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.

A new all metal, low profile cabinet gives you RFI protection, rigid construction, and sleek styling. Black finish. Black front panel has reverse lettering. 5x14x14 inches. A flip down wire stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 12 position inductor. Ceramic rotary switch. 2% meter.

Built-in quality. Every single unit is tested for performance and inspected for quality. Solid American construction, quality components. One year limited warranty.

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MFJ-961 1.5 KW VERSA TUNER III has balun, six position antenna switch. Matches coax, balanced line, random wire, from 1.8 to 30 MHz.

6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.

$139.95

The MFJ-961 1.5 KW Versa Tuner III gives you a flexible six position antenna switch. It lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.

Run 1.5 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, balanced line, random wire.

Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

Black all metal cabinet. Black front panel has reverse lettering. Flip down wire stand tilts tuner. 5x14x14 inches.

Encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 12 position inductor, ceramic switches. SO-239s, ceramic feedthrus. One year limited warranty.

Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

For your nearest MFJ dealer, call toll-free 800-647-1800. Visit your dealer and compare. You'll find real value.

Why not see the NEW MFJ-961 1.5 KW Versa Tuner III at your dealer's today? If no dealer is available order direct from MFJ.

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Introducing Kantronics' Field Day™
Morse Code/teletype reader and code speed display:

Kantronics' Field Day Morse Code/teletype ader and code-speed display reads code signals ht off the air. Its powerful microcomputer stem picks out signals, computes their speed, d reads even sloppy copy up to 80 words r minute!

Flys through the air ith the greatest of ease.

Field Day is simple to use. You plug it into ur station receiver just as you would a set of adphones.

Code and teletype conversations are nverted from dots and dashes to standard hanumeric text. The text advances across 10 half-inch displays, and lab tests show that en the fastest CW is easily readable.

Field Day displays incoming or outgoing code eeds for you at the touch of a button. An curate code speed-sampling program shows speed right on the front panel. Everything is closed in a single, lightweight package that's all enough to fit in with the rest of ur station.

Pay a little, get a lot.

In addition to a highly superior code-reading ogram and unique "on-board" speed display, **Field Day** has the specifications that make it a truly great code reader.

Modes: CW, RTTY and speed display. **Speed Range:** 3-80 WPM. **RTTY Speeds:** 60, 67, 75 and 100 baudot. **Code Display:** 10 alphanumeric displays. **Special Characters:** AS, AR, SK, BT, /, ?, (,), ", ', comma, period, colon, semicolon, "understood," "attention," and "error." **Filtering:** Active, 750 Hz center, 200 Hz bandwidth. **Input Impedance:** 1,000 ohms. **Power Requirements:** 117 Vac, 20 watts. **Dimensions:** HWD 3.44" by 8.50" by 9.25". **Warranty:** Limited, one year parts and labor. **Price:** $449.95 Shipments after 3/1/79.

3. C'mon, take a test drive.

Check with these Authorzed **Kantronics** dealers for more information on the **Field Day** Morse Code/teletype reader and code-speed display:

Associated Radio/Kansas City, **Barry**/New York, **Bill's**/Carbondale, IL, **Brodie**/Moore, OK, **Burghardt**/Watertown, SD, **Burstein-Applebee**/Kansas City, **Cohoon**/Trenton, KY and Austintown, OH, **Fontana Electronics**/Fontana, CA, **H-E-P**/Aurora, CO, **Hirsch**/Williamsville, NY, **Long's**/Birmingham, **Madison**/Houston, **MidCom**/St. Louis, **Omar**/Durand, MI, **Omaha Radio Center**/Omaha, **Queen City**/Cincinnati, **Radio World**/Oriskany, NY, **Spectronics**/Oak Park, IL, **Tracy**/Fort Worth.

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year. Many repeater licensees did not report their repeater this year, consequently the new ARRL Repeater Directory will not show all the repeaters in Alaska. Traffic: KL7JDI 558, KL7CUK 50, KL7JDH 9.

IDAHO: SCM, Lem Allen, W7JMH — Pocatello ARC is going great guns with demos of power supplies, computers, etc. plus 7 new members. Kootenai ARS had a Charter Party with 33 present. K7MM presented the Charter to Prexy W7LQT. His XYL wants to thank everyone who has called her on the fone to advise that he is on the way home from present odd-ball work schedules. Trinity ARA (Mt. Home AFB) is planning another Novice class soon, headed by WB7NSW, who had the highest Novice Round Up score from that area. The TARA Log Sheet is contemplating a swap and shop section to add interest and flavor to the excellent section on DX and Awards worth going after. Glad to hear the CW Net is flourishing. WA7YXQ has a remodeled Ham Shack, complete with painting easel. The Cottonwood repeater is now back on with 147.87/27 to serve North Idaho from Lapwai, thanks to W7HKK and WA7TRO. K7RPB has new Icom 701. W7LQT has new set Icom 701 Twins. Try battery power on Emg. Generator on FD

Net	Sess.	QNI	QTC
Farm	30	1328	57
IMN	22	170	77
CD	22	594	13
TV Emg.	4	52	—

Traffic: W7GHT 208, AC7P 125, W7JMH 72, WA7CTS 66, KN7WLF 26.

MONTANA: SCM, Robert Leo, W7LR — Asst. SCM: WA7PZO. SEC: W7TYN. NMs K7CHY W7TGU. Sorry to report two Silent Keys: W7LVY WA7MDF. W7QYA on four month Landrover trip thru North Africa. W7JMX & W7LR visited Miles City ARC. Hamfests: Essex MT 21, 22 July; WIMU early Aug., Macs Inn, ID. N7AGP reports busy tfc, 6 new Novices in Gt Falls. W7DB sends OBS bulletins & works 6 meter DX. W7TYN QSO 2 meter DX. W7TGU busy on several nets and DX. WB7STG reports net activities. IMN QNI 170, QTC 77. IMN time 0300Z and April 3635. 2 meter nets: Missoula, Th, 7 PM, 28/88; Bozeman, Tue. 9 PM, 28/88. W7KNT 6 meter DX: KH6, KZ5, LU, & many states. K7WNE reports many Missoula area VHF efforts. KB8BI busy with DX & tfc. Many new General class licenses in MT from Helena FCC exams. Next exams Billings in June. Apply for appt to Seattle FCC in May. Many Havre hams help in Amtrack railroad derailment. W7IDK reports WB7UOI & WR7UOJ computer work, & K7NM RTTY repeater. K7WNE new OVS, & WB7BWZ new Billings EC. W7LR trying to find OSL mgr for MX2B QSO in 1938. K7ECF relates 1920 radio work on Atwater-Kents. Gallatin ARC had pot luck & slide show by WA7CAC/ZL1BEQ. New Helena ARC officers: WA7ZSO, pres; KA7CBV, vp; W7LIT, secy; K7PFQ Ncs 6m net. Traffic: W7IXD 66, W7TGU 21, WA7KMP 8, WB7STG 4, N7AGP 6, W7LR 5.

OREGON: SCM, Dale T. Justice, K7WWR — Asst. SCM: K7JF. SEC: W7HLF. Section net reports.

Net	Time(Z)	Days	Freq.	QNI	QTC	Sess.	Mgr.
AREST	0000Z	Dy	3993.5426	67	31		W7HLF
BSN	0045Z	Dy	3908	538	45	31	WB7PQU
JCARES			147.06152	11	11		W7VSE
L-BARES	0230Z	Dy	147.39550	31	20		W7JHZ
OARES	0200Z	Dy	3993.5327	30	3		WB7RUW
PdxAARES	0230Z	Dy	147.32542	25	25		K7WWR
WCN	0300Z	Dy	3702	418	192	31	K7ZIG
1676	0230Z	Dy	146.76955	112	31		K7KVV

OTVARC training sessions have netted 14 new calls. Hoodview classes are in full swing again. WA7WOE now General. OH2BH gave a nice talk at a special TERAC meeting. New in Medolrd are KA7DRH and KA7DUH. New in Trail is KA7DWZ. W7LT has his antennas back up. Traffic: (Mar.) W7VSE 572, WA7IHS 322, K7KVV 262, WB7OEX 104, WB7BCG 82, W7HLF 47, W7XI 47, K7WWR 36, K7QPW 29, W7LT 21, W7GUH 8, W7LNE 7. (Feb.) W7LNE 12, W7BNS 10.

WASHINGTON: SCM, Bob Klepper, W7IEU — NTN QNI 1529, QTC 55; ESN QNI 428, QTC 24; WARTS QNI 3539, QTC 148; NWSSBN QNI 709, QTC 39; WSN QNI 459, QTC 122; SCARES QNI 113; Clark Cty ARES QNI 162. Wenatchee Hamfest June 2 and 3. Cascade ARC presentation in Everett Mall well received with several new prospects signed up. K7VNI received award from Whatcom Cty Commissioners for amateur support in past S&R efforts. W7EJF has become a Silent Key. KA7AWH recommends WCN for beginning traffic handlers. New PSHR point system goes into effect this month. If there is any questions, I'll ve glad to try and answer them. Lower Columbia ARA has new IC22A for their club station. WB7FGC has new 10 mtr. Yagi for FD. W7ERH is new asst. EC for South Snohomish Cty. Island Cty ARC pushing ahead with radio classes for Novice and upgrading. HAMS Club graduated 16 from Novice code class. W7IDZ, active on 6, just received ARRL 600 Club award No. 147. WB7VRZ on 75 with Heath 101 and random wire. Thanks to those who used the Mt. Pilchuck Rotr. sparingly during the fuel shortage at the site. WA7RVA and N7CY heading up West Seattle ARC's communications for West Seattle High School track meets. To set the record straight on the W7DX Silent Key episode, W7EBU reports now that it ws ex-W7DX, that became the Silent Key, my apologies to all concerned. SEC WA7RWK reports changing Section EC-ARES net to 3900 kHz Mondays at 8 PM. KL7JEB reorganizing ARES in Skagit Cty. W7JWJ sends CW practice at 10-25 wpm Wed on 3593 from 7-8 PM for those wanting to upgrade. RASC members worked 93 stations during the George Washington birthday celebration. North Seattle ARC moving club meeting site to Lake City Community Center. WB7PSP was guest DJ on a local FM station. K7MF equipped for emergency communications on 50 through 450 MHz. WB7FDE has over 100 countries confirmed in 14 months and now full member of Williamette Valley DX Club. From report in WWDX Club Totem Tabloid, WA7WMB and K7JA (JR1ZZC) are enjoying life in Japan. Traffic: W7DZX 801, W7AK 438, KL7JEB 236, K7GXZ 91, WA7BDD 89, N7AJ 75, W7LUP 54, W7BUN 46, W7IEU 40, W7EBU 33, KA7AWH 30, WA7PHD 27, W7APS 16, WB7EBP 15, W7ZEV 14, W7BCS 8, WA7OJI 6, WB7CFH 4, W7ERH 1.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst. SCMs: K6UWR W6ZF YE2AQV/W6. SEC: K6UWR. PSHR for Mar.: WB6UZX W6JXK. WB6YBA sporting new 61-ft. rotating tower and tri-band Yagi. WA6JVZ reports WA6CCM/RPT up and running on 220. I attended a meeting of the ECs of our section, chaired by K6UWR, EB SEC. He has an active and aggressive group which has made great strides in improving the posture of

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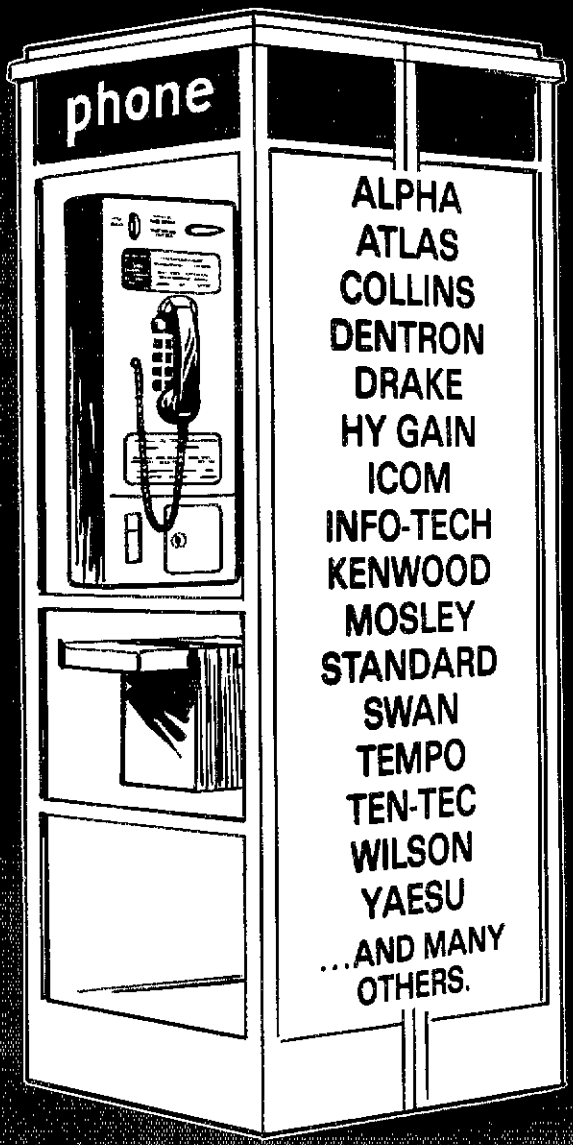

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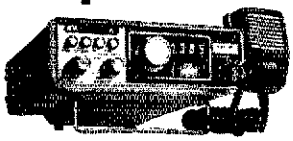

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(50 MHz)

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Keyboard Microphone: YM-22 for FT-127RA and FT-627RA; YM-23 for FT-227RB (YM-22 standard feature with FT-227RB) • Squelch Unit • FP-4 AC Power Supply

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The keyboard microphone allows two-tone input for autopatch or control purposes, as well as remote programming of dial or memory frequencies.

Automatic ±600 kHz repeater split, or program a split up to 4 MHz using the memory. Keyboard microphone allows remote programming of odd splits.

CPU scanner will search for a busy or clear channel, upon your command.

Four memory channels for simplex or repeater use, plus another memory channel for a split of up to 4 MHz.

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ARES in our section. If you'd like to know what you can do for your family and neighbors by providing communications during an emergency, drop him a line at 3130 Raleigh Ct., Fremont, CA 94536. The Fremont-based NCCC captured their fourth-in-a-row Gavel in leading all clubs in the 1978 SS with a score of 14.8 Meg! The W6ZF West Coast Bulletin, 22 wpm at 3540 kHz, 1st & 3rd Mon. of each month at 8:00 PM PST is a very good way to keep up with current events in the world of Amateur Radio. EB section again leads the NCN *Activity* Honor Roll with 16 stations — FBI SBARA welcomed new members W6ITD KA6DRD N6BFO. Traffic: (Mar.) W6IJXK 144, N5MR/6 88, WB6UZX 54, WD6BMX 4, WB6YBA 2. (Feb.) N5MR/6 58, WB6UZX 37, N6RO 4, KA6DZW 1.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. K7ZOK moved into new QTH. W7LTL WA7LHZ K7NAB KA6BAZ and W7HGN new ham in Southern Nevada. N7AKX active in NCN-1 & 2 and AREC. W7DIM reports Southern Nevada sightless center operators, WA7JXJ and WA7JXK have a two-meter station thanks to AD7K KA7BBX W7FJN WB7NGI and WB7QBJ. W7DIK is Director and Chairman Membership Committee of the American Beekeepers in Nevada. ZL2KG visiting W8PHJ/7. VK4AK visiting W7OK. W7OK enlarging ham shack. W7PBV requested his SCM nominating petition be withdrawn. W7ILX on sicklist. Las Vegas RAC holds T-Hunt following monthly meetings. N7CU on air from Korea with HL9UI. KA7BLZ in Japan. Las Vegas RAC 34/94 repeater has auto-patch. Traffic: N7AKX 72.

PACIFIC: SCM, George Morton, N7HR/KH6 — KH6IJ suffered a stroke and is now recovering. Cards via callbook QTH welcomed. By the time you read this, KH6DD will have assumed duties as SCM. He is a distinguished amateur and will receive my fullest support even tho I'll be in Japan. I hope all section amateurs will give him assistance in ARRL field organization activities thru active participation and support of section goals. Teamwork is the key to success and he will do an outstanding job. The HDXC is having a "Spring Sprint" club DX contest, listen for the KH6 big guns, tho KH6DD doing it the hard way: exciter only! That's the energy saving spirit. KH6BZF QSOd JA1UIU on 6M for over an hour! New appointments: SEC: KH6CKJ, ECs: Kauai KH6JIB, Maui KH6H, Hawaii AH6K. KG6JIC Guam. Traffic: KH6ST 93.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Asst. SCM: W6NJU. New officers for the Yuba-Sutter ARC are N6AWI, pres.; AJ6M, vice-pres.; N6AZP, secy-treas.; N6DM WB6GFJ and WD6BFR, dir. A rep. from the PG&E gave them a talk on line noise at their last meeting. WB6GFJ, having RFI-proofed his QTH with ferrite rods, has been issued the call FOØFB and is planning a DX-pedition that will include all mode OSCAR activity. WA6NKQ will offer a college course in Amateur Radio in the Spring Quarter at Butte College. The NOR-CAL 220 Repeater group is operating an experimental repeater on 224.7-223.1 near Camino. WB6UBF is the Trustee. W6SMU/ZL3AGG and K6DLL/ZL3AGF are on a tour of New Zealand. Traffic: W6DEF 31, W6SX 31, W6RSP 12.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. New officers of CCAC are WB6OYM, pres.; WA6NIF, vice-pres.; WA6JIT, secy.; WA6JII, treas. The Stockton RC now meets monthly. K6PVI a Silent Key. NCN Honor Roll for Feb: N6AWH W6DBH W6DPD WA6JDB K6PMG K6SXF and WA6WDL. WD6GAW and WD6GCS made General. KA6AIM on the air. WA6WLJ and WB6SON are ARRL Lifers. N6ZU made 5BWAS. W6CUA has a TR7600. WA6JNM has a FT-227RA. WA6CBD is General. KA6CAG and KA6CAH made Tech. N5ASR is now in Ridgecrest. N6AJ is active on 6 meters from Clovis. WA6GQY has a new antenna. WA6CDB and K6UJG have new towers and beams. WB6TTP and K6YDW have TS520s. WB6SUP has a TS820. K6PBT has DXCC. WA6WLJ has an IC230 and SB102. WA6NWP made General. WA6VIS has a new Quad. WA6OEC W6SMS AA6S W6DPD W6YKM K6YK and N6AJ are chasing DX on 6 meters. See you at the ARRL Pacific Division Convention August 11-12 at the MGM Grand Hotel in Reno. Traffic: W6DPD 11, WB6WYA 6, K6PMG 6, WA6WDL 6, K6RAU 4, WA6JDB 4, WA6YAB 4.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. K7UDG/6 has organized an Explorer Post No. 599 with PAARA as sponsors. They have theory and code classes every Friday. Membership is coed and open to any one 13 to 20 years old or younger if a Scout. For info contact PAARA. Remember the Pac. Div. Convention in Reno Aug. 10-12. FARS busy with field day plans. RFF visited the following clubs; WR6ADE, SCCARA EMARC and SCCARC. W6TWW spoke before the LERA ARC on Mobil Antennas. LERA ARC is planning a new Novice class. WVARA is looking for an editor for Heterodyne, and they are planning for Field Day. SCCARA now meeting at Welfare Dept. Bldg. 55 W. Younger ST., San Jose. They are chartering a bus for the convention in Reno. SCCARA has bid for 1980 Pac. Div. Convention in San Jose — plan ahead. SPARKs Auction/Flea Market was a success. They meet the first Wed. at noon in WDL Auditorium (Bldg. 3). WA6OTP discussed and displayed 8 models of crystal rcvrs to PAARA — including DX models. W6ZRJ completed major repairs on several rigs and checks into NCN when possible. W6MMG reports great condx. on DX bands, but needs new tubes for the linear to get out better. Another of the Newbold's, WB6HBL, reports not much doing but rag chews and chases DX. WA6HAD checks into NCN and working JA's, along with shack and house remodeling. WB6VWK also chasing the elusive DX on phone. W6KZJ busy with traffic on NCN. W6AUC fills the report with net skeds as usual and a good amount of traffic, also has skeds with brothers W6JAO and W6BEU and nephew K7UOI — very busy indeed. WB6IZF busy with geology biz and new home. W6YBV wins the honor for most traffic in the section — as usual, he keeps the bug swinging on NCN, RN6, PAN and a few others! Traffic: (Mar.) W6YBV 275, W6KZJ 72, W6RFF 53, W6AUC 51, WA6HAD 5, W6ZRJ 2. (Feb.) W6ZRJ 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — STM: N4UE. SEC: K4CJZ. North Carolina State Convention and Metrolina Hamfest well attended with many good forums and exhibits. Tnx to Mechlenburg ARS the sponsoring organization. Rockingham ARC & Alamance ARC recently completed a demonstration on Amateur Radio at a local Boy Scout Camporee; excellent reception from the 800 scouts in attendance. Charlotte ARC provided communications to annual March of Dimes Walk-a-thon, 16 stations participating. Alamance ARC displaying club member QSL cards in club room . . . good idea.

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- *Morse code receive (optional) self tracking speeds from 1-175 wpm on a separate plug-in circuit board (Available June, 1979)*
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Optional 9" monitor: $150.00

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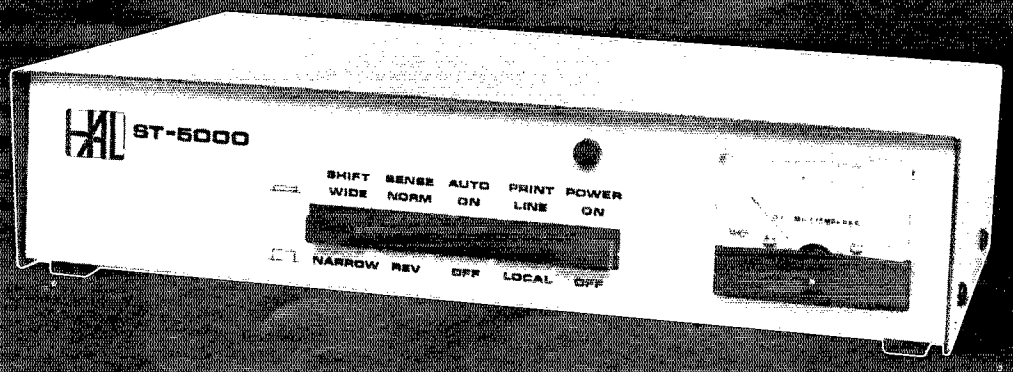

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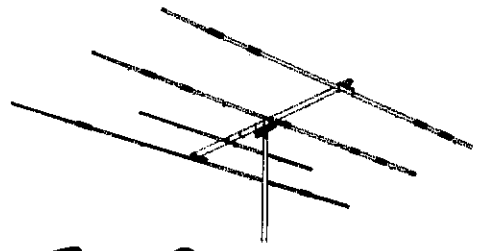

Antenna Sale!

