QST

devoted entirely to Amateur Radio

A "discrete" i-f amplifier

Page 27

tempo does it again

THE WORLD'S FIRST 440 MHz SYNTHESIZED HAND HELD RADIO

Tempo was the first with a synthesized hand held for amateur use, first with a 220 MHz synthesized hand held, first with a 5 watt output synthesized hand held...and once again first in the 440 MHz range with the S-4, a fully synthesized hand held radio. Not only does Tempo offer the broadest line of synthesized hand helds, but its standards of reliability are unsurpassed...reliability proven through millions of hours of operation. No other hand held has been so thoroughly field tested, is so simple to operate or offers so much value. The Tempo S-4 offers the opportunity to get on 440 MHz from where ever you may be. With the addition of a touch tone pad and matching power amplifier its versatility is also unsurpassed.

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

Tempo S-1

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

Tempo S-5

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

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

*For use with S-1 and S-5

Tempo S-2

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

If you're not on 220 this is the perfect way to get started. With the addition of the S-20 Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz station, the S-2 will add tremendous versatility.

Price...$349.00 (With touch tone pad installed...$399.00)
S-20...$89.00

Specifications:
Frequency Coverage: 440 to 449.995 MHz
Channel Spacing: 25 KHz minimum
Power Requirements: 9.6 VDC
Current Drain: 17 ma-standby 400 ma-transmit (1 amp high power)
Antenna Impedance: 50 ohms
Sensitivity: Better than .5 microvolts nominal for 20 db
Supplied Accessories: Rubber flex antenna 450 ma ni-cad battery pack, charger and earphone
RF output Power: Nominal 3 watts high or 1 watt low power
Repeater Offset: ± 5 MHz

Optional Accessories for all models

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

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

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

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

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

53 YEARS OF SERVICE

Henry Radio

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

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
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Butler, Missouri 64730 (816) 679-3127

TOLL FREE ORDER NUMBER: (800) 421-6631
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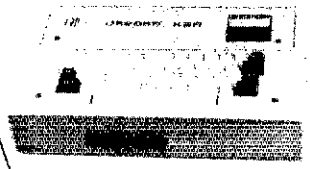
Calif. residents please call collect on our regular numbers.
Prices subject to change without notice.

RTTY for ALL Requirements and Budgets

Whether you're looking for the lowest cost or highest performance RTTY video system, HAL has the equipment for your ham shack.

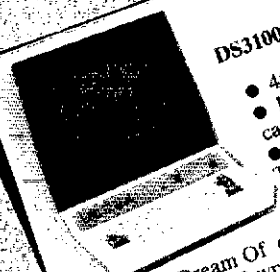
DS2050

DS2050—The features of the proven DS2000 and ST5000 in one convenient cabinet. ● 60 to 133 wpm Baudot ● 110 or 300 baud ASCII ● 5 to 100 wpm Morse transmit ● Add MR2000 for auto-track Morse reception ● 170 or 850 Hz RTTY Shift ● 24 lines, 72 Characters per line ● Word Mode Transmit ● Two HERE IS messages ● 255 Character Transmit Pre-type Buffer or use entire 1728 Character Screen ● Internal RTTY demodulator and transmit tone generator ● KOS for auto TX/RX Control ● Lowest cost Video System anywhere!

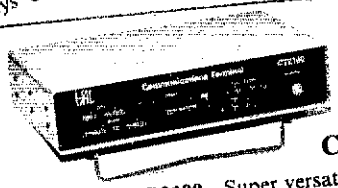


DS3100ASR

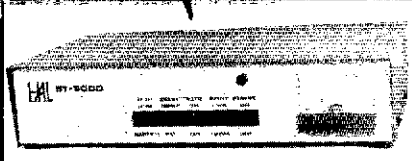
DS3100ASR—The standard of comparison for commercial and amateur terminals. ● 45 to 100 baud Baudot ● 110 to 9600 baud ASCII ● Full or Half Duplex ● Full 96 Character, upper/lower case ASCII ● Modem Connector ● External Printer Output ● 150 Lines Receive Buffer ● 50 Lines Transmit Buffer ● Split-screen or Full-screen Receive ● On-screen Status Indicators ● Triple-legend Keytops to Label Terminal Control Keys ● All the Features You'd Ever Dream Of ● Morse Receive and Transmit—5 to 150 wpm ● Add the MSO3100 Message Storage Option for extended text storage ● MSO3100 adds 450 more lines of text storage ● Read or Write MSO Messages at your DS3100 keyboard or by remote stations over the air ● Use the HAL ST6000 RTTY Demodulator with the DS3100 for unparalleled performance and convenience—the best buy anywhere in a high quality system!

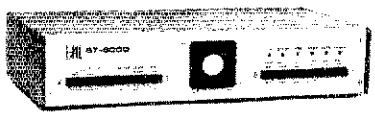


CT2100 and KB2100



CT2100 and KB2100—Super versatile, medium cost video RTTY system. ● Baudot or ASCII at 45 to 1200 baud ● 5 to 100 wpm auto-track Morse ● Add KB2100 to transmit—small and convenient lap size ● Multipage Display ● 24 line screen ● Standard 72 Character Line or Large Character 36 Character Line ● Total of 48 72-Character Lines or 96 36-Character Lines ● Split Screen ● Transmit with KB2100 ● Internal RTTY Demodulator for FOUR tone sets ● U.S. Standard "High Tones" (3 Shifts) ● IARU Standard "Low Tones" (3 Shifts) ● 103 Modem Standard (1070/1270 Hz) ● 202 Modem Standard (1200/2200 Hz) ● Two HERE IS Messages ● Up To EIGHT *non-volatile* EPROM Stored Messages ● Exclusive HAL "Smooth Scroll" Screen Display ● Many, Many NEW FEATURES!





ST5000 and ST6000

ST5000 and ST6000—Everybody's Favorite RTTY Demodulators. ● ST5000 is low cost—receives and transmits both 170 and 850 Shift ● Internal Loop Supply ● Autostart with Printer Relay ● Active Filters and Wide-bandwidth, High-gain Limiter Stage ● ST5000 Plus Your Printer Makes a Super Low-cost RTTY System! ● ST6000 is Proven, High Performance, No-compromise RTTY Demodulator ● Receive and Transmit 170, 425, or 850 Hz Shift ● Internal Loop Supply ● Autostart with Mark Hold and Antispace ● Printer Relay and Socket ● Crystal-controlled Transmit Tones ● Two Loop Keyer Stages ● RS232, MIL188, and CMOS Data Connections ● ATC, DTH, and KOS ● Self-contained Tuning Oscilloscope ● Active Input, Discriminator, and Low-pass Filters ● Input AGC ● Active, Ideal-Diode Detectors ● High-gain, Wide-bandwidth Limiter Stage ● FM or AM type of Operation ● ST6000 is Top-of-the-line for Either Commercial or Amateur Applications!

If You're Into RTTY, You Should Be Looking at HAL Equipment—We've Set the Standards For Video RTTY! See Our Equipment at Your Favorite Amateur Dealer or Write for Literature.

HAL COMMUNICATIONS CORP., BOX 365, URBANA, ILLINOIS 61801, 217-367-7373

ICOM VHF Mobile

Amateur Communications using Space Age Techniques

ICOM's smallest 2 meter FM mobile, the **IC-25A** offers extremely compact size (5-5/8" × 2" × 7" deep) without sacrificing features. 25 watts, 5 memories, 2 scanning systems, priority channel, 2 VFO's and touchtone™ HM-8 microphone standard.

The best 2 meter multimode mobile on the market today, the **IC-290A** has features to make multimode mobile a snap. 2 VFO's, 5 memories, priority channel, memory and band scanning, squelch on SSB, selectable AGC and NB, and RIT. Touchtone ™ encoding provided with HM-8 microphone standard.

6 meter mobile at its best with the **IC-560**, a multimode mobile transceiver for working FM repeaters or sideband simplex, local or DX, 3 memories, 2 VFO's, scanning, squelch on SSB.

Sensible and affordable, the **IC-22U** offers simplicity with ease of operation. Easy to use push buttons for up and down tuning. 800 channels at the push of a button. 4 MHz coverage. EX-199 optional remotable frequency selector.

2112-116th Avenue NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

ICOM

August 1981 *Volume LXV Number 8*

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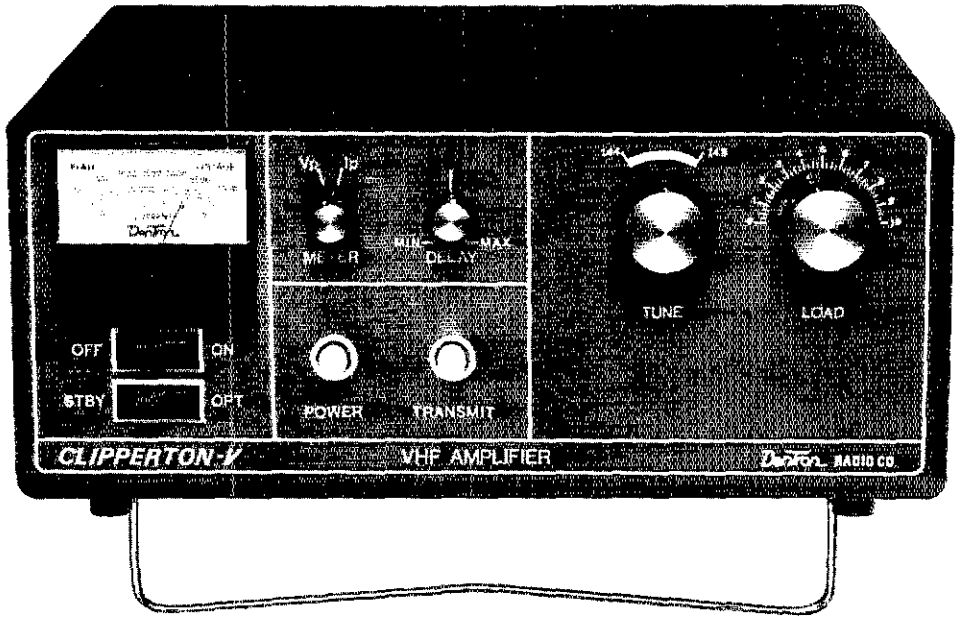
THE COVER

Whether or not you have plans to design and build a receiver, this MOSFET i-f module should be of interest. It features discrete components, unconditional stability and low cost. See page 27.

Contents

POWER

500 WATTS AT 2 METERS



With the new Clipperton-V Amplifier

Power! When you hook into DenTron's new 500 watt, 2-meter VHF amp you've got it. Enough to capture the frequency and leave the others behind. If you're into FM, repeaters, SSB, CW or DXing, the Clipperton-V linear amplifier is loaded with goodies just for you. And when it's DenTron you know it's reliable, high quality, and American-made.

Ask your dealer to demonstrate the new Clipperton-V. And pick up a copy of our complete product guide. Or send to us for a free copy today. Suggested retail $599.50.

Specifications:

- Frequency ranges
  144-148 MHz
  50-54 MHz with 6 meter modification kit
  30-165 MHz (custom from factory for commercial applications)
- 4CX250B ceramic/metal tetrode tube
- Pressurized chassis tube cooling system
  Modes - USB, LSB, CW, RTTY, FM
- Power requirements - 117/234 VAC, 50/60 Hz
- RF drive power - 20 watts maximum, 10 watts RMS minimum for 500 watt dc input
- RF sensing keying circuit with delay feature for SSB
- dc plate voltage - idle + 2250V approximate
- dc bias voltage - variable 55 to 130V
- Input impedance - 50 ohms nominal
- Output impedance - 50 ohms nominal
- Antenna load VSWR - 2:1 maximum
- Harmonic suppression - down 60 db or better
- Size - H 6" x W 15" x D 17"
- Weight - 45 lbs.
- Input - 500 watts

DenTron Radio Co., Inc.

1605 Commerce Drive / Stow, Ohio 44224
(216) 688-4973

DX

1,500 CONTACTS

120 COUNTRIES

A4

IN 2 DAYS

SPECTACULAR PERFORMER

Top performance, easy installation, 4 band operation, and moderate price are yours with Cushcraft's new A4, 4 element beam. A4 operates on 10-15-20 meters. A74 add-on kit expands operation to either 40 meters or the new 30 meter WARC band. New engineering gives better performance through improved trap design with fewer parts, less installed weight and greater strength. You too can experience exciting DX contacts with A4 available through dealers worldwide.

"I used your new A4 during the 1981 Phone ARRL DX contest. It was dynamite!! In 24 hours I had worked 99 countries. After 48 hours my total was 125. The A74 add-on kit allowed me to work 28 countries on 40 meters alone. It added new versatility to my 40 meter activity. By the end of 48 hours I had worked almost 1500 contacts with 285 multipliers. Thank you for making my operating more fun." ART HAMBLETON, K1LL.

*Logs to be verified

cushcraft
CORPORATION

THE ANTENNA COMPANY
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

Power up.

40 W, 15 memories/offset recall, scan, priority, DTMF touch-pad

TR-7850

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts RF output. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-pad (DTMF) encoder. A 25-watt output version, the TR-7800, is also available.

TR-7850 FEATURES:

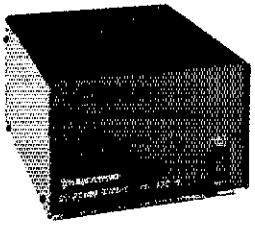
- **Powerful 40 watts power output**
  Selectable high or low power operation. High 40-watt output provides reliable signal for wide area coverage.
- **15 multifunction memory channels, easily selectable with a rotary control**
  M1-M13...memorize frequency and offset (±600 kHz or simplex). M14...memorize transmit and receive frequencies independently for nonstandard offset. M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.
- **Internal battery backup for all memories**
  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood supplied) are installed in battery holder inside TR-7850. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **Extended frequency coverage**
  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Priority alert**
  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.
- **Built-in autopatch touch-pad (DTMF) encoder**
  Front-panel touch pad generates all 12 telephone-compatible dual tones in transmit mode, plus four additional DTMF signaling tones (with simultaneous push of REV switch).
- **Front-panel keyboard**
  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.
- **Autoscan**
  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.
- **Up/down manual scan**
  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).
- **Repeater reverse switch**
  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."
- **Separate digital readouts**
  To display frequency (both receive and transmit) and memory channel.
- **LED bar meter**
  For monitoring received signal level and RF output.
- **LED indicators**
  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR
- **TONE switch**
  To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
  Depth is reduced substantially.
- **Mobile mounting bracket**
  With quick-release levers.

More information on the TR-7850 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Matching accessory for fixed-station operation:
- KPS-12 fixed-station power supply for TR-7850

Other accessories not shown:
- KPS-7 fixed-station power supply for TR-7800
- SP-40 compact mobile speaker



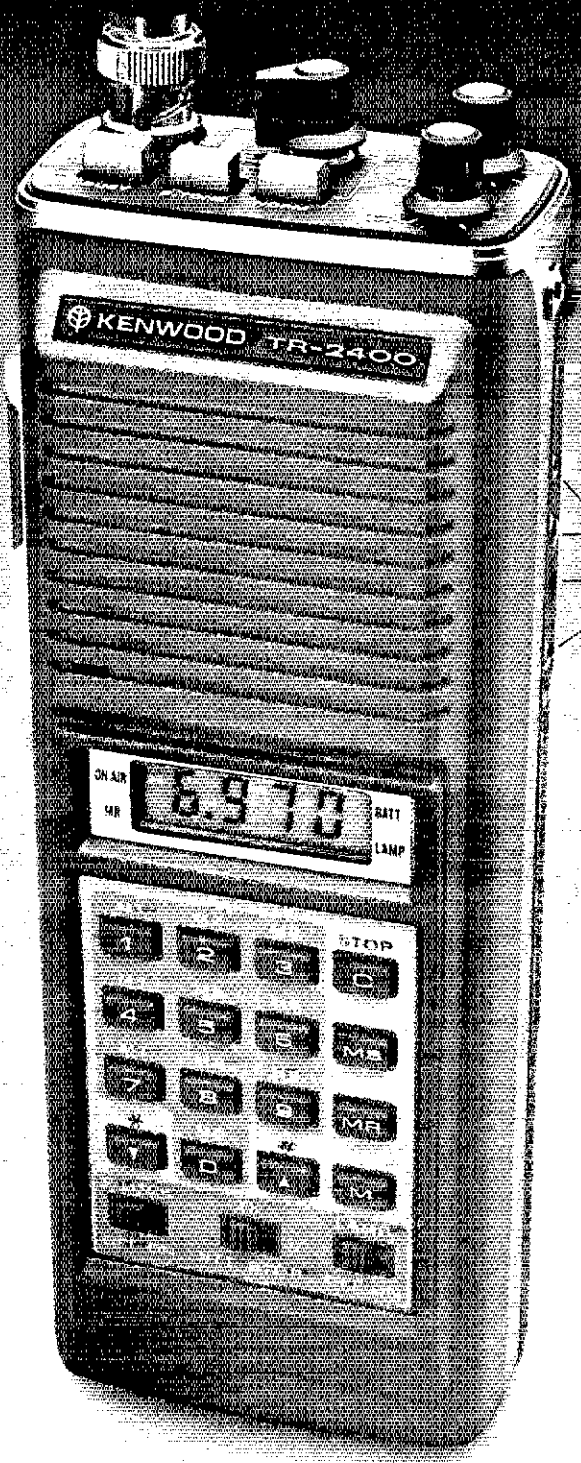
Specifications and prices are subject to change without notice or obligation

Hand-shack.

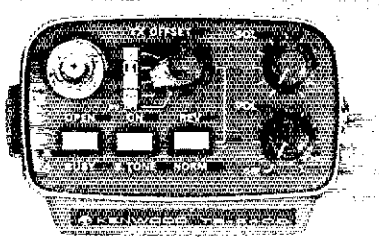
Synthesized, big LCD, 10 memories, scanning, DTMF

TR-2400

Put a ham shack in your hand. The TR-2400 is the ideal hand-held for 2 meters FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-kHz-step PLL synthesized operation, 10-channel memory, scanning, and 16-button autopatch DTMF encoder.



- **Large LCD digital readout**
  Readable in direct sunlight (better than LEDs). Readable in the dark (with lamp switch). Virtually no current drain (much less than LEDs) and display stays on. Rugged and dependable in hot or cold temperature ranges. Shows receive and transmit frequencies and memory channel.
- **5-kHz-step frequency selection**
  PLL synthesized keyboard channel selection system. No "5 up" switch needed. Selects from 144.000 to 147.995 MHz.



CONVENIENT TOP CONTROLS

- **UP/DOWN manual scan**
  Single or fast continuous 5-kHz steps from 143.900 to 148.495 MHz for Amateur and MARS or CAP simplex or repeater operation.
- **10 memories**
  Retained with battery backup (only 2.0 mA). "M0" memory may be used to shift the transmit frequency any desired amount to operate on repeaters with nonstandard split frequencies.
- **Built-in autopatch DTMF encoder**
  All 16 buttons of keyboard provide telephone dual-tones while transmitting.
- **Automatic memory scan**
  Checks all 10 memory channels. Programmable to lock automatically on either BUSY (signal present) or OPEN (no signal) channels.
- **Repeater or simplex operation**
  Convenient mode switch shifts transmit frequency +600 kHz or -600 kHz or to the frequency stored in "M0" memory.
- **Subtone switch**
  Activates subaudible tone encoder (not Kenwood-supplied).
- **Extended operating time**
  With LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output) for longer operating time between charges.
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.
- **Reverse operation**
  Push-button switch shifts receiver to transmit frequency and transmitter to receive frequency.
- **BNC antenna connector**
  Easy to connect external antenna.
- **LCD "arrow" indicators**
  Show "ON AIR" "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- **High-impact case and zinc die-cast frame**
  Extremely rugged with antenna counterpoise.
- **External PTT microphone and earphone connectors**
  Easily accessible on right side of transceiver.
- **Compact and lightweight**
  Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

Standard accessories included:

- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- External-microphone plug
- AC charger • Hand strap
- Earphone

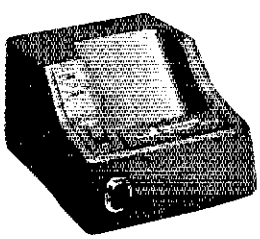
More information on the TR-2400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD

. . . pacesetter in amateur radio

Optional accessories:

- ST-1 base stand (shown) which charges to 90% (to protect battery) in 1.5 hours, with 4-pin connector for dynamic microphone and SO-239 antenna connector
- BC-5 DC quick (90%) charger
- SMC-24 speaker/microphone
- LH-1 deluxe leather case (top-grain cowhide)
- PB-24 extra battery pack with charger adapter
- BH-1 belt hook



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Vice Director: Peter F. Matthews, WB6UIA, 3403 S. Walker Ave., San Pedro, CA 90731 (213-547-5816)

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Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (713-693-1181)

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Where Did All the Yesterdays Go?

In the good old daze we used to talk about the summer slump, that drop-off in League activity which seemed to take place during July and August. Membership activity was down, the clubs weren't active, it was too hot to operate, conditions were lousy, everyone was on vacation — we could think of a thousand reasons why the general level of activity in Amateur Radio (and ARRL) affairs was down during the summer.

True today? Sure doesn't seem that way! Around Newington we have been swamped with applications for term and Life Membership to beat the recently announced dues increase. There's a steady stream of summer visitors touring the office and, as usual, we've hired a summer tour guide to help with the flow of traffic. The Club and Training Department and the Production Department have been working overtime to put together a new "Tune in the World" package which will be ready for the fall classes sponsored by affiliated clubs and others. And speaking of clubs, there continues to be a healthy flow of applications for affiliation from all over the country. It used to be that during the summer we'd put out special solicitations trying to sell combinations of ARRL memberships and Handbooks, but this year we're probably going to be sold out of 1981 Handbooks before the 1982 edition is ready.

And, with regard to that 1982 edition, the Technical Department and its lab crew have been burning the midnight oil building new gear and editing. And once all that preparatory editorial work is done, the Production Department has to translate it into a finished manual. (Did you know that we set every bit of type for every ARRL publication right here on the premises? Just that task alone pretty well takes care of the so-called summer slump!)

In another part of the building, those who have been assigned responsibility for our new in-house computer are hard at work on that project, and by the time these pages reach you, we will have begun maintaining all of our membership records in-house. Well, actually, we always kept the paper records in-house, and did the maintenance in-house, but for a number of years after we gave up our nifty old Addressograph plates we used an excellent EDP service bureau in the Boston area. They kept the electronic files and generated the monthly labels, but now that'll all be done right here in Newington.

A walk through the Communications Department will reveal logs piled yea-deep from the June Field Day and other contests, and the DXCC department awash in applications. Remember what Okino-Torishima looked like at high tide? That's the DXCC desk right now!

Well, enough about the summer slump. We aren't complaining, because all of that activity indicates that things are in good shape. If we really had a slump, then there *would* be cause for worry.

Let's make sure there's no fall slump, either, 'cause there are all sorts of activities that we'd like to see you involved in. If you're organization-minded, we want you to participate in the fall elections for director and vice director, and in the elections for Section Communications Manager where there are going to be vacancies. We want you to participate in the advisory committees (call for nominations will be made next month). We want you to participate as Public Information Assistants. We want you to take an interest in the organizational side of Amateur Radio.

If you're technically inclined, why not make a contribution to Amateur Radio and the League by sharing your knowledge with your fellow members. The announcement on page 48 of this issue will be of special interest to you! We also welcome *QST* articles from the most simple Hint & Kink to the most esoteric whatchumacallit. Or, we have a corps of Technical Advisors, volunteers who provide technical expertise to back up the staff and who have the opportunity of representing the League in technical forums at meetings around the country.

On the operational side, we need official observers and intruder watchers and more participants in the emergency communications preparedness work by amateurs. And there are contests and awards and other challenges to help you improve your operating skills.

And, as we mentioned before, there are all of those nearly 2000 affiliated clubs out there, many of which will be giving classes for beginning amateurs this fall, another way in which you can share your knowledge with your fellow amateurs and your fellow members of the League.

The American Radio Relay League is a fascinating organization, if you'll just stand back and take an objective look. Founded by a mere handful of people in the 1914-era as an association for the relaying of Amateur Radio traffic, it has grown until it occupies a position of preeminence not only nationally but also internationally. Its voice is listened to with respect wherever it chooses to speak. It has withstood the vicissitudes of changing economies, changing politics, two World Wars and several generations of leaders. It has been modest (well, reasonably modest) in times of success and patient (well, reasonably patient) when recklessly attacked. It owes its strength and character to the thousands of dedicated volunteers and other members who have served it well and who have participated in its activities throughout the years.

We urge you to join us this fall in the work and the activities of the American Radio Relay League. — *Richard L. Baldwin, W1RU*

League Lines...

Clarification of the new U.S.-Gambia third-party traffic agreement. The prohibition of phone patch traffic is applicable only to the Gambian telephone system and is not intended to restrict or prohibit patching to telephone systems in the United States.

FCC has granted an extension of time in which to file comments on the proposed plain-language rules for the Amateur Service, Docket 80-729, until August 21. The League supports the concept of plain-language rules, but its comments will propose modifications necessary for the continued well-being of the Amateur Radio Service. If you have comments concerning the proposed plain-language rules, please contact ARRL Hq. promptly.

QEX: The ARRL Experimenters' Exchange, is a new League publication available by subscription. Further details are on page 48 of this issue.

Whether you're heavily into VDTs, disc drives and kilobauds, or don't know a RAM from a ROM, you'll want to keep up with "On Line," a new column that makes its debut in this issue, page 64. Scheduled to appear every other month, "On Line" will discuss the basics as well as new advances in the ever-expanding marriage between computers and Amateur Radio.

Recently there has been confusion about the use of club station call signs on repeaters. The Personal Radio Rules Branch of the FCC has assured ARRL Hq. that any licensed amateur station, including club stations, may be operated as a repeater provided the control operator possesses the requisite frequency privileges.

Last call for papers! The ARRL is sponsoring a conference on Amateur Radio Computer Networking at the National Bureau of Standards in Gaithersburg, Maryland, on October 16, 1981. Those wishing to present papers should send a letter of intent before August 15 to Paul L. Rinaldo, W4RI, President, AMRAD, 1524 Springvale Ave., McLean, VA 22101. Papers are sought on both technical and operational topics. For more information, see July 1981 QST, page 32.

Occasionally, ARRL Hq. receives a complaint from one of our members concerning a chain letter being circulated among radio amateurs. The U.S. Postal Service has this to say about such activities: "Chain letters which request money, books, bonds or other items of value, and promise a substantial return to the remitter, which is dependent upon the activities of those who follow in the chain, are regarded as nonmailable under the postal lottery and fraud laws, Title 18, U.S. Code, Sections 1302, 1341." If you should receive a chain letter, Hq. advises turning it over to your postmaster.

The FCC has decided to eliminate the First Class Radiotelephone Operator's License and allow present holders of all classes of commercial operator licenses or permits (with the exception of the Marine Radio Operator's Permit) to perform all operating and maintenance duties at broadcast stations. The Second Class Radiotelephone Operator's License will in the future be called the General Radiotelephone Operator's License. Applicants for this license will be required to complete the requirements embodied in the present Second Class License. Once the new procedure goes into effect there will not be any further issuance of the First or Second Class Radiotelephone Operator Licenses --only the General Radiotelephone Operator's License. Persons holding either the First or Second Class licenses will receive the General Radiotelephone Operator License upon renewal. FCC will announce when the General Radiotelephone Operator Licenses are ready to be issued.

League members and other interested persons are always welcome during regular business hours for tours of the ARRL Administrative Headquarters and the Maxim Memorial Station, W1AW. Visiting hours for both are Monday through Friday from 8 A.M. to 4:30 P.M. Large groups should make arrangements one week in advance. W1AW is open until 1 A.M. on weeknights and from 3:30 P.M. until 1 A.M. on Saturdays and Sundays. An FCC-licensed amateur may operate the station in between bulletin and code-practice sessions. All facilities will be closed Monday, September 7 (Labor Day); Thursday, September 17 (League Employees' Outing); Thursday, November 26 (Thanksgiving Day); and Friday, December 25 (Christmas).

Reproducible Quagi Antennas for 1296 MHz

Activity in the 23-centimeter band is booming! Here's a high-gain, 1296-MHz version of the quagi, a compact antenna you can build from readily available parts.

By Wayne Overbeck,* N6NB

The 1296-MHz band — 23 centimeters if you prefer — is bustling with activity. In many areas, there are more stations on 1296 MHz today than there were on 432 MHz only a few years ago. Two brands of ssb/cw transverters for 1296 MHz are now available off the shelf, and hundreds of these units have been sold. Meanwhile, commercial varactor triplers and receiving converters are also selling briskly. Many uhf enthusiasts, of course, wouldn't think of buying a "turn-key" system; they build their own, thank you.

Antennas for 1296 MHz can, however, present a dilemma. Helical and parabolic dish antennas work well there, as do various horn and collinear designs. But they can be bulky, offering relatively little gain for their size. Furthermore, even though most of these antennas are broadband types, they present enough construction, feed and impedance-matching difficulties to discourage some builders.

Yagis? Building an efficient Yagi for 1296 MHz is even more difficult. As recently as 1979, the leading 432/1296-MHz moonbounce newsletter dismissed Yagis as generally impractical at 1296 MHz. Yet, parasitic beam antennas do work at 1296 MHz, and they offer excellent gain in small packages. A wide-spaced, 10-element beam is only about *2 ft* (0.6 m) long on this band. One commercial manufacturer's 28-element loop-Yagi has become something of a standard of performance on 23 cm. Also, a 1296-MHz version of the respected F9FT Yagi is now available. These are excellent designs, but they do not lend themselves to amateur construction. Those lacking special uhf expertise and sophisticated test equipment have had trouble duplicating antennas of this sort. Some amateurs have wondered if the quagi antenna, which has become known for its simplicity, is suitable for 1296 MHz.

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The Quagi Antenna

Since the original article on the quagi was published in *QST*,[1] thousands have been built worldwide. The quagi is described in *The Radio Amateur's Handbook* and the *Antenna Handbook*[2] by Orr and Cowan. This design has been republished in amateur journals in such diverse countries as the Soviet Union, India and South Africa. A Japanese firm is now making quagis commercially.

The quagi (pronounced with a hard "g" so that it rhymes with Yagi) is a hybrid antenna combining some of the advantages of the cubical quad and the conventional Yagi. Perhaps its best attribute is ease of construction. The driven loop can be fed directly with 50-Ω coaxial cable without any impedance-matching device. Numerous vhf newcomers have built the quagi as their first homemade antenna for any frequency above 30 MHz.

The quagi has been used in vhf work from fm to moonbounce. German EME enthusiast Johann Bruinier, DL9KR, who has become known for his outstanding signal off the moon, has published the design of his quagi-based 432-MHz EME array.[3]

Because of its simplicity and good performance, the antenna would seem to be an ideal home-constructed one for 1296 MHz. However, the original article only presented dimensions for 144, 220 and 432 MHz. Some amateurs who tried to scale mathematically the original quagi design to 1296 MHz have experienced disappointing results.

Notes appear on page 15.

Table 1

Dimensions, 1296-MHz Cubical-Quad and Quagi Antennas

Note: All lengths are gross lengths. See text and photos for construction technique and recommended overlap at loop junctions. All loops are made of no. 18 AWG solid-covered copper bell wire. The Yagi-type directors are 1/16-in. brass brazing rod. See text for a discussion of director taper.

Feed: Direct with 52-ohm coaxial cable to UG-290 connector at driven element; run coax symmetrically to mast at rear of antenna.

Boom: 1/4-in.-thick Plexiglas, 30 in. long for 10-element quad or quagi and 48 in. long for 15-element quagi, 84 in. for 25-element quagi. Inches × 25.4 = mm

10-Element Quagi for 1296 MHz

Element	*Length (in.)*	*Construction*	*Element*	*Interelement Spacing (in.)*
Reflector	9.5625	(loop)	R-DE	2.375
Driven El.	9.25	(loop)	DE-D1	2.0
Director 1	3.91	(brass rod)	D1-D2	3.67
Director 2	3.88	(brass rod)	D2-D3	1.96
Director 3	3.86	(brass rod)	D3-D4	2.92
Director 4	3.83	(brass rod)	D4-D5	2.92
Director 5	3.80	(brass rod)	D5-D6	2.92
Director 6	3.78	(brass rod)	D6-D7	4.75
Director 7	3.75	(brass rod)	D7-D8	3.94
Director 8	3.72	(brass rod)		

15-Element Quagi for 1296 MHz

The first 10 elements are the same lengths (inches) as above, but the spacing from D6 to D7 is 4.0 in. here; D7 to D8 is also 4.0 in.

Director 9	3.70	D8-D9	3.75
Director 10	3.67	D9-D10	3.83
Director 11	3.64	D10-D11	3.06
Director 12	3.62	D11-D12	4.125
Director 13	3.59	D12-D13	4.58

25-Element Quagi for 1296 MHz

The first 15 elements use the same element lengths and spacings as the 15-element model. The additional directors are evenly spaced at 3.0-in. intervals and taper successively by 0.02 in. per element. Thus, D23 is 3.39 in.

10-Element Cubical Quad for 1296 MHz

Reflector	9.563	(loop)	R-DE	2.375
Driven El.	9.25	(loop)	DE-D1	2.0
Director 1	8.5	(loop)	D1-D2	3.94
Director 2	8.375	(loop)	D2-D3	2.94
Director 3	8.34	(loop)	D3-D4	3.625
Director 4	8.31	(loop)	D4-D5	2.875
Director 5	8.125	(loop)	D5-D6	2.625
Director 6	8.0	(loop)	D6-D7	2.5
Director 7	8.125	(loop)	D7-D8	3.25
Director 8	8.0	(loop)		

Thus, the author set out empirically to optimize the antenna for 1296.[4] The result was a family of quagi antennas offering excellent forward gain for their small size. As is true of their lower-frequency counterparts, these 1296-MHz quagis require neither exotic construction materials nor elaborate test equipment. A number of amateurs, including some new to the band, have already duplicated the antennas described here.

The photos (Figs. 1 to 4) show these quagis, which range from a 27-in. (686-mm) long, 10-element design to a 25-element array on a 7-ft (2.1-m) boom. Table 1 gives the dimensions for each design. As with parasitic antennas designed for other frequencies, a point of diminishing returns is evident here. The gain increases rapidly for the first several wavelengths of boom, but then additional gain becomes increasingly difficult to attain. The 10- and 15-element quagis are probably the best compromises between high gain and compactness. The gain of the little 10-element version is amazing for its size.

A Cubical Quad for 1296 MHz

This may not be the time to reopen the old quad-vs.-Yagi controversy, *but* the author also devoted considerable effort to designing a reproducible, homemade cubical quad (or loop-Yagi, if you wish) for 1296 MHz. The result was a 10-element quad design, an antenna virtually identical to the 10-element quagi in both boom length and measured gain. If you want to be able to say you're using a cubical quad on 1296 MHz, Table 1 includes the dimensions for one that works well.

Some years ago, a Danish scientist reported that the gain of an antenna varies only a little when loop-type directors are substituted for Yagi-type rods if the driven element is a quad *loop*.[5] He found that the rods made slightly better directors, but that the difference was less than 1 dB. My conclusion is much the same, although I eventually came up with a cubical-quad design that equalled the forward gain of a similar-size quagi at 1296 MHz.

To get the quad to perform that well, I had to depart somewhat from the typical quad design. In Table 1, you'll note that the 10-element quad uses director loops that are *tapered* in length. Many quad designers specify that all directors are to be uniform in length, but it seemed apparent during the antenna-range work for this article that more gain could be achieved by varying the director lengths. Note also that the directors do not taper uniformly from long to short. Rather, there were instances where variations in that pattern produce better gain. In particular, the seventh director is a little longer than the sixth one. Repeated experiments with a seventh director shorter than the sixth one failed to produce as much gain as was obtained when the seventh director was slightly longer.

What about a pure Yagi at 1296 MHz? There's no question that a dipole type of driven element can be made to work at that frequency. But getting high efficiency and a good impedance match presents a difficult challenge. Since the goal was to come up with easy-to-duplicate 1296-MHz antennas, I stuck to quads and quagis.

Construction Details

Just about everyone who has ever written a construction article for an Amateur Radio magazine has received at least one letter that begins, "I built your antenna (amplifier, keyer or whatever) just like you said in *QST* except . . ." The letter writer then says it doesn't work and asks for help in fixing it.

At 1296 MHz even slight variations in design or building materials may cause substantial changes in performance. The 1296-MHz antennas described here will work every time — but only if you use the same materials and build them exactly as described here. This is not to discourage experimentation. Innovation and experimentation are part of Amateur Radio. But if you want to modify these 1296-MHz antenna designs, you might consider building one antenna *exactly* as described here, so that you have a reference against which to compare your variations.

The quagis (and the cubical quad) are built on 1/4-in. (6-mm)-thick Plexiglas booms. The driven element and reflector (and also the directors in the case of the cubical quad) are made of insulated no. 18 AWG solid-copper bell wire, available at hardware and electrical supply stores. Other types and sizes of wire will work equally well, but the dimensions will vary with the wire diameter. Even removing the insulation usually necessitates changing the loop lengths.

Quad loops are approximately square (Figs. 2 and 5) although the shape is

relatively noncritical. However, the element lengths *are* critical. At 1296 MHz, variations of 1/16 in. (1.6 mm) may alter the performance measurably, and a 1/8-in. (3.2-mm) departure can cost several decibels of gain. The loop lengths given are *gross* lengths. Cut the wire to these lengths and then solder the two ends together. There is a 1/8-in. (32-mm) overlap where the two ends of the reflector (and director) loops are joined, as shown in the photographs.

The driven element is the most important of all. The no. 18 wire loop is soldered to a standard UG-290 chassis-mount BNC connector as shown in the photographs. This exact type of connector must be used to ensure uniformity in construction. Any substitution may alter the driven-element electrical length. One end of the 9.25-in. (235-mm) driven loop is pushed as far as it will go into the center pin and soldered. Then the loop is shaped and threaded through small holes drilled in the Plexiglas support. Finally, the other end is fed into one of the four mounting holes on the BNC connector and soldered. In most cases, the best VSWR is obtained if the end of the wire just passes through the hole so that it is flush with the opposite side of the connector.

If you have a Bird wattmeter, even one without an element calibrated for 1296 MHz, you can adjust the driven-element

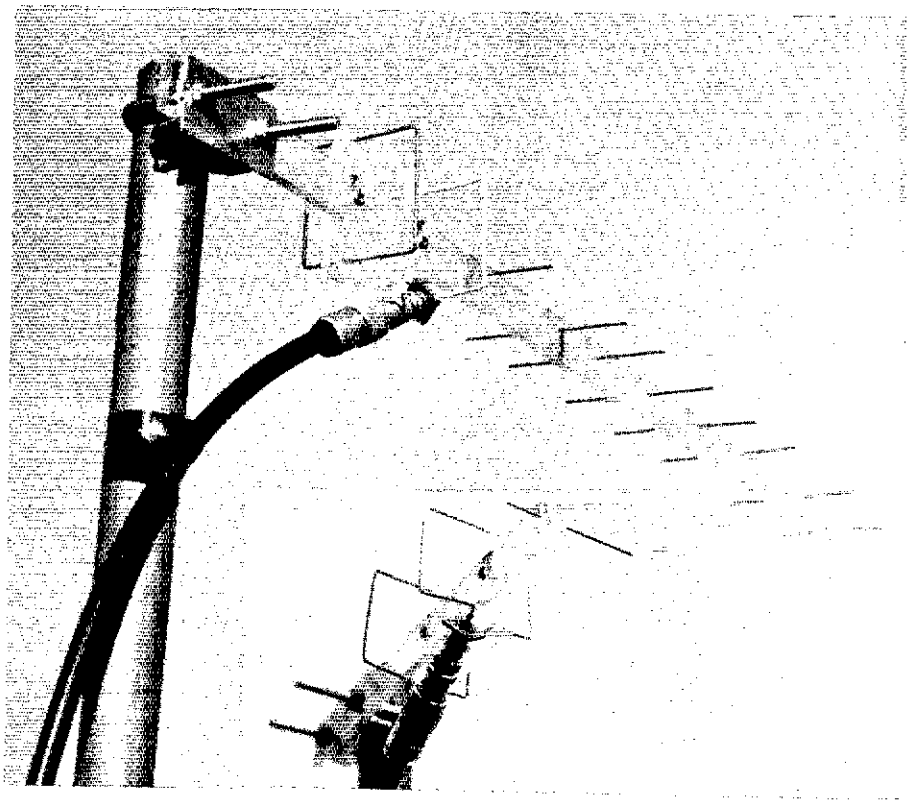


Fig. 1 — A closer view of the 10-element version of the 1296-MHz quagi shown in the lead photograph. It is mounted on a 30-in. (760-mm) Plexiglas boom with a 3- × 3-in. (76- × 76-mm) square of Plexiglas to support the driven element and reflector. Note how the driven element is attached to a standard UG-290 BNC connector. The elements are held in place with silicone sealing compound.

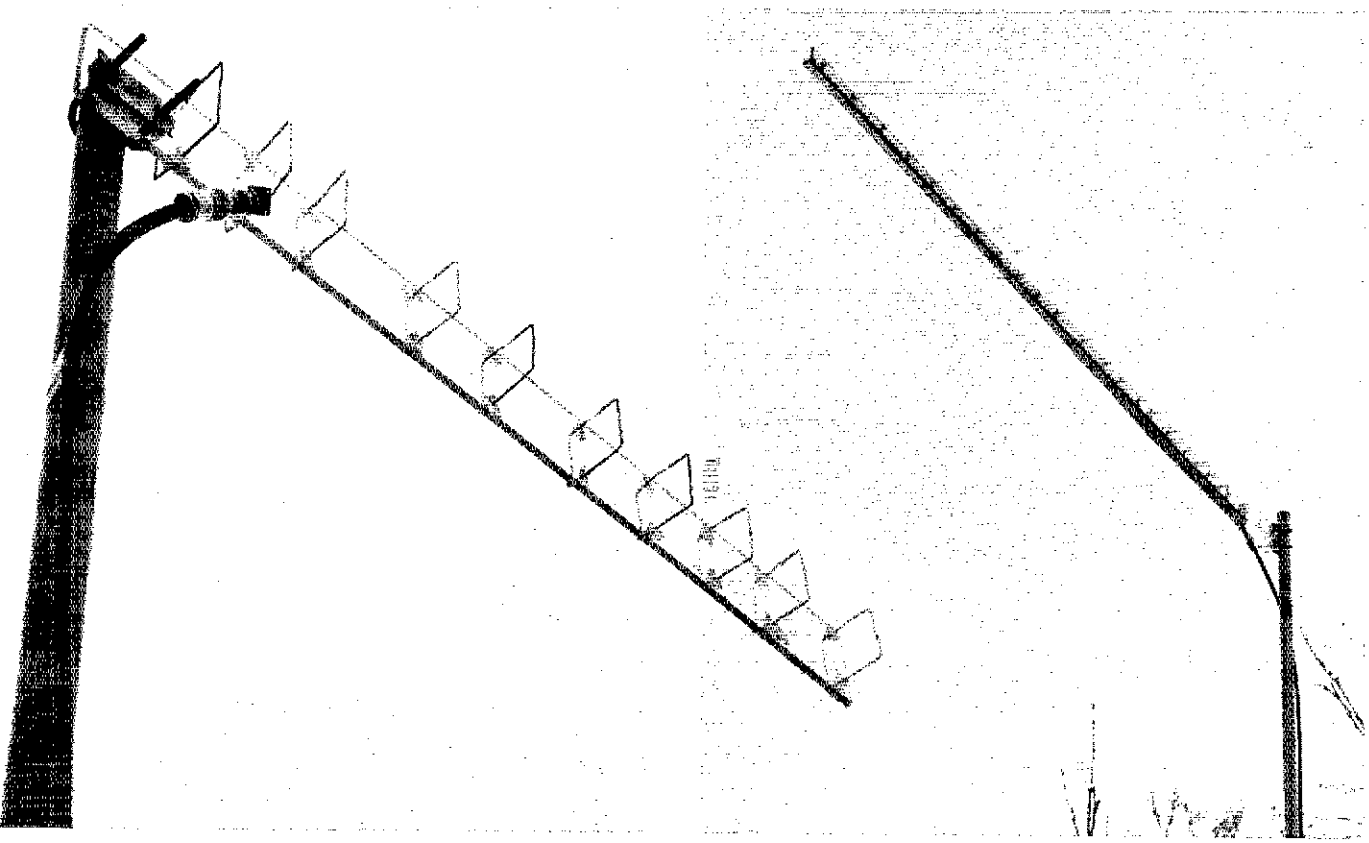


Fig. 2 — This 10-element cubical quad is virtually identical in performance to the 10-element quagi. A 3- × 30-in. (76- × 760-mm) sheet of Plexiglas supports the elements, which are offset slightly to allow room for the feed point on the driven element. All elements are made of insulated no. 18 AWG solid-copper wire.

Fig. 3 — The largest quagi tested on 1296 MHz. This 25-element model is built on two tapered 7-ft (2.1-m) lengths of Plexiglas that form a right angle for additional mechanical stability. In case you're thinking of building one like it for the 20-meter band instead of 23 centimeters, the boom length will be a mere 650 ft (198 meters)!

loop to resonance. First, build the complete antenna and mount it a few feet above the ground, pointing away from all obstructions. Attach a 2-ft (0.6-m) length of RG-8/U cable from the driven element to the wattmeter and provide some strain relief for the cable, perhaps by taping it securely to the supporting mast. Before soldering the driven loop into a mounting hole on the BNC connector, apply some power and adjust the end of the loop in and out of the mounting hole for minimum reflected power. After each adjustment, step away from the antenna to get an accurate reading. It should be possible to approach unity VSWR with 50-Ω coaxial cable. Even without making this adjustment, however, the VSWR will be close to unity if the wire is cut to the proper length and soldered to the connector as shown in the photographs.

In developing these quagi designs, I tried several other connector types, including the SMA. Measuring the difference in gain or VSWR between a driven element using an SMA and one with a less expensive BNC connector was impossible. A number of dealers who advertise in *QST* sell the UG-290 BNC connector, usually for about $2 each.

The quagi directors are made of 1/16-in. (1.6 mm) brass brazing rod, available at welding shops. Lengths of the directors are critical, but a ruler with 1/16-in. or 1-mm scale divisions is adequate for the job.

A good way to obtain the correct director lengths is to cut one piece of welding rod slightly less than 4 in. (102 mm) long, and then file it down to the specified length for the first director. This length should be 3.91 in. (99.3 mm), about halfway between the 3-7/8- and 3-15/16-in. marks on a ruler. Make as many additional directors as needed for the particular size quagi you are building, filing each director down until it is just perceptibly shorter than the previous one. You need not measure each director exactly, provided the first and last ones are the correct lengths, and the ones in between are tapered evenly from the longest to the shortest. If you have access to a bench grinder, the director-making process goes much faster, but the work can be done accurately with only a hand file.

The entire antenna is mounted in front of the supporting mast, since the mast may be nearly a quarter wavelength in diameter at 1296 MHz. The feed line runs directly away from the driven element, passing below the reflector on its way from the BNC connector to the mast.

A 3- × 30-in. (76- × 762-mm) sheet of Plexiglas is sufficient for either the 10-element quad or quagi. It may be cut to 1 in. (25.4 mm) or less where it supports the quagi directors. A 48-in. (1219-mm) length of Plexiglas will be required for the 15-element quagi, while the 25-element array is made by gluing two 7-foot (2.1-m) pieces of Plexiglas together at right angles (forming a T) for additional mechanical stability.

Other Observations

The idea of feeding the driven element of a cubical quad directly with coaxial cable troubles some amateurs: They feel a balun is absolutely essential. While a *well-designed* balun will reduce feed-line radiation and increase the antenna efficiency somewhat, the losses introduced by adding a balun may offset any increase in efficiency, even at frequencies much lower than 1296 MHz. Many builders are better off feeding a quad or quagi directly with coaxial cable, especially at uhf. If the feed line is routed to the antenna in a symmetrical fashion, there should be no problem of pattern skewing, nor should there be any measurable performance degradation because a balun isn't used.

Another question that is asked about the quagi is whether or not other materials can be used for a boom. At lower frequencies, bamboo and fiberglass have become popular as alternatives to the wooden booms specified in the original article. But at 1296 MHz, Plexiglas seems to be one of the few readily available and inexpensive materials that work well. Some other insulators are not very effective at 1296 MHz. For instance, I mounted one 1296-MHz quagi on a fiberglass boom (a commercial spreader for a 20-meter quad) and measured an immediate 2.5-dB performance degradation. A metallic boom will work, but only if the director lengths are adjusted appropriately.

Some readers may want to phase multiple bays of 1296-MHz quagis for additional gain. For the 15-element quagi, the proper stacking distance is 20 to 24 in. (508 to 610 mm). However, making a phasing harness that will perform well at 1296 MHz may be difficult. The velocity factors of coaxial cables can vary slightly from the nominal values, but even small variations can cause serious problems on a frequency where 2 in. (51 mm) amount to more than a quarter wavelength for most cables. The best advice for those who lack an accurate means for determining electrical lengths of cables at 1296 MHz is to use identical lengths of 50-Ω cable (cut from the same roll) to feed each bay. Then bring each of the four feed lines together at a power divider similar to the ones made by KLM Electronics. At this writing, KLM is not marketing a 1296-MHz power divider, but the RSGB *VHF/UHF Manual* describes how to build one.°

Another very simple matching network

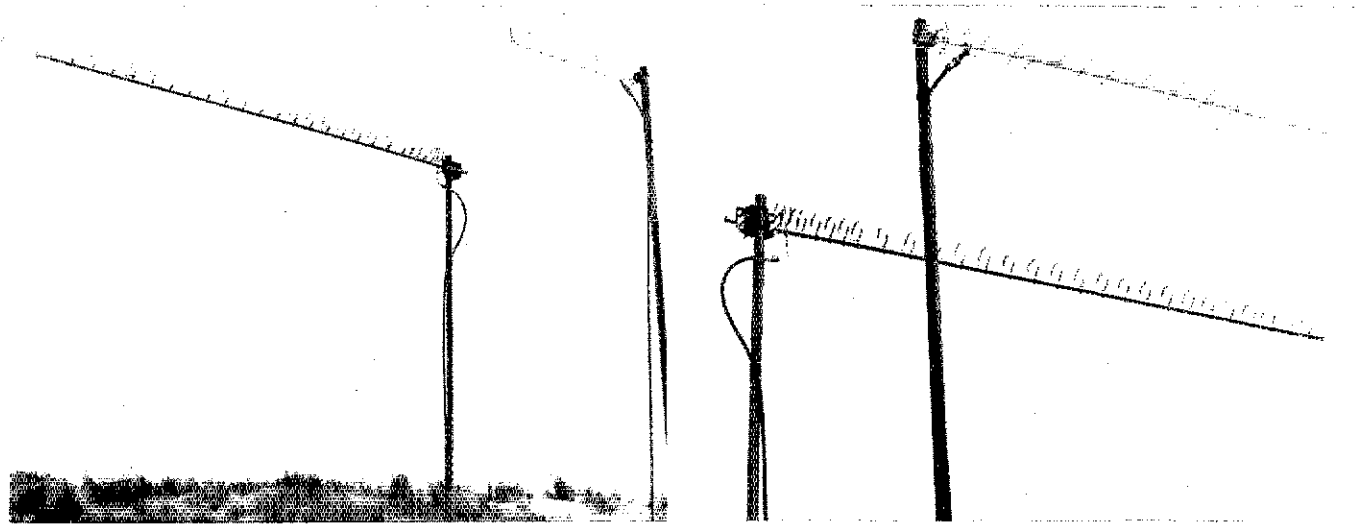


Fig. 4 — Returning to the seaside antenna range where the 432-MHz quagi designs were tested several years ago, the author used this location to measure the performance of a 15-element quagi and a 10-element cubical quad against a commercially made 28-element loop-Yagi. Although much smaller, both approached the gain of the 8-ft (2.4-m) long loop-Yagi. With a 4-ft (1.2-m) boom, the 15-element quagi is an excellent compromise between gain and physical size.

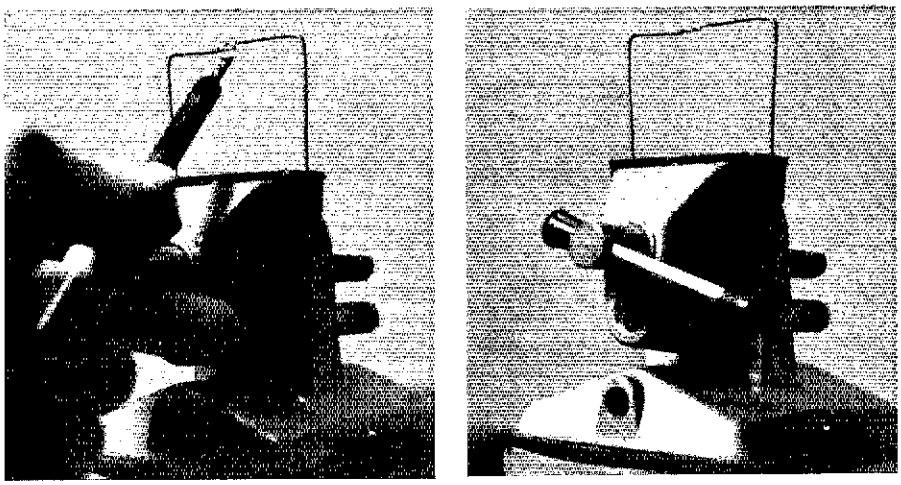


Fig. 5 — These photos show the construction method used for the 1296-MHz quad type parasitic elements. The two ends of the no. 18 AWG copper wire are brought together with an overlap of 1/8 in. (3 mm) and soldered.

for 1296 MHz, this one made from nothing more complicated than three UG-107A/U coaxial T connectors, was described some years ago by Reed Fisher.[7] Feeding his antenna with identical lengths of 50-Ω cable, Fisher simply brought each pair of feed lines to a UG-107 and then joined the two UG-107s with a third one. This works, because paralleling each pair of cables drops the impedance to 25 Ω, but each half of a UG-107 is about one-quarter wavelength at 1296 MHz. Thus, the center UG-107 acts as two quarter-wave transformers, raising the impedance on each side to 100 Ω. That value is again divided by two at the center point, getting the system back to 50 Ω. This is probably the best way to phase four bays if you have access to UG-107A/U connectors.