HY-GAIN

		Regular	Special
TH6DXX	Super Thunderbird	$299.95	$239.95
TH3MK3	3 el. 10-15-20M beam	229.95	179.95
TH3JR	3 el. 10-15-20M beam	149.95	129.95
Hy-Quad	2 el. 10-15-20M Quad	229.95	179.95
205BA	5 el. "Long John" 20M beam	289.95	229.95
155BA	5 el. "Long John" 15M beam	169.95	139.95
105BA	5 el;"'Long John" 10M beam	119.95	99.95
204BA	4 el. 20M beam	219.95	179.95
204MK5	5 el. conversion kit	99.95	79.95
153BA	3 el. 15M beam	79.95	69.95
103BA	3 el. 10M beam	54.95	44.95
402BA	2 el. 40M beam	209.95	169.95
BN-86	Balun for beam antennas	15.95	15.95
TH2MK3	2 el. 10-15-20M beam	149.95	119.95

		Regular	Special
18HT	Hy-Tower 80-10M vertical	299.95	239.95
18AVT/WB	80-10M Trap vertical	99.95	79.95
14AVQ/WB	40-10M Trap vertical	69.95	57.00
12AVQ	20-10M Trap Vertical	39.95	32.95
14RMQ	Roof Mounting kit (verticals)	33.95	29.95
5BDQ	80-10M Trap doublet	89.95	69.95
2BDQ	80-40M Trap doublet	49.95	39.95
66B	6 el. 6M beam	119.95	99.95
203	3 el. 2M beam	15.95	
205	5 el. 2M beam	17.95	
208	8 el. 2M beam	25.95	
214	14 el. 2M beam	31.95	
LA-1	Deluxe lightning arrestor	59.95	49.95

MOSLEY

		Regular	Special
Classic 33	3 el. 10, 15, 20 Mtr. beam	304.75	209.95
Classic 36	6 el. 10, 15, 20 Mtr. beam	392.75	269.95
TA-33	3 el. 10, 15, 20 Mtr. beam	264.00	189.95
TA-36	6 el. 10, 15, 20 Mtr. beam	392.75	269.95
TA-33 Jr.	3 el. 10, 15, 20 Mtr. beam	197.00	149.95
TA-40KR	40 Mtr. Add On	119.95	89.95

CUSHCRAFT

ATB-34	4 ele. 10, 15, 20 Mtr. beam	289.95	219.95
ATV-4	10, 15, 20, 40 Mtr. Vertical	89.95	69.95
ATV-5	10, 15, 20, 40, 80 Mtr. Vertical	109.95	89.95
ARX-2	2 Mtr. Ringo Ranger	39.95	32.95
AR-6	6 Mtr. Ringo	36.95	32.95
ARX-220	220 Mhz. Ringo Ranger	39.95	32.95
ARX-450	435 Mhz. Ringo Ranger	39.95	32.95
A144-11	11 ele. 144-146 Mhz. beam	36.95	30.95

A147-11	11 ele. 146-148 Mhz. beam	36.95	30.95
A147-22	22 ele. Power Pack	109.95	89.95
A144-10T	2 Mtr. "Twist" 10 ele.	42.95	34.95
A144-20T	2 Mtr. "Twist" 20 ele.	62.95	52.95
A147-20T	2 Mtr. beam	62.95	52.95
A430-11	432 Mhz. 11 ele. beam	34.95	29.95
A432-20T	430-436 Mhz. Beam	59.95	49.95

HUSTLER

3-TBA	3 ele; 10, 15, 20 Mtr. beam	259.95	189.95
4-BTV	10-40 Mtr. Vertical	99.95	79.95
5-BTV	10-80 Mtr. Vertical	134.95	99.95
RM-75	75 Meter Resonator	16.95	14.50
RM-75S	75 Meter Super Resonator	31.95	27.50
G6-144B	2 Mtr. Base Colinear	79.95	59.95
G7-144	2 Mtr. Base Colinear	119.95	89.95

WILSON

System One	5 ele. 10, 15, 20, Mtr. Beam	$299.95	$239.95
System Two	4 ele. 10, 15, 20 Mtr. Beam	249.95	199.95
System Three	3 ele. 10, 15, 20 Mtr. Beam	199.95	159.95
WV-1	10-40 Mtr. Vertical	79.95	69.95

TAYLOR

HQ 1040AV	10-40 Mtr. Trap vertical	59.95	49.95

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NEW! *GRANDMASTER* MEMORY KEYERS

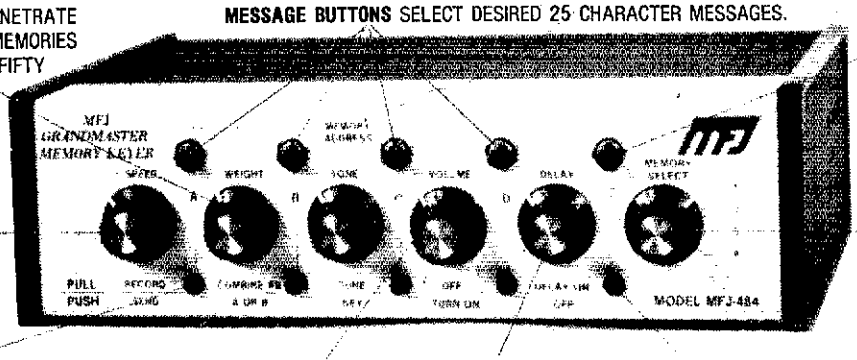
At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.

RESETS MEMORY IN USE TO BEGINNING.



SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control, 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

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WCARS (Asheville) newsletter now edited by WB4DRN, good luck. Look for new instructions on filling Public Service Honor Roll reports this month. Get details from SCM. W4EAT & W4HG off the air for a few weeks. W4EAT rebuilding his shack and W4HG moving to new QTH. W4EHF reports big 10-X group in the Fayetteville area. KA4CIO is now N4BJI; N4ARY is now General. Field Day fever reaching its peak in the clubs in North Carolina with all planning real big outings. Is your club participating? Looks like good participation planned in VHF QSO Party on June 9-10 too .... see you on the air. Traffic: (Mar.) WD4GNQ 124, W4PCN 110, W4FMN 91, K4MC 89, AB4S 86, KB4IZ 84, K4VHT 84, WB4ZIQ 84, WA4SRD 70, N4UE 59, WB4MXG 58, WD4EPO 48, AA4R 47, K4FTB 44, WA4UYS 44, WD8NYN/4 43, WB4WII 42, WD4AIE 39, K4DHX 38, WB4CES 31, AB4V 29, K4TPK 28, N4ALE 25, W4ACY 23, WA4IHG 18, AI4O 17, WA4CUD 14, WB4CYN 14, W4OFO 14, WA4UTC 14, W4EHF 13, KB4HG 13, N4BEX 12, WD4ABZ 10, WB4ETY 10, WD4NTE 7, K4TTN 5, K4AI 4, W4IZI 4, W4OCZ 2, W4EAT 2. (Feb.) K4MC 124.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. STM: W4ANK. NMs: WA4SJS KD4D. Check-ins (Mar.) SCSSBN 1637/175, Blue Ridge 2M net 972/10, Anderson 2 M net (Feb.) 306/18, 487/31, York County 2M net 238/32, Lancaster County 2M net, 103/0 Laurens County ARES 37/10, Florence ARC 2M net 33/0, Dillon County ARES 14/0. Congrats to all known upgrades WD4DJS WB4TSP WD4GAX WD4RHV WD4GAT WB4WOX KA4HLW KA4BGX KA4EMS WD4FJP WD4NMF WD4OEK KJ4X KA4DPI KA4DFV. Congrats to WA4JWS, High S.C. score in 160 contest. 10 mts. rpt. on 29.53/29.63 using N4JK Anderson Area. Traffic: (Mar.) N4PQ 527, K4ZN 409, WD4AWN 207, W4NTO 106, W4ANK 88, WB4HVL 42, K4FRX 38, W4MTK 37, WB4UDK 36, W4FVV 35, W4FMZ 27, WB4FEU 19, W4NQL 19, WA4SJS 13, AF4J 11, WD4EDM 8, WB8TCT/4 8, K4PFC 7, WA4VYS 5, N4EE 5, W4OGX 4, WD4EDU 3, WA4YAF 2, WA4CHC 2. (Feb.) W4FVV 8, KB4IU 8.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. STM: W4SQG. SEC: N4NK. Chief OO: W4HU. Chief OVS: WA4PGI.

Net	kHz	Time	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	31	183	275	WA4FDV
VSBN	3947	6/10:15 PM	62	572	1502	W4JK
VSN	3680	6:30 PM	30	121	358	WA4YIU
VN	3680	7/10 PM	61	522	878	WB4FLT

Many Virginians, including W4SQG N4NK WB4ZNB WB4PNY WA4CCK and K4BKX, had the pleasure of meeting our new CM, W1XX, at the Charlotte hamfest. WB4DBK is waiting to see which school he will attend next year. N4NK is ready for OSCAR. N4IF is improving 2-meter SSB/CW. WA4STO has his new OMNI on emer. pwr. K4EJ to spend April in Fla. W3BBN in Calif. with daughter. W4YE enjoyed CW DX contest. K4GR reports slowest month since 1977. WA4RXY activated local ARES for March of Dimes walkathon. WB4LAB is back in school full time. W4KFC is anxiously awaiting spring to get antennas back in shape. W4JUJ received 1st for VA in GA QSO Party. N4OT busy with contests and traffic. W4PVA busy sending the Official Bulletins and has arranged for FCC to give exams at Manassas on June 23rd. WB4YNU now KJ4J. K4DHB alerted ARES on Feb. 25 for flood warning, but fortunately wasn't needed. W4WWQ reports he is still alive but far from well until the Quiet Zone issue is settled. WA4FDV earned an "A" for last quarter. Remembmer: the 4th at 10:30 PM is cutoff for traffic rpeorts. Next month will be the last month late reports will appear! Traffic: (Mar.) WA4AVN 541, W4JK 514, WB4PNY 509, WA4CCK 398, W4SQG 362, K4KNP 318, W3BBN 315, WB4FLT 256, KF4R 253, WB4DBK 240, N4NK 212, W4UQ 208, K4BKX 162, N0ZO 135, N4IF 86, W3BBQ 84, K4JM 81, WA4YIU 81, WB4ZNB 75, AA4CK 73, WA4STO 72, WA4FDV 71, W4NWM 67, K0JH 64, N4LE 64, N4BA 55, W4OKN 55, WB4RWW 54, K4EJ 52, K4DHB 50, W4OOL 50, W4YVG 50, KB4OF 48, WA4ISA 47, W4YE 46, K4GR 40, WA4UYD 40, W4LXB 36, W4SHJ 29, WB4KIT 28, N4FM 26, WA4SQG 26, KB4OB 24, N4ATT 23, W4JAZ 20, K4VWK 18, W4SUS 17, WA4RXY 15, K4ITV 11, W4WWQ 11, W4CFV 10, W4KXE 10, WB4MAE 10, WB4LAB 9, WA4QWC 9, WB4FNW 8, WB4ODZ 8, W4DM 7, W4JUJ 7, N3RC 6, WA4RTS 5, N4AZI 4, N4BJX 4, AG4D 4, W4KFC 4, WB4TPT 4, WD4EUV 2, WA4JUO 2, AF4O 2, WA4YJF 2, N4AOP 1, N4OT 1, W4PVA 1. (Feb.) WD4OVR 423, K4KNP 292, W4UQ 218, WB4ZNB 202, WD4EUV 165, AF4B 81, N4YO 60, N4UY 56, W4LXB 52, WB4UHC 49, WB4ODZ 43, K4DHB 35, AG4D 28, K0JH 28, WD4KUK 26, W4CFV 25, WA4EGW 25, WD4GVU 23, WB4YNU 18, W4PVA 16, AD4J 12, W4PXA 9, WB4ZKN 9, N4AOP 8, W4WWQ 8, N3RC 6, K4BAV 4, N4BJX 4, WB2JAY 4, N4BHI 2, N4OT 2, WA4QWC 2, K4YEP 2. (Jan.) N4AOP 6, WB5SHK 5.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — STM: WA8WPW SEC: K8OEW NMs: W8YP WA8WPW WD8JYM. Huntington Hamfest June 3 at Camden Park. FCC exams in Huntington with no appt. required. DX Association being formed. Contact W8AH for info. WV QSO Party June 16 and 17. See Contest Corral this issue. WD8JYN in charge. Repeater WD8OQJ/R on the air at Oak Hill with excellent coverage. WV section ARRL Convention June 30 - July 1 at Jackson's Mill. Details this issue.

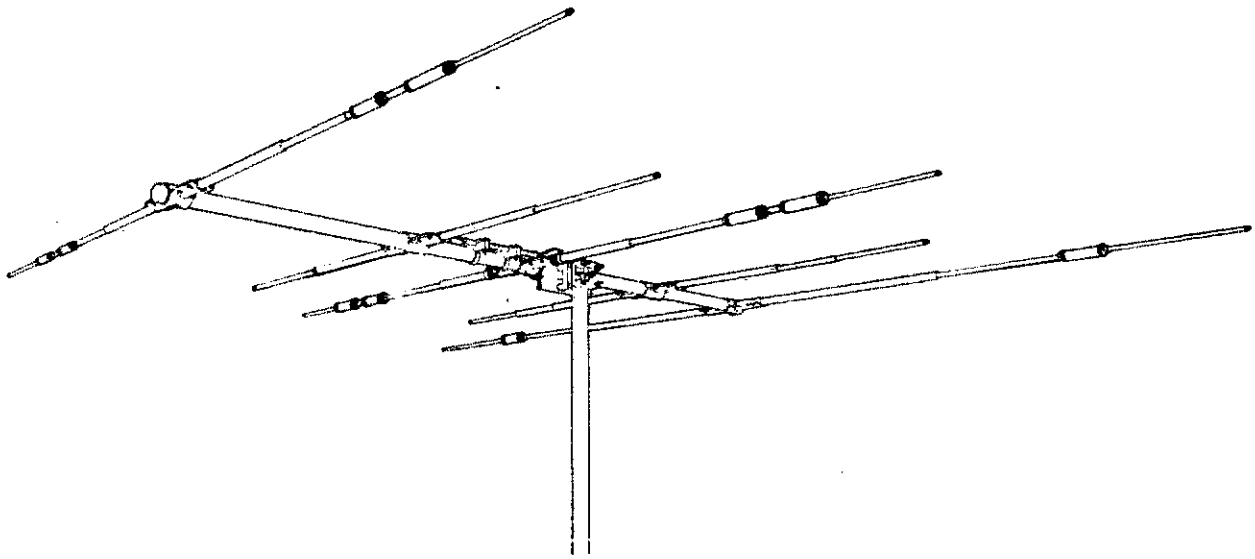
Net	Freq.	Time(Z)	Ck-In	Ttc.	Sess.
Hillbilly	14290	1700 Su	193	72	4
Novice	3730	2215 Dy	171	34	31
Phone	3990	1700 Dy	324	34	29
Phone	3990	2300 Dy	931	112	29
CW	3567	0000 Dy	194	58	27

Traffic: WA8WPW 101, WBYP 62, W8HZA 53, WD8JYM 52, WD8JYN 43, WD8DHC 40, WD8LDY 37, K8KT 31, WB8AKQ 27, N8AJC 16, WB8TDA 15, AI8I 8, W8CAL 8, K8QEW 7, WB8VAZ 7, W8CKX 6, K8JQ 6, WD8IGN 5, K8ZDY 5.

ROCKY MOUNTAIN DIVISION

COLORADO: Robert W. Poirier, K0DJ — SEC: W0GOW. STM: WB0MCL. NM: K0CNV WB0ZQG. Welcome to five new amateurs who have just taken the big step courtesy of W0MDT's classes. AD0A reports his recently built SB-220 is now operational and working beautifully. Spring should hopefully be in full swing by the time you read this, but late snow caused several weather nets to be activated with amateurs in the section helping out. Speaking of weather, the tornado and violent thunderstorm season will soon be upon us. Does you ARES or repeater group have liaison with your local NWS? N0DV and others in the Colo. Springs area are contemplating organizing a contest club. Net tfc. for March: Columbine 31 sessions, QNI 1046, QTC 196, informals 203, QNF 1305; CWN 31 sessions, QNI 268, QTC 221, QNF 1240; Hi-Noon 28 sessions, QNI 1288, QTC 59.

TH5DX
10-15-20 METERS

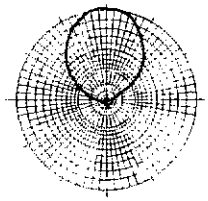


We are proud to introduce the newest member of our famous Thunderbird line of Tri-Band antennas. The TH5DX offers outstanding performance on 20, 15, and 10 meters. It features 5 elements on an 18 foot boom, with 3 active elements on 15 and 20 meters and 4 active elements on 10 meters. The TH5DX also features separate air-dielectric Hy-Q traps for each band. This allows the TH5DX to be set for the maximum F/B ratio and the minimum beam width possible for a Tri-Band antenna of this size. Also standard on this antenna are Hy-Gain's unique Beta-match, rugged Boom-to-mast bracket, taper-swaged elements and improved element compression clamps.

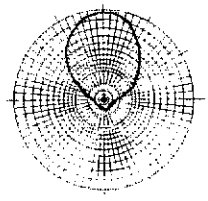
Boom length	**18 feet**
Longest Element	**31 feet**
Turning Radius	**18 feet**
Surface Area	**6.4 sq. feet**
Wind load	**164 lbs.**
Weight	**50 lbs.**

VSWR at resonance	**less than 1.5:1**
Power Input	**Maximum Legal**
Input Impedance	**50 ohms**
-3dB Beamwidth	**66° average**
Lightning Protection	**DC ground**

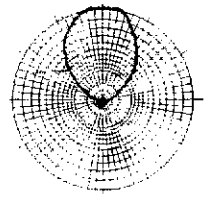
20 Meter



15 Meter



10 Meter



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FEATURES:

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- A fraction of the price of other units
- 2W p.e.p. output with 1 MW of drive
- Use low power tap on exciter or attenuator pad
- Easy to align with built-in test points

Frequency Schemes Available:

MODEL	INPUT(MHz)	OUTPUT(MHz)
XV2-1	28-30	50-52
XV2-2	28-30	220-222
XV2-3	28-30	222-224
XV2-4	28-30	144-146
XV2-5	28-29	145-146
XV2-6	26-28	144-146

ONLY $59.95!

VHF RECEIVING CONVERTERS

LET YOU RECEIVE OSCAR AND OTHER EXCITING SIGNALS ON YOUR PRESENT HF RECEIVER!

MODEL	RF RANGE	I-F RANGE
C28	28-32MHz	144-148MHz
C50	50-52	28-30
C144	144-146	28-30
C145	145-147	28-30
C146	146-148	28-30
C110	Aircraft	26-30
C220	220-222	28-30
C222	222-224	28-30
Special	Inquire About Other Ranges	

ONLY $34.95

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let you hear the weak ones!

Great for OSCAR, SSB, FM, ATV. Over 10,000 in use throughout the world on all types of receivers.

P9 Kit $12.95
P14 Wired $24.95
Specify Band When Ordering

- Deluxe vhf model for applications where space permits • 1-1/2 x 3" • Models avail to cover any 4 MHz band in the 26-230 MHz range • 12 Vdc • 2 stages • Ideal for OSCAR • 20 db gain • Diode transient protection • Easily tunable

P8 Kit $10.95
P16 Wired $21.95
Specify Band

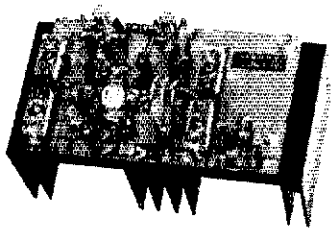
- Miniature vhf model for tight spaces - size only 1/2x2-3/8 • Models avail to cover any 4 MHz band in the range 20-230 MHz • 20 db gain • 12V

P15 Kit $18.95
P35 Wired $34.95

- Covers any 6 MHz band in UHF range of 380-520 MHz
- 20 dB gain • 2 stages • Low noise

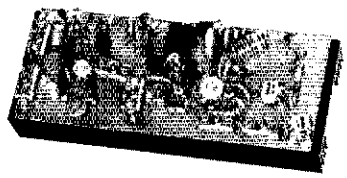
VHF Linear PA's

- Use as Linear or Class C PA's • For XV-2 Xmtg Converters, T50 Exciters, or any 2W Exciter



LPA 2-15 Kit $59.95

- 15W out (linear) or 20W (class C) • Solid State T/R Switching • Models for 6M, 2M, or 220 MHz



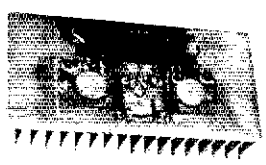
LPA 2-45 Kit $109.95

- 45W out (linear) or 50W (class C)
- Models for 6M or 2M

LPA 8-45 Kit $89.95
For 2M, 8-10W in, 45W out

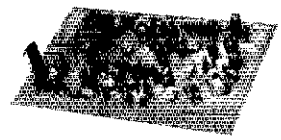
T80 UHF POWER AMP

- Broadband PA • No Tuning Required • Class C PA
- 430-470 MHz
- 13-15W Out
- 200 mW Drive



Model T80-450
$99.95
Wired & Tested

UHF RECEIVING CONVERTERS



MODEL	RF RANGE	I-F RANGE
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C432-7	427.25	61.25
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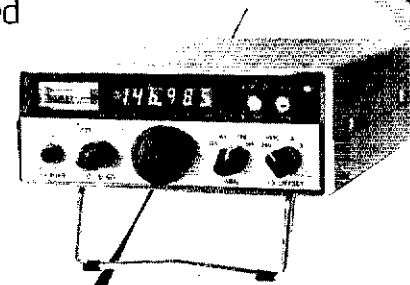

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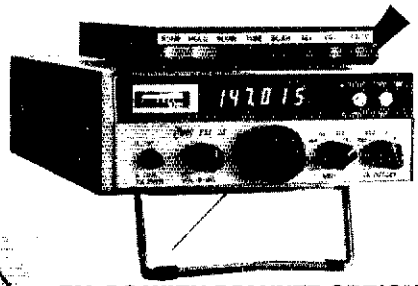

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informals 202, QNF 1310. Traffic: (Mar.) WØWYX 2824, KØYFK 1246, WAØHJZ 762, WBØIBS 596, WBØMTA 360, WØHXB 231, WBØHZL 212, WDØAIT 200, WBØZQG 200, KØTER 198, AUØA 119, KØDJ 105, WØEJD 79, NØACW 78, WAØYNP 54, WBØUWE 37, WØGO 35, WBØYKH 32, WDØDNM, 25, WØGW 22, KØGEZ 13. (Feb.) NØACW 116, WAØYNP 98, WØNFW 47, KØGEZ 1.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WD5AHH & K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 2000 local time and handled 200 msgs with 208 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 147 msgs with 1143 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 104 msgs with 778 checkins. Tucca 2 Mtr. Net (Pecos Valley ARC) handled 20 msgs, with 470 stations reporting in. Congrats to the Socorro ARA on the new SARA Newsletter. Tnx to WB5TGR and crew for finding the ELT in the C-130 which was on a training exercise over White Sands Missile Range. Traffic: W5UH 409, WD5AHH 143, K5KPS 132, KL7HSF 127, K5MAT 69, KB5DA 12, WA5MIY 12.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO. STM: W7OCX. BUN and UCN will shift time to 1830Z and 0115Z respectively for the summer. UARC provided communications for a marathon and telethon sponsored by the Easter Seal Society. KA7CNM home from hospital recovering from broken leg suffered during an aircraft search in Jan. WA7ARK busy developing VHF OF equipment and promoting the virtues of Amateur Radio to assist in downed aircraft search. W7BPS has new tower and beam and working DX on 10, 15 and 20 meters. WB7UFW is enjoying new TS-520S, working UCN as NCS four times during the month. WB7NDZ upgraded to General from Novice. Congrats! KA7DMT and KA7DNC upgraded to Technician Class. K7CRK upgraded to Advanced. K7QEQ will be your new SCM starting in July. He lives in Moab and is very active on BUN as one of the NCS. Traffic: K7HLR 150, WA7JRC 80, WA7MEL 53, N7IE 30, N7DF 21, KB7DC 18, W7OCX 18, WB7UFW 7, W7QWH 4, W7UTM 4.

WYOMING: SCM, Chester C. Stanwarty, W7SDA — The 1979 Wyoming Hamfest will be held at the Meadow Lark Ski Lodge in the Big Horn Mountains on Highway 16, 42 miles west of Buffalo WY and 20 miles east of Ten Sleep WY July 21 and 22. Mark your calendar. Talk-in frequencies 3923 kHz, 146.52 vhf and possibly 146.22/82. New Generals WB7WVN and WB7WVP. New Novices: KA7CWZ KA7DBK KA7DBL KA7DBM KA7DBY KA7DGE and KA7DMW. New Techs KA7CUJ and KA7CUK. WA7ZZY qualified for five band WAS No. 529. The Sheridan Amateur Radio League ARES Net held first sess. at 0200Z March 14 on 146.52 MHz. Wyoming Amateur Radio Council ARES Net meets 0230Z Sun. on 146.22/82. Wyo. Cowboy Net held 22 sess., 785 QNI, 10 QTC. SARL ARES Net 3 sess., 32 QNI, 1 QTC. Traffic: W7LYA 318, WA7GYQ 118, WA7SGG 20.

SOUTHEASTERN DIVISION

ALABAMA: SCM, William E. Scates, WA4JYU — SEC: K4WYT. STM: WA4JDH. OTS: WA4VKD. BARC members provided emergency communications with a ham in Guatemala to assist with delivery of Rabies vaccine. The operation was a success, and the Red Cross was extremely grateful for this lifesaving service. On Tues. March 6, at 2 PM, the Red Cross called and stated they needed assistance. A child in Guatemala had been bitten by an animal and was in urgent need of Rabies vaccine. After many hours, contact was made with KØDGM/TG7 and all arrangements were made. BARC hams involved were WB4TLW N4APY K4CLG KC4P W4EVD WD4EKN. Special thanks should go to the many South Alabama hams who did such an outstanding job during the recent extreme weather in South Alabama. Special tnx to W4YXO WB4BWM WD4FJZ WB4BHS and K4JIE. In addition to weather watches, WB4NDF and others will be working on the Mobile Register Azalea Trail Run. Tnx to WA4IRT. Congrats on new Extra class KA4CRU. I missed Ft. Walton Beach Hamfest, but hope to make Birmingham and Mobile. Both are in some doubt since I am filing this report from the CIC unit of East End Memorial Hospital in Birmingham. There is a possibility of heart surgery at University Hospital. Tnx for fine job by Twin Base ARC in the March of Dimes Walk-a-thon and to WA4YCM who did the leg work. Traffic: WA4JDH 1387, W4MD 249, K4ADZ 112, WB4KSL 63, WA4JYU 39, WA4ZPZ 38, K4HJY 30, WA4PIZ 23, WB4RCF 20, W4IBU 16, WB4TKU 14, WB4ZNL 12, WB4TVY 10, WA4RMP 9, WD4GZV 6.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — Panama Canal Chapter of Ten-Ten Net alive and well every Sun. night at 2400Z on 28.555. Beautiful colorful certificate and endorsements available. The FCC has ruled out the possibility of KZ5 hams retaining that prefix upon their return to US. It seems KZ5 prefix does not belong to FCC but to the US Army. Former KZ5BA (Bad Apple) now active as WB7QWB. Most active Canal Zone ham at present is KZ5OJ on all bands, CW & SSB.

GEORGIA: SCM, Ed Kosobucki, K4JNL — Asst. SCM: K4VHC. SEC: K4SWJ. STM: WA3NAZ. NMs: W4HON W4WXA.

Net	Freq.	Time
GCN	3995	0700 M-S & 0800 Su
GTN	3515	1815 Dy
GSSBN	3975	1830 Dy
GSN	3595	1900 & 2200 Dy

This is my first station activities report and I am honored to have been appointed SCM to fill K4WC's remaining term. Pressing commitments and a trip abroad are taking Stake from us — we say many thanks and Godspeed to him for his service. New officers for the Cedar Valley ARC are AK4E, pres.; KI4E, vice-pres.; W4IMQ, secy-treas. The Cedar Valley Hamfest is August 12, Polk County Fairgrounds. These fellows also had full membership participation during a recent flood. Congrats to WD4PAH, Extra, and WD4PAG, Advanced. Successful hamfest by the Columbus ARC due to chmn. N4BGN. AA4TT cured his rig troubles at Columbus and all the GSN members are glad. W4HA, SE Division Dir., and I were in attendance at the annual GSN breakfast at the hamfest where we received honorary membership in the Georgia CW Association. Section Net Certificates went to W4CZN WB4DHC K4EV K4NM W4PIM WB4SPB WB4TEK AA4TT N4UZ W4WXA WB4ZOJ. Plaques for QSO party were presented to WA4PUJ, high GA score; WB4RUA, high multi-op mobile; K4EEK, high single-op mobile; K3NB, high out-of-state. GSN (Mar.) QNI 541, QTC 231. GTN (Feb.) QNI 200, QTC 38. Traffic: (Mar.) WA3NAZ 223, WD4ADV 203, W4PIM 156, WA4PUP 142, WB4ZOJ 120, K4WC 56, W4GH 49, AA4TT 47, W4WXA 39,

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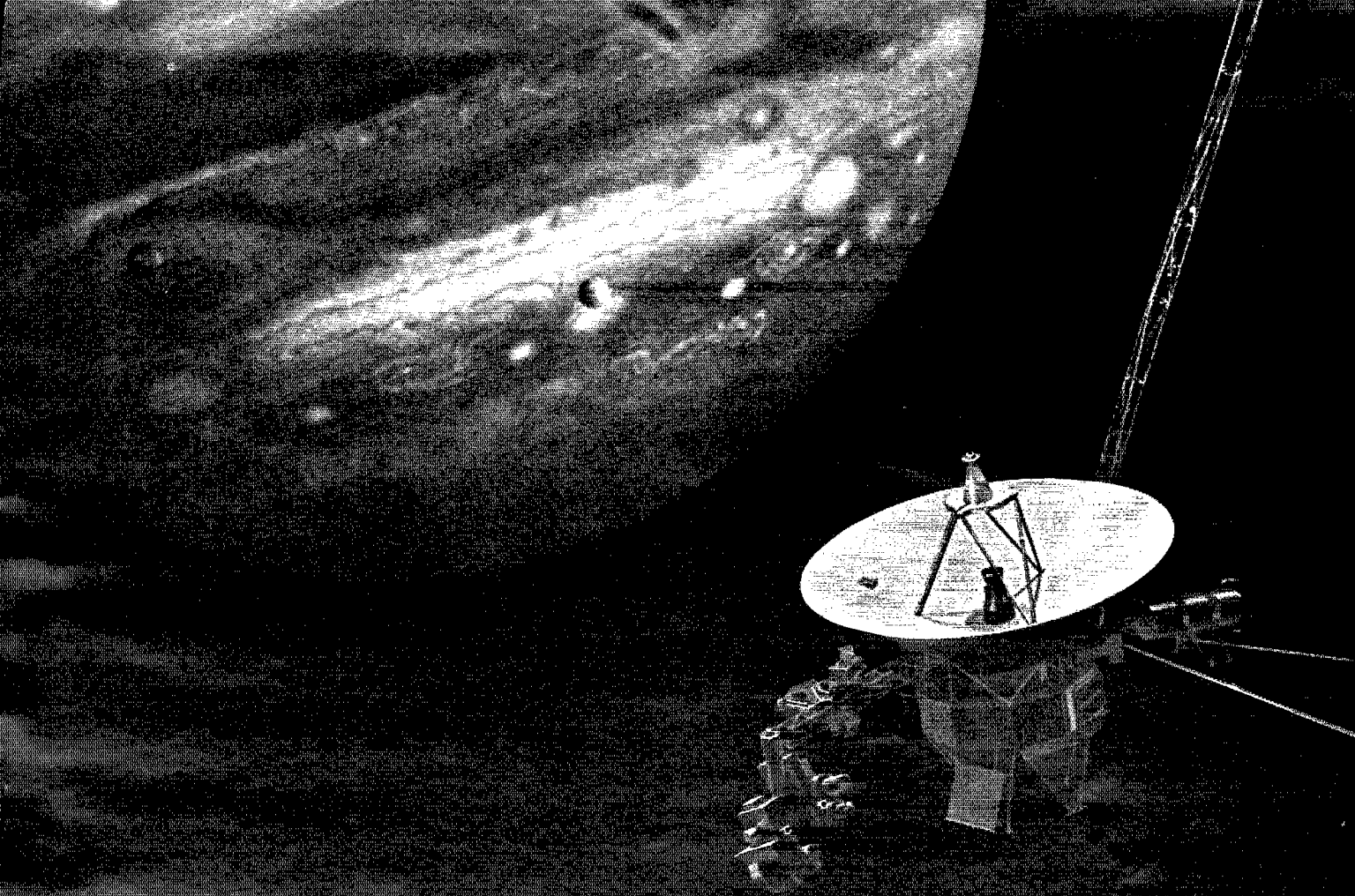

SSTV'ers got first look at Voyager I Jupiter Encounter!

Thanks to some outstanding work by the JPL Amateur Radio Club, those hams with SSTV equipment were receiving and viewing the memorable pictures of Jupiter and its moons within seconds of their arrival from Voyager I last March (tape highlights of these transmissions are now available from the club. See below.).

If you missed out on this history making event, we suggest you add a Robot Model SSTV Converter to your station soon, because there's more to come: Voyager II's Jupiter Encounter will occur July 6 through 15, and JPL's Amateur Club will again be transmitting those pictures on the SSTV bands as they are received from the space craft. In November, 1980, Voyager I is scheduled to pass by Saturn and Voyager II will encounter Saturn in August, 1981, and the club will be transmitting those pictures also!

Not only will a Robot Scan Converter enable you to view these pictures on a monitor or your home TV set, but you can also record them on an audio tape recorder for playback again and again.

Exciting things are happening on SSTV. Be a part of it. Add a Robot Model 400 to your station today.

Write for your Free SSTV Fact Pack and the name of your nearest dealer today! July 6 will be here soon!

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JPL's Amateur Radio Club's Voyager II/Jupiter Encounter Operating Period:

Call Sign: W6VIO (Voyager In Outer Space)

SSTV Freq.: 3845, 7220, 14235, 21340, 28680.

Date: July 6—July 15

Times: Present plans call for heavier operation on weekends and between the hours of 4 PM to 7 PM PDT.

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K4NM 34, K4EV 32, WA4VMV 28, W4BIA 22, AA4GA 21, N4BHX 20, W4HON 17, KI4Y 2. (Feb.) WB4ZOJ 216, W4PIM 145.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH. SEC: AA4FG. STM: N4WA. NM: WD4LUG WD4PDK. New appts.: WD4PDK NM of NFPN; KB4T EC of E. Volusia County; KC4N EC of Leon County; WA2GIN EC of Escambia County. Many tnx to WB4PGB, retiring NM of NFPN, for good job done. SNCs earned by WD4DNC and WD4HIF on QFNS; WD4HXS on TPTN; W4SME on FAST; K4DHK K4FFM WD4HXS WD4MNU WD4NFG W4WEB & W4YPL on NFPN; and W4BRP WA4CRI WD4LLE WB4NJI K4RNS WB4VAP and WD8DMQ on VEN. WA4TXM upgraded to Extra. WA1STO from ARRL Hq. was a visitor at FWB Swapfest. Clubs in Tallahassee, Jax and Brooksvile provided comm. for Walk-a-Thons. WA4IMC arranged for FCC exams in Panama City. Tallahassee ARC Newsletter had a good aid for directing mobiles on nearby I-10; a map and list of mile markers at key intersections. KA4DGF earned ARRL 20 WPM CP certificate. Jax Hamfest, Aug. 4-5, has been designated the official N. Fla. ARRL Section Convention. WA4IMR presented FB program on SSTV at recent NOFARS meeting. WA4CRI named "Ham of the Year" by Daytona Beach ARA. New Floridora officers are: WD4EWD WD4EQT W4KZT and WB4ZPU. Their net meets every Tue. at 1400Z on 3933 kHz. WB4GHU EC of West Volusia County. W4MGO's "Mike & Key" column in local newspaper beginning its third year. HCARA putting a 2m repeater on in Brooksville — WA8AKR/RPT. WA4OEM elected vp of FTU ARC. Don't forget — new rules for PSHR go into effect with June reports. Traffic: (Mar.) WD4HIF 414, WA4CRI 217, N4WA 206, WD4DNC 186, WB4RIS 172, WD4LUG 168, AA4FG 111, W4FZX 107, WB4TZR 96, W4KIX 86, W4JL 82, WD4IIO 68, K4RNS 62, W4MGO 61, WD4NYY 59, W4LDM 53, WD4PDK 53, W4WNY 53, WD4HXS 42, W4RH 38, WB4VAP 38, W4MVG 30, WB4GHU 29, KB4T 27, KF4U 19, WB4DTS 17, WB4WOO 14, WA4EYIJ 11, WB4ADL 10, WA4CLY 8, WA4TXM 3. (Feb.) WB4WOO 22.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCM: W3KGJ. SEC: AA4WJ. March was a quiet month relaxing after SET with traffic totals low. However, BPLs were earned by W4MEE W4LX (ARL 77) WD4COL (Orig. plus Del.) and W4IE (ARL 77). We have been fortunate that summer QRN has not taken over the ht bands yet and traffic net conditions remain good. State ARRL Convention at Orlando was well-attended with excellent meetings. Our thanks to Eastern Area Staff members for coming to Florida to brief us on 4RN, EAN and TCC operations. We felt we had "the world's foremost traffic authorities" in attendance with W1NJM N4KB W2JJ WB4PNY N2YL W4SHJ and WA4CCK. Yours truly, K4SCL, hosted the NTS presentations as Eastern Area Staff Member at Large. W1NJM, in retirement from ARRL, has been vacationing in Florida, checking in on our nets and keeping us on our toes. He is now back home in CT. Fun-in-sun activities in Clearwater and Festival of States activities in St. Petersburg are in full swing. SPARC club furnished medical/first aid communications for Youth Parade March 31st. More parades, races, concerts in April. 73 de K4SCL. Traffic: (Mar.) W4MEE 675, W4LX 600, K4TH 556, K4SCL 394, WA4PFK 389, WA4EIC 310, WD4COL 291, WA4FKE 278, WA4GYR 275, W4NFK 262, W4WYR 259, WB4PIB 228, K4EUK 202, WA4SCK 177, WA4JPV 172, K4YX 157, W4NTE 137, WB4FVV 126, W4IE 119, WB4AID 113, WD4ISN 107, WD4BAJ 105, W4IRA 92, N4KB 88, WB4NJV 69, W4GPL 60, WD4HMC 58, W4KMN 55, WB4CDO 51, W3QQ/4 44, WA4NBE 43, KE4O 35, WA4HXU 34, W4IYT 33, WB4GSV 24, WB4NJU 24, WB4SNX 24, N4AUO 23, K8PXM 22, W4SMK 20, K4SJH 15, N4ET 14, WA4BYT 13, W4TJM 13, W4MML 11, WD4FGT 10, WA4MJT 5, W4JM 2, WB4DWU 1, N4XR 1. (Feb.) WB4NJU 76, WA4JPV 53, W4MML 5.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Willard Haskell, AC7D — ARCA is sponsoring their annual Hamfest at Fort Tuthill, Flagstaff, AZ, Aug 3, 4, and 5. W7GX became a Silent Key March 24, 1979. He was a dedicated "ham" and a staunch supporter of QCWA. As your newly elected SCM there are two subjects I will briefly touch on. Firstly, I would be most appreciative if all AR clubs would place me on their mailing lists for club newsletters, etc. Secondly, amateurs who are presently assigned ARRL Station Appointments are being screened to assure complete participation. Correspondence is being initiated where management action is deemed appropriate. W7DQS, Marshall Lincoln, our former SCM provided me with correspondence which reflected "much needed" guidance and recommendation on matters pertaining to this position. I would like to convey my sincere gratitude for the outstanding and professional approach he extended to assist me in my new assignment. Congratulations to WB7VUU, who reports that XYL WB7VOF gave birth to twins, a boy and a girl on the first of April — no fooling. Congratulations to you both. NM P.A.N. (E) W7EP, 3575.

Net	Mgr.	Freq.	Time(Z)	QNI	QTC
A-10	WA7KQE	3992	0200	1011	178
SWN	K5KPS	3585	0300	208	200
CACTUS	W7UOQ	3915	0100M-F 2230S-S	1160	110

Traffic: W7EP 185, K7MC 171, K7UXB 169, K7NTG 92, W7LVB 72, K7NMQ 60, WA7KQE 42, WA7NXL 13, AC7D 12, W7DQS 8, N7EH 6, K7JKM 2, WA7WEB 1, W7DRR 1.

ORANGE: SCM, Roy C. Zukerman, AC6H — All official appointees have been asked to continue on with their activities and functions as the Section looks forward to bigger and better things for the future. Any member holding an appointment who has not heard from AC6H is asked to contact me as soon as possible. Many of the activity reports may have been waylaid with the change of address, and next months's report will pick up the late comers. Planning goes ahead for the Division Convention. AE6N will be ending his stint as SEC due to personal commitments, and he will be greatly missed. Selection of a new SEC is at the top of the priority list, and we hope to fill the gap without any loss to the emergency preparedness of the Section. Traffic: WB6QBZ 118, WB6BZZ 93, W6NTN 57, WA6QCA 30, AC6H 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. Asst. SEC: N6RD. New EC for Eastern SD County is W6OGC. Thanks to retiring EC WA6UFY for three years of dedicated public service. N6GW had fiftieth anniversary as licensed ham in Apr. HAMSAT meets for breakfast each Sat. at Coco's on Lake Murray Blvd. in La Mesa. AA6EE managed to get building permit for his 71

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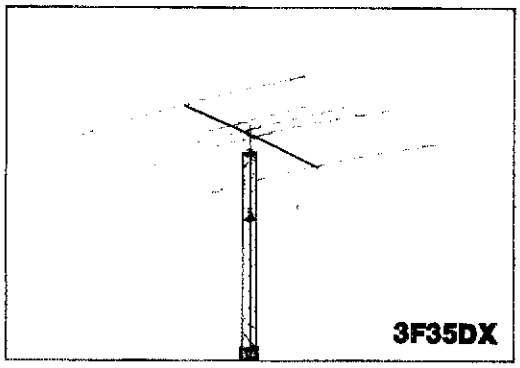
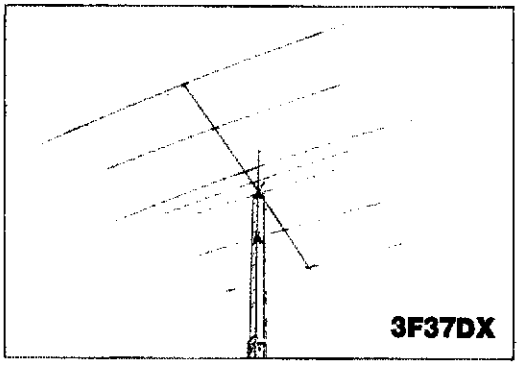


3F35DX



3F37DX

MODEL		3F37DX	3F35DX
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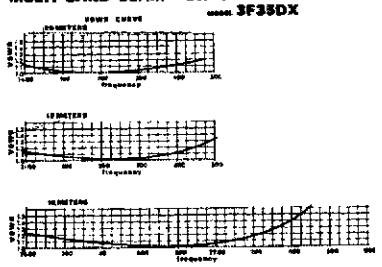
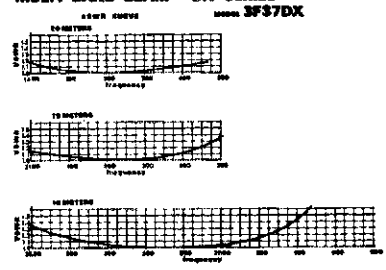
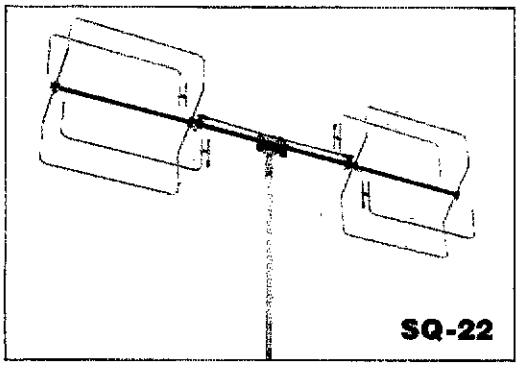
ELEMENTS		7	5
ELEMENTS PER BAND	20m	3	3
	15m	5	3
	10m	5	3
ANTENNA GAIN	20m	EXCELLENT	
	15m		
	10m		
FRONT BACK RATIO		EXCELLENT	
MAX. POWER INPUT		3kw	3kw
VSWR		1.5 OR BETTER	1.5 OR BETTER
IMPEDANCE		50Ω	50Ω
MAX. ELEMENT L.		10.6m	10.5m
BOOM LENGTH		7.5m	5.0m
BOOM DIAMETER		50mm	50mm
TURNING RADIUS		5.3m	5.25m
WIND RATING		40m/sec.	40m/sec.
SUITABLE MAST		50mm	50mm
WEIGHT		23kg	17kg