Performance and Conclusions

In both forward gain and directivity, typical 1296-MHz quagis, built and described here, come very close to the performance level of the 144-, 220- and 432-MHz quagi designs.

The author used a commercially made 28-element loop-Yagi as a reference in developing these 1296-MHz antennas. Gain for the 25-element quagi is similar to that of the commercially made loop-Yagi, while the smaller 15-element quagi is only about 1.5 dB down from the loop-Yagi. The 10-element quagi is another dB down, as is the 10-element cubical quad. In terms of gain per ounce, the 10-element, 1296-MHz quagi is in a class by itself. The TV type of U bolt that attaches the antenna to a mast weighs almost as much as the entire antenna.

How much gain over a dipole do these antennas develop? The manufacturer of the 28-element loop-Yagi rates the gain at 20 dB over an isotropic source, or 17.8 dB over a dipole. At the various conference sessions on vhf antenna measuring held in recent years, these loop-Yagis and most other 1296-MHz antennas have usually exhibited something less than their theoretical gain figures. Loop-Yagis typically are measured at 14- or 15-dB gain over a dipole. Using that number as a reference, the long quagi also delivers 14- or 15-dB gain over a dipole, while the smaller 15-element version offers about 13 dBd of gain. The 10-element quagi or quad will deliver about 12 dBd of gain.[8] When you compare these little quads and quagis with helical, horn and dish antennas big enough to provide that kind of gain at 1296 MHz, the difference in size is remarkable.

It hasn't been long since the adage among vhf people was, "Yagis don't work at 432 MHz." Maybe conventional Yagis are a little tricky at uhf, but Yagis that use quad loops, log-periodic cells and folded dipoles as driven elements have revolutionized our thinking about 432-MHz antennas in the last few years. Now the same sort of rethinking is going on at 1296 MHz. The day when you had to find a way to support (and aim) a 6-ft (1.8-m) dish to get decent gain at 1296 MHz is history. QST

Notes

[1] W. E. Overbeck, "The VHF Quagi," *QST*, April 1977, pp. 11-14.
[2] W. Orr and S. Cowan, *The Radio Amateur Antenna Handbook* (Wilton, CT: Radio Publications, 1978).
[3] *432 and Above EME News*, Jan. 1980.
[4] For a description of the antenna-range techniques used to design these antennas, see Overbeck, "Measuring Antenna Gain with Amateur Methods," *QST*, October 1977, p. 11.
[5] J. Appel-Hansen, "The Loop Antenna with Director Arrays of Loops and Rods," *IEEE Transactions on Antennas and Propagation*, July 1972, p. 516.
[6] D. S. Evans and G. R. Jessop, *VHF/UHF Manual*, (London: Radio Society of Great Britain, 1976), p. 8.49.
[7] R. E. Fisher, "A Successful 1296-MHz Yagi," Ham Radio, May 1972.
[8] After this was written, some of these antennas were tested at the 1981 West Coast UHF Conference in Sunnyvale, California. The 15-element 1296-MHz quagi was measured at 14.0 dB gain over a dipole. The 10-element model was measured at 13.5 dBd gain.

Strays

PICTURES FROM SATURN

☐ Voyager II, an interplanetary spacecraft, will make its closest approach to Saturn on August 25, 1981. To celebrate this event, the Jet Propulsion Laboratory ARC station (W6VIO), in Pasadena, California, will re-form and transmit, from August 15 through 30, SSTV images of Saturn and its rings and satellites as the pictures are received from Voyager II. The SSTV operation will be on or about 14,235, 21,340 or 28,680 kHz as conditions allow. Ssb and cw on 40-10 meters, ssb and fm on 2 meters, and fm on 220 MHz will also be used. Most of the activity will be conducted each day between 1830 and 2030 UTC. A color photo QSL will be available for an s.a.s.e. to W6VIO, 4800 Oak Grove Dr., Pasadena, CA 91103. DX stations QSL via ARRL bureau. — *Dr. Norman L. Chalfin, K6PGX*

MISSING SLIDE SHOW

☐ The ARRL slide show, *Arecibo* (stock number SC-16), was lost at the Dayton Hamvention. Anyone with information of its whereabouts please contact Joyce Martin, ARRL Film Librarian, tel. 203-666-1541, ext. 219.

Richard Ward, W6DZH, of Van Nuys, California, contemplates the view from about 3000 feet above the Mojave Desert. Ward had just completed what is thought to be the first successful transcontinental, direct-dial telephone call from a hot air balloon. Using his 2-meter HT, the call was made from Southern California to East Windsor, Connecticut, on March 28, 1981. *(photo by Howard Stapleton)*

Let's Measure Beam-Antenna Gain with a Reference Dipole

A reference dipole, receiver, attenuator and signal source — that's all we need for this simple method of gain measurement!

By Gerd Schrick,* WB8IFM

What's the best and most straightforward method of measuring the gain of a specified antenna? Directly substitute the antenna under test with a reference dipole? Most antenna designers say "yes." While this can be done with relative ease where small vhf/uhf beams are concerned, the method is troublesome and awkward when using hf antennas. Placing the reference antenna on a separate support side by side[1] with the antenna to be measured is perhaps the next best thing to do. Such a support is not often available, however, and if it is, it may not be of the same height as the test antenna. In any case, each antenna "sees" a different foreground. As we will learn, the interaction of shortwave antennas with the ground is important and has to be accounted for!

Let's go one step further and mount the reference antenna on the same support (mast or tower) as the test antenna. This procedure can be duplicated easily by the average one-tower ham. Here we have, in essence, the same problems encountered with the side-by-side method. If the reference dipole is mounted lower than the test antenna, and though the same ground is in front of both antennas, the higher antenna sees more ground — and at a distance farther out — than seen by the lower antenna (Fig. 1). By stacking the two antennas vertically, a rather strong influence is exerted by the beam on the dipole, and a proportionally smaller influence is exerted by the dipole on the beam. Practical measurements have shown that even when the respective capture areas were considered and the antennas spaced so that there would be no overlap, the influence of the beam on the dipole was still on the order of 1 dB. Simultaneously, because of the larger difference in height above ground, the size and surface of the reflecting areas typically would introduce 1- to 2-dB of error into the measurements. Being aware of these facts greatly facilitates the understanding of the whole antenna-testing problem.

What To Do

There is a way out of this dilemma: One can space the two antennas relatively close (1/4 to 1/2 λ apart), thus bringing the reflecting surfaces closer in agreement. To eliminate the large influence of the beam on the dipole, we can rotate the beam out of the way of the dipole (90° to the dipole). With the positioning problem solved, we still have to account for the difference in height above ground.

Consider how the gain measurements are carried out. A source a few miles away will provide a stable, horizontally polarized signal, and if a beam antenna is used, less than 1 W of cw power is needed to provide a strong signal for reception. No other parameters, such as the height of the source antenna, need be observed. This method represents a measurement at the

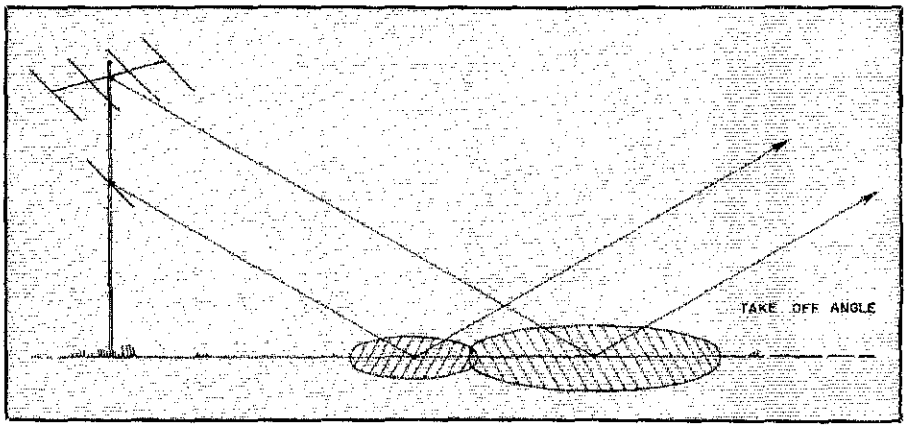


Fig. 1 — Ground-reflection zones for antennas at different heights. These zones are farther away at low angles of radiation.

[1]Notes appear on page 17.

*4741 Harlou Dr., Dayton, OH 45432

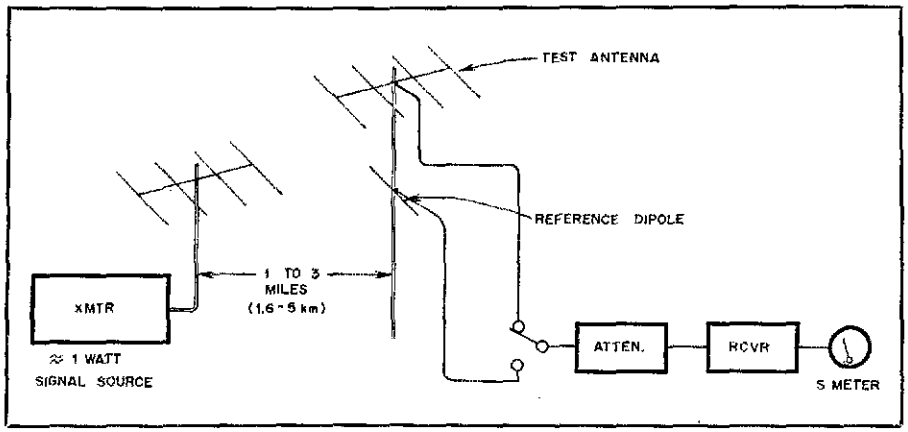


Fig. 2 — Test-equipment setup for measuring beam-antenna gain, as described in the text.

"grazing angle," which is just over zero degrees. Because of the law of reflection, true measurements of all pertinent antenna parameters can be made — gain, front-to-back ratio and horizontal-pattern plotting. Moreover, at this grazing angle a simple relationship exists[2] for the height factor of the antennas, namely

$$\text{Height factor} = \left(\frac{h_{beam}}{h_{dipole}}\right)^2$$

or in decibels,

$$20 \log \frac{h_{beam}}{h_{dipole}}$$

Let's refer to Fig. 2 and examine a hypothetical case. Here we have a 70-ft (21-m) tower with the rotary beam antenna on top and a reference dipole mounted at about 50 ft (15 m), with the broad side directed toward the signal source. Both antennas are resonated and matched (SWR less than 2:1), connected with approximately the same type and length of cable (to ensure equal losses) and can be switched alternately to an S-meter-equipped receiver preceded by a 1-dB step attenuator. The attenuator can be built[3] or purchased. Our signal source is located about 1.5 miles (2.4 km) away and radiates a 1-W cw signal from a beam antenna pointed in our direction. The test antenna is pointed toward the signal source, and the attenuator adjusted to produce a convenient reading on the receiver S meter, say S6. Then the receiver is switched to the dipole and the test antenna is rotated 90°. A signal-strength change on the order of a few decibels will be noticed. The attenuator is adjusted to produce the same S-meter reading as was obtained with the test antenna pointed toward the source. We obtain a preliminary gain figure by calculating the difference between the two attenuation figures. Now the height factor must be subtracted. In our case this is

$$\text{Height factor (dB)} = 20 \log \frac{70}{50}$$

$$= 2.9 \text{ dB}$$

Assuming we measured a 10-dB difference in attenuator settings, the actual gain of the test antenna over a dipole would be approximately 7 dB.

This is a relatively simple measurement procedure: Once everything is in place, it should not take much longer than a few minutes to complete. It is then possible for us to measure the antenna gain at various frequencies across a particular band of frequencies. Naturally, one should perform these measurements without any interference to or from other signals. The best time is when the band is dead.

Practical Application

I applied this method with good results when checking and improving a commercial 5 element, 15 meter beam and a home-built 4 element, 10 meter beam. It was helpful to know the gain of the homemade antenna at different frequencies. After two alterations, mainly adjusting element lengths, performance of the antenna had improved noticeably. (Readers might be interested in a series of articles that will be quite helpful in understanding Yagi antenna design.[4]) I'd like to acknowledge the help of Bruce Lundy, KA8EDE; Ralph Study, WA8IGB; and Jack Bender, K8TUY, in making the measurements during this study. QST

Notes

[1]W. E. Overbeck, "Quads vs. Yagis Revisited," *Ham Radio*, May 1979, pp. 12-21.
[2]G. H. Schrick, "Calculating Gain vs. Height of DX Antennas," *Ham Radio*, Nov. 1973, pp. 54-55.
[3]*The Radio Amateur's Handbook*, 58th ed. (Newington: American Radio Relay League, 1981), p. 16-38. Resistor data from *QST*, Nov. 1967, p. 52.
[Editor's Note: The resistor data may also be obtained from the *ARRL Electronics Data Book*, p. 32.]
[4]J. L. Lawson, "Yagi Antenna Design," *Ham Radio*, May, June, July and Dec. 1980.

Strays

TA PROFILES

☐ We appreciate the services of our fast-scan TV (ATV) expert, ARRL Technical Advisor Tom O'Hara, W6ORG. First licensed in 1957, Tom got on ATV in 1960 with a converted APS-13 transmitter. Since that time he has authored many articles on ATV and uhf for ARRL technical publications, *QST* and various journals. As a result, Tom received numerous requests for pc boards and assembled modules. After trying to supply the orders on a part-time basis, he decided to resign as director of engineering for the Vega division of CETEC Corporation to open his own business, P.C. Electronics.

Tom enjoys all modes of Amateur Radio including RTTY, Air Force MARS, RACES, civil defense and hf ssb phone patching. However, ATV has remained the mode of his primary activity and interest. Tom has also put ATV to work in public service: He built a solid-state ATV transmitter used in a helicopter at the 1968 Tournament of Roses Parade, equipped two boats with color ATV to coordinate the Congressional Cup yacht races and worked on equipment that received Voyager I Flyby data. His future plans are to help coordinate the sailing events for the 1984 Olympics.

Tom resides in Arcadia, California. He earned a BS degree in business management after completing courses in mathematics and electronics. He holds a First Class Radio Telephone license with a Radar endorsement. Leisure-time activities are shared with his wife, MaryAnn, WB6YSS, and family, who all enjoy Enduro motorcycle races in the Mojave Desert, plus skiing and snorkeling. Tom has a commercial pilot's license and takes ATV along while flying! — *Marian Anderson, WB1FSB*

TA Tom, W6ORG, at the workbench, tuning up an ATV exciter.

The "Ugly Weekender"

Winter in Oregon brings rain showers and cool temperatures — a fine time to build ham gear! A QRP rig is a good choice for a rainy-weekend project, at any time of year.

By Roger Hayward,* KA7EXM, and Wes Hayward,* W7ZOI

There are many obstacles for the builder in spite of the simplicity of a small QRP transmitter. Some published designs are less than optimum, having poor keying and chirps, perhaps a result of oversimplification. Other designs are mechanically complex, and parts procurement is an ever-present problem.

Simple transmitters often use crystal control, but today this is somewhat impractical, owing to the high cost of crystals: A VFO can be built for the price of but one or two crystals. The largest obstacle to some builders, however, is the circuit-board layout. The use of circuit boards has become so popular over the last decade that many amateurs are afraid to attempt a project that is not accompanied by a board layout or referenced to a source where an etched board may be purchased. This is unfortunate!

An Alternative

Numerous methods may be used in the construction of electronic equipment. The assumption that a design might function better if built on an etched and drilled circuit board is false.

The purpose of this article is to present a simple, good-performance QRP transmitter design, and to illustrate some "ugly" construction methods that may be used for whatever the builder might want to assemble. These methods are especially attractive for weekend projects that are to be completed while the weather is similarly ugly!

A virtue of "ugly" construction is great flexibility. The builder may use the parts on hand, something that is often difficult to do with projects utilizing etched boards. The circuit may be changed with ease to facilitate experimentation, as was done with the transmitter described here. The design can be duplicated easily. Speed is the greatest virtue of "ugly" construction. This transmitter was designed and built in two winter afternoons during the KA7EXM Christmas vacation from high school. Contacts were made before the end of that period. Estimated construction time was less than half that required for projects using boards that had been etched and drilled.

Overall Design

The transmitter, shown in Figs. 1 and 2, operates in the 7-MHz cw band. VFO control is utilized for operating flexibility and economy. The VFO is well buffered, then routed to a second enclosure containing a keyed driver and an output amplifier. Shaped keying is used to provide a click-free signal. The output power is 1.5 watts, low enough to add sport to the operation but high enough to be practical. Efficiency was considered important for battery conservation, as the authors often take their rigs into the mountains on backpacking or snowshoe trips (weather permitting). Finally, electronic transmit-receive switching is employed. This allows for near-QSK operation; it's also less expensive than using a relay. Slight modifications will allow the transmitter to be converted to a direct-conversion transceiver.

*7700 SW Danielle Ave., Beaverton, OR 97005

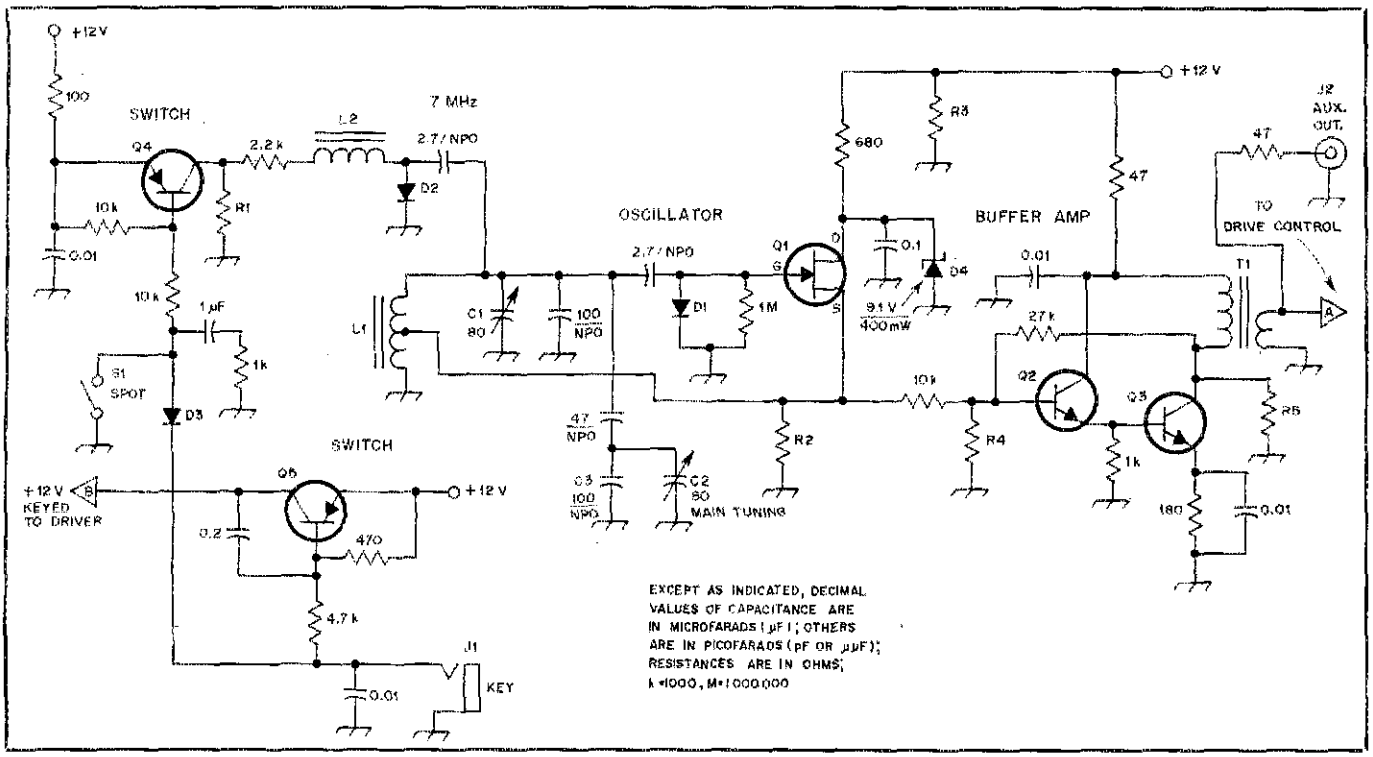


Fig. 1 — Schematic diagram of the VFO and control circuits for the QRP transmitter. Fixed-value capacitors are disc ceramic unless specified otherwise. Resistors are 10% tolerance composition.

C1, C2 — Miniature air variable, 75 pF max.
D1, D2, D3 — Silicon switching diode, 1N914, 1N4152 or equiv.
D4 — Zener diode, 1N937 or equiv.
J1 — Phone jack.
J2 — Phono jack or jack of builder's choice.
L1 — Toroidal inductor. 25 turns no. 22 enam. wire on Amidon T50-6 powdered-iron toroid core.
L2 — Toroidal inductor. 20 turns no. 26 enam. wire on Amidon ferrite toroid core, FT-37-43.
Q1 — JFET, 2N4416, MPF102, TIS88 or equiv. See text.
Q2, Q3 — General-purpose npn transistor, such as 2N2222 and 2N3904.
Q4, Q5 — General-purpose pnp transistor, such as 2N2907 and 2N3906.
R1-R5, incl. — Resistors as insulating tie points (see text).
T1 — Broadband ferrite toroidal transformer. Collector winding has 20 turns no. 28 enam. wire on Amidon FT37-43 toroid. J2 winding has 5 turns no. 28 enam. wire over primary winding.

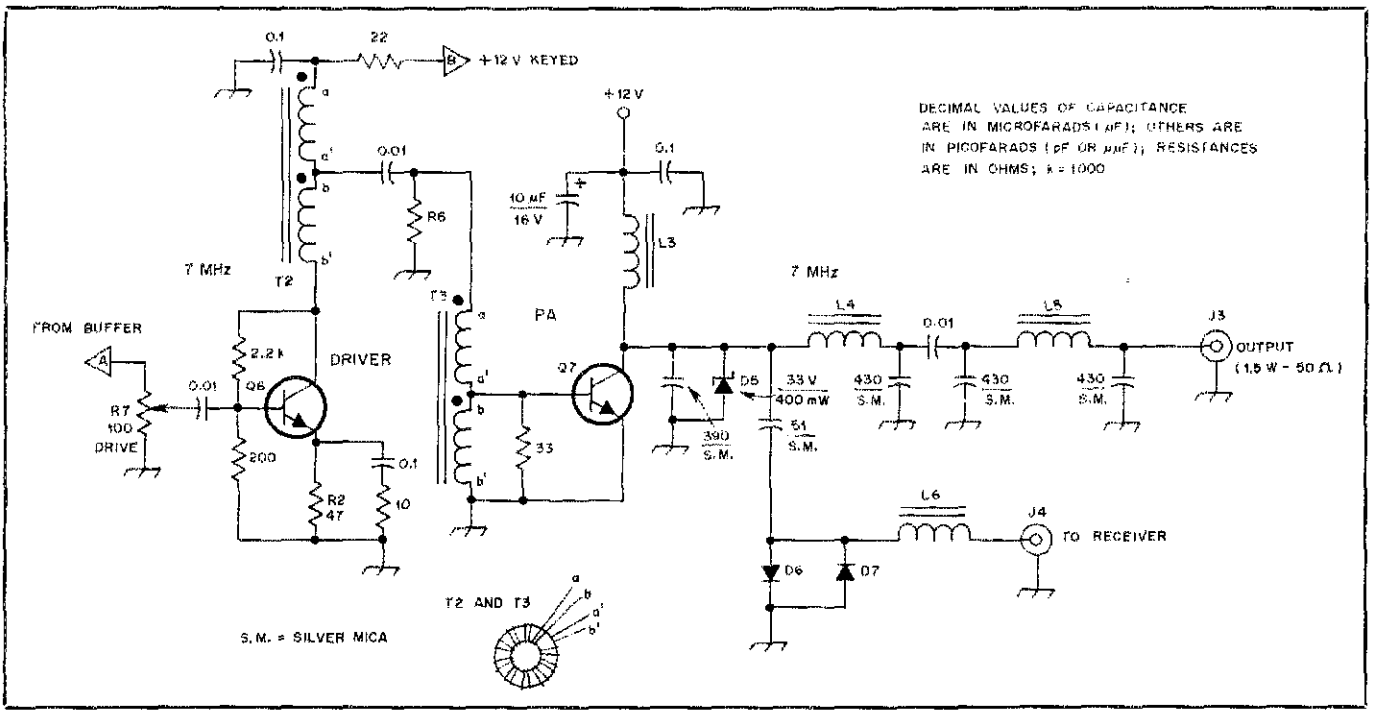


Fig. 2 — Schematic diagram of the driver and power-amplifier portion of the QRP transmitter. Fixed-value capacitors are disc ceramic unless noted otherwise. Polarized capacitors are electrolytic or tantalum. Fixed-value resistors are 10%, 1/2-watt composition.

D5 — Zener diode, 1N973B or equiv.
D6, D7 — Silicon switching diode, 1N914, 1N4152 or equiv.
J3, J4 — Phono jack or connector of builder's choice.
L3 — Collector rf choke. 35 turns no. 22 enam. on Amidon T68-2 toroid.
L4, L5 — 16 turns no. 22 enam. on Amidon T50-6 toroid.
L6 — 45 turns no. 26 enam. wire on Amidon T50-2 toroid.
Q6 — Npn transistor, 2N2222, 2N3904 or equiv.
Q7 — Rf power transistor, 2N3553, 2N3866 or equiv. Use small heat sink.
T2, T3 — Transmission-line broadband transformer, 10 bifilar-wound turns no. 28 enam. wire on Amidon FT37-43 ferrite toroid core.

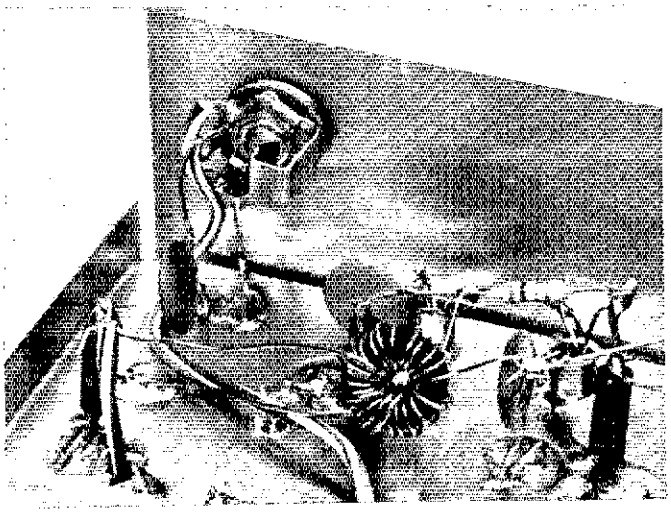


Fig. 3 — Close-up view of the assembly technique discussed in this article. Components are soldered to the circuit-board material and used as tie points.