MULTI BAND BEAM DX SERIES 3F35DX



MULTI BAND BEAM DX SERIES 3F37DX





SQ-22

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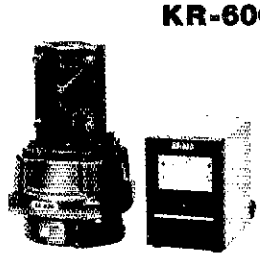
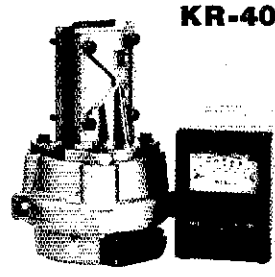
KR-2000

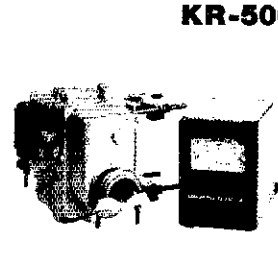
KR-600



KR-400



KR-500



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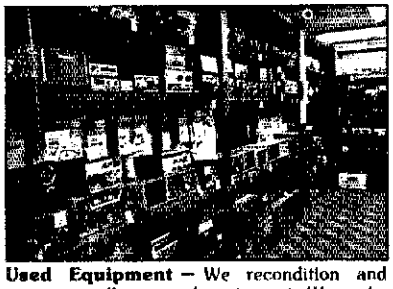

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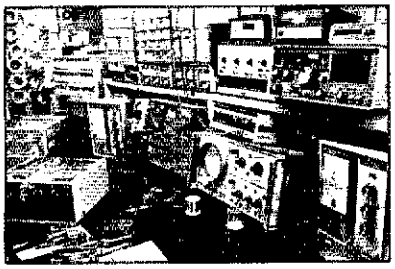

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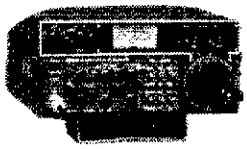
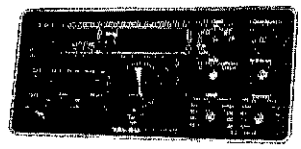
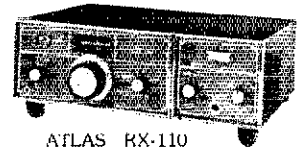


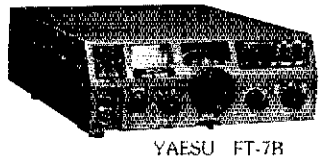
ICOM IC-701



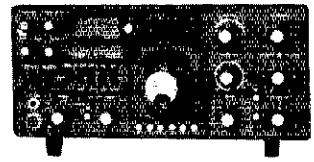
YAESU FT-301D



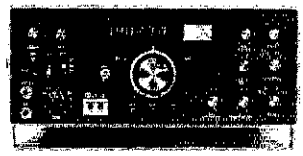
ATLAS RX-110



YAESU FT-7B

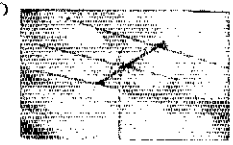


YAESU FT-101ZD



TEN TEC OMNI-D

KDK 2016A



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ft. antenna the day before a 50-ft. height limit became effective. Thru efforts of W6OGC, the limit is expected to be raised to 100 ft. PSHR rules change with June activity reports. See Apr. QST, page 76. Note that late reports don't count for PSHR certificate. Amateur Radio is doing its part in keeping track of San Diego to Savannah roller skaer, Jackie Jacobs. Leaving San Diego on March 18, he was near Dallas TX on Apr. 7, over half-way. Assisting in position reporting and phone patches were WB5VKF WA6FZQ W6INI W6NFG W6TET and WB7QOM. The San Diego Mountain Rescue Team presented its Outstanding Service Award to WB6TQF and W6TET for their communication support roles. Ex-SCM WA6COE is the proud owner of a TS-520S. SANDRA's new repeater on Mt. Laguna operates on 222.46 in 224.06 out. Traffic: (Mar.) WA6UAZ 580, N6GW 191, WA6AMK 186, WB6HMY 117, W6HUJ 112, K6HAP 89, N6AT 55, WB6MLB 51, N6RD 33, WA6JFY 27, WA6SKU 12, WB6SUA 6. (Feb.) WA6ZZL 66, WB6MLB 64, W6UQF 4.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — WB6BWZ is running an RTTY net daily on 3635 at 2230 sending bulletins and traffic. Check in if you have the capability. W6JTA is NCS for the OCWA net Sat. at 1000 on 3917. Poinsettia ARC provided comms. for the SPAAU run with WA6MTQ N6SR WB6RVA N6ZJ and KA6BPH participating. WA6ISS and WA6ASY are doing a super job with the SBARC Key Klix. WA6VNN WA6BRW K6ZEM WA6ATE and WB6SJV form the Santa Barbara Interference Committee. WB6ACU spoke at SBARC on Synthesizers and Moogs. Sulphur Mt. Repeater Assn. classes are in progress. Contact WB6GNS for info. W6SUN spoke at Simi Settlers on Field Day. W6YO spoke at Conejo Valley ARC on his Yankee Trader trip. The Satellite ARC picnic will be held June 17 at Union Oil Picnic Ground near Santa Maria. W2KVA vice pres. of Satellite ARC. W6RIC has resigned as SEC. Will you volunteer to serve in this capacity? WD6EEN has a new Ten Tec 544 and had WØLOW as a visitor. K6SZS doing fine after cataract surgery and didn't miss a bulletin broadcast. WA6URZ took the big step and got married. His dad is W6OLE. W6SMJ is moving to Ohio with the Air Force. WD6EGI passed his General and KA6ENR and KA6ETR are new Novices in Santa Barbara. K6YD and WD6EEN have earned SCN net certificates. W6ZRR sent 98 QSTs and WB6JKM sent 116. PSHR: WØKON 43, N6WP 39, K6YD 25, WB6BWZ 28, N6MA 22. Traffic: (Mar.) WØKON 420, N6WP 196, WD6EEN 66, N6YH 51, K6YD 33, N6MA 15, WB6BWZ 5. (Feb.) NØFB 8, WB6BWZ 5.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. SEC: N5WB. STM: W5VMP. NMs: AE5I AA5J. March came in like a lion, and all Section Skywarn Nets have had their "baptism under fire;" this may prove to be a busy tornado season! We have come a long way with Skywarn since 1976; from 5 to over 50 active nets; thanks to the dedicated amateurs and the cooperation and training by the NWS! Field Day is just 'round the corner; let's get some nice b&w glossy pix of the troops in action for QST this year. The "Northerners" have been "hoggin" the pages too long! The DFW Metroplex Traffic Net has moved to the WR5ABY 146.28/.88 rptr. Meets daily at 0030Z for the purpose of ttc, QSP and training. Now all of us here in the area have an outlet into the NTS, not to mention several new inlets also. In March, DFW had 290 QNI; QTC 82/69 in 29 sess. NM is AA5J. Your QNI is cordially invited. KA5CDZ now KA5Q, congrats. K5ERJ now Extra. EC: WB5DUQ rpts. 2-M stn. now in operation @ NWS Lubbock. K5IS and N5AE rpt. WR5APD in Perryton, 146.22/.82, will be in service soon. EC, N5GK, Denton Co., has reorganized ARES group. Had Skywarn school and recruited 30 members in first month of operation. EC WD5GLP, has organized Skywarn Net in Titus Co. thru NWS Shreveport. EC WA5KCZ, rpts. local ARES unit worked MOD Walk-A-thon plus two wx watch nets. PSHR for March: WB5SDD AA5J N5WB W5VMP AE5I AC5Y K5SOH AJ5K AJ5F and WB5LAT. Your new Asst. SCM is Jim Sanders, AE5C, who will be our roving PR, public service, and club liaison man. Jim is also pres. of the Dallas ARC. Attn ARES members: your new SEC is N5WB, 1612 Glenwick, Plano, TX 75075. Please address all EC rpts and ARES correspondence to him. Your STM is W5VMP, 1302 S. Rolling Hills, Graham, TX 76046. He will be processing all OTS, OBS, and ttc. related appointments and functions. Your NMs are AE5I (HF Phone) and AA5J (HF CW and VHF-All Modes). If you are interested in starting a net, an OTS appt., or becoming a net member, contact them for details. Each of these fine gentlemen is an expert in his field, and will be glad to assist you. Don't forget to rpt. all formal ttc. handled on the first of each month to K5PC. BPL for March: W5TI and K5OUK. Traffic: W5TI 656, WB5SDD 468, K5OUK 386, AA5J 201, AJ5F 122, K5MC 118, WB5OXE 92, N5WB 75, WB5LAT 69, W5VMP 64, WB5BKM 54, WA5INJ 50, AE5I 45, K5PC 44, AC5Y 39, AJ5K 34, K5SOH 28, W5CTZ 28, WB5YYK 26, WA5EZT 22, WA5KCZ 14, WB5JCT 14, N5BT 9, AE5U 6, KA5Q 5.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — K5MGD & W5VXU new OTS appointments. WB5MVR new OBS. Along with a lot of traffic handling, K5OWK received PSA for work with a fire in Florida. WD5GLO active on O.L.Z. W5FKL out of hospital and back on the traffic nets. WB5FLG and WD5ETD still having no trouble. Miss them. W5HGH and WA5OUV active in 160 meter net covering a wide area of NW Okla and other states. FB. OVS reports from N5KW and WB5IIU. Fine time at Lawton Hamfest. Is FCC making it tougher? Passing late on exams taken at Lawton down to 35%. Will be getting new style PSHR reports effective with June reports, will yours be there? WA6AOB, former SEC, became Silent Key in April. Looking forward to Ham Holiday Oklahoma City, July 27-28-29. C.U. there. Traffic: (Mar.) WB5MVR 714, K5OWK 537, K5JGZ 523, WB5NKD 262, W5REC 191, W5RB 185, WB5NKC 180, WB5EAY 70, W5BYC 67, W5UYH 57, WB5OCZ 51, WA5OUV 45, W5VXU 41, W5SUG 37, WA5FSN 35, K5CAY 30, K5MGD 24, W5VOR 24, WD5ETB 11, W5FKL 10, KA5DRD 9, WB5ELG 6, WB5OVT 5, WA5UTO 5, W5HGH 3, WB5AXH 2, W5JJ 2, WB5UCM 2. (Feb.) WB5OCZ 25.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst. SCM: N5TC. SEC: WD5CZI. Net Mgrs.-at-Large: N5TC, phone; WA5RKU, CW. OOs: WB5CIT K5DL K5MEN. OVSs reporting this month: WB5CIT WA5OCP. AEC/OES W5SPD upgrading net activity in southeast Harris County sector. OVS/OO WB5CIT proud of making PSHR for first time. OPS WA5VBM had visitors from Mexico, XE2WH (WD5EDC). EC WA5RVT rprts. WD5DXB

and KA5DHL (both YLs) upgraded to Technician; KA5DYO new Novice; WB5SPE and father-in-law won Brazosport ARC xmtr. hunt. EC WA5RNV received ARRL National Certificate of Merit for his activities during 1978 Hill Country flooding. AD W5OVH rprts. that 25 amateurs took part in El Paso Simulated Medical Alert; K5TRW furnished a real emergency when he received a crushed finger and had to be taken to hospital emergency room. WB5YDD reports two public service events in Houston area: the Fun-Run from Houston to Memorial Park with K5HUT K5ZC WD5CNJ WD5DNG WD5HUM WB5YIF and WB5YDD taking part; Amigos de las Americas bike-a-thon covering 53 miles in Harris, Montgomery and Waller counties, with WB5ANG KA5AQU WD5DNG WD5FOT W5HBO WD5HUM AK5L W5TMH WB5YJN WB5YVQ K5ZC WB5YIF and WB5YDD taking part. Brazosport Newsletter reports YL WD5DXB upgraded to Technician. OO K5MEN reports ten-meter contacts with HB, G, HK, KZ5 and US stations while mobiling between Midland and Odessa, TX, one evening; also reports W5HQV (San Antonio) won Midland Hamfest homebrew contest with ARRL Handbook version of Universal Transmatch in which he actually made his own rotary conductor. Traffic: (Mar.) W5KLV 762, N5TC 277, K5HZA 193, WA5RKU 174, W5SBE 170, WB5MMI 79, WA5VBM 68, W5BGE 63, WB5CIT 48, K5QEW 43, K5PE 38, W5KR 31, AK5M 20, K5RG 16, WD5IEB 16, W5BHO 14, W5SPD 10, WA5RVT 8, WB5YDD 8, K5DG 7, K5RVF 5. (Feb.) WB5YDD 49, K5DG 14.

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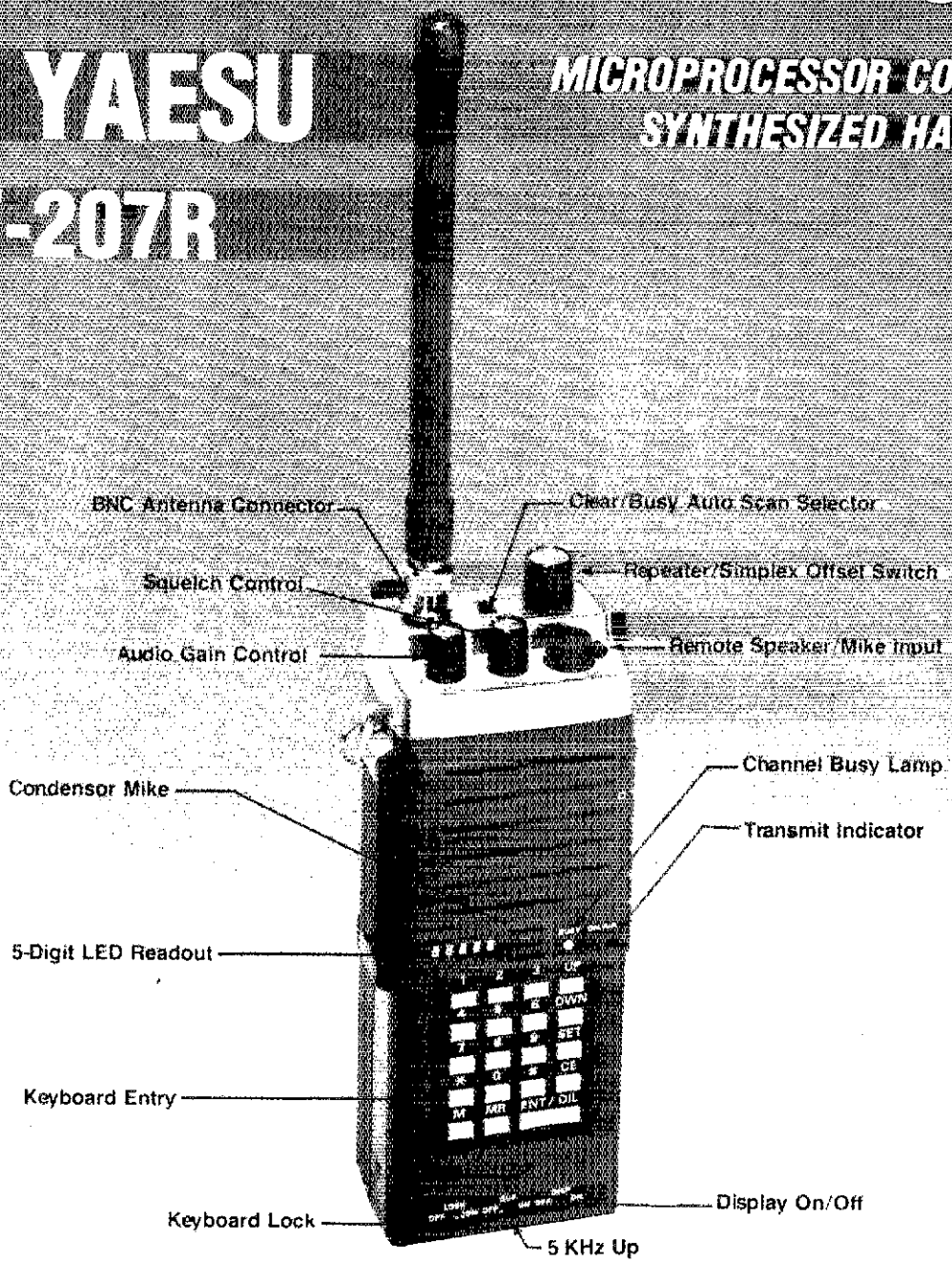

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RX144C Kit	140-170 MHz rcvr w/2 pole 10.7 MHz crystal filter	74.95
RX114C W/T	same as above—wired & tested	131.95
RX220C Kit	210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter	74.95
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SRX150 Kit	High performance, single board, 144 MHz rcvr w/4 pole crystal filter	94.95
RXCF	accessory filter for above receiver kits gives 70 dB adjacent channel rejection	9.95
RF28 Kit	10 mtr RF front end 10.7 MHz out	13.50
RF50 Kit	6 mtr RF front end 10.7 MHz out	13.50
RF144D Kit	2 mtr RF front end 10.7 MHz out	18.50
RF220D Kit	220 MHz RF front end 10.7 MHz out	18.50
RF432 Kit	432 MHz RF front end 10.7 MHz out	29.50
IF 10.7F Kit	10.7 MHz IF module includes 2 pole crystal filter	29.50
FM455 Kit	455 KHz IF stage plus FM detector	18.50
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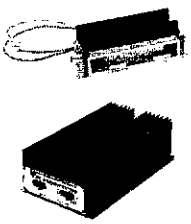
TX144B W/T	same as above—wired & tested.	65.95
TX220B Kit	transmitter exciter—1watt—220 MHz	34.95
TX220B W/T	same as above—wired & tested	65.95
TX432B Kit	transmitter exciter 432 MHz	49.95
TX432B W/T	same as above—wired & tested	87.95
TX150 Kit	300 milliwatt, 2 mtr transmitter	24.95
TX150 W/T	same as above—wired & tested	43.95

POWER AMPLIFIERS



PA2501H Kit	2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors	69.95
PA4010H Kit	2 mtr power amp—10w in—40w out—relay switching	69.95
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	59.95
PA144/15 Kit	2 mtr power amp—1w in—15w out—less case, connectors and switching	49.95
PA144/25 Kit	same as PA144/15 kit but 25w	59.95
PA220/15 Kit	similar to PA144/15 for 220 MHz	49.95
PA432/10 Kit	power amp—similar to PA144/15 except 10w and 432 MHz	59.95
PA9610 W/T	144 MHz, 100 w, repeater amp. incl. power supply	549.95
PA9611 W/T	220 MHz, 90 w, repeater amp. incl. power supply	549.95
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BLC 2/70	144 MHz	2W	70W	184.95
BLC 10/150	144 MHz	10W	150W	269.95
BLC 30/150	144 MHz	30W	150W	249.95
BLD 2/60	220 MHz	2W	60W	189.95
BLD 10/60	220 MHz	10W	60W	169.95
BLD 10/120	220 MHz	10W	120W	269.95
BLE 10/40	420 MHz	10W	40W	169.95
BLE 2/40	420 MHz	2W	40W	219.95
BLE 10/80	420 MHz	10W	80W	289.95

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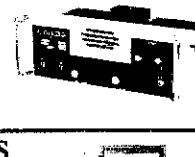
PS15C W/T	same as above—wired & tested.	134.95
PS25C Kit	25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	139.95
PS25C W/T	same as above—wired and tested	169.95
PS25M Kit	same as PS25C with meters	159.95
PS25M W/T	same as above—wired and tested	189.95
O.V.P.	adds over voltage protection to your power supplies, 15 VDC max.	14.95
PS3A Kit	12 volt—power supply regulator card with fold-back current limiting	11.95
PS3012 W/T	new commercial duty 30 amp 12 VD regulated power supply w/case, w/fold-back current limiting and overvoltage protection	274.95

REPEATERS



RPT50 Kit	repeater—6 meter	599.95
RPT50	repeater—6 meter, wired & tested	899.95
RPT144 Kit	repeater—2 mtr—15w—complete (less crystals)	599.95
RPT220 Kit	repeater—220 MHz—15w—complete (less crystals)	599.95
RPT432 Kit	repeater—10 watt—432 MHz (less crystals)	649.95
RPT144 W/T	repeater—15 watt—2 mtr.	899.95
RPT220 W/T	repeater—15 watt—220 MHz.	899.95
RPT432 W/T	repeater—10 watt—432 MHz.	949.95
DPLA50	6 mtr close spaced duplexer	680.00
DPLA144	2 mtr, 600 KHz spaced duplexer, wired and tuned to frequency	409.95
DPLA220	220 MHz duplexer, wired and tuned to frequency	409.95
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DSC-U	double shielded duplexer cables with PL259 connectors (pr.)	29.95
DSC-N	same as above with type N connectors (pr.)	34.95

REPEATER BASE STATIONS

RB50 W/T	50 MHz repeater base station w/autopatch	2,355.00
RB144 W/T	144 MHz repeater base station w/autopatch	2,085.00
RB220 W/T	220 MHz repeater base station w/autopatch	2,085.00
RB432 W/T	432 MHz repeater base station w/autopatch	2,105.00

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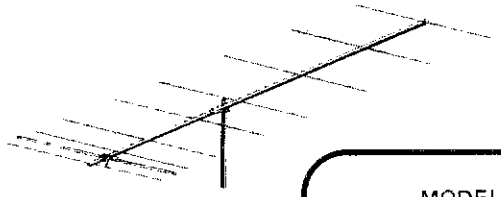
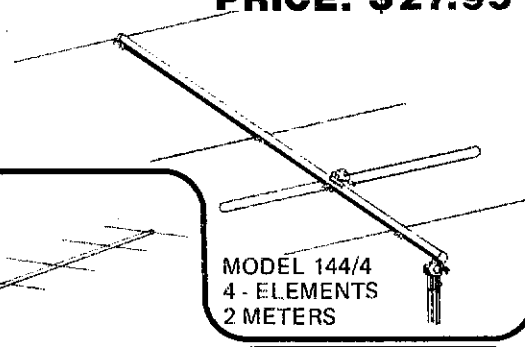


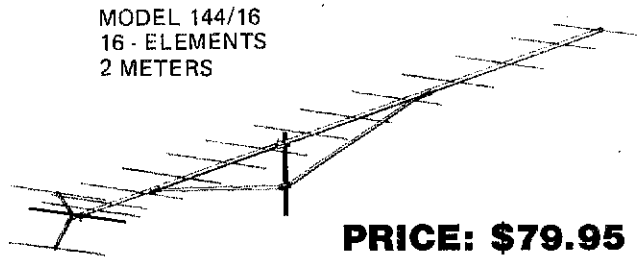
MODEL 144/9
9 - ELEMENTS
2 METERS

PRICE: $27.95



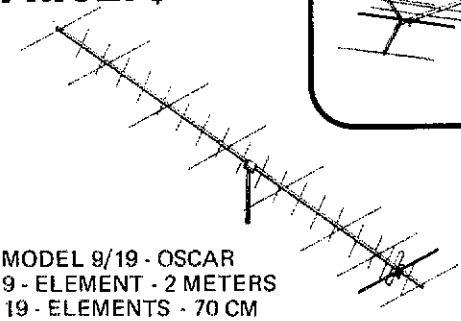
MODEL 144/4
4 - ELEMENTS
2 METERS

MODEL 144/16
16 - ELEMENTS
2 METERS



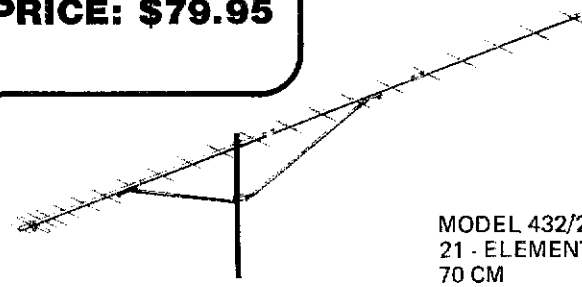
PRICE: $79.95

PRICE: $77.95



MODEL 9/19 - OSCAR
9 - ELEMENT - 2 METERS
19 - ELEMENTS - 70 CM

PRICE: $67.95



MODEL 432/21
21 - ELEMENTS
70 CM

MODEL	FREQ.	NO. ELEMS.	WT./LBS.	LENGTH	3 dB WIDTH		STACKING DISTANCES	
					E	H	D_H	D_V
144/4	144-146 MHZ.	4	2	3'	28°	46°	6' - 6"	6' - 6"
144/9	144-146 MHZ.	9	5	11'	38°	46°	10' - 6"	9' - 0"
144/16	144-146 MHZ.	16	12	21'	32°	34°	12' to 13'	12' - 0"
432/21	430-435 MHZ.	21	7	15'	24°	26°	5' - 0"	5' - 0"

CONSTRUCTION: THE ANTENNAS DESCRIBED ON THIS PAGE ARE MADE OF ALUMINUM 3005. THEY ARE PROTECTED AGAINST CORROSION THROUGH PASSIVATED CHEMICAL OXIDATION PROCESSING. ALL HARDWARE IS MADE OF STAINLESS STEEL.

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B&W 850A	$79.95
B&W 851	$57.50

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Mod 28KSR	$225
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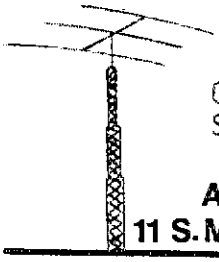
TTY Perf Tape case	$15
TT292 Typing Reperf	$150

Specials Good thru 7/31/79



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Drake TR-22	Regency HR-212
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Genave	Regency HR-2MS
Heathkit HW-2021 rec. only	Heathkit HW-202
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Lafayette HA-146	Trio/Kenwood TR2200
Midland 13-505	Trio/Kenwood TR7200

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6.61R	
6.04T	6.52R
6.64R	6.55T
6.07T	6.55R
6.67R	6.58T
6.10T	6.58R
6.70R	6.94T
6.115T	7.00R
6.715R	7.60T
6.13T	7.63T
6.73R	7.03R
6.145T	7.66T
6.745R	7.06R
6.16T	7.69T
6.76R	7.09R
6.175T	7.72T
6.775R	7.12R
6.19T	7.75T
6.79R	7.15R
6.22T	7.78T
6.82R	7.18R
6.25T	7.81T
6.85R	7.21R
6.28T	7.84T
6.88R	7.24R
6.31T	7.87T
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Note: If you do not know type of radio, or if your radio is not listed, give fundamental frequency, formula and loading capacitance.

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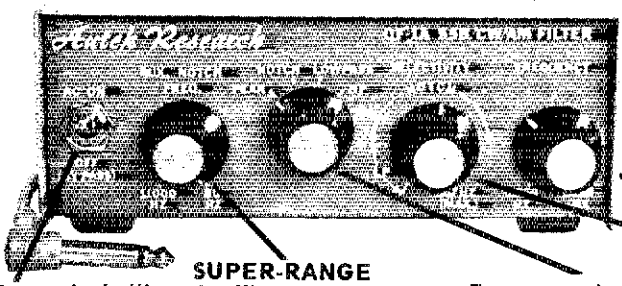

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Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

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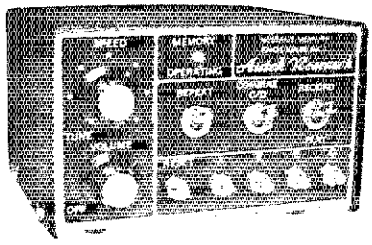

Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

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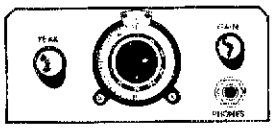

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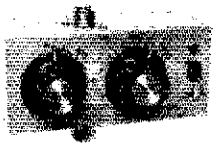
Individual kits $54.95



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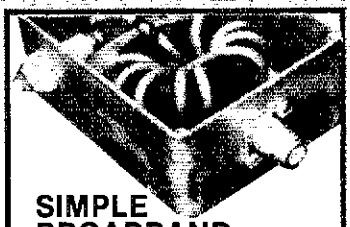

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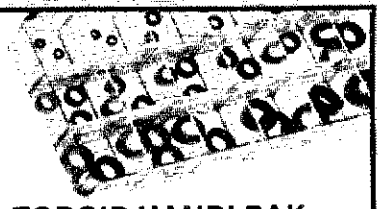

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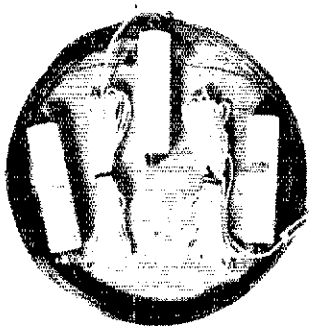

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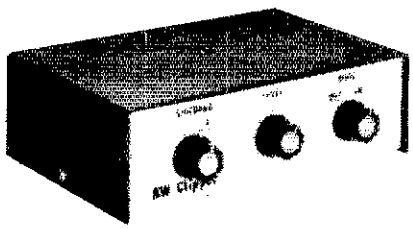

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Drake T4X $195.00
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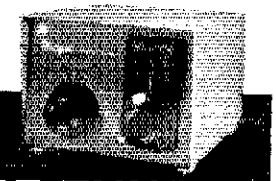

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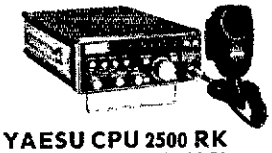
Cash (no trades) $339.15



YAESU CPU 2500 RK
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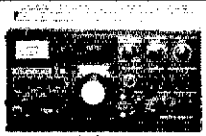

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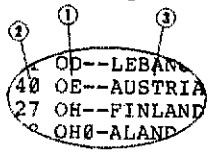

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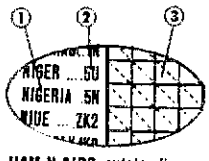
DXCC Progress Chart



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THE SYSTEM IS ILLUSTRATED in the inset above. Printed on both sides of the scorecard is an alphabetic list of 319 DXCC countries and their prefixes. Next to the country (1) and prefix (2) is a series of five boxes (3), one for each band 80-10 meters. In each box is a diagonal dotted line. You fill in the spaces as you work and confirm your contacts. You can also show CW or SSB./Complete instructions are supplied.

THE DX SCORECARD is printed on a special 8x10½ white matte-finished vinyl that takes pen or pencil. There is plenty of room for adding new or deleted countries to the list. You keep the **DX SCORECARD** clean and protected in a specially designed clear plastic envelope provided.

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Chicago	Louisville	Salt Lake City
Cincinnati	Memphis	San Antonio
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SST T-4
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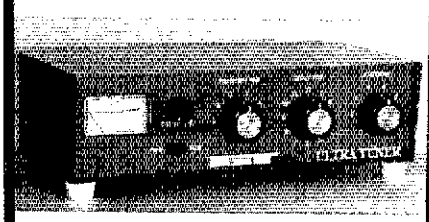

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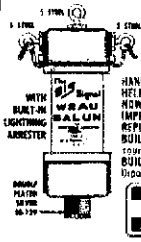

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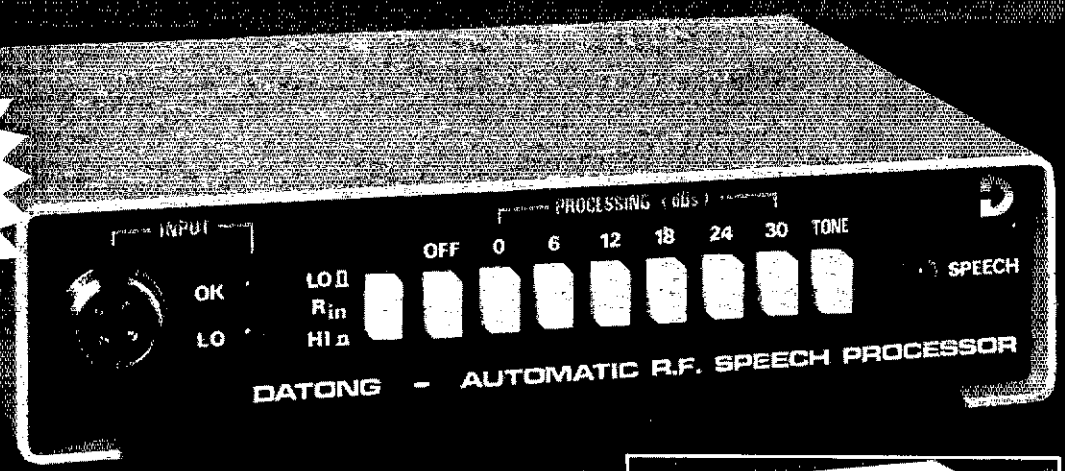

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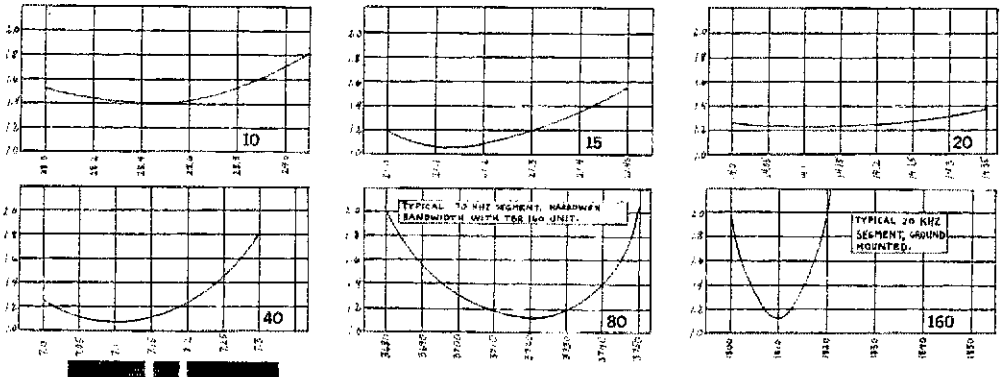

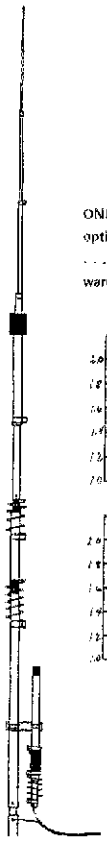

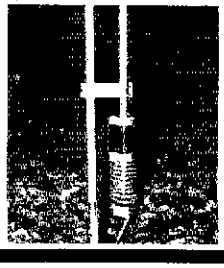

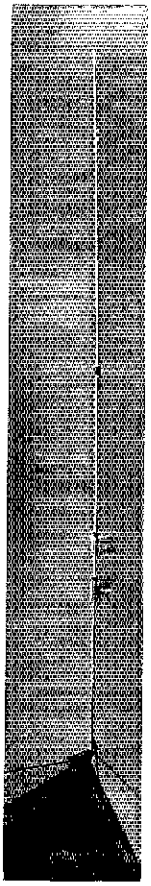

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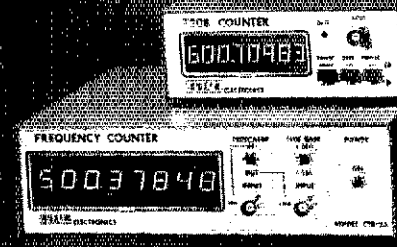

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205BA	5-Element 20-mtr "Long John"	$200
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105BA	5-Element 10-mtr "Long John"	$85
203BA	3-Element 20-mtr beam	$99
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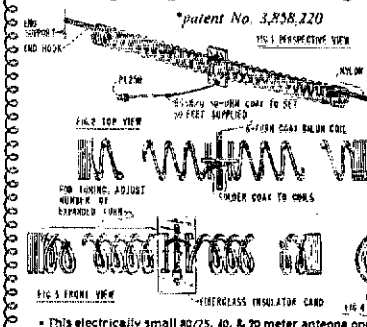

• This electrically small 80/75, 40, & 20 meter antenna operates at any length from 24 to 70 feet • no extra balun or transmatch needed • portable — erects & stores in minutes • small enough to fit in attic or apartment • full legal power • low SWR over complete 80/75, 40, & 20 meter bands • much lower atmospheric noise pickup than a vertical and needs no radials • kit includes a pair of specially-made 4-inch dia. by 4-inch long coils, containing 335 feet of radiating conductor, balun form, 50 ft. RG58/U coax, PL259 connector, UG-175/U adaptor, 100 ft. nylon rope and instructions • now in use by US Dept. of State, US Army, radio schools, plus thousands of hams the world over

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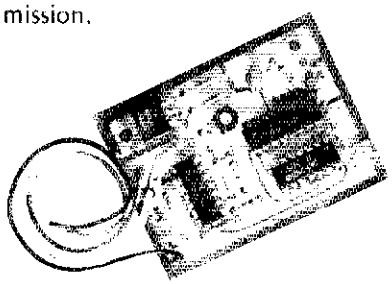

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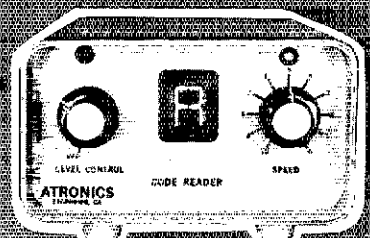

Works with any keyer, including squeeze keyer in speeds from 7 WPM to 40 WPM. Both in a single unit.

Model CR101EK $249

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The Atronics Code Readers:
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- Operating speed 5 to 50 WPM at selected speeds.
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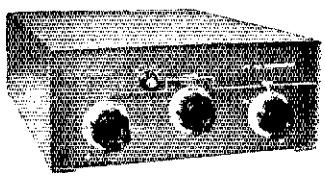
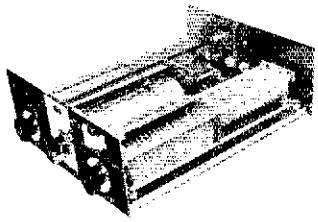
NEW— The UT-160 & UT-160B



UT-160, less balun & meter $194.50 + shipping
UT-160B, with balun, no meter $212.75 + shipping

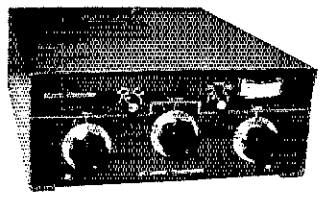


Internal construction
Of UT-160 models

- UT-160, UT-160B, UT-160M & UT-160MB models:
- Ceramic inductor tapped every turn each band
- All B models for use with balanced lines, heavy duty 3 core balun
- All M models have relative output meter

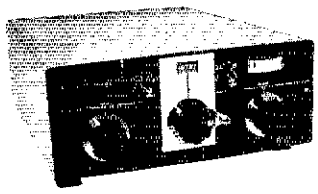
12"Wx15½"Dx5"H, 13 lbs. shipping wt.

NEW— The UT-160M & UT-160MB



UT-160 M with meter, no balun $212.75 + shipping
UT-160MB with meter, balun $230.50 + shipping

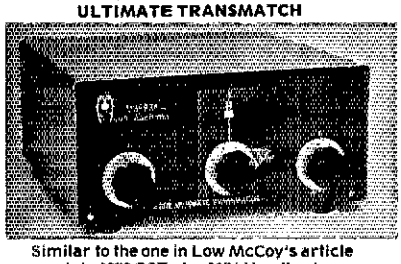
NEW— The UT-2000B



- Continuous coverage 160-10 meters
- Rotary inductor with turns counter
- Relative power output meter
- Three core balun

12"Wx15½"Dx5"H, 13 lbs. shipping wt.
$242.50 + shipping

MODEL UT-2000A
ULTIMATE TRANSMATCH



Similar to the one in Low McCoy's article
July 1970 QST also 1976 Handbook

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers
- 80-10 continuous, including MARS
- Rotary inductor with turns counter for precise and rapid tuning

12"Wx12"Dx5½" H, 12 lbs. shipping wt.
$139.95 + shipping

MODEL 68A
MULTIBAND ANTENNA 10-80 M

- Field proven 4 years
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- Ready to use. Great on all bands when used with the Ultimate Transmatch
- 2000 w P.E.P.

$44.50 p.p.

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- Use these Transmatches with any antenna — dipoles, random wires, verticals, whips, beams
- Function switch — in, out, dummy load (not supplied), ground (switch not on UT-2000A)
- Provides SWR of 1 to 1 to the transmitter
- Full legal power on all bands 160 to 10 meters (UT-2000A 80 to 10)
- Outputs for coax, random wire, balanced line
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- Use with any watt meter, SWR bridge
- Changing frequency by a few kilocycles normally requires only a slight adjustment

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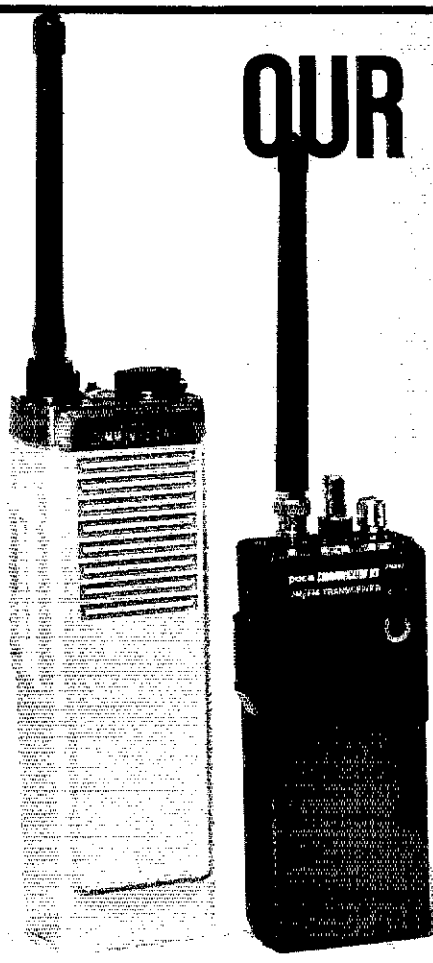

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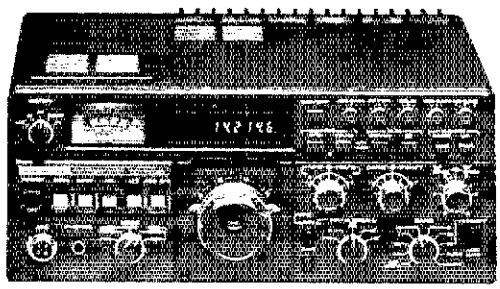
DFC

(DIGITAL FREQUENCY CONTROL)

in the TS-180S HF Transceiver features four memories with digital up/down paddle-switch tuning.



TS-180S

How will four memories improve operating efficiency on the HF ham bands?

The TS-180S with DFC features four memories, each one digitally tunable up and down in minute 20-Hz steps by means of dual-speed paddle switches. It's like having four remote VFO's in addition to the built-in VFO.

The serious DX chaser, for example, can program various DX pileups into the four memories, and periodically check those frequencies to determine if the DX station is listening for calls from his call area. The memories are usable for transmit, receive, or transceive operation. Therefore, a memory can be used on transmit and the VFO on receive, or vice versa, either of which can be tuned up or down in frequency, for working DX stations who are listening for calls several kilohertz away from their transmitting frequency. With the push of a button, the operator can listen on his transmit frequency, which he can tune, and be ready for a perfectly timed call to the DX station, immediately after another station finishes working the DX station.

The memories are also extremely convenient for contest operating. Pileups can be stored and periodically checked for improved propagation or other conditions for "getting through". A "CQ CONTEST" frequency could also be stored.

The memories are also very useful for storing net and schedule frequencies.

What frequencies are displayed on the digital readout during memory operation?

The digital display shows the memory frequency being used, whether in receive or transmit mode. It also shows the actual VFO frequency when the VFO is activated, or the fixed-channel frequency, or the remote VFO frequency (if the optional VFO-180 is used). Separate RIT (receiver incremental tuning) controls are provided for VFO and memory/fixed-channel operation, and the RIT frequencies, when RIT is utilized, are displayed.

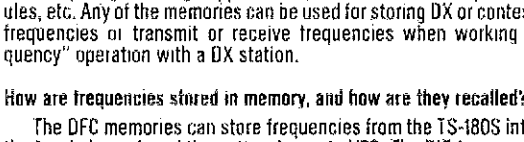
When a frequency is stored in the "M1" memory, the digital display can be switched to indicate the stored frequency and the difference between the stored and VFO frequencies (with signs to show VFO above or below the stored frequency). This function is handy for temporarily moving off of a net frequency with another station by a specified number of kilohertz, and, after completing the conversation, moving back immediately to the net frequency stored in the "M1" memory.

What are the differences between the four memories in the TS-180S with DFC?

The M1 memory is intended for fast or temporary memory operation such as moving off of a net frequency. The [M], M', and M" memories are used for relatively longer storage applications, such as for net frequencies, schedules, etc. Any of the memories can be used for storing DX or contest "pileup" frequencies or transmit or receive frequencies when working "split frequency" operation with a DX station.

How are frequencies stored in memory, and how are they recalled?

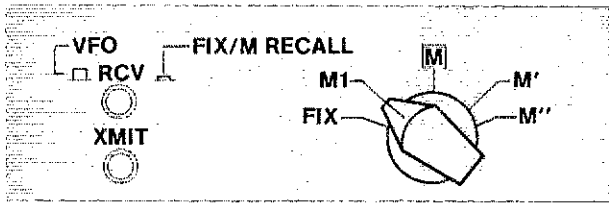
The DFC memories can store frequencies from the TS-180S internal VFO, the fixed channel, and the optional remote VFO. The RIT frequency can also be stored, and frequencies can be shifted from one memory to another. To store an operating frequency in M1, simply set the main tuning to the desired frequency and push the DSP/M1 switch; a "beep" will be heard.



To recall the frequency stored in M1, set the M RECALL switch to M1.

To receive on the memory frequency, the RCV switch should be in. To transmit on the memory frequency, the XMIT switch should be in. To transceive on the memory frequency, both the RCV and the XMIT switches should be in.

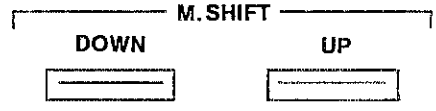
To store frequencies in the other three memories, the main tuning is set to the desired frequency (which we will call frequency A for this explanation) and the [M] switch is pushed in (a "beep" will be heard). To store frequency B, push the [M] switch to release it, and then push again ("beep"). Now frequency B will be stored in the [M] memory and frequency A will shift to the M' memory. To store frequency C, push the [M] switch to release it, and then push again ("beep"). Frequency C is now stored in [M], frequency B in M' and frequency A in M".