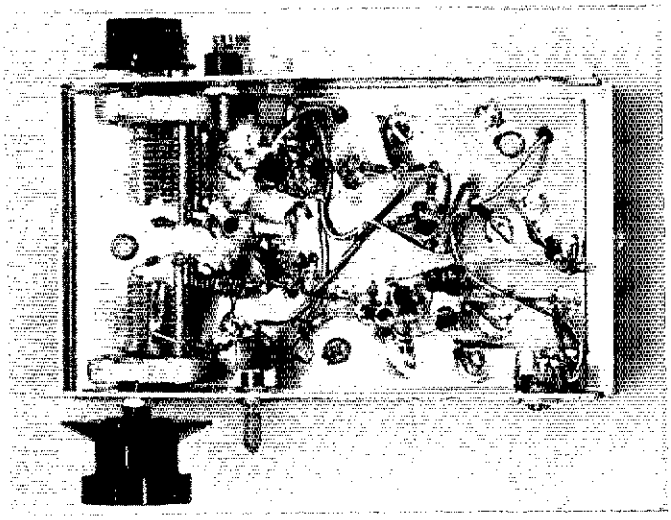


Fig. 4 — Interior of the VFO portion of the transmitter. The variable capacitors are shown at left.

This transmitter is based largely on a transceiver designed and built (with "ugly" methods) by a Field Day partner, Roy Lewallen, W7EL. The reader should review Roy's article for design details.[1] The writers mention those places where they have departed from the W7EL circuit. This transmitter is not as compact as Roy's is, but then few are!

Circuit Details and Construction

The transmitter is built by means of point-to-point wiring (Fig. 3). The foundation is a pair of small aluminum boxes, LMB type 139, 1-1/2 × 3 × 5-1/2 inches (38 × 76 × 140 mm). The boxes are bolted together, each containing a scrap of copper-clad circuit-board material. Bolted directly to the aluminum boxes, the boards serve as a low-impedance ground for all of the circuitry: They contain no etched patterns.

Examination of the circuit shows numerous components attached to ground. These serve their desired circuit function and provide mechanical support for the other components that are attached to the ungrounded ends (additional tie points are sometimes required). High-value resistors serve this function. The value is not critical if it is high enough not to disturb circuit operation. We used 1.1-MΩ, 1/2-watt parts. Any value from 220-kΩ upward (1/2 or 1/4 watt) will function well. The resistors are shown for reference in the schematic diagrams as R1-R7, inclusive. They have no bearing on circuit operation, but provide the needed mechanical support. Some builders may wish to insert resistors as tie points at other places in the circuit. Tuning is provided by a pair of 80-pF air variables from the authors' junk box. C2 is the main-tuning control, and C1 is a coarse band-set adjustment. C2 spans about 80 kHz with the components shown (see Fig. 4).

The FET type is not especially critical at Q1. However, reports from others indicate that the oscillator output may be low when the popular MPF102 is used: A 2N4416 is preferred. The TIS-88, essentially a plastic version of the 2N4416, is used in this transmitter.

All fixed-value capacitors in the VFO are NP0 ceramic types, chosen for optimum stability. Silver-mica capacitors should be avoided. Polystyrene capacitors would probably be suitable, but they may degrade the stability.

Most VFO drift occurs when the power is applied initially. This warm-up drift is minimized by allowing the VFO to operate continuously. The frequency is shifted downward by paralleling the oscillator tuned circuit with an additional 2.7-pF capacitor during key-down periods. This is added to the circuit by D2, a diode switch that is activated by Q4, a transistor switch attached to the key line. The timing components associated with Q4 force the oscillator frequency to be constant between characters, but to shift upward by about 25 kHz during longer key-up periods.

The VFO output is buffered with a two-transistor feedback amplifier, Q2 and Q3. This circuit provides an output of 10 to 15 mW, which is more than enough to drive the following stage. The reverse isolation is excellent. This circuit is a refinement of the first one by W7EL, and was published in a later *QST* "Feedback."[2]

The transistor type is not critical: 2N2222As or 2N3904s will work well at Q2, Q3 and Q6. The builder should be careful about transistors purchased at local electronics stores. Often devices sold as a "2N2222A" do not meet actual 2N2222A specifications.

The keying transistor, Q5, is also contained on the VFO board. The capacitor between collector and base forces an integrator action that ensures clean keying.

Construction of the VFO section is noncritical. Builders are often advised to keep all leads as short as possible. This is generally an exaggeration, especially for hf equipment. Some leads must be short, while others may be relatively long with no harm. Specifically, the leads on bypass capacitors should be short.

Consider the buffer amplifier, a circuit that has two bypass capacitors. One decouples the positive supply from the circuit. This capacitor should have a short lead to the ground foil. The other end should be connected directly to one end of T1 and to the collector of Q2. Similarly, the emitter bypass on Q3 needs to have reasonably short leads. Other leads may be longer, with no ill effects.

The output stages are shown in Fig. 2. This part of the circuit is built in the second box. The isolation aids in preserving VFO stability and preventing variations in output loading from shifting the oscillator frequency. Holes for leads (between sections) are drilled through the two boxes and the adjacent ground foil circuit boards. A bare wire is passed through the hole where the buffer output connects to R1, and is soldered to both ground foils. An insulated wire passes through the same hole, from T1 directly to R1.

The drive control, R7, is a necessary part of the circuit. Adjustment is described later. The value is not critical, with 100 to 1000 ohms being suitable.

The driver stage is a departure from the W7EL design: The original circuit was tuned. There is, however, no need for selectivity at this point, so a broadband design was adopted. The original circuit had a tendency toward instability (self-

[1]Notes appear on page 21.

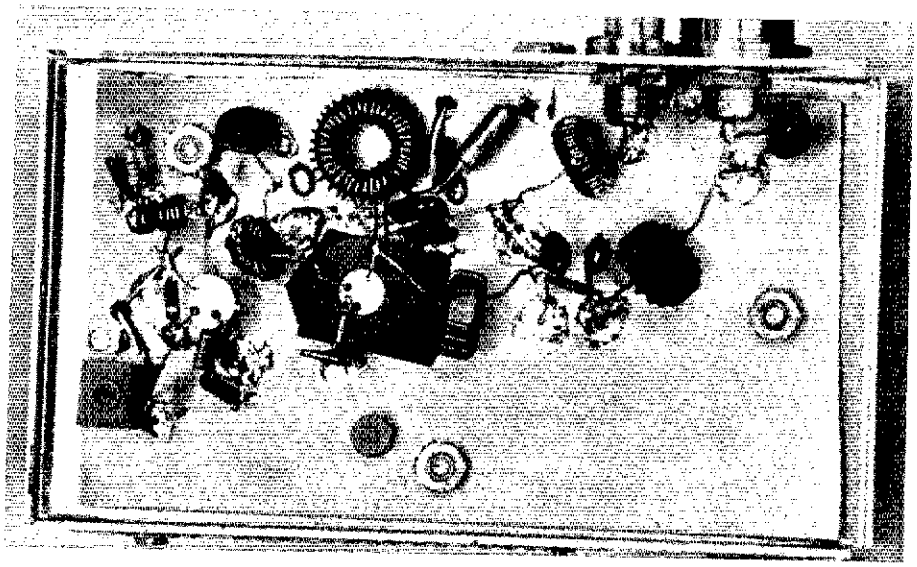


Fig. 5 — Photograph of the driver and PA assembly. Drive control R1 is visible at the lower left.

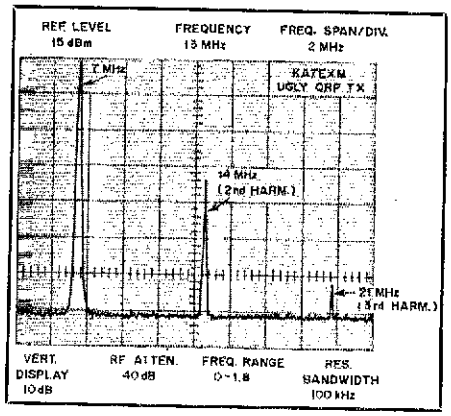


Fig. 6 — Spectral representation of the transmitter output energy. Worst-case harmonic data is presented with an operating voltage of 14. This presentation was made while using a Tektronix 492P analyzer, 4052 computer and 4662 plotter. The authors thank Dave Green, KA7IYT, for his assistance in doing the spectrum analysis.

oscillation). This is eliminated by using an amplifier with negative shunt feedback

amazed if it did. This transmitter was built and tested in a sequential manner, [illegible]

with stations up and down the West Coast [illegible]

Experience 10-Meter FM Operation!

Like to build and modify equipment? Here is an inexpensive project that will give hours of building fun — and put a CB radio to good use, too!

By Bob Heil,* K9EID

Remember the "good old days"? Many operators built their own equipment, or at least modified surplus rigs. I think operators who "paid their dues" were more responsible on the air than some of today's "appliance" operators are. Notes were exchanged on modifications and improvements. Things just seemed more congenial. On the other hand, modern-day technology allows the amateur to pick up a miniature hand-held unit and communicate with noise-free, full-quieting fm. Which is better?

10-meter FM: A Different Experience

Perhaps neither is better, but 10-meter fm operation now has the best of both worlds. Most operators use equipment originally designed for other bands and/or other modes. Much of the casual talk relates to modifications and improvements. Most of the people on this band have "paid their dues" with their equipment. I think respect for the other fellow runs higher here than on most of the other bands.

I recently worked LA9SC; both stations were portable with less than 2 watts of power into "rubber duck" antennas. How could we work across thousands of miles with so little power? We were using 2-meter hand-held units to access 10-meter fm remote bases. It is this melding of modern technology with the "home-construction" philosophy that seems to make 10-meter fm what it is today.

History

Ten-meter fm is not a new mode; amateurs were experimenting with this mode and band in the late 1940s.[1] Why does it seem so new? A few hardy souls have been using equipment converted from the business "low band" since the early days. This is similar to the start of the 2-meter fm boom. Wide availability of surplus commercial equipment, however, did not popularize 10-meter fm as it did 2-meter fm.

The CB boom came. Digital synthesis rapidly became the standard frequency-generation scheme for CB sets. Cybernet, a Japanese firm, dominated the market. Few people outside the electronics import industry heard of the company, because it did not market equipment under its own name. Cybernet specialized in producing circuit boards. Kraco, Hy-Gain and similar companies purchased completed circuit boards from Cybernet. These companies put the boards in their own cabinets and sold them.

Cybernet had a "universal" board that they sold to anyone. The board could function as a stripped-down, low-cost basic transceiver or a full-feature, top-of-the-line radio, depending on the options added. The Cybernet factory was totally automated and capable of producing thousands of boards each day. This one board was the heart of radios that ranged in price from $75 to $350; the only differences were the "bells and whistles"!

The CB market declined at the same time that the FCC introduced changes in the requirements for purity of emissions and the number of channels allocated to the service. Cybernet engineers found an easy, straightforward modification to the board that changed it from 23 channels to 40. However, the FCC would not type-accept modified boards. Hundreds of thousands of radios, varying from bare boards to completed sets, were in the "pipe line." They could not be sold legally after a specified date. Everyone left holding the bag began "dumping" radios and component boards.

In the meantime, Cybernet had made a new version of the basic board and that met FCC requirements. They were gearing up for the anticipated boom in 40-channel rigs.

The Boom That Fizzled

One by one, the U.S. companies marketing radios that were built around the Cybernet board began to fold. Hy-Gain had stockpiled a huge quantity of the 40-channel boards. When the business failed, the overseers sold the stockpile to surplus dealers, further complicating matters. As the CB market declined, many store owners faced the question of what to do with radios in inventory that could not be sold legally at any price. I worked out a deal with a local department store to the benefit of everyone involved. The store manager donated their inventory of 83 "illegal" radios to our club. Our members had the radios for conversion to 10 meters, and the store had a "write-off."

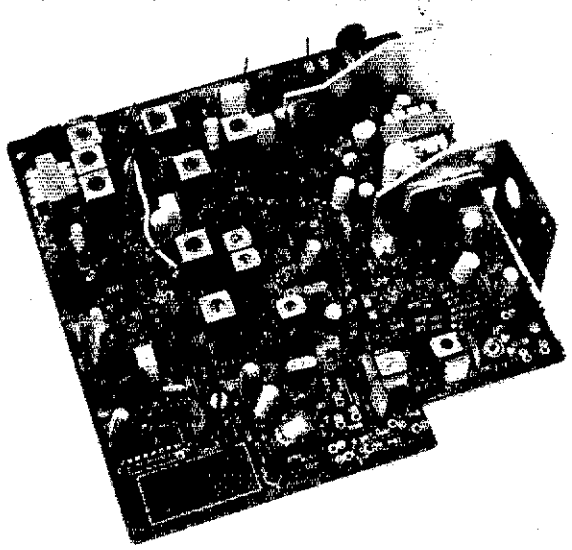
Originally, we planned to change the operating frequency, and to leave the mode of operation alone (a-m). While researching the situation, however, I came across the Knickerbocker et al. article describing the conversion of CB transceivers to 10-meter fm units.[2] Our radios corresponded to the ones described in the article. Most of our club members decided to make the fm conversion. That was our introduction to 10-meter fm.

What Do You Find When You Get There?

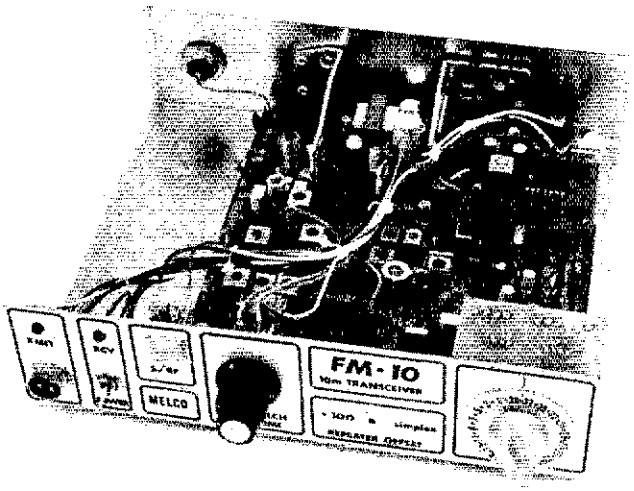
Most of the activity on 10-meter fm is simplex. The major calling frequency is

*MELCO, Box 26, Marissa, IL 62257

[1]Notes appear on page 26.



The Cybernet CB board. The clear silk-screen markings on the board make component location and circuit tracing easy. The PLL is located in the lower-left corner. The modulation transformer (T110) is visible between the heat sinks.



A completed 10-meter fm transceiver built from a kit. The fm modulator board is mounted above the main board near the rear panel. This unit uses a CB channel-selector switch to program the PLL.

29.6 MHz, with 29.5 MHz as a back-up. Typically, users establish contact on one of these frequencies and quickly move to another spot for the QSO. I think the hands-on approach for building equipment instills a level of pride and responsibility not found on some other bands and modes where "appliance operators" predominate.

Repeaters do exist on 10-meter fm, but they are not the towering influence that they are on 2-meter fm. The 10-meter fm repeater band is only 200 kHz wide (29.5 to 29.7 MHz), so the input and output frequencies are much closer together than they are for the other repeater bands. Furthermore, worldwide communications (using only a few watts) is a normal occurrence during much of the sunspot cycle. Most 10-meter fm systems use separate sites for receive and transmit to eliminate the need for large, expensive duplexers. Most repeaters have a CTCSS (PL) decoder at the receiver to keep DX signals from locking up the system. It is common for 10-meter fm repeaters to be linked with repeaters on other frequencies. (Consult the ARRL *Repeater Directory* for the 10-meter repeater band plan, the 10-meter CTCSS plan and a list of active 10-meter fm repeaters.)

Remote Bases

Remote bases are not the same as repeaters, but the distinction is subtle and may be overlooked. A remote base functions like your home station; it can work other stations simplex or *through* a repeater system. The major difference between your home station and a remote base is how the station sends and receives information to and from you. In your home station, you are interfaced to the radio by sound waves (microphone and speaker). In the case of the remote base, you are interfaced with a vhf or uhf radio link (your end of the link uses the speaker and microphone). Of course, a remote base can have various levels of sophisticated controls.

What About DX?

I have made contact with all continents in a single afternoon. Europe and Japan seem to be the areas with the most 10-meter fm'ers. Unlike their U.S. counterparts, many of the foreign operators seem to be using Yaesu FT-901DMs or Comtronix FM-80s. There is plenty of DX!

One thing that is noticeable on 10-meter fm DX contacts is the phase shift of a signal as it passes through the ionosphere. Full-quieting signals will fade suddenly, only to return to full strength in a few seconds. The reason for these fades has to do with the polarity of the signal at the receiving end. If the incoming signal and the receiving station antenna are both vertically (or horizontally) polarized, everything is copacetic. If one is vertically polarized and the other is horizontally polarized, reception deteriorates. This is particularly noticeable on fm. As the signal passes through the ionosphere, the polarity rotates. Shifting levels in the ionosphere cause different degrees of rotation. In a period of minutes the incoming signal may "rotate" through several cycles. These shifts cause the deep fades. Dual diversity receiving systems can overcome this problem, but they are beyond the scope of this article.[3]

Equipment For 10-Meter FM

Most hf ssb transceivers with RIT can be made to transmit on 10-meter fm with minor modifications. In a typical RIT circuit, a varactor diode acts like a variable capacitor when a small voltage is applied to it. There are two things necessary to frequency modulate such a transmitter: You must enable the RIT circuit on transmit, and you must couple an audio-voltage to the varactor diode. Receiving fm signals is not quite so easy for these rigs. If the transceiver has an a-m detector, you can tune slightly off frequency and use slope detection to demodulate the fm. A better solution is to add an fm detector that can be switched in and out of circuit.

I think the best procedure is to convert a CB transceiver built around the Cybernet board. Second best is to convert the board and "build up" the radio. There are thousands of these radios and boards available now. Many show up at flea markets; some are collecting dust on the shelves of pawn shops. Anyone in the U.S. should have little trouble locating one of these radios. The quickest way to determine if you have a radio with the proper board is to take the case apart and look at the board. On the foil side of the board you should find the numbers 33AOX, 36AOX or 39AOX (except for some of the Hy-Gain boards marked 75A080). On the component side you should find three crystals: 10.240 MHz, 11.806 MHz and 10.695 MHz. Some later versions have only two crystals. The new circuit was designed to prevent bootleggers from moving the radios to "hfer" channels. This also makes it difficult to put the radio on 10 meters. The older multiple-crystal rigs are difficult to modify and should be avoided. Unfortunately, the manufacturers used the same

model number for radios based around all three circuits. That's why I say it's best to pull the cover off and look at the board before you pay for the radio.

The other alternative is to use one of the Cybernet or Hy-Gain boards sold by the surplus houses. Again, look for a board with the appropriate marking, three crystals and the 02A (MC145109 or 760136) PLL. The first-time converter should avoid Hy-Gain board 750096. It appears to be identical to the other boards, except for a few differences in the area of the PLL chip, marked 58141. This chip is not the PLL! It is a decoder. Hy-Gain used this board in their "one armed bandit," which had the PLL in the microphone. Modifying this board is more extensive than is the case with the regular boards.

Conversion

There are five steps to converting a Cybernet board to a functioning 10-meter fm transceiver. First, you must hook up the board and make sure it is working. If you have a complete CB transceiver, you can move ahead to the next step and convert the operating frequency to 10 meters. Slope detection will work (with RIT), but I advise constructing a simple fm detector. You must also defeat the a-m circuit and "fm" the transmitter. Finally, you will need a scheme for programming the PLL.

A schematic diagram for the Cybernet board appears in Fig. 1. Please note that this diagram has not been redrawn in *QST* style; consequently, some of the symbols and terminology differ from those normally used. On the drawing, numbers inside circles refer to the "pin outs" of the board and are called pins in the remainder of the article (most are actually drilled holes and pads). The component side of the circuit boards have been silk-screened to provide a good indication of parts location. Fig. 2 is a pictorial diagram of the Cybernet board and shows major connecting points.

Board Hookup

Refer to Figs. 1 and 2 and to the parts numbers on the component side of the board for the following steps. Where needed, use appropriate lengths of hookup wire. Solder two short wires to the terminals of a no. 47 pilot lamp. Connect one lead to pin 5 and the other to pin G2 on the board. The lamp will serve as a dummy load and power output indicator.

Attach the 50-kΩ squelch potentiometer to pins 7 and G3. Connect one side of the 50-kΩ volume control to pin 19 and the wiper to pin 21. Solder the other side to the squelch-control ground lug. If either or both of the controls "turn backwards" after completing the other steps, reverse the connections on that particular potentiometer. Attach a speaker to pins 23 and

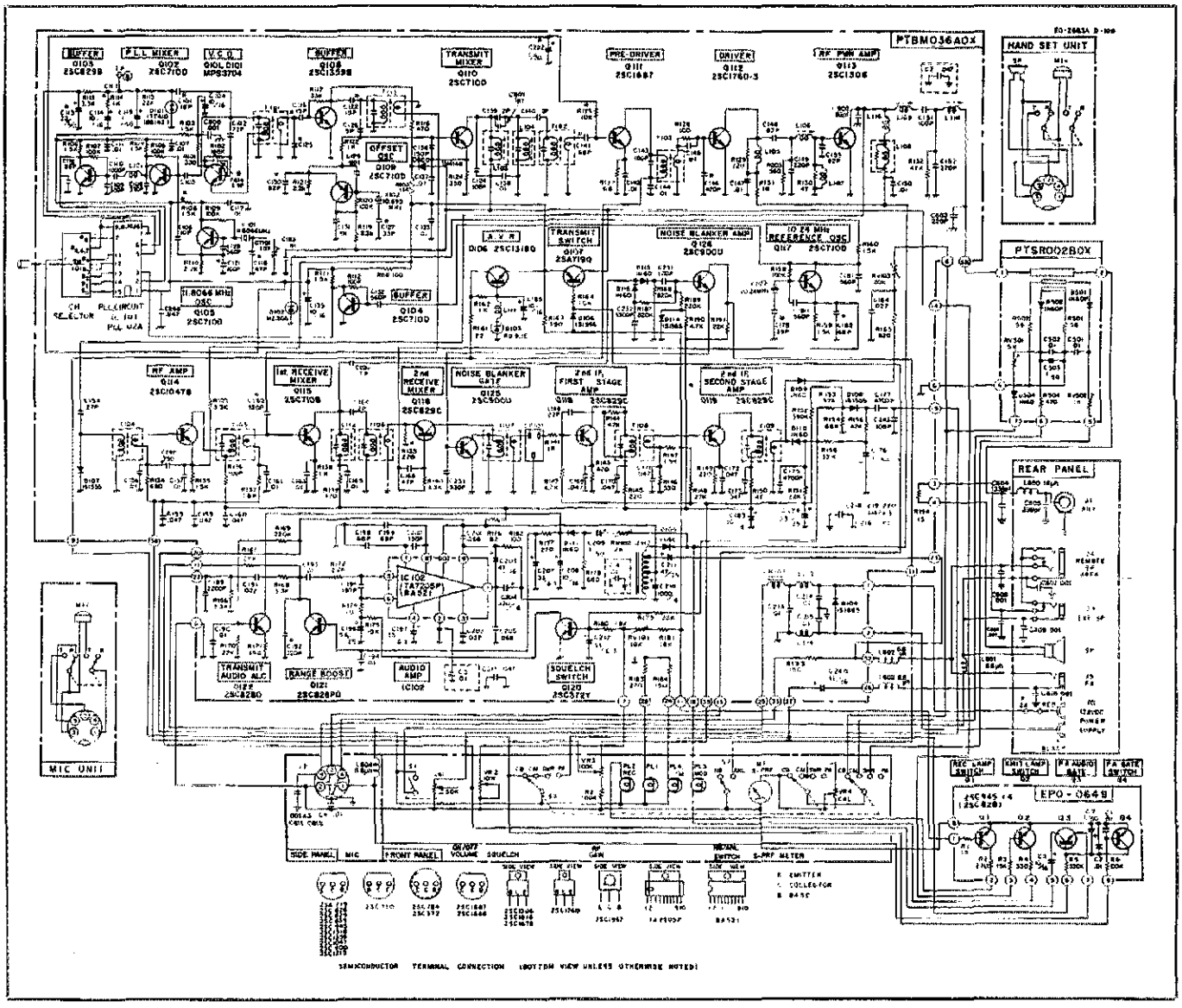


Fig. 1 — Schematic diagram of Cybernet CB board (not redrawn with *QST* symbols and terminology). Numbers inside circles indicate "pin outs" from the board. Corresponding drilled holes and pads are marked on component side of board. Large area inside broken lines indicates main circuit board.

Table 1

Preliminary Coil-Slug Adjustments

T101 — 1 turn cw	L108 — 1 turn ccw
T111 — 3/4 turn cw	L109 — 2 turns ccw
L103 — 1 turn cw	L110 — 2 turns ccw
L104 — 1/2 turn cw	T104 — 1 turn cw
T102 — 1/4 turn cw	T105 — 1 turn cw
T103 — 1 turn cw	

G2. Install jumpers between pins 9 and 20, and between 23 and 3. Connect a 50-kΩ potentiometer between pins 38 and 39 for an rf gain control. You may omit the rf gain control by installing a jumper between these two pins. Temporarily wire a microphone cartridge or an audio-frequency generator to pins 22 and G3.

Initial Frequency Adjustment

Determine whether your board is a 23- or 40-channel model. Your board is a 23-channel type if pin 7 of the PLL is grounded and if pins 8, 9 and 10 are connected to a 1.5-kΩ resistor. If you have the 23-channel variety, modify it to 40 channels by cutting the foil between pin 7 of IC-101 and chassis common and disconnecting pins 8, 9 and 10 of IC-101 from the 1.5-kΩ resistor. Attach a short wire to pin 7 and another one to pins 8, 9 and 10.

Once the 40-channel modification is complete, set the PLL for channel 20 (27.205 MHz), which will become 29.5 MHz after the 10-meter conversion. If you do not have selector switches, jumper D102 (cathode) to pins 8, 9, 10, 11 and 12 of the PLL (IC-101).

Initial Testing

Apply +13 V dc to pin 1 and power-supply common to pin 2. The receiver should be operational at this point. If not, recheck your wiring for errors. Troubleshoot and repair any section of the receiver that isn't functioning normally. (Hint: I have found 95% of the troubles with these boards to be crystal failures.) Detach the speaker lead that goes to G2. Connect G2 to pin 13 (PTT). This should key the transmitter, and the lamp should glow. If not, check for wiring errors, troubleshoot and repair. Use a high-impedance voltmeter to measure the voltage at TP8. If it does not read exactly 1.5 V, adjust T101 until it does.