Storing another frequency in [M] will shift the memories again, and frequency A will be lost, unless it is recalled and stored in [M] again before another frequency is stored. Therefore, as stations in memory are worked or for some other reason, a memory frequency is no longer needed, it can be erased automatically as it shifts out of M" where another frequency is stored in [M]. This method of moving memory frequencies "up the stack" retains the chronological order of entry for easy operation, which is particularly important in a contest. The operator, then, does not need to remember which memory in which he stored a particular frequency. To recall any of the stored frequencies, simply set the M RECALL switch to the appropriate position.

How can the memories be tuned up or down in frequency?

On the front panel of the TS-180S are a pair of paddle switches for digitally tuning any of the memories up or down in frequency.



A memory frequency can be stepped up or down 20 Hz at a time. If the UP or DOWN switch is kept depressed, the frequency changes continuously in 20-Hz steps. The rate of change can be increased by depressing the opposite switch while the appropriate switch remains depressed.

The original frequency can be recalled after it has been digitally tuned by the UP or DOWN switch, by moving the M RECALL switch to any position other than the one on which it is memorized, and then resetting it to the original memory position.

The memory frequency, after it is digitally tuned, can be stored by pushing the DSP/M1 or the [M] switch.

Will memory frequencies be retained after power is shut off?

All memorized frequencies will be retained for approximately 30 seconds after power is shut off. Memory backup batteries (Panasonic WL-14 or G-13, Eveready 357, Duracell 10L14, or RAY-O-VAC RW-22 or RW-42) may be installed to retain memory frequencies for an indefinite period after power is shut off. These batteries will function for about one year of normal operation. The batteries provide backup voltage for the [M], M', and M" memories.

The M1/DSP memory is intended for temporary applications, but can be modified for backup battery operation. The batteries are silver-oxide type and are not supplied by Trio-Kenwood. They are commonly available at local stores.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received March 21 through April 20 will appear in June *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. Any currently licensed Amateur who was first licensed 25 or more years ago is eligible for membership. Members receive a membership call book and quarterly news. Write Q.C.W.A. Inc. 1409 Cooper Dr., Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE Sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P. O. Box 173, Huntington NY 11743.

QST and CQ 1950-1975 issues for sale. Send s.a.s.e. if ordering 73, Ham Radio, or other QST and CQ issues. One dollar minimum order and all issues cost 25c each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire, Burbank, CA 91504.

RADIO Expo '79 September 15th and 16th, 1979, Lake County Fair Grounds, Routes 120 and 45, Grays Lake, Illinois. Manufacturers displays, flea market, seminars, ladies programs. Advance tickets, $2. Write EXPO, P. O. Box 305, Maywood, IL 60153. Exhibitors inquiries: Expo Hotline 312-345-2525.

STARVED Rock Hamfest — June 3 — See May Hamfest Calendar details via s.a.s.e. April W9MKS, R.R. no. 1 Box 171, Oglesby, IL 61348 — 815-667-4614

SUPERFEST 1979 Peoria Illinois. Now two fantastic days — September 15th and 16th. Manufacturers (R.L. Drake, etc.), forums and excellent programs for the ladies. Great smorgasbord Saturday night. Advance tickets $2. Exhibitors and advance tickets write: Peoria Hamfest, 5808 N. Andover Ct., Peoria, IL 61614.

WARREN, Ohio Hamfest — Sunday August 19, 1979, Trumbull KSU Campus: Ohio 45 at Warren Outerbelt. Our 22nd year with the big & famous flea market. $2 registration. Prizes: Ten-Tec 546, complete; Wilson Antenna system; Mark 2 HT; Atlas 110 special and more. Mobile check-in. Arrowsigns lead from interstates, main highways. For map, details, QSL: Hamfest, Box 809, Warren, Ohio 44482.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

MASSACHUSETTS NoBARC Hamfest July 21, 22 at Cummington Fairgrounds. Tech talks, demonstrations and dealers. Flea market. $1; advance registration $3 single, with spouse $5, to Tom Hamilton, WA1VPX, 206 California Avenue, Pittsfield, Massachusetts 01201 or $4/$6 at gate. Mobile talk-in on 146.31/91. Gates open at 5:00 P.M. on Friday for free camping.

50TH Anniversary and annual hamfest Egyptian Radio Club, Inc., W9AIU, Granite City, Illinois, Sunday June 10th. Largest in Midwest.

ROME Ham Family Day, June 10. Bring the whole family. Write: Rome Radio Club, Box 721, Rome, NY 13440.

ELMIRA, New York International Hamfest — September 22, 1979. Tech talks, free flea market, great food, contests — even more prizes than last year! For more info, contact WA2FJM, John Breese, 340 West Avenue, Horseheads, New York, 14845.

CENTRAL Michigan Amateur Repeater Association fifth anual swap & shop in Midland, Michigan, June 16th at the Midland County Fairgrounds. Computer demonstrations, door prizes. Donation: $2.50 at door. Talk-in: 146.73 WR8ARB and 146.52 simplex. Tickets & info, s.a.s.e. to: R. L. Wert, W8QOI, 309 E. Gordonville Rd., R 12, Midland, Michigan, 48640.

31st Annual U.P. hamfest will be held on July 28 & 29,

1979. Add your name to our mailing list. Send QSL to Sawyer Radio Ass'n., P. O. Box 73, Gwinn, MI 49843.

BLOSSOMLAND Fall Swap Shop, October 7th, Berrien County Youth Fair Grounds, Berrien Springs, Michigan. Large convenient facilities and refreshments. Tables restricted to radio and electronic items. Advance ticket donation $1.50. Tables $2. Write Charles White, 1940 Union Ave., Benton Harbor, MI 49022. *Make checks* payable to Blossomland ARA.

HAMFEST '79 — Tennessee. The Oak Ridge Amateur Radio Club will hold the Oak Ridge Amateur Radio Convention and Hamfest in Oak Ridge instead of Crossville this year. The date is July 14-15 at the Oak Ridge Civic Center. 10,000 square feet of air conditioned area available for commercial and flea market exhibits. The FCC will be in Oak Ridge Sat. July 14 to give exams. Exams start promptly at 8 A.M. in the high school cafeteria, across the street from the Civic Center. Have form 610 completed and your present license. Talk-in on 146.88 and 146.52. For more information contact Charles Byrge, WB4OBE.

HAMFEST — Official ARRL 5th Annual Hall of Fame Hamfest. Stark County Fair Grounds, Canton, Ohio, Sunday July 15, Mobile checkin on 19-79 or 52-52. $2.50 advanced, $3. at gate. Contact WA8SHP, 10877 Hazelview Ave., Alliance, OH 44601.

HAMFESTERS 46th annual picnic and hamfest, Sunday, Aug. 12, 1979 at Santa Fe Park, 91st and Wolf Rd., Willow Springs, IL, southwest suburb of Chicago. Famous Swappers Row. Tickets at gate $2, advance $1.50. For Hamfest info or advance tickets send check or money order (s.a.s.e. appreciated) to Box 42792, Chicago, IL 60642.

MISSOURI: Indian Foothills ARC Fourth Annual Hamfest, Sunday, July 22, 1979 at the Saline County Fairground's air-conditioned multi-purpose building in Marshall. Advance registration $2 each or 3 for $5. $2.50 at the door. Morning coffee and breakfast rolls and noon lunch for a nominal fee. Flea markets for the OM and XYL. No charge for tables; reservations requested. For information and advance tickets contact Norman Gibbins, WBØSZI, 692 North Ted, Marshall, MO 65340. 816-886-2837.

OHIO: Second annual Salem area hamfest, 9 A.M.-3 P.M. Sunday, August 5th, Kent State Salem campus, Salem. Advance tickets, $1.50, $2 at door. Inside tables, $5, space for yours, $2. Fleamarket space, $1. Air conditioning, wheelchair ramp, free parking, refreshments, prizes; grand prize: Atlas RX-110, TX-110, PS-110. Check in 146.52 simplex. Details: Harry Milhoan, WA8FBS, 1128 West State, Salem, OH 44460.

ATLAS 350XL owners net at 2100 GMT, 28.888, 3rd Sunday of each month. Check in for fun. WB4YQU.

RETAIL radio store owners rag chew net. S.a.s.e. for info. WB5FXI.

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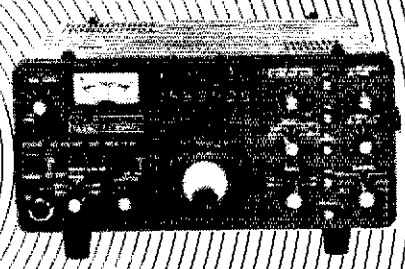

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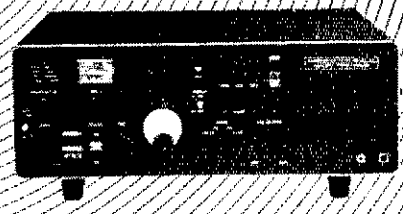

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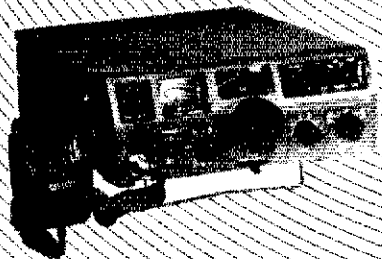

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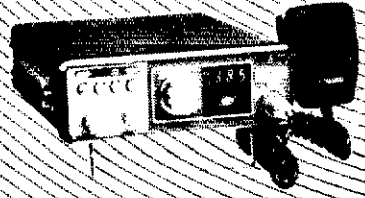

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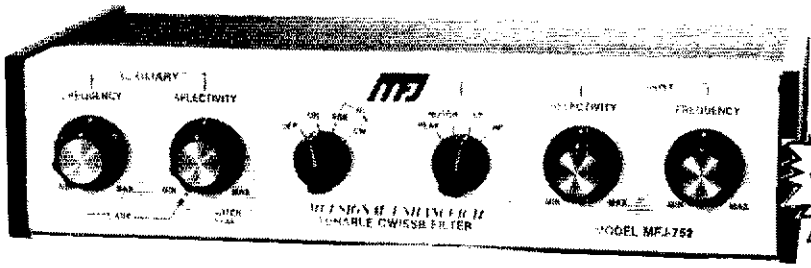
lets you zero in SSB/CW signal and notch out interfering signal at the same time.



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MFJ has solved problems that plague other tunable filters to give you a constant output as a bandwidth is varied. And a linear frequency control. And a notch filter that is tighter and smoother for a more effective notch.

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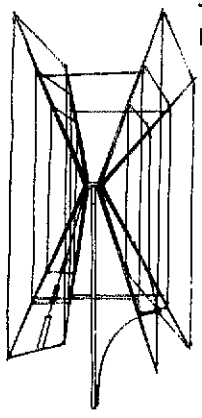

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- Two miniature toggle switches supplied with kit (Scanner on-off, scan lock) may be mounted externally or on the top or bottom cover of the rig.
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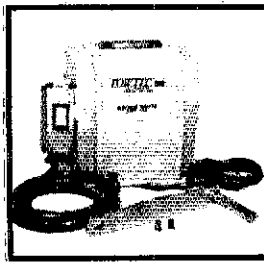

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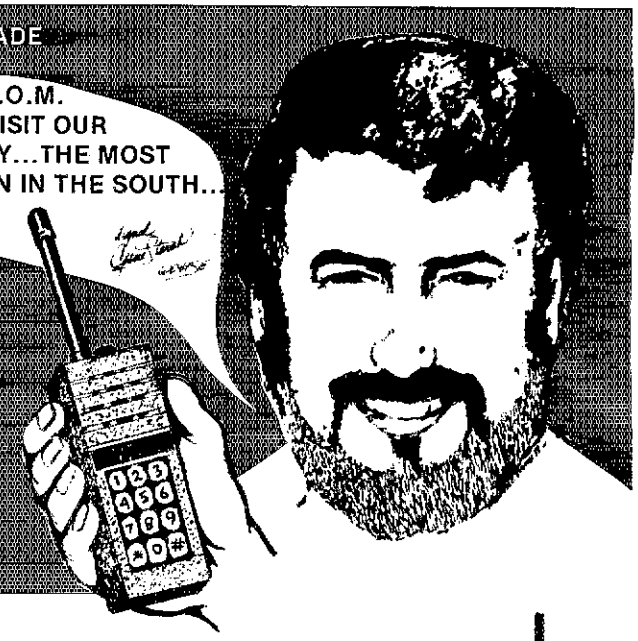

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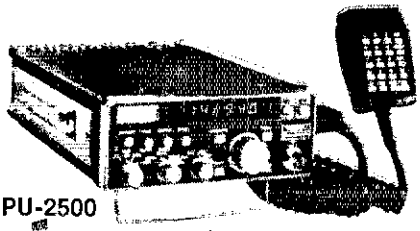

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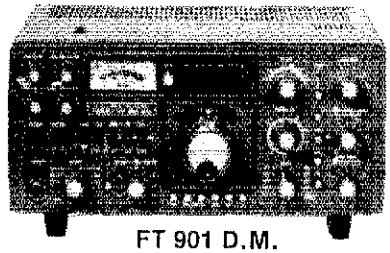

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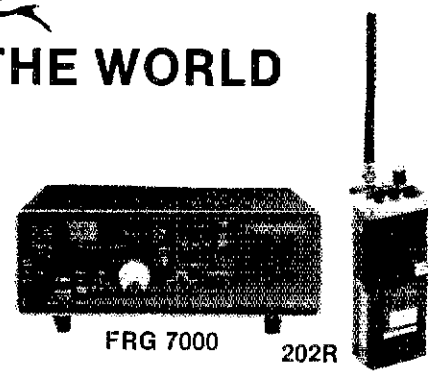

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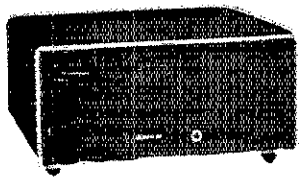

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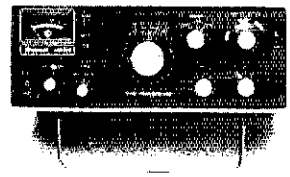

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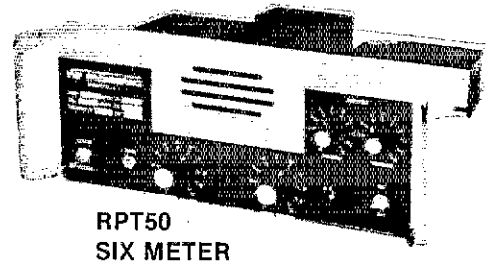

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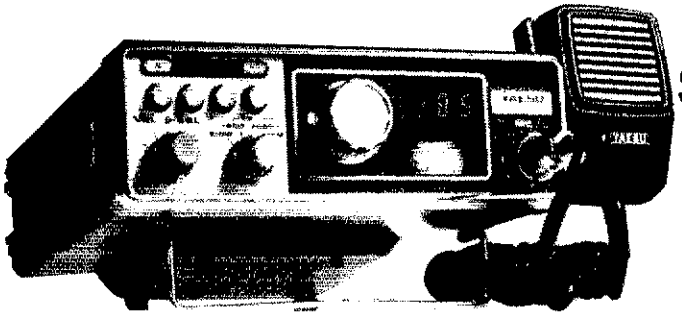

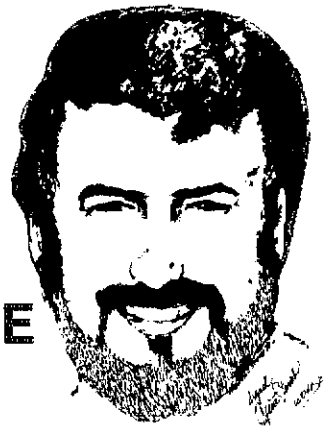

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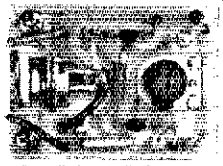

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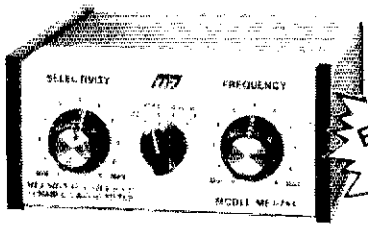

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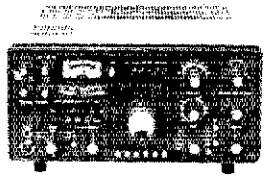

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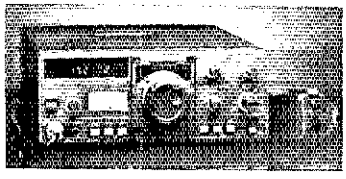

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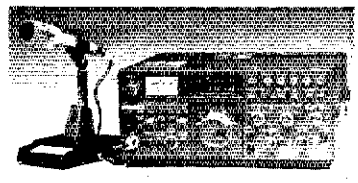

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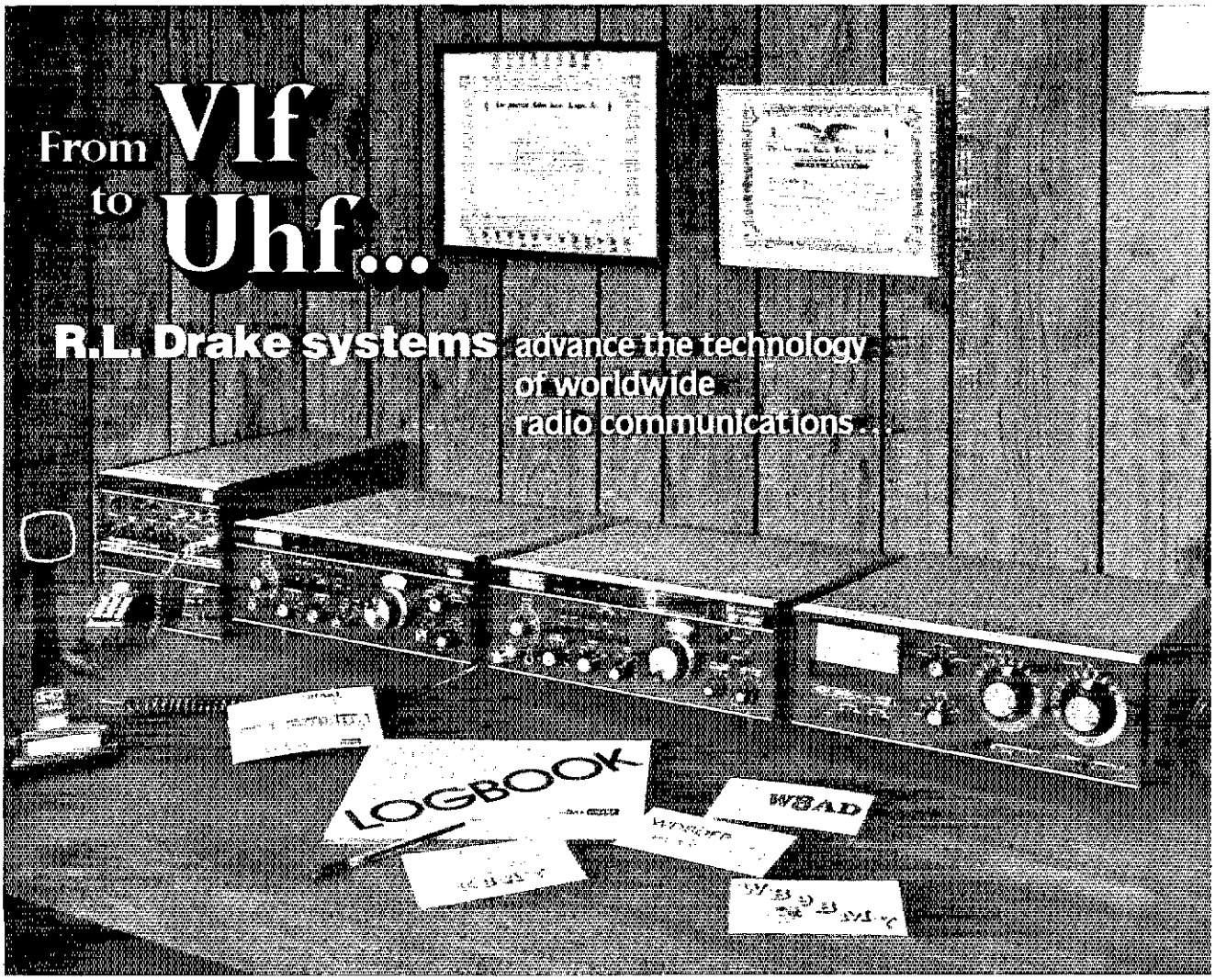

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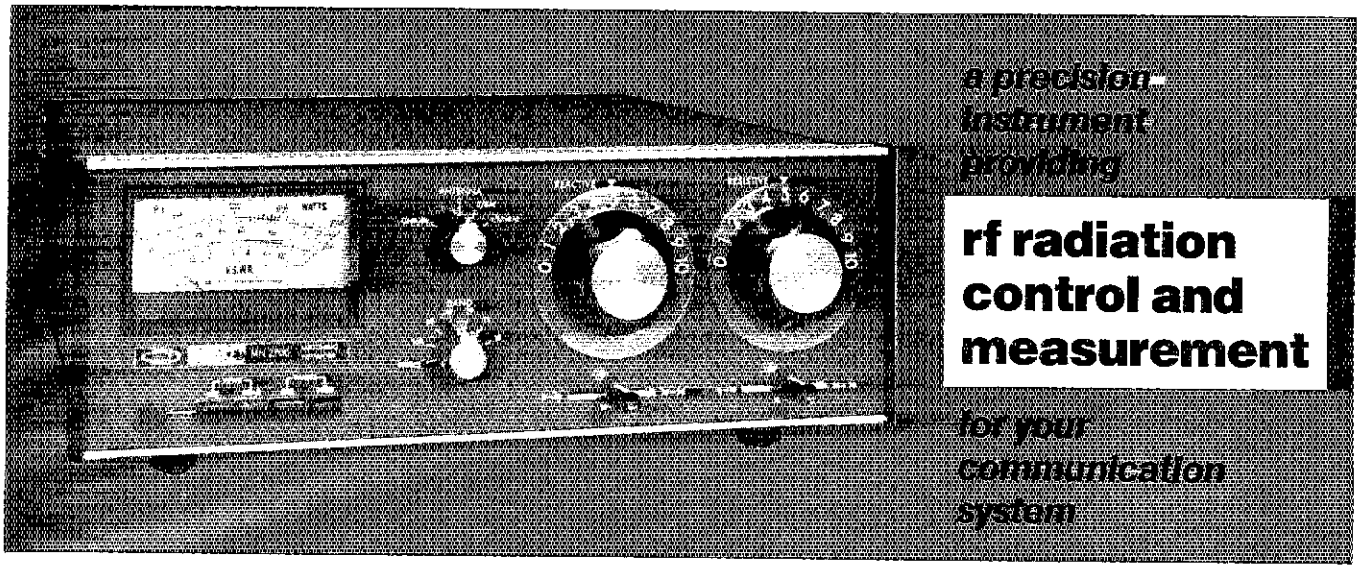
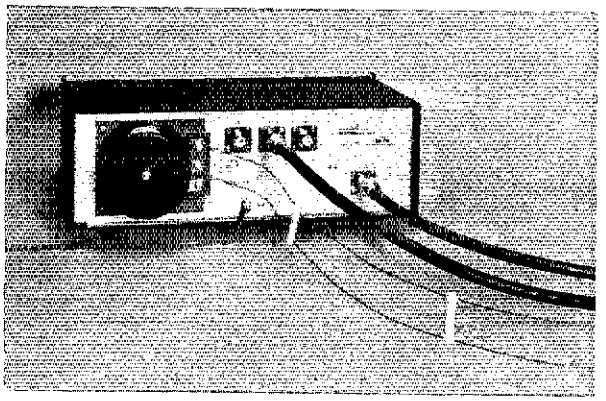
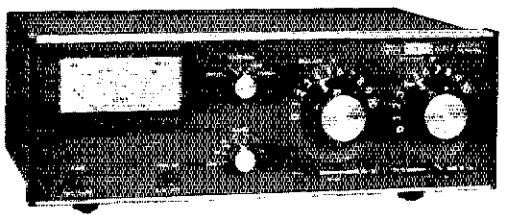


The Drake MN-2700 manages rf radiation in the areas of impedance match to the antenna, rf power measurement, VSWR measurement, reduction of harmonic radiation, and antenna selection.