Frequency Conversion

Replace crystal 3 (11.806 MHz) with a 12.571-MHz crystal. Use a proper-size nonmetallic alignment tool to gently adjust the transmit and receive coil slugs. *The slugs break easily*! Use the information in Table 1 to preadjust the transmit inductors. Once the prealignment process is completed, restore power to the board and (with PTT still connected to G2) tune the transmit coils for maximum output power, as indicated by the pilot lamp.

Use the voltmeter to check the voltage at TP8 again. It should indicate 1.5 V. If not, adjust T101 for this reading. For a final peaking of the circuit, observe the S meter of a nearby receiver or use a wattmeter. Disconnect the power.

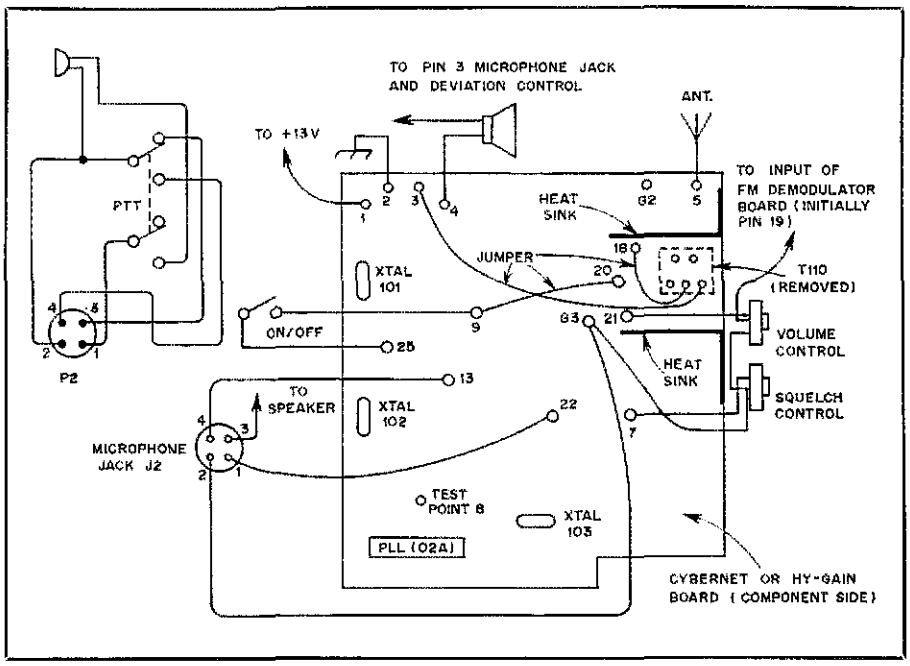


Fig. 2 — Pictorial diagram of component side of Cybernet CB Board and modifications needed to "hook it up." The volume control and squelch control are 50-kΩ potentiometers (wattage and type are not critical). The speaker is an 8-Ω type (size not critical). Crystal 103 (11.8066 MHz) is replaced with a 12.571-MHz crystal (fundamental type, HC-18/U holder). Jacks, plugs and enclosure are the choice of the builder.

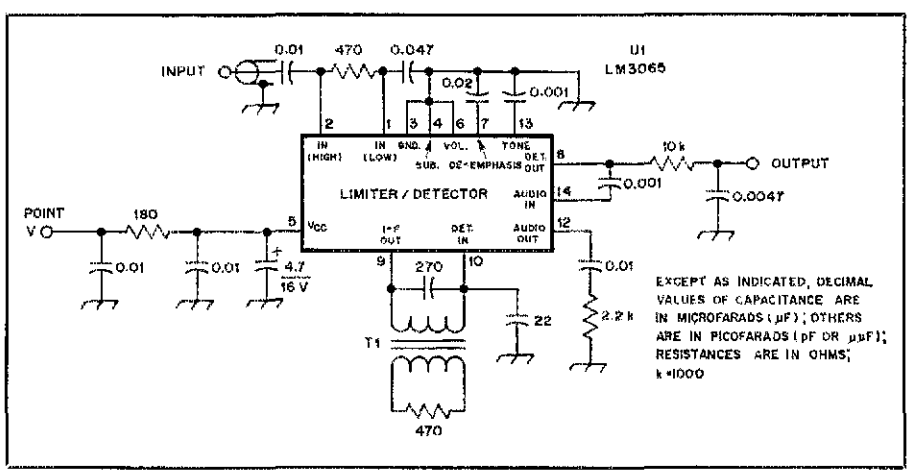


Fig. 3 — Schematic diagram of fm demodulator board. This circuit will work with any receiver having a 455-kHz i-f and may be employed in radios having i-fs other than 455 kHz by making the appropriate changes in the components associated with pins 9 and 10. All capacitors are disc ceramic, except those with polarity marked, which are electrolytic. Resistors are carbon composition, 1/4 watt.
T1 — Miniature 455-kHz i-f transformer, 680 μH. U1 — Limiter/detector IC, LM3065 or equiv.

Receiver Alignment

Remove the lead from pin 13 and reattach it to the speaker. Connect pin 7 to G2 and apply power. The receiver should be unsquelched (the background noise may be at a low level, though). Tune, in order, T104, T105, L112, T106, T107, T108 and T109 for maximum background noise. Disconnect pin 7 from G2. This rough alignment is adequate for the remainder of the conversion process. Once the board is installed in a metallic cabinet, it will be necessary to "tweak" the receiver. The preferred method is to use a signal generator, but if one is not available, use a weak on-the-air signal. The receiver will function "as is" for slope detection if it has RIT.

FM Demodulator

The simple demodulator detailed in Fig. 3 will provide superior service compared

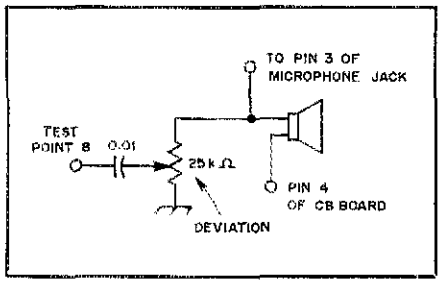
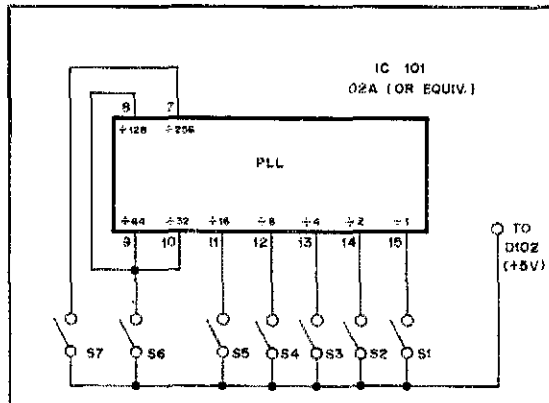


Fig. 4 — Diagram of method of frequency-modulating the transmitter. Audio voltage from the audio amplifier is taken from the speaker terminal and fed through the voltage divider (deviation control) and coupling capacitor to TP8, where it modulates the VCO. The coupling capacitor is a 0.01-μF disc ceramic. The deviation control is a pc-board style, 1/4-watt, 25-kΩ variable resistor.



OPERATING FREQUENCY (MHz)	CLOSE SWITCHES
29.50	4, 5, 6
29.51	4, 5, 6, 1
29.52	4, 5, 6, 2
29.53	4, 5, 6, 2, 1
29.54	4, 5, 6, 3
29.55	4, 5, 6, 3, 1
29.56	4, 5, 6, 3, 2
29.57	4, 5, 6, 3, 2, 1
29.58	7
29.59	7, 1
29.60	7, 2
29.61	7, 2, 1
29.62	7, 3
29.63	7, 3, 1
29.64	7, 3, 2
29.65	7, 3, 2, 1
29.66	7, 4
29.67	7, 4, 1
29.68	7, 4, 2
29.69	7, 4, 2, 1

Fig. 5 — Wiring diagram for programming the PLL for the proper frequency. S1-S7, inclusive, are spst toggle switches. Binary-coded arrangements and diode-matrix encoders are two of the many alternatives to this circuit.

to slope detection.[4] It is built around the LM3065 (MC 1358) limiter/detector IC. Layout is not critical, so any of the usual construction techniques may be used as an alternative to the pc board.

Perform the following steps to disable the a-m detector and to enable the fm demodulator. Connect V of the demodulator to pin 9 of the Cybernet board. Attach ground of the board to a convenient chassis "common" on the radio. Disconnect the wiper of the volume control from pin 19 and attach it to the output of the fm board. Use a short piece of coaxial cable (RG-174/U or similar) to connect the input of the detector circuit to the base of Q119.

Transmitter FM

Carefully remove the modulation transformer, T110. Remove RV102. I use a solder sucker for desoldering, but solder wick should work as well. Attach a wire from pin 3 to the positive terminal of C204 (use the hole and pad at T110). Move the speaker lead from pin 23 to pin 4. Solder a jumper between pin 18 and pin 20 (use the hole and pad at T110). Removing T110 prevents the amplified microphone audio from amplitude modulating the rf final amplifier. The jumpers restore the audio path to the speaker and the dc path to the rf final amplifier.

Locate TP8 near the VCO in Fig. 1. Notice that a changing voltage at TP8 will cause the VCO to change frequency. Fig. 4 shows the circuit used to couple audio from the output of IC-102 to TP8. The 25-kΩ variable resistor acts as a deviation control.

Fig. 2 provides hook-up data for the microphone, microphone jack and the ON/OFF switch. Prepare a suitable package for the unit. The microphone is a low-impedance type. Replace the dummy load with an antenna jack. Jacks and plugs can be added to suit your needs.

Fig. 5 provides data for programming the PLL for most frequencies typically used by fm'ers on the 10-meter band. Assuming that you do not wish to be "locked" onto one frequency, the diagram shows the simplest arrangement for changing frequency quickly. This design requires seven spst toggle switches.

There are several other popular schemes for changing frequency. If available, a 40-channel CB switch may be used. Digital readout and scanner circuitry may be added, if you desire. You may need or want a repeater offset circuit. This is just the beginning! Numerous modifications, improvements and accessories can be added. There isn't enough room to list, let alone to describe, them. The fastest way for you to find out about them is to put the basic radio on the air and ask questions. Everyone I know on the band loves to talk about modifications. Grab your soldering iron and come join us!

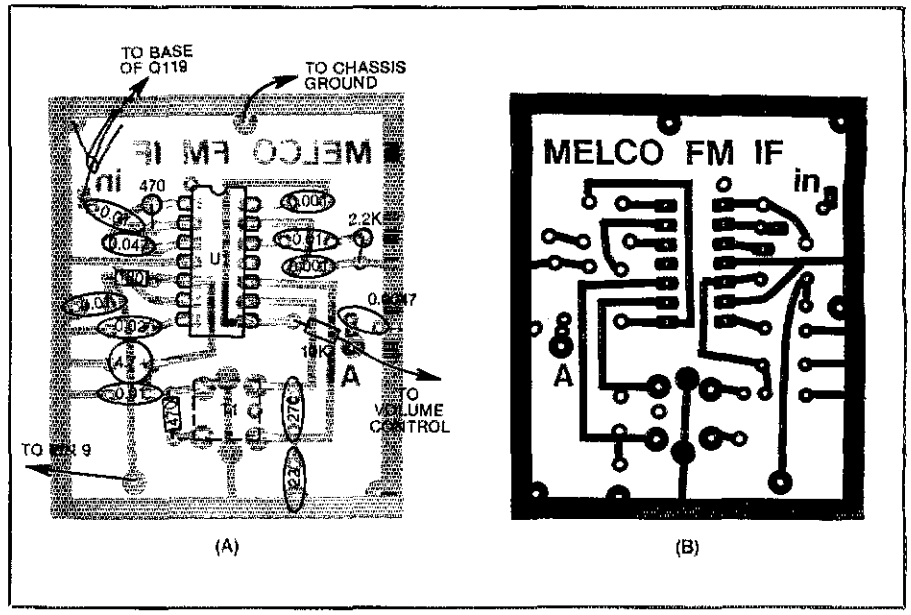


Fig. 6 — At A, parts-placement guide for the fm demodulator board. Parts are placed on the non-foil side of the board; the shaded area represents an X-ray view of the copper pattern. Resistances are in ohms; k = 1000. Capacitors with whole-number values are in picofarads except those with polarity shown, which are electrolytic with values in microfarads. Capacitors with decimal-value numbers are in microfarads. At B, circuit-board etching pattern for the fm demodulator board. Black represents copper. The pattern is shown at actual size from the foil side of the circuit board.

Notes

[1] *FM & Repeaters for the Radio Amateur*, 2nd ed. (Newington, CT: The American Radio Relay League, Inc., 1978), pp. 7-10.

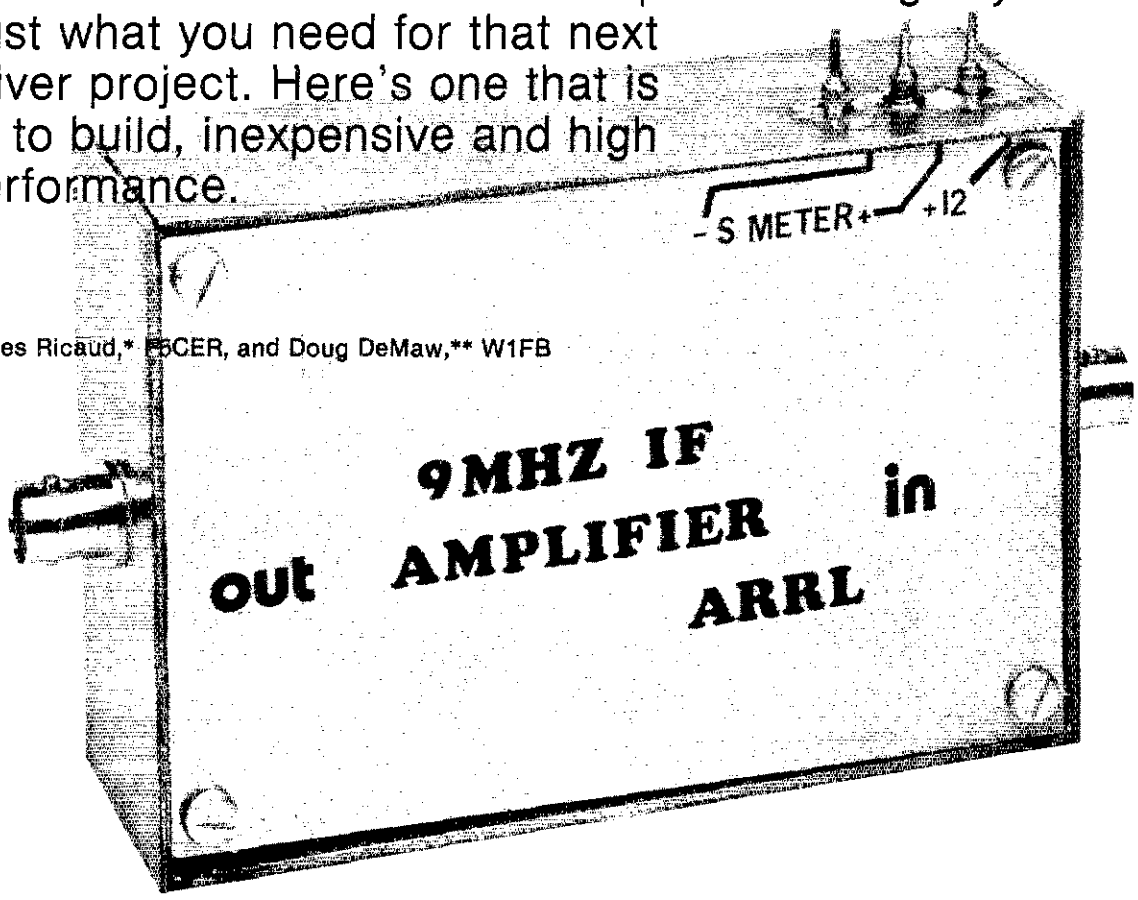
[2] H. Knickerbocker, A. Weise and R. Stielau, "CB-to-10 FM best conversion yet?" *73*, January 1980, p. 117.

[3] B. Heil, *The 10 Meter FM Handbook*, (Marissa, IL: MELCO Publishing, 1980), p. 31.

[4] Parts, partial kits, complete kits and manual available from MELCO, Box 26, Marissa, IL 62257, tel. 618-295-3000.

A Universal MOSFET I-F Amplifier

A 40673 or 3N211 MOSFET i-f amplifier and agc system may be just what you need for that next receiver project. Here's one that is easy to build, inexpensive and high in performance.



By Georges Ricaud,* F6CER, and Doug DeMaw,** W1FB

Do you prefer to work with "discretes" rather than ICs during experimental efforts? Certainly, it allows somewhat more freedom with respect to changing the operating parameters of a circuit, and discrete transistors make the layout of a pc board less challenging in some instances. Perhaps you simply enjoy working with FETs and bipolar transistors because you're able to get a better "feel" for what's happening in the circuit. Whatever your outlook, this circuit could be what you've been seeking as the core of that new homemade receiver!

This i-f module was designed by author Ricaud. His circuit was published in French and later translated by him for use in *QST*.[1] The ARRL staff duplicated the design, then made minor changes to permit the use of parts available in the USA. The latter version is presented here, with additional information added by author DeMaw. The layout for the ARRL version in Fig. 2 was developed by G. Hull, AK4L, of the Hq. technical staff.

This i-f system is suitable for use from below 5 MHz to frequencies above 10.7 MHz by merely changing the parallel capacitance across the i-f transformers to an appropriate value for resonance. The design objective was to provide a low-noise i-f strip for use in a high-dynamic-range receiver. Care was taken to ensure unconditional stability and to provide fast-acting agc with a wide control range (100 dB plus). Overall gain is approximately 110 dB. Provision is made for a linear-reading S meter.

Circuit Information

Fig. 1 contains the schematic diagram of the F6CER i-f system. Three dual-gate MOSFETs are used to develop the desired overall gain. The 40673s are recommended for best stability. The ARRL version employs 3N211s, but they have somewhat greater gain capability (high transconductance) than the 40673s, and may encourage instability if care is not taken with the layout and lead lengths of the components.

To obtain the required agc control range it is necessary to bias Q1, Q2 and Q3 for an effective gate no. 2 swing of −2 to +6 volts. To accomplish this action it is mandatory to reference the sources of the FETs at approximately +2 volts. This is done by inserting D1, D2 and D3 as shown; the barrier voltage of the diodes establishes a regulated positive bias. Most LEDs will yield a 1.5-volt reference, but some that were tested in the ARRL lab provided a 2.1-volt reference (large red LEDs). Alternatively, three silicon diodes, such as 1N914s, can be used in series at D1, D2 and D3. Zener diodes are not available for 2.1-volt operation, but 2.5-volt ones would probably work okay.

Vhf parasitic oscillation is discouraged by using 100-Ω resistors at the gates and

[1]Notes appear on page 29.

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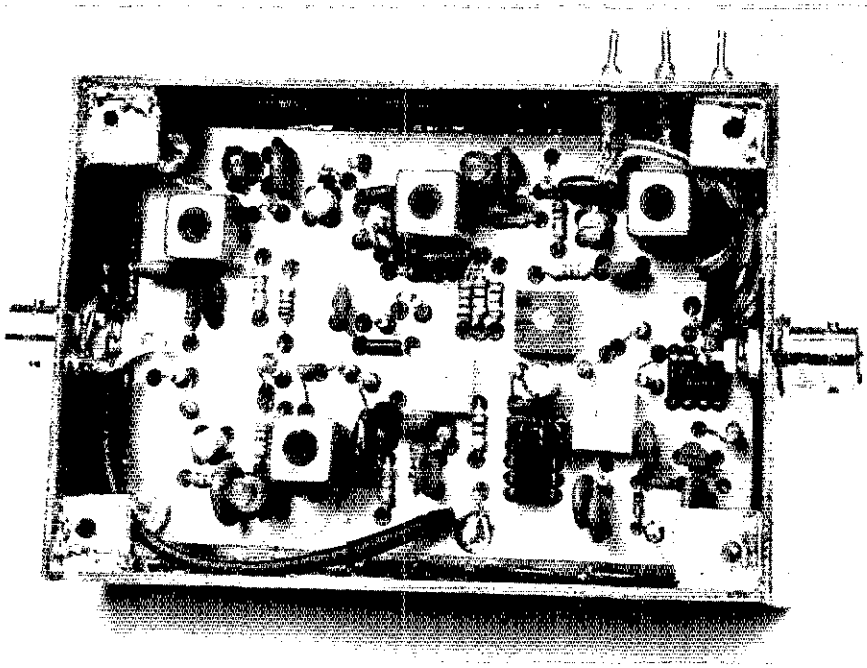


Fig. 2 — Interior view of the ARRL model of the F6CER i-f system. Double-sided pc board is used to contain the circuit and to fabricate the box that houses the unit. Pc boards, negatives and complete parts kits for this project are available (see note 3).

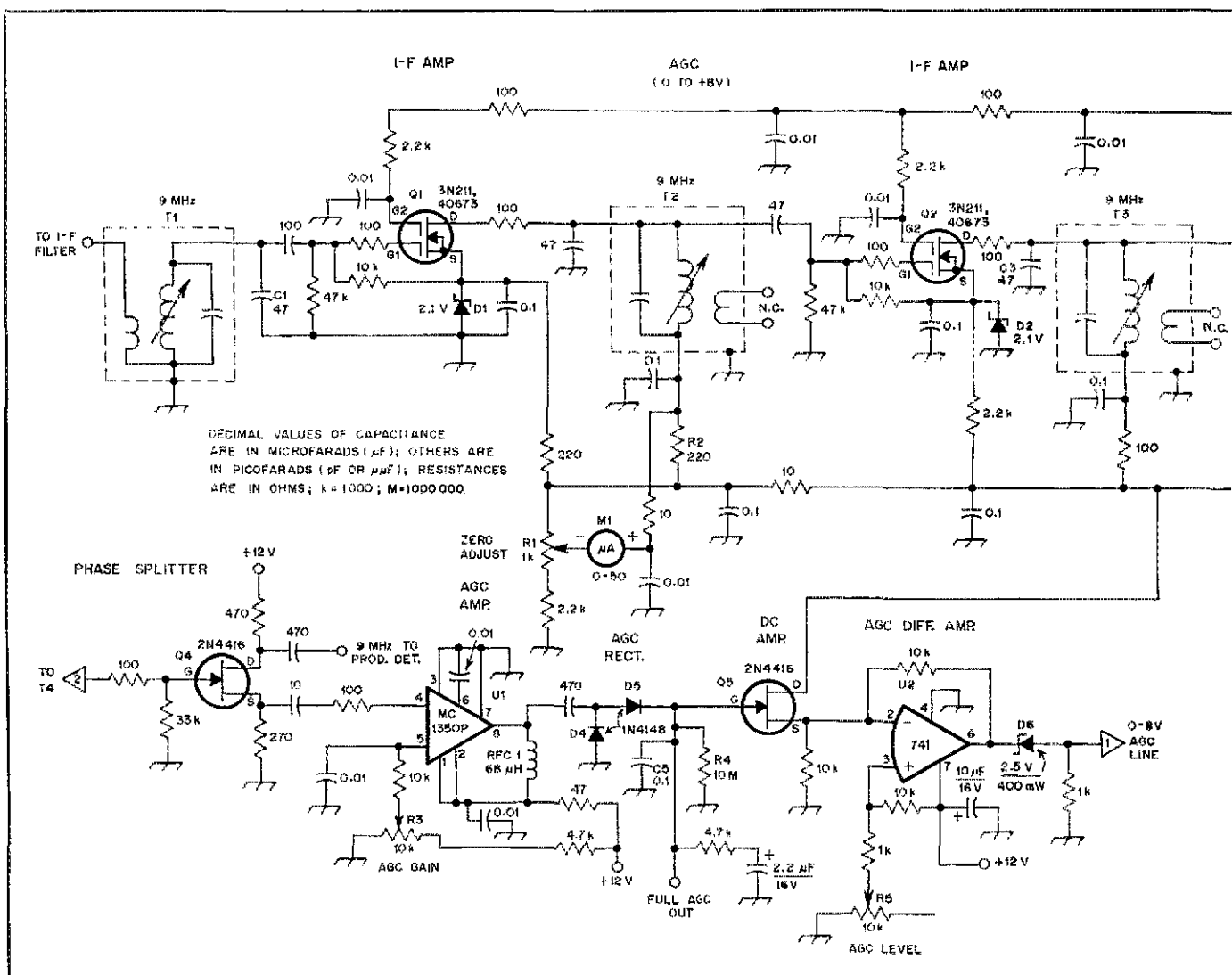
drains of the FETs. The drain-supply lead of each i-f amplifier stage is decoupled with an RC network to discourage instability at or near the i-f (9 MHz).

T1, T2 and T3 are J. W. Miller Co. 10.7-MHz miniature i-f transformers. Similar transformers from junked pocket-size fm radios should work satisfactorily in this circuit. C2, C3 and C4 are placed in parallel with the built-in capacitors in the transformers to effect resonance at 9 MHz. Larger values of capacitance can be added for lower intermediate frequencies. No other circuit changes should be required.

The output signal from Q3 is buffered by means of phase-splitter Q4 (a technique used by W7ZOI) to isolate the age amplifier (U1) from the outboard product detector. A 2N4416 JFET or equivalent type is suitable for use at Q4 of Fig. 1.

AGC Circuit

One JFET and two ICs are used in the age circuit of Fig. 1. U1 can be considered a fourth i-f amplifier. Its rf output is rectified by voltage doubler D4/D5. The resultant dc voltage is routed to a JFET dc



amplifier, Q5, which in combination with U2 forms the familiar control circuit used by W7ZOI and W1FB in their high-performance receivers.[2]

Op amp U2 samples the level across the Q5 source resistor and responds in accordance with the setting of R5. This control determines the dc voltage swing at the output of U2, and hence the agc control-voltage range. R3 is used to set the agc threshold with respect to the incoming signal level at the receiver front end. The actual threshold will depend on the operator's preference, but usually dictates that agc action commences when the receiver input signal is somewhere between 0.5 and 2 μV.

The agc "hold" time is determined by the values selected for R4 and C5. The time constant is a subjective matter, and is left up to the builder. With the values shown it is 1 second, but R4 can be increased in value for longer decay times.

A 2.5-volt Zener diode (D6) is used in series with the output of agc difference amplifier U2. It helps set the lower limit of the agc voltage range. In the original F6CER design this point in the circuit employed three series-connected 1N4128 silicon diodes for the same purpose. If the agc circuit is functioning correctly, the output swing of U2 will be 0 (no rf signal at the U1 input) to +8 volts at full receiver input-signal level. Because of the D1, D2 and D3 action, the effective agc swing on the MOSFET i-f amplifier no. 2 gates is −2 to +6 volts.