Drake B-1000 Balun installed on Matching Network.



The Drake MN-7. Same features as the Drake MN-2700, but rated at 250 watts. Same width and height, but only 8½" (21.6 cm) in depth, and weighs 10 lbs. (4.55 kg).

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Antenna Choice—Matches antennas fed with coax, balanced line, or random wire. (For balanced line use optional Drake B-1000 Balun, which mounts on rear panel of MN-2700.)

Antenna By-pass Switching—Unique design allows unit to be switch-by-passed regardless of which antenna is in use, whether coax or wire type. No need to manually disconnect feedlines. Switch also selects various antennas.

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Dimensions—13 3/32"W x 4 17/32"H x 13" D (33.26 x 11.5 x 33 cm), weight 11 lbs. (5 kg).

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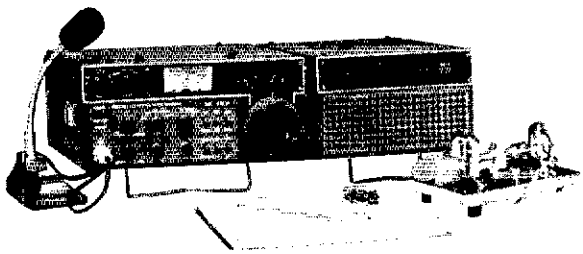

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KENWOOD TS-820, with cw filter, separate VFO, matching speaker. All in excellent condition. Will ship to licensed amateur in U.S. First $850 takes all. Call 203-666-1541 days, 203-677-1841 nights, to arrange sale. Ask for K1TX.

HW-8, p.s., crystal calibrator. Excellent. $110 postpaid. WB7VOO (602-298-4820)

TELETYPE ASR35, with extras. Good condition. $500 or best offer. W1HXE 802-387-4653.

ROSS' Specials: Ten-Tec 207 $11.50; 251 $75; 252G $80. All new. Drake mic, 7077 $36; MN4C $128; Drake TR/DR7 phone. Used Drake TR4CW RIT noise blanker, MS4, AC4 $679. Used Heath-kit SB-401 and SB-303 $469. SB-310 $190. SB-650 $140. SB-303 $240. SB-101, HP-23 $359. SB-301 $205. HW-100, HBps $249. SB-102, SB-600 HP-23A $410. New kit SB-220 $580. Gonset Communicator IV $90. Collins KWM-2, PM-2 $659. Collins 75S-1 $310. R390 $300. ETO Alpha 76 $1,095. Yaesu FL-101 $420. FR101S $350. FR101D $580. New FT101ZD $799.95. Johnson Viking Hanger $90. New Display Atlas 350XL, DD6, 350PS $1,250. New Astro 200A $650. Ross Dist. Co. Preston, ID 83263. Phone 208-852-0830.

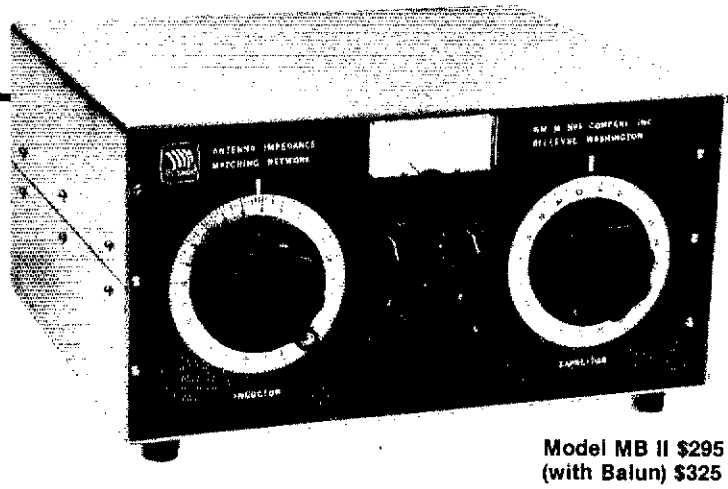
RF ammeters, Simpson new surplus, boxed. 100ma. – 10A. ± 2% FS (60mw to 5Kw into 50 ohms). Half price and less (well below distributors cost). Write for list. Bill K2PO, 62 Colchester Rd., New Providence, NJ 07974.

SELL: Hammarlund receiver HQ-170A with clock. Like new. Will ship. $250. KA3BGT, Bernie, RR 1, Box 24, Thompson, PA 18465. 717-727-2293.

HALLICRAFTERS SX101A receiver, Hammarlund HX50 exciter, both mint $160 each; Johnson Courier 500W linear very good $150; brand new pair 4-125A with ceramic sockets best offer — pick up only. Lewis Prescott, W1RFQ, Lincoln, Rhode Island.

SALE: Swan 700CX-SS16B, p.s., VOX. Mint, hardly used. First $575 firm. (703) 860-9571 eves or w/e. W4TRP.

TRITON IV, 262G/VOX, cw filter, noise blanker, all 10 meter xtals, excellent, $525. Irv Weinman, W9GA, 7820 W. Heather, Milwaukee, WI 53223.



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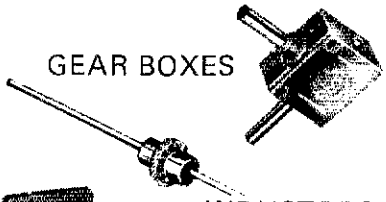
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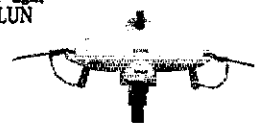

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SELL: Drake T4XB/AC4. Just aligned at factory — $425. Magnum Six Speech Processor — $100. Will pay shipping. John Dorr K1AR/5 7900 Viscount, #408, El Paso, TX 79925. 915-778-7804.

WANTED HT-220, any range, working or not. WB9HPJ 6649 S. Fairfield, Chicago IL 60629.

FT-101 $325. SB-500 $110. (W6RQZ) 1330 Curtis, Berkeley CA 94702.

DRAKE TR-22C, AA-10, fully crystalled, $200. Heathkit HW-2036, Micoder, partially assembled, $250. Yaesu FT-7,FP-4, like new, $435. Al Brogdon, K3KMO, 301-774-3481.

KENWOOD TS-820/cw filter, Heath SB-220 (10 M). Both mint, yr. old. $1200 pair. W3XW 301-357-8053.

MOVING, sell QST 1962-1978, Ham Radio 1969-1978, Ham Horizons 1977-1978, CQ 1965-1970. .25 each $1.00 minimum. Heath capacitor checker, rf generator. Kryger, WA9QJH, POB 643, Superior, WI, 54880. 715-394-4509.

SELL: HW-8 + ac supply $125. MFJ deluxe keyer $55. Tom Shinas, 401 San Paula, Farmington, NM 87401. 505-325-8046.

R390A/URR with cabinet and manual. Excellent condition. $375. WA2IXG 914-897-9562.

SELL: Allied T150 transmitter, National NC 155 receiver $175 both. Instructograph Code Machine and tapes $25. R. Reader, 1443 Mary St., Marinette, WI 54143. 715-735-9556.

FOR SALE: QST's 37 years 1941-1978. Any reasonable offer accepted. Bob Falk 7744 Western, Omaha, NE 68114. 402-391-9089.

STANDARD 146A 2M transc., perfect; all accessories incl whip, fixed, mobile antennas. $195. Jerry, Box 21, Newton U.F., MA 02164. 617-787-9194 Mon. or Thurs. after 10 p.m.

HEATHKIT SB-102, power supply/speaker, cw filter, microphone, manuals — Like new — $400. Allied SX-190 11 band a-m/ssb ham/shortwave rcvr., manual, orig. carton — mint — $200. Hallicrafters S-120A continuous coverage rcvr — manual, service manual/schematic — $40. WB5KFP 1520 Johnstone, Bartlesville, OK 74003.

SALE: Realistic DX-160 only $80. Going QRP and need the money. Alan Knight, WD4PZN in 1979 Callbook. 205-396-2530.

HEATHKIT HW-2036A digitally synthesized 2-meter transceiver. Fully assembled and checked out by Heath service center. Never used on the air. (Built as part of NRI electronics course.) With HW-2036A power supply and standard microphone, $300 or best offer. J. R. Barger, P. O. Box 14323, Austin TX 78761

SELL Swan 250 six meter transceiver, $150. Robot model 80 SSTV camera, $150. Donneau, W1YIX, 11 Blanche Ave., Cumberland, RI 02864. Phone 401-766-0742.

WANTED: SB-303; WDØBVF, RR 1, Box 212C, Willard, MO 65781.

HRO-W s/n 227 for sale. Perfect condition. All coils 50 kHz — 30 MHz. Best offer. Prefer pickup. Bob Fischer, K2ND, 516-665-7585, 80 Iroquois Dr., Brightwaters, NY 11718.

KENWOOD TS-520 excellent, VFO-520, cw filter, $650 ppd USA, or offer. Joe, WA3NQX, 425 Waupelani, State College, PA 16801. 814-234-8624.

WANTED — National NC-173 receiver, used cw key. K7EA, 3891 Seagull, S.L.C. UT 84119. 801-969-5216.

COLLINS: 75S3B (round) — $750. 30L1 — $595. S16F2 — $145. 32S3 — $595. F455FA08 — $75. F455FA21 — $50. W9ZR, 1-414-532-6643.

CODE practice cassettes — Computer generated, perfect code. High quality, full 90-minute cassettes. QSO tapes very much like FCC code exam. Printed text included. 25 QSOs at 15 wpm order no. C7 — 25 QSOs at 22.5 wpm order no. C8. Other types and speeds available. All cassettes $5.95 each ppd. S.a.s.e. for catalog. MC and Visa welcome. Fast Service! K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037.

A-TRONIX cw keyboard with memory. New in original carton $260 plus UPS. Grontkowski, WA2JBZ, 2855 University Ave., Bronx, NY 10468.

TEMPO-One plus ssb attachment only new $110. Grontkowski, WA2JBZ, 2855 University Ave., Bronx, NY 10468.

WANTED: Semiautomatic keys, Vibroplex, McElroy, others, chromed or plain. WFMN, Box 1081, St. Helens, OR 97051.

Yaesu FT-101EX, cw filter, mint, $550. Dumont oscilloscope 2100A field model, cost $1250 1977, $400. 616-673-2141, 8-5 P.M. Max Hale, WB8ENA.

HEATH DX-60B, with HG-10 VFO, $125. Eico txcvr. with p.s. $150. Will ship. WD6CWB, 711 9th Ave. No., Buhl, ID 83316. 208-543-8341.

NEW Close-outs: Yaesu FR-101S digital, cw filter, 6 + 2 meter converters, fm unit $599. YC-601B digital display $199. XF-30C cw filters just $25. Adirondack Radio Supply, P. O. Box 88, Amsterdam, NY 12010. 518-842-8350.

FOR SALE: Collins 800 Hz mechanical filter #F455 FA 08 6453. Best offer. Robert H. Webb, K4NYO. Rt. 1 Box 187, Danville, KY 40422. 606-332-4061.

SWAN 350C xcvr w/p.s. $360. Hammarlund HQ-215 rcvr $230. Collins F455FA-05 filter $90. W1ZHW, 6 Hawthorne St., Acton, MA 01720.

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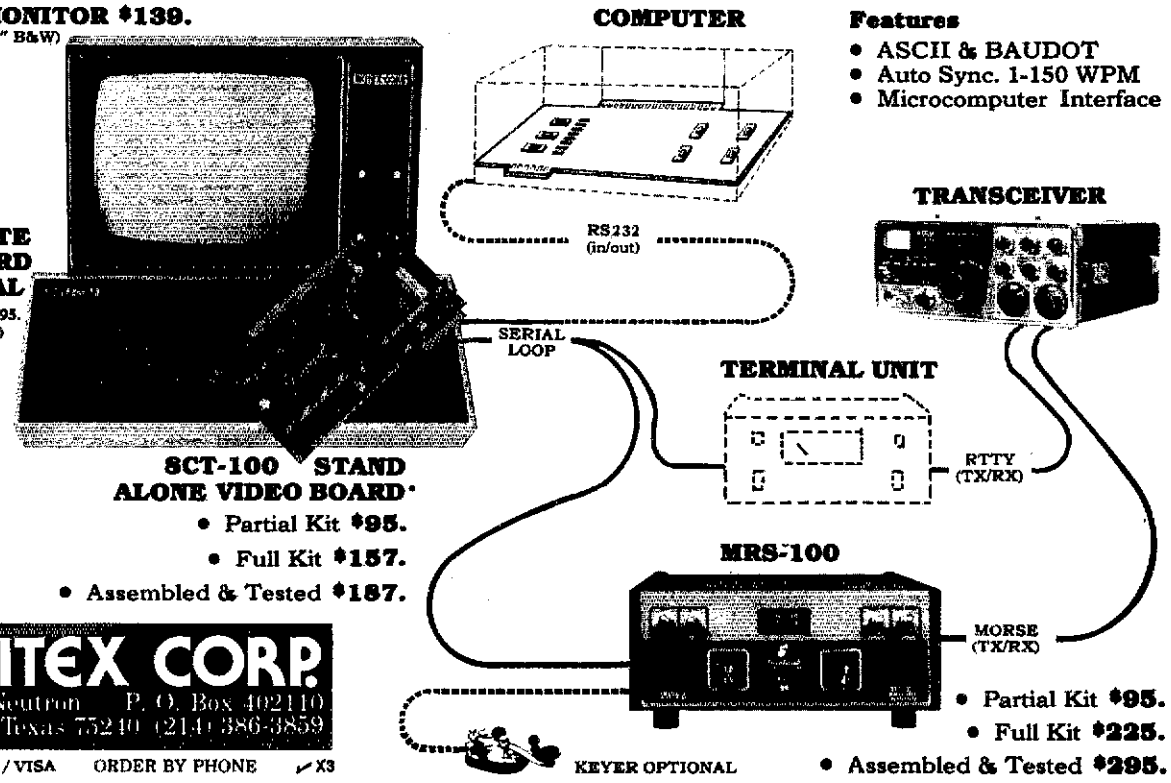

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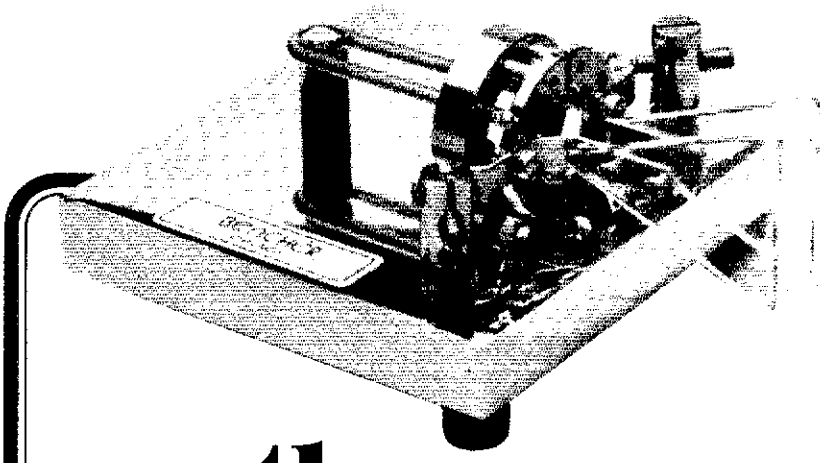

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FOR SALE: Hallicrafters SX-101 receiver and HT-32A transmitter mint condition $375. N. D. Laster K3EU, 1338 Burke Rd., West Chester, PA 19380. 215-692-5571.

SCOPE — dual trace Fairchild type 702, H.P. VTVM type 400D, both $100. Bird 43 thruline wattmeter $60. W2KZK 516-LY-3-7615.

FOR SALE — TA-33 jr. beam, RBS-50ft. EZ way tower. 4 el 2 mtr beam, HW-12 75 mtr transceiver & mobile supply, 2 pas B&W switch, AR-22 rotor, 40-80 trapped dipole. Can deliver tower a reasonable distance. Vince, K8UPC, 923 Jewell, Milan, MI 48160. 313-429-4231.

YAESU FT-101E like new complete with cw filter and fan $600. W6WY 213-661-4189.

HEATH SB-301, cw/am/ssb filters with SB-600 and manuals, $200. Yaesu FT-2FB 2 meter transceiver, 10 watts output, 11 sets of crystals and manual, $130. WB9SQH, RR #2, Box 219F, Crothersville, IN 47229.

WANTED, manuals/schematics for BC-611F, BC-348, BC-639, TCS-12, T-67/ARC 3, TS-34A/AP, R-122A/ARN12, RT-77/GRC9, RT-70/GRC, AM8/GRC, TDQ modulator. Motorola: T41GGV-4A, T53,GAD-1. Dumont: 5834-A-4, 5814-BA. RCA: CMF40A3, CMV315. Hallicrafters HT-2A. Gonset Communicator 4. Globe 6N2. Hewlett-Packard 202B. Multitone Electric TA4. Krohn-Hite 330-A. Sony TC-105A. Paul Prescott, N1AAC, 2 Allen Road, Brookfield, CT 06804.

CLEGG FM-27B, 2 meter synthesized rig covering 146-148 MHz, 30 watt output with mobile bracket, $180. George Steube, N3ADN, 13254 Triadelphia Rd., Ellicott City, MD 21043. 301-286-2321.

ATLAS 210X/NB, DCC cable, 200 PS ac supply, Shure 404C mic., ex. cond., complete $635. 212-698-5793 eves. W2BS.

HP-410B VTVM $35, Hallicrafters HA-1 Keyer $35, Heath HP-24 ps $25, Heath SB-610 scope $65, Ballantine 320A TRMS VTVM $35. Excellent. Ship UPS collect. Newman; 63A Youngs Hill Road, Halesite, NY 11743. 516-271-2894.

KENWOOD TS-820, digital, cw filter, spare tubes $900. D104 microphone $25. Dr. Michael Hayes, N2OD, 425 Neptune Avenue, Brooklyn, NY 11224.

WANTED: Keyboard for cw only. Call 501-925-1432. Paul Wise.

ROBOT SSTV Model 70-80 monitor and camera with lens complete. Mint. Shipped UPS first certified check $400. W3LRE. 216-386-3683, no answer call 216-386-4539.

KENWOOD 820, remote VFO — $825. Atlas 210X, ac VOX console, N.B., mobile mount, mint $675. WAØLLQ 402-339-3448, Papillion, NE 68046.

AMPLIFIER 80 to 10 meters 2kW input Henry K2000 like new $850. Frequency readout for Kenwood TS-520 Spectronics-Henry mod. DFD/K $90. W2AXU, 609-882-8811.

WANT Hallicrafters SR-160 xcvr and PA150-120 AC supply, in good condition. WB4NLW, USS Illusive (MSO-448). FPO New York, NY 09501.

HUSTLER 4-BTV Vertical antenna, 4 bands — 10 thru 40. RM-75-S can be obtained for 75 meters thru your jobber. Includes all radials and long length coax. Longest length tube 6'. Must be picked up here. Instruction book included. Net $40. Edward Meeker, W2FKF, Box 703, 19 Bass Rock Rd. Hopatcong, NJ 07843. 201-398-4600. (N.W. Jersey)

DUPLEXER, 450 MHz: Decibel Products DB-4023 (3 cavities), $175. Hank Riley, 617-994-3487.

FOR SALE — Hallicrafters SX101-MKIIIA, mint condition, re-tubed Aug. 1978, $170. Sierra power/SWR meter, model 164B with two plug-in elements, 1-50 watts, 50-470 MHz, plus carrying case, $200. Jon Kohn, 9635 Forrest Ridge, Shippensburg, PA 17257. 717-532-3175.

SWAN 500, 117 XC power supply mike, speech compressor, 410 external VFO with relay unit, VOX unit VX-1, Autek QF-1 audio filter. All for $375. Also Regency HR-212 complete with 22 crystals, power supply, mike, Ringo antenas, for $175. Cash, no shipping. Will demonstrate. W2RNM, 33 B Hicks Lane, Great Neck, NY 11024. 516-482-0519.

Tripole TM 160m-6m-SWL ant. assembled $45. 2kW. Nuvistor conv. CN-50, CN-144 $12.50 ea. PS-1 pwr $5. Janel 432 PC preamp $45. W6RQZ.

WANTED: Pair 813 tube sockets-3" scope bezel. Swap pair of 4-125A's for 813's. W9UDI.

SELL: Drake TR-3 with matching power supply/speaker good $325, including UPS. Rich Brock N8RB, 15806 Fernway Road, Shaker Heights, OH 44120. 216-751-7340.

ZOOM-Lens Television Camera, new $195. Haas Enterprises, 6017 Majorca Ct., San Jose, CA 95120. 408-997-0132.

FILTERS, Collins: F455J05 (75A4) — $75. F455FA21 — $50. F455FA08 — $75. W9ZR, 1-414-532-6643.

CASE for Tempo S1, $10. W. Harris, 1703 Verdun Dr. Greensboro, NC 27410.

SELL Atlas Mobile Mount, $22. WB5FXI. 601-769-4383.

COLLINS KWM-2, wing emblem, excellent condition, $500. Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60515. 312-852-4704.

HEATH DX-60 — $70. National NC-155 — $105. Mint condition, manuals, Prepaid, WØBPA 2926 W. 24th Joplin, MO 64801.