Construction Notes

If the 9-MHz i-f filter is to be contained within the agc-system shield box, care must be taken to prevent the filter can from touching the sides and top cover of the box. This will help prevent unwanted ground loops from degrading the ultimate-attenuation characteristics of the filter. Also, it is recommended that a small shield plate be soldered to the pc board (ground) across the center of the filter to aid the input/output isolation of the filter. The input lead to the filter should be miniature coax such as RG-174/U. The shield braid is soldered to the *inner* wall of the i-f module box.

A parts-placement guide for this circuit is not available, but a pc board and parts kit can be obtained for this project.[3] A homemade shield box can be built easily from pieces of double-sided pc board. A die-cast aluminum box will also serve well as an enclosure.

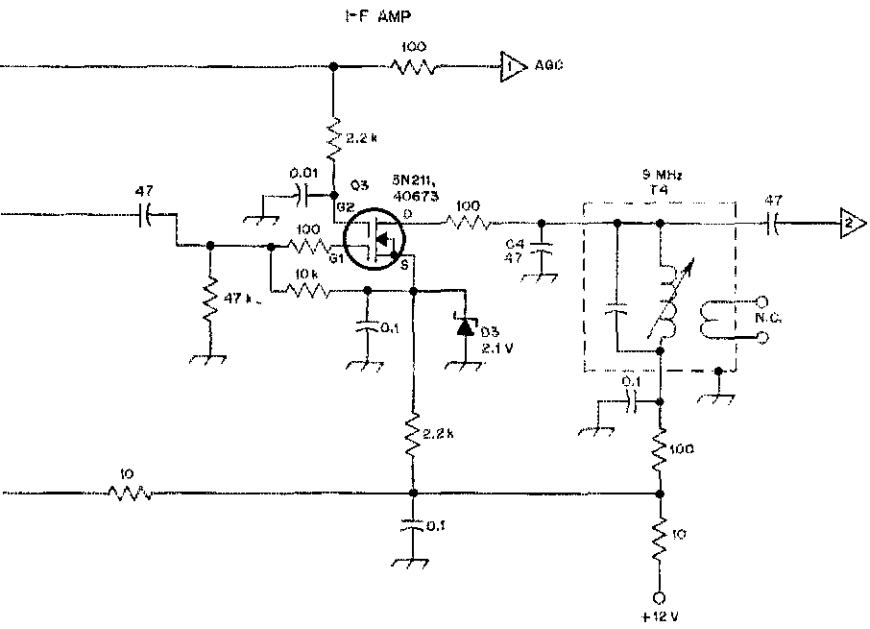


Fig. 1 — Schematic diagram of the F6CER i-f amplifier and agc system. Capacitors are disc ceramic. Fixed-value resistors are 1/4-watt composition types.
C1-C5, inc. — See text.
D1-D3, incl. — See text.
D4, D5 — Silicon small-signal diode (1N4148 or 1N914).
D6 — 2.5-volt, 400-mW Zener.
M1 — Dc meter, 50- or 100-μA type.
R1, R3, R5 — Pc-board linear-taper composition control.
RFC1 — Miniature rf choke, 68 μH.
T1-T4, incl. — Miniature 10.7-MHz i-f transformer, untuned secondary. Primary padded to resonate at 9 MHz. (J. W. Miller Co. no. 8852 or equiv.)
U1 — Motorola MC1350P IC.
U2 — Type 741 op amp.

Selecting the Semiconductors

It is prudent to use only the top-quality active devices that are available. Many surplus or bargain ICs and transistors perform poorly, or not at all. An inferior 741 op amp, for example, will not provide the required agc voltage swing. If the FETs are grade-outs or defective parts, the amplifier will have low gain and poor agc range. It may also be very noisy.

Since it is nearly impossible to obtain matched MOSFETs, it is recommended that the builder adjust the I_{dss} (drain current) of each i-f amplifier stage for 10 to 12 mA. The current can be determined by measuring the voltage drop across the 100-Ω drain-supply resistors. The current of the three stages can be matched by changing the value of the 47-kΩ gate no. 1 resistors. A lower value will reduce the I_{dss}, and a higher value will increase it.

Alignment

A 9-MHz signal is applied to the input of Q1 with the i-f module being operated from a 12-volt dc supply. It is assumed that a product detector, BFO and audio amplifier are connected to the output of the i-f system during these tests. T1, T2 and T3 are adjusted for maximum signal response as noted at the output of the audio amplifier.

R3 and R4 are not adjusted until the i-f/agc module is operating in the composite receiver for which it was built. R1 is then adjusted so that M1, the S meter, reads zero when no receiver input signal is present. The meter response is quite linear with the circuit shown in Fig. 1.

An additional agc line is available at the output of D4 and D5. The dc voltage range at this point will be much smaller than at the output of D6 — roughly 0 to +3 volts. This agc takeoff point is useful for supplying delayed agc to the rf amplifier of a receiver. A series R-C network is used from this line to ground to establish the decay time of this leg of the agc system.

Acknowledgments

W1FB wishes to thank Georges Ricaud for making this circuit available to the ARRL for use in *QST*. Appreciation is expressed also to Gerald Hull of the ARRL staff for building and testing this circuit.

Notes

[1] *Radio REF*, March 1980.
[2] W. Hayward, "Competition-Grade Receiver," and D. DeMaw, "His Eminence, the Receiver," *Solid State Design for the Radio Amateur*, ARRL.
[3] Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

An Ash-Proof Keyer Paddle — Something New for CW Operators!

Now you can say good-bye to mechanical keyer paddles and troublesome dirty contacts. Go electronic with this weekend project!

By Roy Lewallen,* W7EL

Having experienced difficulty with mechanical switch contacts during Field Day operation on the huge pile of volcanic ash known as Mount Hood (near Portland, Oregon), and thinking about the effect of the ash from Mount St. Helens, I designed a keyer paddle that would be immune to the effects of ash. Those of you who aren't contending with ash may be pleased to know this paddle is immune to ordinary dirt, too!

This keyer paddle has no moving parts. It can be completely insulated and sealed, is built easily and will work with iambic keyers. But, perhaps most important, it has a feel much like a conventional paddle!

The "electronics" consist of two ICs and a pair of transistors. With a continuous current drain of only 1 mA, the paddle may be powered by a self-contained 9-volt transistor-radio battery, which will last a long time. Even if the paddle is inadvertently left on overnight, you won't find a "dead" paddle in the morning. If desired, the paddle can be powered from the keyer supply if it provides a positive potential of 5 to 15 volts.

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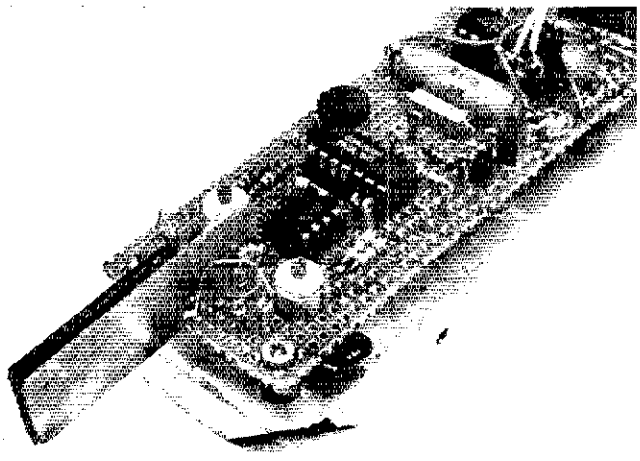
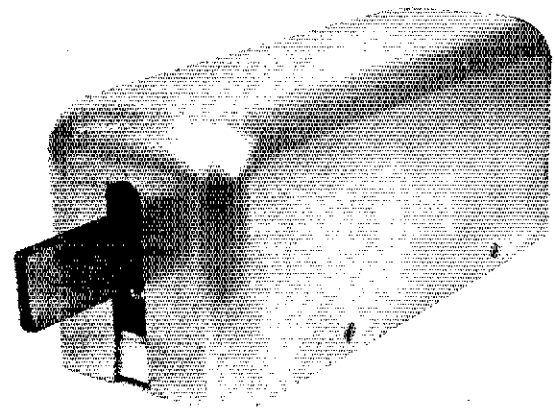
Theory of Operation

Refer to Fig. 1. Capacitive coupling to



An inside view of the workings of the ash-proof paddle. The two cylindrical objects on either side of the paddle are trimmer capacitors C1 and C2.



No, it's not a bunker or an armed juggernaut, but the paddle safely ensconced beneath a housing that would make an armadillo jealous!

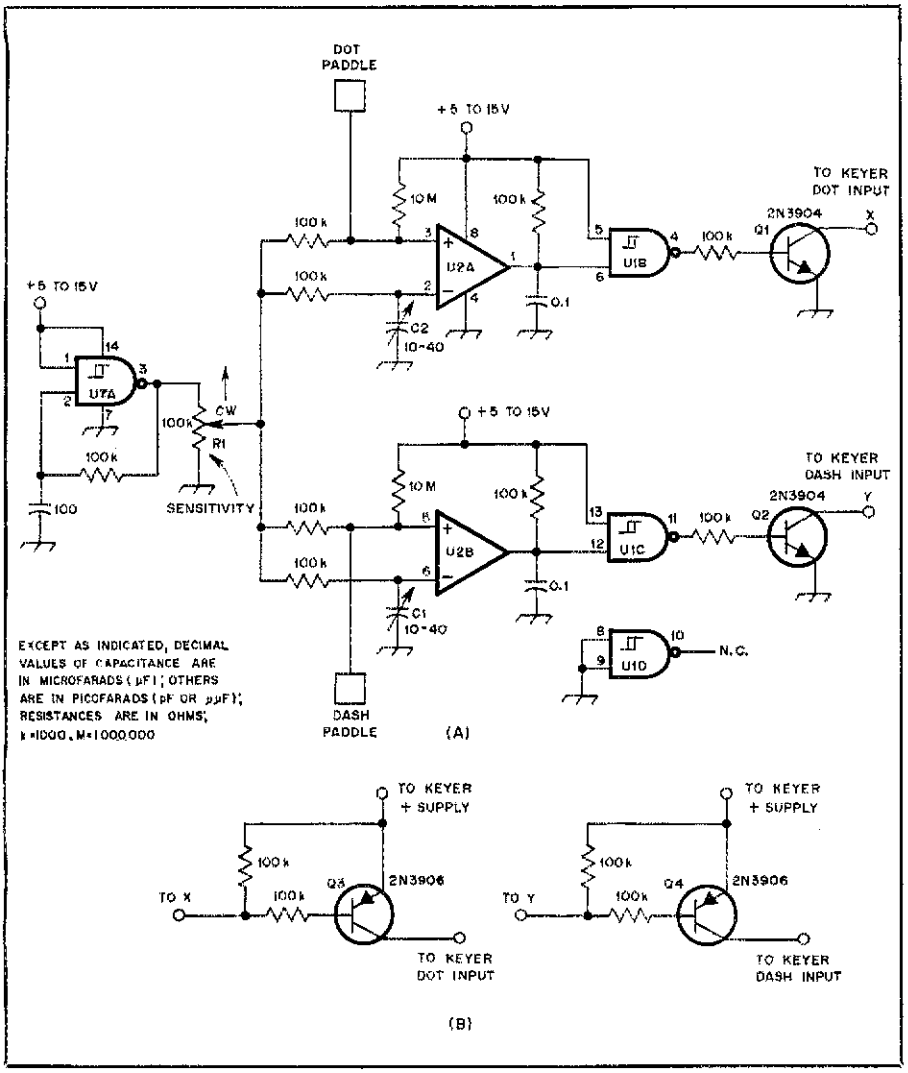


Fig. 1 — Paddle-circuit simplicity is evident at A. Q1 and Q2 are used with keyers requiring a contact closure to ground. The circuit at B may be added to points X and Y for keyers having the paddle common connected to the positive supply.

C1, C2 — 10-40 pF trimmer.

Q1, Q2 — Silicon general-purpose npn transistor, 500 mW. Radio Shack 276-2009 or equiv.

Q3, Q4 — Silicon general-purpose pnp transistor, 600 mW. Radio Shack 276-2032 or equiv.

U1 — CD4093 quad 2-input NAND Schmitt trigger, ECG4082B or equiv.

U2 — LM393 dual differential comparator. Two sections of an LM339 (ECG834) quad differential comparator may be used, but pin numbers will be different. The LM393 is an 8-pin IC and the LM339 is a 14-pin IC.

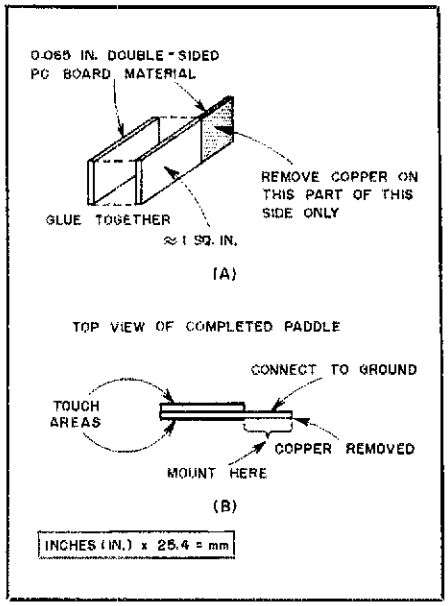


Fig. 2 — Mechanical details of the capacitive paddle. The completed assembly should be sprayed with two coats of clear lacquer.

the operator's body (grounded or ungrounded) by touching the paddle triggers the circuit. The paddle itself should be insulated, making operation independent of such variables as humidity and skin resistance.

U1A forms a simple free-running oscillator, which operates at approximately 300 kHz. Oscillator output is fed equally to both inputs of comparators U2A and U2B, with the trimmer capacitors (C1, C2) balancing out the paddle capacitance. The comparators are slightly prejudiced by the 10-MΩ pullup resistors: They stay in the high-output state when the inputs are balanced. When the paddle is touched, the inputs to the affected comparator are unbalanced, causing it to change state at a 300-kHz rate. Comparator output is filtered by the 0.1-µF capacitors and cleaned up by U1B and U1C.

Most modern keyers have a positive supply and are activated by a switch closure to ground. If yours is of this type, the circuit as shown in Fig. 1A may be used. If the center of the paddle normally connects to the positive supply, use the alternative circuit of Fig. 1B. Other situations will require appropriate ingenuity.

Construction

The mechanical portion of the paddle is constructed as a three-layered sandwich as shown in Fig. 2. Ordinary pc-board material is adequate and readily available, but other materials can be used if desired. The center layer is needed to shield the two sides from each other and is connected to ground.

Paddle sensitivity to touch is inversely related to the capacitance of the paddle assembly itself. Using ordinary 0.065-in. (1.7-mm) glass-epoxy board with each side of the paddle having an area of one square inch (645 sq. mm), sensitivity is more than adequate. Increasing the paddle area or decreasing the material thickness will reduce the available sensitivity.

U2 should be mounted close to the paddle to minimize lead lengths. Each comparator input should be laid out symmetrically to aid balance. Layout is otherwise uncritical. My paddle circuit, along with a simple keyer, is built on perforated board and mounted in a small metal box.

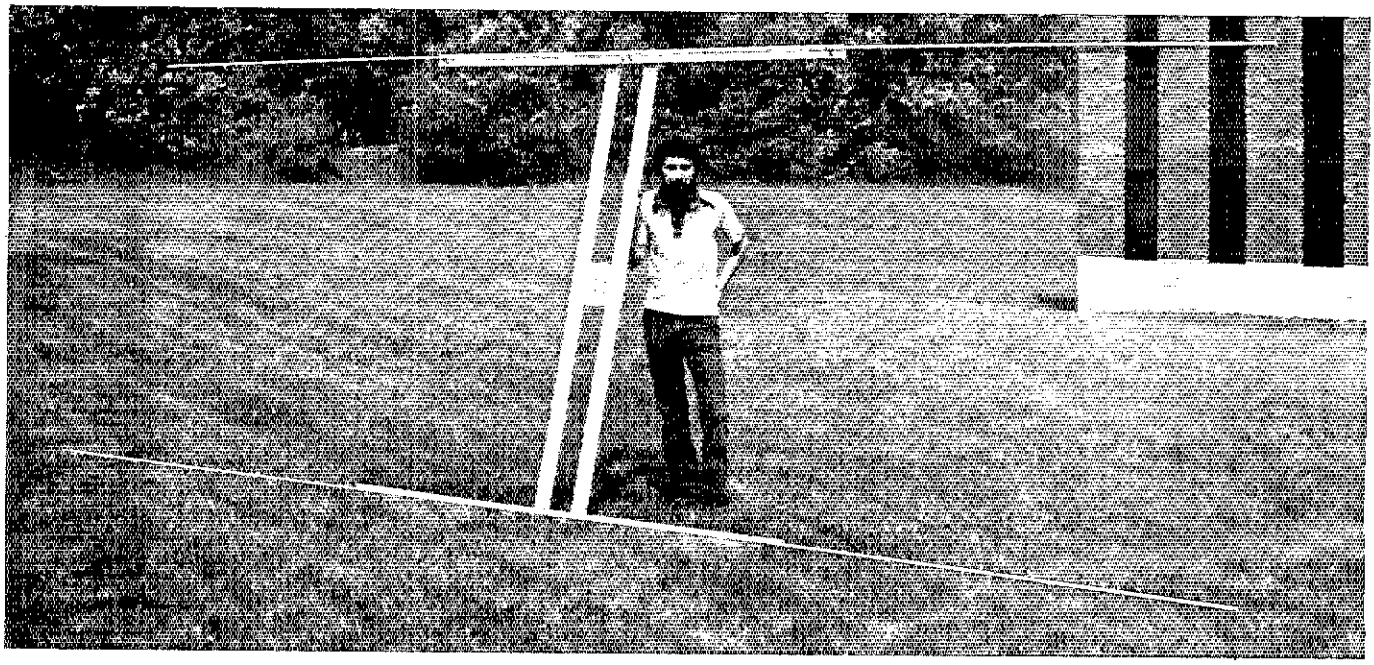
Adjustment

Advance the SENSITIVITY control (R1) until one side of the paddle operates spontaneously. Adjust the appropriate trimmer capacitor until operation stops or changes from dot to dash or vice versa. If the keyer operation is reversed, adjust the other trimmer; otherwise, increase the sensitivity. Repeat this procedure until R1 is at maximum and no spontaneous operation occurs. R1 may then be adjusted to suit your personal tastes. No readjustment of the trimmers is necessary. You may want to experiment with the SENSITIVITY control to find the setting that feels best for you.

That's all there is to it! This paddle should provide many hours of operating enjoyment. With no contacts to clean (or mechanisms to adjust), you've got a trouble-free paddle!

• *Basic Amateur Radio*

Simple Gain Antennas for the Beginner



You need not be a structural engineer or invest an absurd amount of money to build a beam type of antenna. Good performance can be obtained with simple antennas made from some very ordinary materials.

By Doug DeMaw,* W1FB

Let's refer to the antennas discussed here as inexpensive types rather than cheap ones. There's a difference! Cheap denotes inferiority, but an inexpensive antenna can be superior in performance. We will focus our attention this month on directional antennas that can provide gain. The expression "superior performance" has significance here. "Superior to what?" we might ask. Well, a gain antenna with directivity is superior to a wire antenna (Basic Radio, May 1981 *QST*, pp. 26-29) that has no gain and may exhibit mediocre directivity. What's the advantage of this superior style of antenna? The answer is, rejection of unwanted QRM off the sides and back of the antenna, plus some forward gain. The gain provides the same effect as increasing the transmitter output power, and all of us can use a few extra dB (decibels) when the going gets difficult on our favorite ham band!

Directivity and Gain

For the purpose of this discussion let's think of directivity as an antenna characteristic that permits us to concentrate the radiated signal energy in a favored direction. With a properly designed beam type of directional antenna the energy radiated off the *sides* of the antenna will be substantially lower (20 to 30 dB typically) than off the front of the antenna. Similarly, the response from the back side of the beam will be much lower than off the front, typically 10 to 20 dB. Nice way to reduce QRM (interference), eh?

The expression "gain" will refer to the effective increase in the power of the transmitted wave or signal. For example, if we had a 100-W output power from the transmitter, and increased it to 200 W, our signal would be 3 dB louder in the other station's receiver. (A 3-dB increase is just discernible to the human ear.) Now, if our *beam antenna* had a 3-dB gain characteristic, our 100-W transmitter would sound like a 200-W rig to the other station. If the gain antenna could produce a 9-dB signal enhancement (a forward gain of 9 dB or greater is not uncommon), our 100-W transmitter would be equivalent to an 800-W transmitter connected to a half-wave dipole antenna (no gain with a dipole). We can see from this

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that it would cost less to improve our signal strength with an antenna than to do it at the expense of a big power amplifier. From a moral point of view we would be helping to reduce consumption of precious natural fuel, and the monthly utility bill would be more acceptable! Finally, your signal might end up somewhat louder than the others (when several stations call a particular one) if you are using a gain antenna. This does not mean that the dog-eat-dog concept should be endorsed, but there is a definite advantage in being loud (or louder) in a crowded amateur band when the DX is rolling in! A stronger signal will also help you to *hold* the frequency on which you're having a QSO: Unwanted CQers won't survive long on your frequency if you have a robust signal!

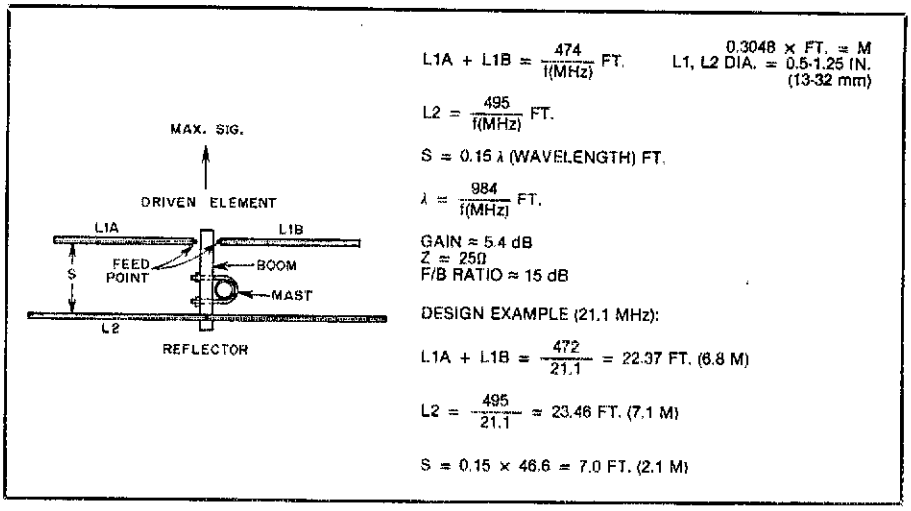


Fig. 1 — Basic design data for a 2-element ht-band Yagi antenna. (Gain figures are theoretical.)

Yagi-Uda Antennas

Perhaps the most common of the amateur gain antennas is the Yagi, which at its inception was known as the Yagi-Uda antenna, named after the Japanese inventors who developed it. Nowadays we hams refer to it simply as a "Yagi." It consists of two or more conductive elements, with the simplest type containing a driven element (radiator) that is one half wavelength long electrically, and a reflector (longer) or director (shorter). Fig. 1 shows one type of simple 2-element Yagi. In this example we find a driven element (split) and a reflector. The term "driven" means that power is fed to it. The reflector is called a "parasitic" element because it is not connected to the rf power source (transmitter). A director is also a parasitic element.

The simple antenna of Fig. 1 is easy to build and will work nicely for DXing on 20, 15 or 10 meters, depending on which band we design it for. The theoretical forward gain with the "S" spacing given will be roughly 5.4 dB. This would be equivalent to increasing the transmitter output power from 100 W to 350 W in the favored direction of the beam!

The various characteristics specified in Fig. 1 depend on the diameter of the beam elements, the spacing "S" and the height of the antenna above ground. For this discussion we will assume that the diameters of the driven element and reflector are between 0.5 and 0.75 in. (13 and 19 mm). However, wire could be used instead of tubing (if supported properly). We could also use tubing that is greater or smaller in diameter than that specified. The conductor cross-sectional area has a direct effect on the electrical length of the elements and on the *bandwidth* of the antenna. The bandwidth is generally thought of in amateur work as the frequency over which the VSWR (voltage standing-wave ratio) is 2:1 or less. The larger the antenna elements are in diameter, the lower the Q (quality factor) of the antenna, and hence the greater the bandwidth. The highest Q would be obtained when using, say, no. 16 wire as opposed to large-diameter tubing. Whatever conductor we may choose to use for the beam elements can be employed satisfactorily. Some experimenting may be necessary, however, to get maximum performance. This can be done by observing a field-strength meter (see "measurements" chapter of the *Handbook*) and adjusting spacing "S" and the element lengths for maximum forward gain from the beam. The dimensions given in Fig. 1 will yield good performance without any adjustments.

Beam Radiation Patterns

All directional antennas exhibit a specific radiation pattern. The approximate pattern for the 2-element Yagi of Fig. 1 when mounted for horizontal polarization is shown in Fig. 2. There are two *significant* lobes. The larger one at the left is in the favored direction of the beam. The rear lobe is shown at the right in Fig. 2. It is much lower in magnitude, which gives us what is known as a *front-to-back ratio*, expressed in decibels. A typical theoretical ratio for a 2-element Yagi that uses a driven element and a reflector is 15 to 16 dB. The spacing "S" (Fig. 1) has a marked effect on the front-to-back ratio.[1] We can envision the pattern shown in Fig. 2 as one we would see if we were directly above the antenna, looking toward ground. We are assuming also that our eyes could see the rf (radio frequency) energy as it was radiated from the antenna.

Very deep nulls are observed directly off the sides of the beam antenna, as indicated in Fig. 2. This gives us what is known as the front-to-side ratio of the beam, based on field-strength measurements that are taken in decibels. It can be seen that maximum rejection takes place off the sides of the antenna, but that approximately 15 dB of rejection is also

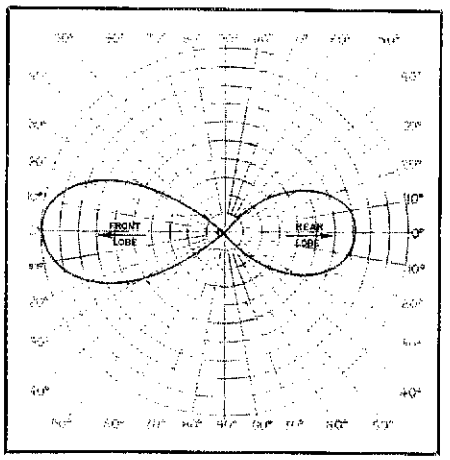


Fig. 2 — Directivity characteristics of a horizontally polarized 2-element Yagi antenna. The major (front) lobe is at the left.

available off the rear of the antenna. These ratio characteristics aid us in rejecting QRM from all directions other than the favored one. Therefore, a beam that had no gain, or even had a loss, would be useful if it had a front-to-back and front-to-side ratio.

Another important radiation characteristic is depicted in Fig. 3. This is known as the *radiation angle*. We are concerned here with the angle at which the lobe leaves the antenna, respective to ground. Since we are bouncing our signal off the ionosphere in an oblique manner to work distant DX, the lower the radiation angle, the greater the distance we can work. This phenomenon is known as "skip." The vertical pattern in Fig. 3 is that of a 2-element Yagi of the type shown in Fig. 1. The height above ground is 1.25 wavelengths. The radiation angle of the main lobe is 12° for the height specified. The rear lobe is approximately the same in degrees. We can also see two *minor* (higher) lobes in Fig. 3. These are useful for working DX that is closer in, depending upon band conditions (propagation) at a given time of the day. These smaller

[1]Notes appear on page 35.

lobes have radiation angles that are between 30° and 40°.

Impedance Matching

The feed point of any antenna has a characteristic *radiation resistance* in ohms. This is referred to commonly as the feed-point impedance. To have maximum transfer of power from the feed line to the driven element we must have a *matched condition*. That is, if the feed point is 50 Ω, we should use a feed line that has a 50-Ω characteristic impedance. If the antenna feed impedance is nonstandard with respect to available types of feed lines, then we must include some type of matching network or device between the antenna feed point and the feed line. This can be done in a number of ways.

Various matching systems for Yagi antennas are described in detail in *The ARRL Antenna Book*. The reader is referred to that publication for tutorial guidance. But, for our immediate interest, we will consider a simple technique that will give us a reasonably close match between 75-Ω coaxial feed line and the antenna of Fig. 1. With the dimensions specified in the diagram we will have an antenna feed impedance of roughly 25 Ω. An easy way to obtain the required 2:1 transformation ratio is to insert a *quarter-wavelength transformer*. If we insert a quarter wavelength of 50-Ω cable between the feed point and a 75-Ω feed line, the system will be closely matched, and the system VSWR will be close to 1:1 (optimum).

Our matching transformer will be cut to a length dictated by the velocity or propagation factor of the cable we use for the transformer. Sections of transmission line that are cut for a particular wavelength dimension will always be shorter than a free-space length for the same frequency. This is because the insulating material in the feed line has a pronounced effect on the electrical length of the line. The matching transformer in Fig. 4 must be 7.69 ft (2.34 m) long for 21.1 MHz (Fig. 1), whereas the free-space dimension for one quarter wavelength would be 11.65 ft (3.55 m). This is because the velocity factor of RG-8/U cable is 0.66. Hence, 0.66 × 11.65 = 7.69 ft, or 7 ft, 8-1/4 in. The 75-Ω line (RG-11/U or RG-59/U) can be any convenient length. RG-58/U can also be used for the matching transformer. The larger coax cables will be best for reduced feed-line losses and high-power operation. The required impedance of the cable used in the matching transformer is determined by:

$$Z_o = \sqrt{Z_r Z_s}$$

where

Z_o = impedance of the cable used in the transformer.
Z_r = antenna feed-point impedance.
Z_s = characteristic impedance of the feed line.

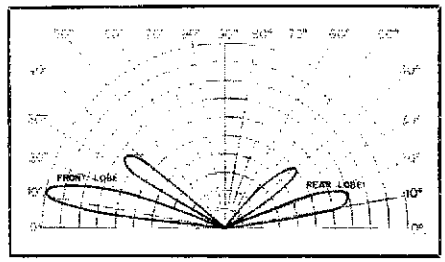


Fig. 3 — Major and minor lobes of a 2-element Yagi showing the radiation angles of the lobes (see text).

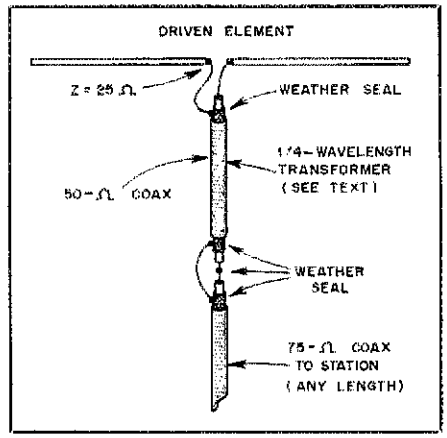


Fig. 4 — Method for using a quarter-wavelength matching transformer between the antenna feed point and the transmission line. The illustration shows how to effect a close match between a 25-Ω antenna and a 75-Ω feed line.

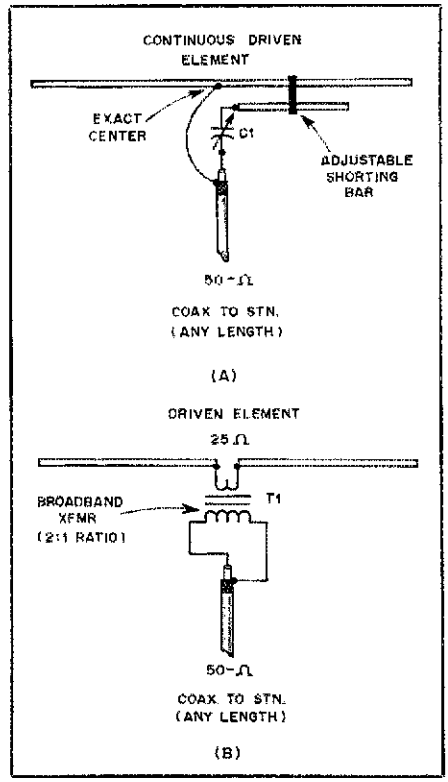


Fig. 5 — A gamma match is shown at A for use with a continuous length of conductor as the driven element. T1 at B is a broadband toroidal transformer that can be used to match 25 Ω to 50 Ω in this example. A split driven element (dipole) is used at B.

From this we find that the calculated impedance of the transformer coax cable is 43.3 Ω, using 25 Ω for Z_r and 75 Ω for Z_s. This will be close enough to the desired 50 Ω to provide a low VSWR. The VSWR can be calculated simply by:

$$VSWR = Z_o/R$$

where

Z_o = impedance of cable used for the transformer.
R = desired impedance of the cable (43.3 Ω).

This yields a VSWR of 1.15:1 on the line, which is entirely acceptable. If we connected a 50-Ω feed line directly to the 25-Ω feed point of the antenna we would have a VSWR of 2:1 as a best-case condition. Although we would probably work plenty of DX with a VSWR this high or slightly higher, we would lose even more transmitter power in the feed line. Furthermore, if our solid-state transmitter contained an SWR protective circuit, the output power would be reduced automatically by that circuit.

Other Matching Schemes

If the driven element in Fig. 1 were not split (continuous length of tubing or wire) we could employ a *gamma match* of the kind shown in Fig. 5A. Its length and the setting of C1 would be adjusted to provide a VSWR of 1:1. Simple formulas for calculating the dimensions of a gamma match are given in *The ARRL Antenna Book*. An alternative matching method is shown at B of Fig. 5. This involves the use of a toroidal broadband 2:1 matching transformer. Recent editions of *The ARRL Radio Amateur's Handbook* contain practical information on broadband-transformer design.

The matching technique illustrated in Fig. 4 requires the use of 75-Ω line to the ham shack. This means that a 50-Ω VSWR indicator will not yield accurate readings, since the line impedance is not right for the VSWR instrument. Transmitters with tubes and a pi network in the final-amplifier section will work fine into 75-Ω line. If the rig has a solid-state final amplifier designed for a 50-Ω load, there will be a slight power loss caused by the SWR-shutdown circuit. This is because when the 75-Ω cable is connected to the 50-Ω termination provided by the transmitter, a VSWR of 1.5:1 will be present. Chapter 19 of the 1981 *Handbook* contains data on building a simple 75-50 Ω broadband transformer that can be used between the VSWR indicator/transmitter and the 75-Ω line to correct the 1.5:1 mismatch condition. It can be used to solve the aforementioned problem.

Adding Yagi Elements

Although our intent in this article is to highlight the simple 2-element Yagi, we should mention the more popular 3-element version of this antenna. What

will an additional parasitic element do for us? Basically, it will improve the front-to-back ratio and increase the forward gain. A beam pattern for a 3-element Yagi (director, driven element and reflector) is shown in Fig. 6. We can see that the back lobe is substantially smaller than that of the 2-element Yagi of Fig. 2. Also, the gain has increased to approximately 7.2 dB over a dipole. This would be like increasing our 100-W transmitter output power to 525 W, but without the aid of an amplifier.

With the antenna represented in Fig. 6 we would use a director-to-driven-element spacing of 0.1 wavelength. The height above ground for the pattern shown would be 0.5 wavelength. The beamwidth remains about the same as when using a 2-element Yagi. At a height of 0.5 wavelength the radiation angle is fairly high — about 28°, but by increasing the antenna height to 1 wavelength it becomes 12°, as is the case with the 2-element Yagi of Fig. 1. This illustrates the importance of antenna height versus DX capability. The spacing between the elements determines the feed-point impedance. With the antenna arranged for maximum gain we will find the feed impedance quite low — on the order of 10 Ω. By trading gain for element spacing we can raise the feed impedance considerably. But, it is better to adjust the Yagi for maximum gain and to use a matching system at the feed point. A gamma match is recommended for use with the 3-element Yagi. The driven element would then be a continuous length of tubing (Fig. 5A).

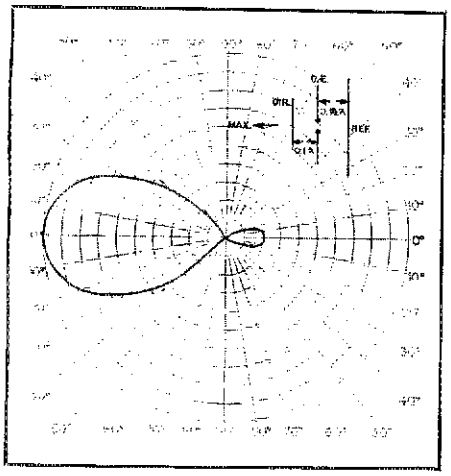


Fig. 6 — Radiation pattern for a 3-element Yagi. Note how much smaller the rear lobe is than that of the 2-element Yagi (Fig. 2). Also, the 3-element beam has greater forward gain than the 2-element one.

Simple 2-Element Yagi

A 2-element Yagi is easy to build and to erect. It is probably the best starting point for that first directional gain antenna. A number of construction methods are available to the builder. For example, one can obtain bamboo fishing poles, put a continuous wrapping of aluminum foil on the bamboo and use these poles as Yagi elements. This was described years ago in amateur literature as a "Catfish Beam." The aluminum foil can be taped firmly at intervals to affix it to the bamboo poles. The foil would of course have to be opened at the center of the driven element. Homemade aluminum clamps can be attached at the feed point (around the foil and poles) to provide a connection to the coax cable. Each clamp would be equipped with a screw, nut and solder lug for this purpose.

Aluminum tubing is expensive and sometimes hard to find. If you don't have a supply of it available, you can use thin-wall steel electrical conduit (aluminum conduit is also manufactured) for the Yagi elements. Of course this material will make the antenna much heavier than an aluminum version, and rust will form on the elements eventually. A coating of spar varnish or polyurethane lacquer can be applied to inhibit oxidation and rusting.

Fig. 7 illustrates a wooden frame we could build to serve as a foundation for tubing or wire Yagi antennas. Wooden elements "C" need not be nearly as long (about 0.33 ×) as the antenna tubing. They can be varnished to prevent deterioration from the weather. The hardware for holding the sections of the frame together can be 1/4-in./20 bolts. Items "B" are ceramic standoff cones. Other types of insulators can be used, such as plastic blocks. The insulating material must be strong enough to sustain the stress imposed by the driven element and director. A 1-in. (25.4-mm) pipe flange can be attached to plate "A" to allow the builder to employ 1-in. diameter water pipe as a mast.

Wire antenna elements can be used for the Yagi if wooden members "C" are as long as the wire elements. The weight of the antenna would be somewhat excessive if this were done, and could prove impractical for operation on 20 or 15 meters. At 10 meters and higher it should be an acceptable technique. For vhf Yagis we could use a single 2 × 2-in. (51 × 51-mm) section of wood as a boom, with 1/4-in. (6.3-mm) diameter tubing for the elements. Yagis with good performance on 144 MHz have been built in this manner by using coat-hanger wire for the antenna elements.[2] An 8- or 10-element 2-meter Yagi can be built inexpensively in this fashion.

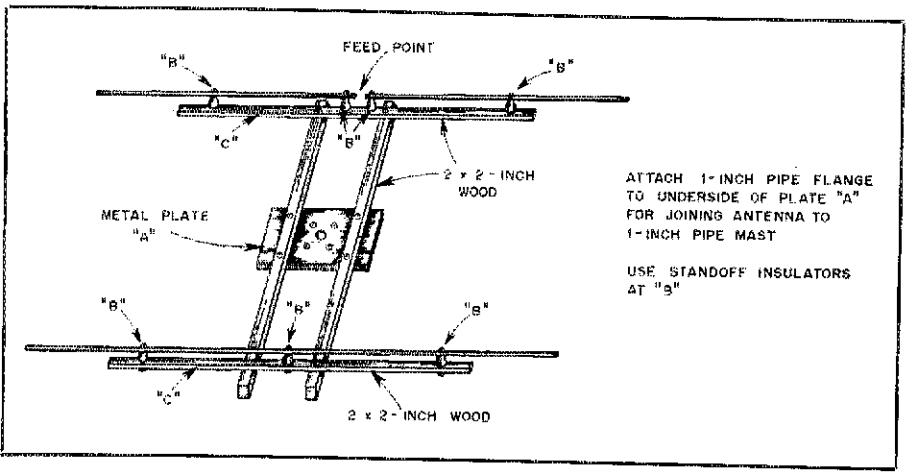


Fig. 7 — Details for building a wooden frame on which to assemble a 2-element Yagi. Readily available, inexpensive materials are specified. Some innovation will improve this design and perhaps reduce the cost. The cone insulators, B, can be replaced by blocks of plastic or phenolic material. Inches × 25.4 = mm.

Some Final Comments

Certainly there are other types of gain antennas we could have described in this article, but space doesn't permit such an in-depth treatment of the general subject. The intention was to present some fundamentals of gain-antenna design and performance.

Those who don't want to build a rotatable Yagi of the type shown in Fig. 7 may choose to construct a 2- or 3-element stationary Yagi from wire. It could be oriented toward Europe, Japan or some other favored direction. Antennas of this type have been used successfully on 160, 80 and 40 meters for many years. There is no reason why they wouldn't work nicely on 20, 15 or 10 meters as well.

The important consideration is to erect whatever type of Yagi we build as high above ground as possible, and well away from nearby conductive objects. An attempt should be made to match the antenna to its feed line to minimize losses and obtain a low VSWR. The DX awaits you, so perhaps now is the time to build your first Yagi!

Notes

[1]See *The ARRL Antenna Book*, chapter 4, 13th edition, for in-depth data on Yagi-antenna element spacing and conductor size.

[2]L. McCoy, W1ICP, "A Five-Element Two-Meter Beam for $1.50," *QST*, Oct. 1962, p. 17.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

TWO-TONE GENERATOR FOR SSB TESTING

☐ A two-tone signal is well suited for quick visual tests of transmitter performance and IMD measurements. The circuit (Fig. 1) combines low parts cost with low distortion (typically 0.2%, which is adequate for our commercial ssb equipment). The output is 0 to 1 V peak to peak, for a 600-Ω load.

The frequency of the Wein bridge oscillator is determined by R1, R2, C1 and C2. Although 1% values are shown, 5% components may be used if the frequency tolerance is not too critical. A Trimpot, R5, serves as a tuning adjustment to compensate for component variations in the oscillator and filter. Other components in the circuit are not critical. A single-tone generator may be built by eliminating the balance control (U2) and associated components.

This generator is made using printed-circuit-board construction. It should be enclosed in a shielded case. The LC networks for the power and output leads are recommended to prevent feedback when high rf fields are present. Often the operating voltage can be obtained from the equipment under test. A battery may be installed in order to make a self-contained unit.

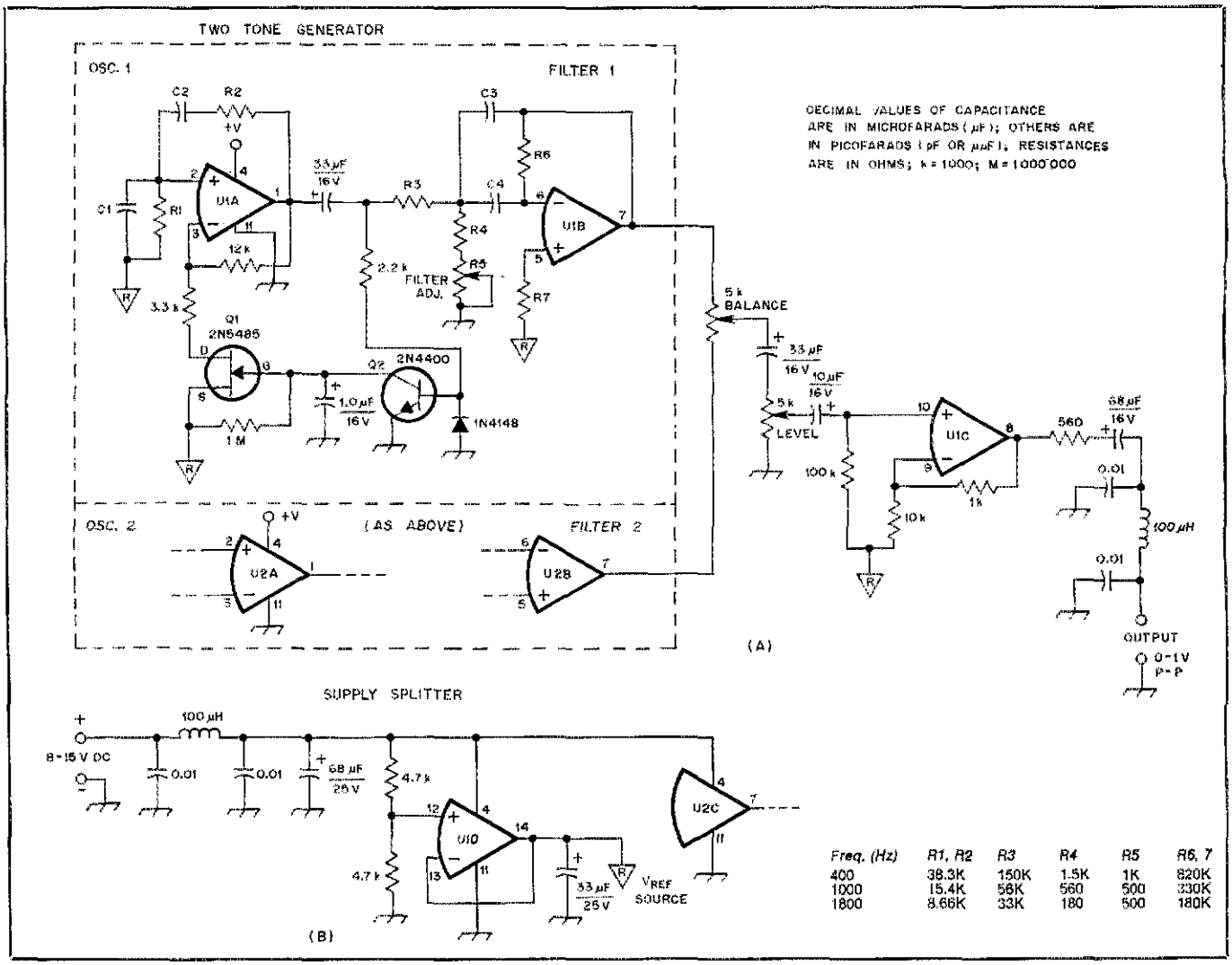
Alignment consists of setting R5 for maximum output of the respective tone. Balance and level controls are adjusted as required. — *Thomas Bavis, Test Engineer, Scientific Radio Systems, Rochester, New York*

*Assistant Technical Editor

A MONITOR FOR COMPUTER-OPERATED RTTY

☐ Being able to monitor the outgoing signal for proper cw i-d is a convenience for the RTTY operator working with a computer. Although a second receiver (with the antenna disconnected) could serve the purpose, I took a hint from Tony Toulis, KI4X, and decided to mount a small monitor circuit inside my Crown ROM-116 RTTY/CW Operating System. He obtained the idea from another amateur.

My monitor is the result of the basic plan Tony showed me when I visited his shack. Added to this is the technical assistance of Jim Sladek, WB4UBD. The circuit (Fig. 2) consists of a standard NE555 oscillator mounted on a small, ready-made circuit board obtained from Radio Shack. Since there is ample room inside the ROM-116 cabinet, location of the monitor can be a builder's choice. A tiny speaker, driven by the NE555, can be mounted on the inside back wall of the ROM-116 enclosure: I placed mine over an empty slot, conveniently left there by the manufacturer. An ON-OFF



Freq. (Hz)	R1, R2	R3	R4	R5	R6, 7
400	38.3K	150K	1.5K	1K	820K
1000	15.4K	56K	560	500	330K
1800	8.66K	33K	180	500	180K

Fig. 1 — A two-tone signal generator for quick visual checks of transmitter performance and IMD measurements. Part B of the drawing shows how the supply voltage is split and includes additional filtering. Resistance values are in ohms and are 1/4 watt. More-precise indications can be obtained with 1% resistances, but 5% resistors are satisfactory. U1 and U2 are LM348 or MC4741 ICs. C1-C4 are 0.01 μF and may be either 1% or 2% (Mylar or P.C.). A frequency/resistance chart is included with the drawing.

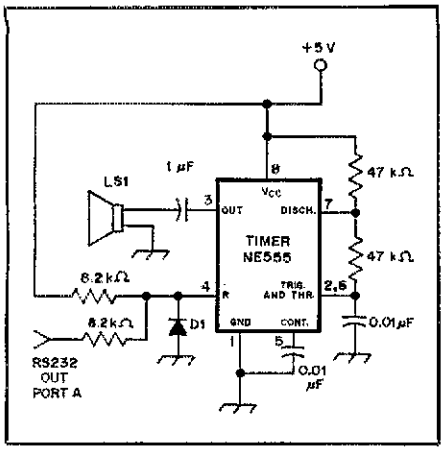


Fig. 2 — This simple circuit, built around an NE555 timer, may be added to an ROM-116 for monitoring the output.

switch for the speaker can be placed on the front panel. The operating voltage (+5 V) may be taken from the ROM-116. Input signals come from the RS-232 terminal point Port A, not the DB-25 connector. The extra LED on the front panel, used for cw, flashes as the RTTY signal is transmitted, as described on page 45 of the operating manual. — *Gay E. Milius, W4UG, Virginia Beach, Virginia*

DIRECT-CONVERSION RECEIVER HUM

☐ Ac supply hum in direct-conversion receivers is not uncommon. Wes Hayward described it as local-oscillator energy mixing with 60-Hz energy in the power-supply diodes, and reradiating at the local-oscillator frequency with mixer products.[1] He suggests a bifilar choke in the power supply leads to the direct conversion receiver. Lack of a suitable ferrite toroid in the junk box prevented me from trying this solution.

Douglas Kohl suggests for a receiver very sensitive to noise[2] that bypassing the power-supply diodes is necessary to eliminate noise from this source. He uses a 0.1-µF capacitor placed directly across each diode.

Each of the three power supplies in my shack produced a similar hum problem. Bypassing the rectifier diodes with 0.01µF capacitors cured the problem in each case.

My direct-conversion receiver is an 80-meter version of the W7EL transceiver. I also found that I had to bypass the diodes in the power supply of a K1LBH keyboard connected to this unit. — *Joel R. Anderson, N1JA, Old Saybrook, Connecticut*

GO TO MARS ON THE ICOM IC-2A

☐ The new ICOM IC-2A, in my opinion, is one of the best 2-meter, hand-held-transceiver buys on the market today. An investment of 15 minutes of your time can provide an extra bonus for the 2A, an advantage especially for MARS members.

As designed, the ICOM IC-2A is limited to the regular amateur band (144 to 148 MHz) even though the thumbwheel switch may lead you to believe otherwise. This limitation, provided by the manufacturer, is accomplished by strapping the binary 4 output on the thumbwheel switch to V_{cc} and by opening the binary 8 output to the PLL chip of the same section.

To modify the set, begin by removing the battery pack, exposing the metal battery mounting clip at the bottom of the unit. Take the clip off by unscrewing the four outer screws. The back cover is removed by unscrewing the two recessed smaller screws along the outer edges. Pull the cover down and away from the radio. Next, pull the front cover down and slightly away from the frame. Be careful not to strain the connecting wires going to the front. See Fig. 3.

Closely observe how the black push-to-talk lever fits into the case parts. You will need to remember the arrangement when you reassemble the radio. The next step is to look into the front side of the frame at the area just below the thumbwheel switches. Find a brown wire jumper connected between two sets of switch contacts. Carefully clip this from the circuit. *Do not disturb* the green wire that shares a common contact with the brown jumper. It may be easier for you to reach the lower contact by removing the two screws on the side of the frame. The two pc boards may now be spread apart by opening them like a book. Your IC-2A is ready to operate below 144 MHz.

Now, turn the radio over to the back or PL side. You will see a flexible circuit board that goes to an integrated circuit in the lower-middle, left-hand side. Solder across a gap in the foil on the bottom set of contacts. This contact is at the lower center of the chip and is the fifth, or last, away from the frame. The radio will now perform above 148 MHz.

As you reassemble the radio, insert the push-to-talk lever halfway into the front case. Slide the top edge of both the front and back case into the frame and bring the bottom together. Make sure both case parts fit tightly together against the radio top. Your IC-2A will now operate from about 141.50 MHz to 149.995 MHz. My unit, with 2-W output at 146 MHz, still puts out over 1 W at both frequency extremes. The receiver sensitivity holds almost constant throughout the range.

Offering a transmitter offset for the MARS repeaters is beyond the scope of this easy conversion. Working into repeaters on simplex with some fast thumbwheel switch work is possible. I use my IC-2A to listen to MARS activity while I am away from the big rig. I find this MARS conversion is well worth the time spent. — *Larry Waggoner, AFB3FP/WØKA, Wichita, Kansas*

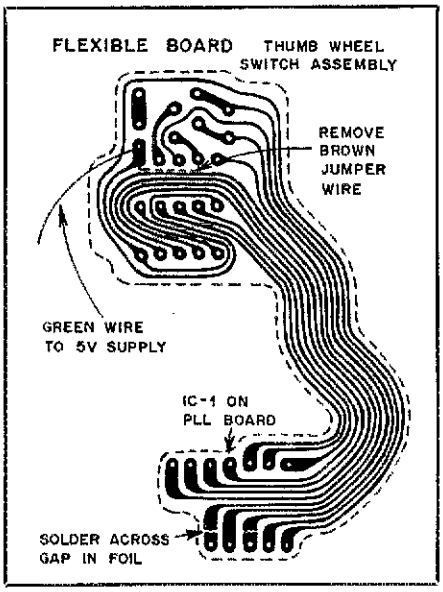


Fig. 3 — This foil-side view of the IC-2A transceiver circuit board shows the location of the few simple changes that enable the 2A to operate on the MARS frequencies. It takes about 15 minutes to make the modification according to Larry Waggoner, WØKA, who provides the details in the accompanying text.