SWAN 100MX solid state mobile, 100 watts out, two months old, with Shure 404C mic. $600. W1GWA, Dennis Bird, 144 Golden Hill St., Bridgeport, CT 06604. 203-334-4837.

SELL Swan 350-C with power supply, built-in calibrator, mike & speech processor. $450. WB7TEW. 702-883-0403.

MURCH UT-2000A transmatch, mint, $105. WN1TKD 617-533-8904.

YAESU FT-301D, p.s., remote VFO, mint, $875; FT-221R all mode 2M xcvr $450; ICOM IC-22A $150; WA4OEJ, 205-881-5327.

SIGNAL/ONE CX 7B integrated stations, all immaculate, LED readouts, warranty $1295. Alpha vapor $1195. Alpha-77D $2495. Payne Radio, K4ID. 615-384-2224.

COAX — RG-213/U 500MIL Spec. 100' multiples, 23¢/ft. 400' roll, 21¢/ft. ADD UPS shipping. Hardline, 1/2" 50Ω with jacket. 500' and 1000' rolls, 45¢/ft. Towers — 25% off list. S.a.s.e. for info. JRS Electronics, (WA8OGS), P. O. Box 1893 Cincinnati, OH 45201.

HELP! Am 13 year old who will soon have my Novice ticket. Have antenna and xmtr. Need receiver. Chris Odel, 5 N. Washington Ct., Cheney, WA 99004.

SELL for best offer: Frequency meter sets SCR211 125-20KC BC906-6 140-225 MC with cal book and manuals. Hallicrafters receiver SX-28. Poly-Comm 2 transceiver, am. Ranger fm 2 meter 12 V. Hallicrafters Vari-freq oscillator HT-18. All with manuals. W2BLK, Maywald, 1310 W. Magnolia, Sea Girt, NJ 08750.

QRP HW-7 $80. W2CRW 201-686-1177.

SELL: SB-102, HP-23B, SB-600 — all mint condx. $395 (package only). Hustler 5BTV vertical — $65. HT-32 xmtr factory recond. — $150. Details: Dave, WA2UIS, Box 132, Selinsgrove, PA 17870.

I will assemble and test your Heathkit. Please write for details. Paul Preidecker, WA5WBF, 4123 Durness, Houston, TX 77025

SELL: 346 issues — QST 1927 to 1959 inc., 50c each, FOB Milbank. 121 issues — QST 1961 to 1974 inc., 25c each. FOB Milbank. Send s.a.s.e. for issued available (by months, will not sell individual issues). Irving Patridge — WØTI, 602 4th Ave. E., Milbank, SD 57252.

FOR SALE: TR4C and RV4C, $495. firm, no trades. Used very little. New set of 20 tubes installed this year. Perfect working condition. I am replacing TR4C and RV4C with Drake twins. Call 1-912-283-3954. Try it out after 5:00 P.M. weekdays or all day weekends. Waycross, GA. T. L. Everett WA4KKI

YAESU FT-301D with cw filter and microphone, FP-301, FV-301 and FC-301. All in mint condition. $975. Bob, WA6GNT, 415-522-2304, 3016 Bayview Drive, Alameda, CA 94501.

PRIOR year(s) Call Books. Buy/sell. S.a.s.e. for prices. WB1ASX

SELL Drake R4, 10m 160m xtals, $225. Want DX Engineering processor for T4X. Al Rousseau, W1FJ, 180 Den Quarry Rd., Lynn, MA 01904. 617-598-3744.

QST — Back Issues — 1915 to 1929, will quote. 1930-1939 $2. each, 1940 - 1950 $1 each 1951 up $5 year plus UPS — W3ZD 215-675-4539. December 1915 reprint $3 postpaid.

PRINTED circuit boards for all QST construction articles commencing December 1978. 20m 6w xmtr $5.50, Club Filter $3.50, Accu-weight $3.50, YY rcvr $9.25, Accu-Keyer mod $3.50, Touch tone encoder $4.75, Soup preamp $4.75, 10/15m converter $5, Sharc meter $10, cw audio filter $4.75, Boots ampl. $11.75. Daniel Gravereaux, N1ZZ, 602 Carter Street, New Canaan, CT 06840.

FOR SALE: QST's 1955-1975 (252 issues) $125. John Glauber, W4OB, 1536 Orangewood Circle, Zellwood, FL 32798. 305-886-7885.

WANTED: FMTD-1 decoder for KDK-FM 144. C. Mathias, 8519 Warwick S.E., Warren, OH 44484.

WANTED: Heathkit SB-600 speaker, WB2NDE, 14 Meridian, Ballston Lake, NY 12019.

MUST sell due to college. Kenwood TS-520, VFO 520-S, SP-520, $675. Richie — WA2GCQ, 212-338-7568.

HEATH HW-16 transceiver, solid state VFO, manuals, excellent condition $125. KA2CNG. 607-797-7891 evenings.

DRAKE C-Line: T-4XC, R-4C, AC-4, MS-4, 4-NB, FL-6000, FL-500, 10 xtals, Shure 444, $1874 value for $1150; MN-2000, $200; C-4, $400; SPR-4, MS-4, 5-NB, SCC-4, RY-4, 17 xtals $984 value for $550. WB2EDD, 212-295-3748.

WANT several 450TL tubes. Prefer new. W7SC, 2211 Bergeson, Boise, ID 83706.

NEED 5-pin porcelain plug-in coils for Hammarlund Comet Pro Receiver. W7SC, 2211 Bergeson, Boise, ID 83706.

TS-520, DK-520, DG-5, VFO-520 $795 mint. Atlas 210X/NB, 200-PS, DMK, CLC, Globe Gell-Cell $800 mint. Unique Standard wire-tuner $95 mint. W1ABJ. 1751 Beacon, Brookline, MA 02146. 617-232-7080.

QUAD Builders — blizzard/hurricane proof your antenna. Fiberglass vaulting poles, incredible strength. S.a.s.e. for info. K5WSE, Box 1032 Cedar Park, TX 78613 512/259-2164.

HEATH station: SB-401 xtal pack, SB-303 cw filter, SB-200 w/10 mtr. All cables and manuals, also SB-600 speaker. $800. Dave Lacroix, WBØRRX, 1-314-837-2909.

ARGONAUT, excellent condition, $195. Gary Carmack,

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The 5-BTV is made heavier for better performance and quality. Heavier traps assure accurate and permanent trap resonance. Solid one-inch fiberglass trap forms give optimum electrical and mechanical stability.

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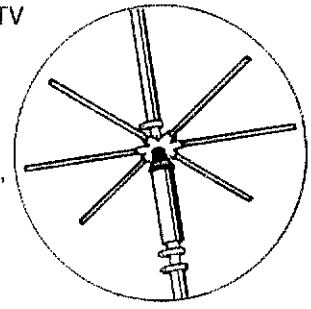

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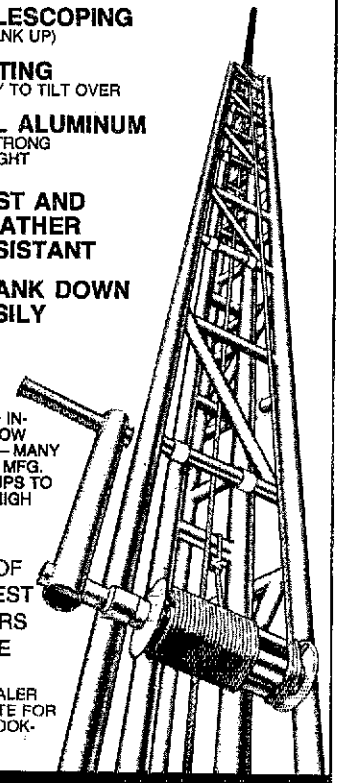

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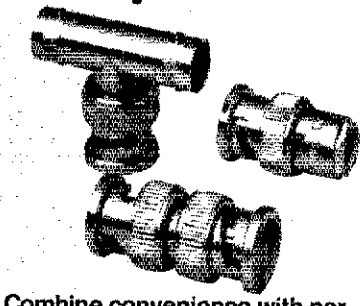

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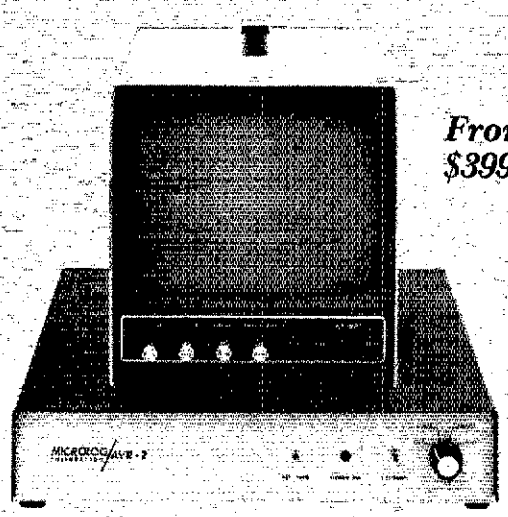

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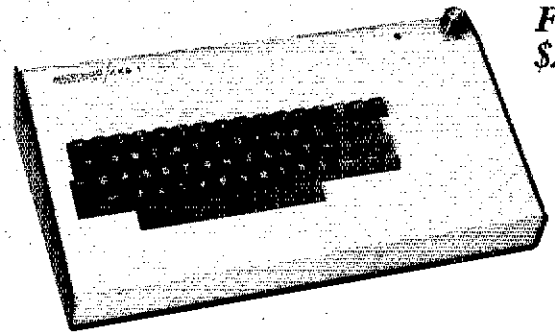

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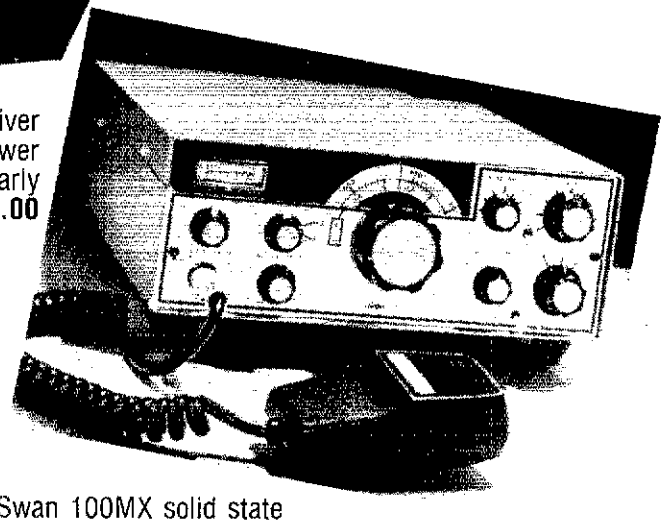

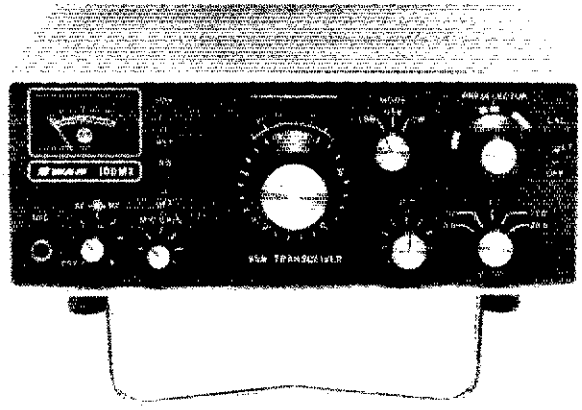

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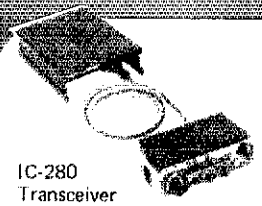

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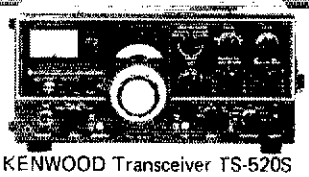

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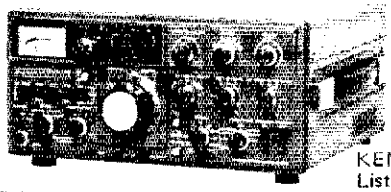

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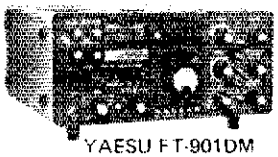

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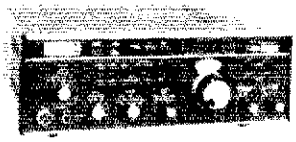

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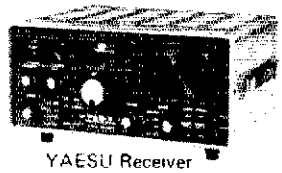

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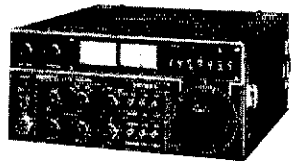

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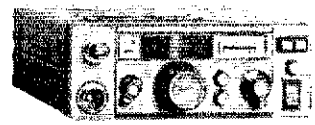

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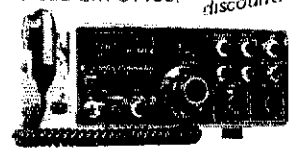

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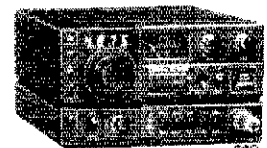

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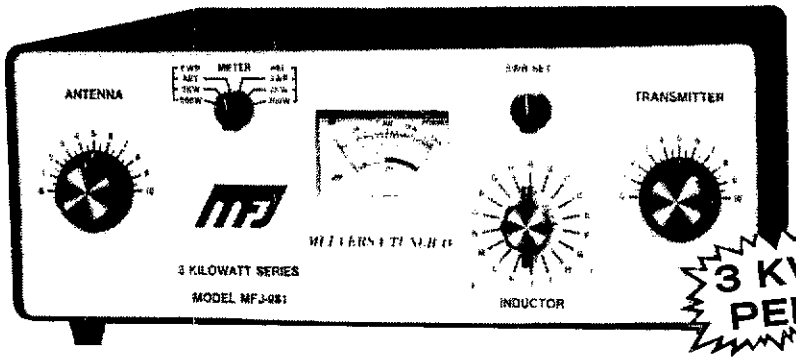
For $199.95 you can run up to 3 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced lines, random wires. Built-in balun, SWR, dual-range forward and reflected power meter.



3 KW PEP

Built-in balun, SWR, dual-range forward and reflected power meter.

$199.95

The NEW MFJ-981 3 KW Versa Tuner IV lets you run up to 3 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

This gives you maximum power transfer to your antenna for solid QSO's and attenuates harmonics to reduce TVI and out-of-band emission.

An accurate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

A new all metal, low profile cabinet gives you RFI protection, rigid construction, and sleek styling. Black finish. Rich anodized aluminum front panel. 5x14x14 inches. A flip down wire stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 18 position dual inductor. 17 amp, 3000 volt ceramic rotary switch. 2% meter. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. Binding post for ground.

Every single unit is tested for performance and inspected for quality. Solid American construction, quality components. Full one year limited warranty.

For your nearest MFJ dealer, call toll-free 800-647-1800. Stop by your dealer. Compare it feature for feature with other tuners. Compare its value, its quality and its performance.

After a truly side by side comparison, you'll be convinced that its value, quality and features make it a truly outstanding value.

Why not visit your dealer today and see the NEW MFJ-981 3 KW Versa Tuner IV? If no dealer is available order direct from MFJ.

MFJ-982 3 KW VERSA TUNER IV has balun, 7 position antenna switch. Matches everything: coax, balanced lines, random wires continuously from 1.8 to 30 MHz.

- *7 position antenna switch*
- *4:1 ferrite balun for balanced lines*

$199.95

Flexible 7 position antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.

Up to 3 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, random wire, balanced line.

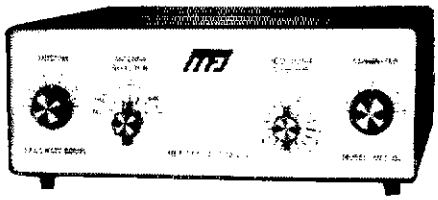
Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

Black metal cabinet, anodized aluminum front panel. Flip down wire stand. 5x14x14 in.

Encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 18 position dual inductor, 17 amp ceramic switches. SO-239 coax connectors, ceramic feedthru for random wire, balanced line, binding post for ground.

Made in USA. One year limited warranty.

See it at your nearest dealer. If no dealer is available order direct from MFJ.



If you already have a SWR/wattmeter, the MFJ-982 is for you.

MFJ-980 3 KW VERSA TUNER IV has built-in balun for balanced lines. Matches coax, balanced lines, random wires, 1.8 to 30 MHz.

- *Encapsulated 4:1 ferrite balun for balanced lines*

$169.95

Up to 3 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, random wire, balanced line. Heavy duty encapsulated 4:1 ferrite balun.

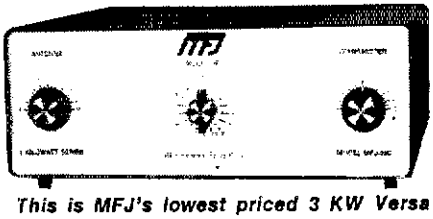
Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

Black metal cabinet, anodized aluminum front panel. Flip down wire stand. 5x14x14 in.

500 pf, 6000 volt cap., 18 position dual inductor, 17 amp ceramic switches.

Made in USA. One year limited warranty.

See it at your nearest dealer. If no dealer is available order direct from MFJ.



This is MFJ's lowest priced 3 KW Versa Tuner IV.

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Order today. Money back if not delighted. One year limited warranty. Add $8.00 shipping/handling.

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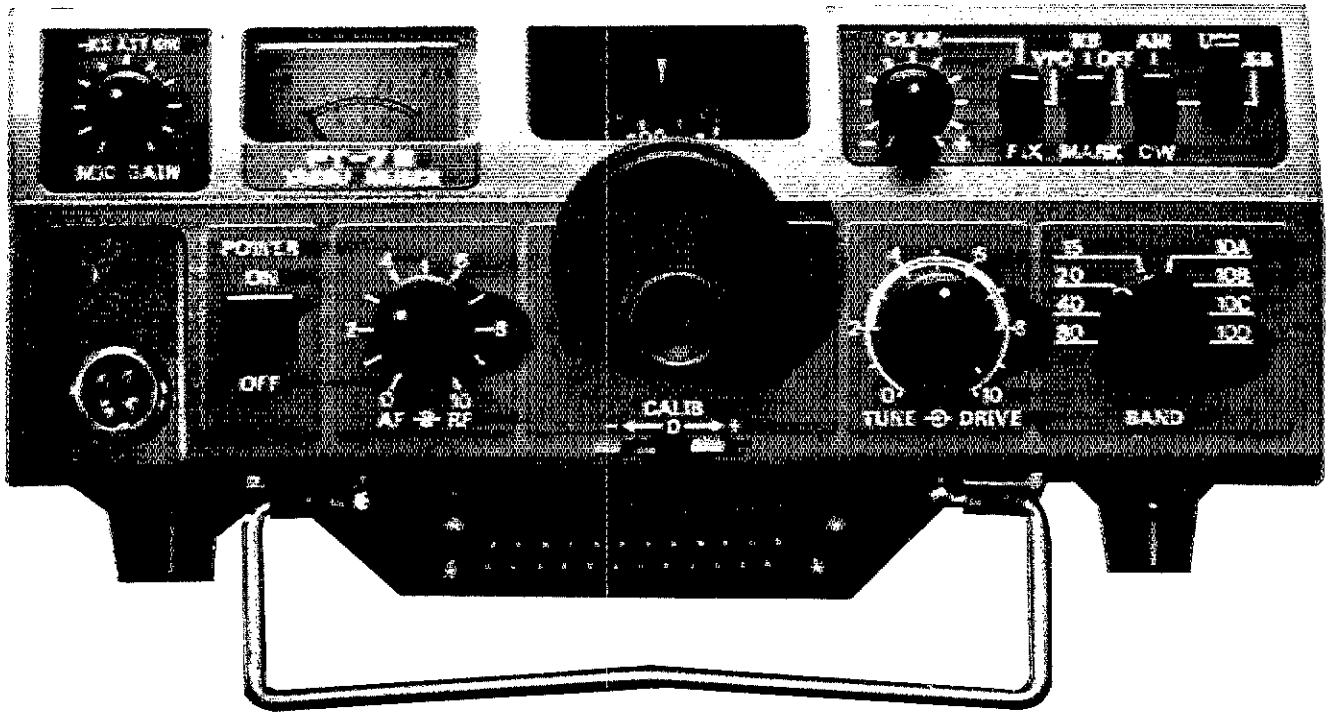
NEW FT-7B 100 W MOBILE/BASE HF TRANSCEIVER

Enough power to drive those linears! The FT-7B is the high powered version of the popular 20 watt FT-7 that so many hams are running mobile in cars, boats, and planes around the world. Use the FT-7B as a top quality base station. New improvements include an audio peak filter (like our FT-901DM) to give you super CW selectivity, drive control, four 10M positions, full 80-10M coverage, 28.5-29.0 MHz crystal supplied (other crystals available as options), optional YC-7B Plug-in Remote Digital Readout, optional FP-12 Speaker/Power Supply Console.



RECEIVER

Sensitivity: 0.5uV for S/N 20 dB
Image rejection: Better than 50 dB
IF rejection: Better than 50 dB
Selectivity: -6 dB: 2.4 KHz, -60 dB; 4.0 KHz
Cross-modulation: Better than 60 dB immunity at 20 KHz off a 20 dB input signal typical
Audio output: 3 watts @ 10% THD

TRANSMITTER

Emission: LSB, USB (A3j), CW (A1), AM (A3)
Input power: A1, A3j; 100 watts DC
Carrier suppression: Better than 50 dB below rated output
Unwanted sideband suppression: Better than 50 dB @ 1000 Hz
Spurious emission: Better than -40 dB
Distortion products: Better than -31 dB

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU

The radio.

579X

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TS-180S *with* DFC*

TS-180S, featuring DFC *(Digital Frequency Control, with four digitally tuned memories), is an all solid-state HF transceiver specially designed for the DXer, contest operator and other Amateurs who enjoy working the 160 through 10-meter bands. Also available is a full line of matching accessories, including the PS-30 base-station power supply, SP-180 external speaker with selectable audio filters, VFO-180 remote VFO, AT-180 antenna tuner/SWR and power meter/antenna switch, DF-180 digital frequency control, YK-88CW filter and YK-88SSB filter. Stand-up microphone shown above is optional.

TS-120S

TS-120S, popularly referred to as "a big little rig," is a compact, up to 200 watts PEP input, all solid-state HF transceiver with such standard features as built-in digital readout, IF shift, new PLL technology and requires no tuning. It's ideal for car or ham shack use. Accessories available include the PS-30 base-station power supply, SP-120 external speaker, VFO-120 remote VFO, AT-120 antenna tuner/SWR meter, MB-100 mobile mounting bracket and YK-88CW filter. Hand microphone shown above is optional.

See the exciting TS-180S and TS-120S at your Authorized Kenwood Dealer!

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See Kenwood's "Tech Talk" in this issue for more information.