FASTER AGC ACTION FOR THE DELTA 580

☐ The new Ten-Tec Delta 580 has a very slow "hang" age circuit that works well on ssb. On cw, however, no provision has been made to disable the age. As a result, when receiving strong cw signals, the initial character received is uncomfortably loud before the age can take hold. The age decay time is also very slow. Consequently, in net QSK operation where weak and strong stations are mixed, the age holds down the weaker stations.

My solution to the problem is simple. Install a miniature toggle switch through the rear of the set. Connect a small 5000-Ω potentiometer in series with the switch, with one end of the potentiometer wired to chassis ground. This combination is then in parallel with the 3.9-MΩ age resistor (R12) on the detector/age board. The potentiometer can be adjusted to prevent overloading on strong signals. This arrangement will provide very fast, but reduced, age action for excellent cw reception without the initial blast from strong signals. See Fig. 4. By opening the switch, you have the original operation on ssb. — *Ced Justis, W3QQ, Newport, Delaware* QST

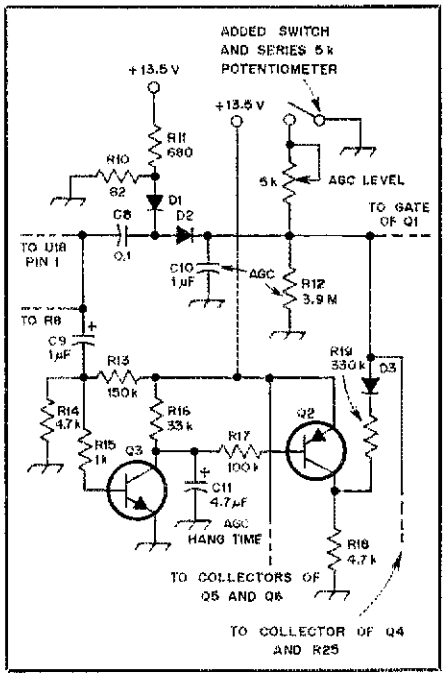


Fig. 4 — By adding a small toggle switch and a 5000-Ω potentiometer to the Ten-Tec Delta 580, the "hang" time can be shortened for better cw operation. Resistance values are in ohms. Component designations, except for the modification, are those of the manufacturer.

[1] W. Hayward, "Common Mode Hum in Direct-Conversion Receivers," QST, July 1977, p. 51.
[2] D. Kohl, "The Amateur Scientist," *Scientific American*, Sept. 1980, p. 232.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu FRG-7700 Communications Receiver

The general-coverage communications receiver has always been a welcome addition to the ham shack. Depending on your operating habits and interests, such an addition might be looked on as a luxury or necessity. Though many of the older receivers are still performing "yeoman service" today, you might admit they are large, power-hogging heavyweights with faces only a radio enthusiast could love. In contrast, today's general-coverage receiver is compact, lightweight and perhaps attractive enough to occupy a place in the family living room. The Yaesu FRG-7700 fits the latter description.

General Description

Yaesu's '7700 is an ac-operated, dual-conversion, PLL frequency-synthesized receiver, that permits reception over the range of 150 kHz to 30 MHz in thirty 1-MHz bands. Ten 1-MHz bands on one sector of the BAND switch are assigned specifically for coverage of the hf amateur frequencies, while another sector of the switch has all 30 positions. This feature eliminates needless stepping of the BAND switch should the operator be interested in listening only to the amateur frequencies at a given time.

The optional 12-channel memory unit (MU-7700) was supplied with the review unit. This option easily and quickly installs on the rear panel of the receiver; it is a useful accessory. Particular frequencies on any band of operation may be stored and recalled by the push of a button without the need to index the BAND switch no matter what the frequency difference is between that to which the receiver is tuned and the memorized frequency. A ±1 kHz FINE tuning control permits the memorized frequency to be "rubbered." Unfortunately, no fine tuning or BFO control exists for VFO operation. A readily accessible three-cell battery clip (batteries not supplied) provides memory-unit backup when the receiver power is turned off or disconnected from the line.

Controls and Features

Front panel layout is attractive and the controls are well placed. Two pairs of concentric controls exist: AF GAIN/TONE and MEMORY FINE/SQUELCH. Square and rectangular brushed aluminum push buttons are used for many other functions.

A 12-hour clock with A.M. and P.M. indicators and a 59-minute sleep timer is built in. The clock may be programmed and set from the front panel push-button switches and used to turn the '7700 on and off. The FUNCTION switch determines whether the digital readout displays the received frequency or one of the several clock functions. A DIM push button reduces the illumination of the S meter and both the analog and digital dials. Beneath the front-panel-mounted speaker and adjacent to the POWER switch are a 1/4-inch (6.4-mm) PHONES jack and a miniature RECord jack (used

Yaesu FRG-7700 Communications Receiver Serial No. OMO314224

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 150 kHz-30 MHz.	As specified plus 50-kHz overlap at high and low band edges.
Modes of reception: A-m, ssb, cw, fm.	As specified.
Frequency readout: Analog and digital; 5-digit, orange LED digital display.	0.3-in. (8-mm) digits.
Resolution: Analog, 10 kHz; digital, 1 kHz.	As specified.
KHz/turn of knob: Not specified.	38
Backlash: Not specified.	Nil
RIT range: ±1 kHz with optional memory unit.	As specified.
Attenuators: Rear panel, switchable 20 dB; front panel, continuously variable.	Rear panel, 26 dB; front panel, as specified.
S-meter sensitivity (μV/S9): Not specified.	2000 m, 1500; 160 m, 660; 80 m, 24; 40 m, 27; 30 m, 37; 20 m, 40; 17 m, 49; 15 m 66; 12 m, 66; 12 m, 68; 11 m 80; 10 m 100.
DB/S unit: Not specified.	Variable from 1 to 6 dB from S1 to S9; each 20-dB step above S9 measured 10 dB.
Receiver sensitivity (μV/50Ω), 2-30 MHz: A-m, 5; ssb/cw, 0.5; fm, 1.	Receiver dynamics measured with 2.7-kHz ssb/cw filter. No narrow bandwidth cw filter available.

	80 M	*20 M*
Noise floor (MDS) dBm:	−126	−114
Blocking DR (dB):	noise limited	noise limited
Two-tone 3rd order IMD DR (dB):	75	82
Third-order input intercept (dB):	−13.5	9

Audio power output (8-ohm load): 1.5 W, 1.1 W.
Frequency stability: < ±1 kHz from 1-30 min. after power applied; < ±300 Hz after 30 min. warm-up. 600 Hz from a cold start to one hour later.
Power requirements: 100/120/220/240 V ac, 50/60 Hz, 39 VA with memory unit.
Size (HWD): 5 × 13 × 8.9 inches (129 × 334 × 225 mm).
Weight: 13.2 lb (6 kg).
Color: Gold-brown.

*Assistant Technical Editor

for tape recording received stations). The output level of the RECord jack is fixed and unaffected by the position of the AF GAIN control.

The rear panel supports a 3-prong male ac socket (the line cord is detachable), ac operating voltage selection switch, fuse holder and EXTernal SPeaker jack (miniature type). Two phono jacks provide access to a set of internal relay contacts. An SO-239 coaxial antenna connector; the fixed, switchable ATTenuator (also labeled DX/LOCAL); a 5-pin DIN jack for ACCessory connections (two for antenna attachment, one for a ground wire and another connected to the receiver muting line) are also on the rear deck.

Circuit Description

Incoming signals are either routed around or through the fixed, switchable front-end attenuator. It then passes through an L-C low-pass filter and through one of six diode-switched band-pass filters before reaching the rf amplifier. Up-conversion to 48 MHz takes place in the first mixer. The signal is then passed to the first i-f crystal filter, which has a 20-kHz bandwidth. The signal proceeds to the second mixer for conversion to the second i-f of 455 kHz. A 20-kHz-wide ceramic i-f filter, noise blanker circuitry and switch-selected ceramic filters for the different modes are next in line. A-m selectivity positions of 12, 6 and 2.7 kHz are provided with 2.7 kHz being used for ssb and cw reception. For fm signals, a 15-kHz-wide filter is used. The signal is then demodulated, amplified and passed on to the audio chain.

Operational Comments

While the 38-kHz-per-turn tuning rate of the VFO is somewhat rapid, it is manageable. I found the analog dial to be somewhat superfluous with its 10-kHz increments, and noted the skirt could easily be knocked out of calibration by a hasty hand on the tuning knob. The addition of a BFO or fine-tuning control would be an asset. Since the BFO frequency is not counted in the mixing scheme, a frequency readout error of 1 kHz on usb and 2 kHz on lsb (as read from the display) exists when zero beating a particular frequency.

A number of "birdies" were noted, primarily on 10 meters. Most of them were weak, and none was strong enough to cause deflection of the S meter. I also heard quite a few weak RTTY "signals" (images), which appeared to populate the 10- and 12-meter bands during operation from a suburban location. A trap tribander and 40-meter, half-wave sloping dipole were used for antennas.

The age time constant may be switched between FAST and SLOW, but no OFF position is provided. Some age popping occurs, but I did not find it to be annoying. Noise-blanker action appeared to be ineffective against most types of noise encountered.

Overall mechanical and electrical stability is very good. There's lots of audio power available, and the quality of the recovered audio while using the built-in speaker did not leave me wanting. It's too bad the manufacturers of general-coverage receivers haven't recognized the desire many prospective buyers have for owning a receiver that has a 24-hour clock instead of the 12-hour types being supplied presently.

A capacitively coupled antenna input circuit is used. Thus, there is no dc discharge path to ground for antenna static build up.

The fm reception capabilities of the '7700 should be an attraction to many who might like to copy the ever-growing number of fm stations on 10 meters. Also, by placing a converter ahead of the '7700, you can extend your listening range into the vhf spectrum. The SQUELCH control operates only in the fm mode.

The rear panel has a rectangular plug fitted over a hole, above which a DC label appears. Though the manual makes no mention of this and the plug and label cannot be seen in the rear-panel photograph, a 12-V dc option is available from Yaesu. Many prospective purchasers, I'm sure, will want to add this low-cost feature. The unit certainly is designed for going places, with the built-in carrying handle and feet mounted on opposite ends of the cabinet.

I'm sure a number of amateurs and SWLers will be adding the FRG-7700 to their "desirables" list. The FRG-7700 is manufactured by the Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723. Price class: *$550; dc kit, $6; MU-7700, $150. — Paul K. Pagel, NIFB*

THE RADIO SHACK DX-302

☐ This synthesized, triple-conversion, general-coverage receiver is designed to receive cw, a-m and ssb signals at frequencies from 10 kHz to 30 MHz. The '302 will operate from 117-volt house current or from a 12-volt supply. An external 12-volt supply may be used or eight C-size batteries may be installed internally. Should the ac power fail, the internal battery supply will be switched in automatically.

Front panel controls include: PRESELECTOR BAND, PRESELECTOR TUNE, BFO PITCH, RF GAIN, VOLUME, MODE, WIDE/NARROW SELECTIVITY, 0-20-40 dB ATTENUATOR, LIGHT/BATTERY TEST and MAIN TUNING. A PRESELECTOR tuning dial, signal strength and battery meter, phones jack and five-digit frequency display complete the layout. At the rear of the receiver is the access door for the battery compartment, an EXTERNAL SPEAKER jack, a TAPE OUT jack for interconnection with a tape recorder, and a KEY jack. With the proper control setting, the receiver may be used as a Morse code practice oscillator! An SO-239 connector is provided for use with antennas exhibiting a 50- to 75-ohm impedance. A terminal strip is used for mute, ground and single-wire antenna connections. The ac line cord, fuse holder and 12-volt external dc supply jack are also mounted on the rear panel.

"Kenwood R-1000 General Coverage Receiver," Product Review, *QST*, Dec. 1980, pp. 46-47.

Frequency Selection and Display

Tuning in a station with the '302 is different from most receivers — except for its predecessor, the DX-300. The PRESELECTOR BAND switch is first to set to the band of interest. Then, the PRESELECTOR TUNE is adjusted to the approximate frequency of the desired signal (it never gave a very definite peak). Next, the main tuning control comes into play. It consists of two concentric knobs, an outer MHZ knob and an inner KHZ knob. By means of the outer knob, the synthesizer is incremented in 1-MHz steps, and the inner knob tunes the receiver within the 1-MHz block you have chosen. The tuning rate of the inner knob is approximately 65 kHz per revolution. The outer knob does not have a positive detent, and the adjustment is critical. Sometimes the proper position was found at a point just on the edge of synthesizer lock.

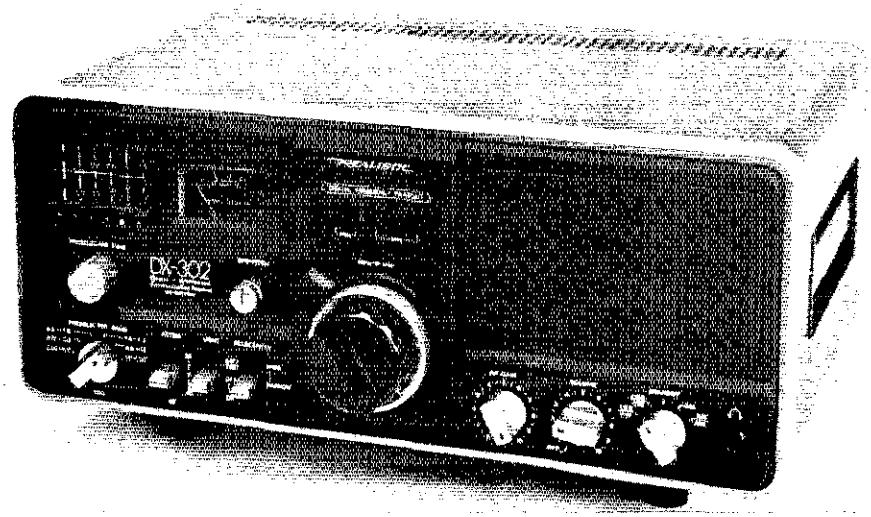
The BFO is not accounted for in the frequency-mixing scheme. When it is used, the displayed frequency differs from the actual received frequency by 2 kHz. Therefore, when receiving lsb signals, 2 kHz must be added to the displayed frequency and subtracted when receiving usb signals.

Operational Notes

The nonswitchable age time constant is fast, but "comfortable." Received audio was found to be somewhat unpleasant because of distortion, but not unduly so. The '302 overloads in the presence of strong signals. While using the receiver coupled to a 5-foot (1.5-m) long indoor antenna (five blocks away from W1AW), the station made its presence known even when it was not tuned in. On the 10-meter band, W1AW was heard as far as 200 kHz away from its actual operating frequency. Interestingly enough, the tuned-in signal registered only 25 dB over S9, which indicated the meter to be somewhat unresponsive.

Receiver "birdies" were found throughout the range of the '302. Usually a "birdie" could be eliminated by careful tweaking of the MHZ knob. Two exceptions worth noting occurred at 910 and 1000 kHz. The instruction manual mentions these responses and states that they are normal because of the Wadley Loop synthesizer circuit used in the receiver.

Use of the high-impedance antenna input is recommended by the manufacturer for long-



Radio Shack DX-302 Receiver Serial No. 000281

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 10 kHz-30 MHz, continuous.	As specified.
Modes of operation: Ssb/cw/a-m.	As specified.
Readout: Digital, five 7-segment LEDs.	Red 0.5-inch (12.8-mm) digits.
Resolution: 1 kHz	As specified.
KHz/turn of knob: Not specified.	65
Backlash: Not specified.	Nil.
Agc auto/man. selected: Not specified.	No.
BFO range: ±1 kHz.	As specified.
Receiver attenuator: 0-20-40 dB.	As specified.
S-meter sensitivity (μV/S9): Not specified.	80 m, 50; 40 m, 50; 20 m, 50; 15 m, 110; 10 m, 175.
Receiver birdies/spurs: Not specified.	Multiple, each segment: None registers on meter.
Receiver sensitivity: Ssb, 0.03 μV for 10-dB S/N.	Noise floor (MDS) dBm: *80 M* –129, *20 M* –127 Blocking DR (dB): Not measurable. Two-tone third-order IMD DR (dB): *80 M* 37, *20 M* 52 Third-order input intercept (dB): *80 M* –71.5, *20 M* –49
Audio power output (8-ohm load): 0.8 watts.	As specified.
Audio quality: Not specified.	Fair.
Power requirements: Ac — 120 volts 60 Hz, (220/240 volts 50 Hz for European/Australian models).	
Dc — 8 "C" cells or external 12-V supply, negative ground only.	As specified.
Power consumption: 120 V, 15 W; 12 V dc, 8 W.	
Frequency stability: Within 1 kHz during the first hour after 60 min. of warm-up; within 2 kHz during 10 min. after initial turn-on.	Within 4.55 kHz from cold start to one hour later.
Size (HWD): 6 × 14.5 × 10 in. (146 × 362 × 254 mm).	
Weight: 13.2 lb (6 kg).	
Color: Black.	

wave reception. Some beacons were heard in that range, but local QRN ruled out the possibility of any DXing.

The DX-302 is suitable for *casual* listening on the amateur bands. It comes supplied with a telescoping whip antenna and a 30-foot (9-m) wire antenna. While not technically oriented, the instruction manual adequately introduces the owner to the operation of the receiver and the wonders of shortwave listening and Amateur Radio. The DX-302 is manufactured by Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102. Price class: $400. — *Bruce Kampe, WA1POI*

THE AEA MORSE MEMORY KEYER MODEL CK-1

☐ It is difficult not to use words like "amazing" and "impressive" in describing this compact electronic keyer. A few minutes spent with it will just begin to uncover its unusual flexibility. It takes some familiarity to tease the most out of the nearly shirt-pocket-size device, but the excellent instruction manual does a fine job of making you feel right at home with it.

Many features of the CK-1 have been designed for the dedicated cw operator. They include an extremely versatile memory-load and edit capability, automatic serial numbering, rapid cw speed changes and full weighting control.

The front panel of the CK-1 is little larger than the key pad that is used to call up each of the features. There are two other controls: a top-mounted power ON/VOLUME (sidetone) control and a memory-load switch on the left side.

Speed Change and Adjustment

At turn-on, the keyer has set into it two speeds, 20 and 30 wpm. Either of these speeds may be called up by pressing two buttons for each speed. If these speeds are not desired, any speed from 1 to 99 wpm may be inserted in the two preset speed positions. A variable speed feature provides speed selection within the above range of speeds. Alternating dots and dashes are automatically sent during the change to advise the operator of the increasing or decreasing speed.

Sidetone Change

The starting sidetone frequency is set at 500 Hz. The pitch may be lowered or raised through a range of approximately 50 tones. It would be difficult not to find a tone to please the most finicky operator.

Automatic, Semiautomatic and Iambic Operation

Here I had a little fun. When first turned on, the keyer is set for automatic, iambic operation. The keyer may be set for "bug" operation by pressing three keys. The exclusive use of a keyer for more than 20 years has reduced me to a "fumble fingers" when attempting to use a "bug." However, the instruction manual says one may set up for "bug" operation and put a message in memory. The keyer will revert to automatic operation when the message is sent from that memory. Deciding that a real test was in the making, I keyed in a message, very poorly. When it was sent by the memory, out came perfect cw, in no way resembling the poor job done in storing the message. Ah, there's hope for all! More about the message memories in a moment.

Iambic keying fans haven't been forgotten either. A dash may be inserted in a string of dots, and similarly, a dot may be inserted in a string of dashes. If one chooses, these memories may be disabled.

Dot-Space, Dash-Space Ratios

Though it might not be apparent from listening to some of the signals on the bands, good cw is supposed to be formed by making a dot equal to the space between parts of characters, and a dash equal to three dots. Therefore, a dash is equal to three intra-character spaces. In the CK-1 these dot-space and dash-space ratios may be tailored to suit individual preferences, though why anyone would wish to use any spacing other than the perfect (and *correct*) 1 to 3 ratio is difficult to understand. The dot-space ratio (normally at 1.0) is adjustable from 0.5 to 1.5. The dash-space ratio, initially at 3.0, may be adjusted between 2.0 and 4.0. In other words, one may select short or long dots, and short or long dashes.

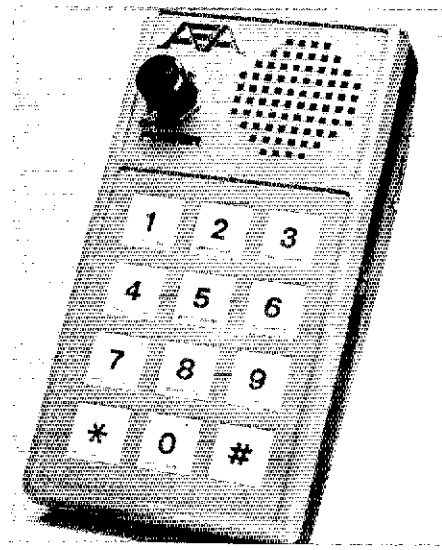
Transmitter Tuning and Message Memories

The * and 5 keys place the CK-1 in a key-down condition that may be used to turn one's transmitter on for tuning. Touching any key pad or the paddle terminates the tune procedure.

The CK-1 has an approximately 500-character memory, which may be divided up into 10 random-length memories. This is known as "soft partitioning." Actual memory length depends upon the length of stored characters, the number of pauses and the length of each pause. The memory length of each message location is adjusted automatically during loading.

Real-time memory loading or automatic character and word-space loading may be selected. In real-time loading, all pauses will be recorded. The keyer powers up in automatic memory mode. In this mode a pause longer than two space lengths records a character space. A pause longer than five space lengths records a word space. At this point, loading stops until the next character is sent.

Maintenance of the memories requires constant application of the 12-volt power source.



If power is removed, or momentarily interrupted, all memories will be dumped. In testing the CK1 at W1SE it was found that just turning the VOLUME control to its lowest point was sufficient to dump the memories. The manufacturer offered the explanation that the power switch actually starts to open at the point of lowest volume, well before the "click" of the switch is audible. He suggested wiring across the switch. This was done with a 1/2-inch (13-mm) length of wire. Now, no more inadvertent memory dumps. Actually, the CK-1 is designed to be left on continuously, and has been for many months at W1SE. To erase one of the memory locations requires only that one switch to MEMORY LOAD, press the number of that memory and the pound sign, #. Random characters appear in each memory when the keyer is first turned on. These should be erased by the technique mentioned above, before loading is begun.

Automatic Serial Numbering

Tailor-made for the contester, the automatic serial-number function alone is probably worth the price of the keyer. The keyer will automatically increment from 01 to 9999, or it can be started at any number one may choose. The serial number may be inserted anywhere in a message, to appear as many times as one selects, and it also may be repeated upon demand. Once the memories are loaded, the touch of only one button at the desired memory location is required to send a message from a memory containing a serial number. This remarkable keyer has even more features, including editing, extra word and character spaces, and a "memory full" warning.

In the past several months of operation at W1SE, only one problem arose, and the manufacturer advises that this problem has been solved. He had been supplied about 50 faulty 0.01 μF capacitors. Most never made it out of the plant, but one of them was in the keyer reviewed. The capacitor was replaced with a new one supplied by the manufacturer. He tells me that all keyers that fail as a result of this capacitor will be repaired free of charge.

The capacitor is located on the bottom-right side of the circuit board. It is across the paddle dash input line. Failure of the capacitor is evidenced by continuous dashes from the keyer.

The CK-1 is manufactured by Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Price class: $130; AC-2 power supply, $10. — *Lee Aurick, W1SE*

HAL MESSAGE STORAGE OPTION

☐ The folks at HAL have come up with a new addition to their line of sophisticated gear, aimed primarily at the RTTY/ASCII gang. The MSO-3100 Message Storage Option, a factory installed accessory for their DS-3100 ASR terminal,[2] will provide more than 32,000 characters (approximately 450 lines) of additional memory. The MSO-3100 was designed with Electronic Mailbox operation in mind.

Messages may be stored in the MSO in variable-length files with passwords for security if desired. The contents of a file may be accessed locally or remotely, read on the DS-3100 screen, or printed out on an external printer. A directory is available that gives a complete listing of all your files and the level of security for each, and lets you know how much file space has been used and how much is still available. When a file is deleted, the remaining files are compressed so that all the remaining space is in one block.

Once the MSO is activated, a valid command in the receive buffer of the DS-3100 will be obeyed. Thus, it may be inserted by typing it on the DS-3100 keyboard and transferring it to the receive buffer, from another keyboard or tape locally, or by a signal received from a remote station. Just a few commands are necessary to operate the MSO, and a couple of hours of experimentation will show just how simple and versatile it is. First, the DS-3100 is set in the "MSO Enable" mode. Now, a simple letter-group command, such as MSOWPR, indexed to the left margin in the receive buffer, will activate the MSO. The DS-3100 has a real-time clock, so the correct time and date should be entered. Each file will carry both the time and date it was originated and that it is read. A valid command must be indexed to the left margin and consists of a period (.) followed by the command and file name and "Newline" symbol. For example, to store your brag tape into the file, simply type ".Write Brag" and hit the "Newline". Then copy your tape into the buffer and at its conclusion type "Newline" followed by "Endfile" and "Newline" again. Your brag tape is now in the file and the terminal will tell you how many bytes were used and how many remain. If you want to see your file, ".Read Brag" will show it on the receive portion of the screen. ".Send Brag" will transfer it to the transmit buffer ready to be sent on the air. ".Delete Brag" will delete the file and the terminal will again tell you how much space is left. ".Exit" will return the MSO to ENABLE status. Other commands allow you to control relays, read the full directory or a shortened version of it, print a couple lines of RY,*U (the ASCII equivalent of RY), or "The Quick Brown Fox." ".Help" and ".Filehelp" commands will bring assistance if you run into a problem.

The basis of Electronic Mailbox operation is that you leave your receiver and copying equipment on while the station is otherwise unattended. With the use of the AUTOSTART and SELCAL features of your terminal unit and DS-3100, stations knowing your MSO Enable code may activate your MSO and store messages in your files. Later, when you (or another control operator) are present, stations may call in and access whatever files they are interested in. Since you, as control operator, are responsible for the proper operation of your station, you want to be able to screen the files to prevent transmission of any illegal files. These could be in the form of "commercial" messages or messages involving third parties with countries with which we do not have third-party agreements. Thus the file security provisions of the MSO are very important. The "Brag" file we entered was an "Open" file. It could be copied by anyone or deleted by anyone having access to the MSO. The second level of security is the "Read" status. "Brag/Bill" could be copied by anyone, but only a person knowing the password "Bill" would be able to delete the file. Two passwords give a file "Private" status. Thus, "Brag/Bill/Mike" could be copied only by someone using either password and deleted only by someone using the first. If someone attempts to copy or delete a file without the proper password, the MSO merely prints out "File is protected". A directory listing is available in a full form listing all the files, the length of each, its password status, and date and time of origin; or in a short form listing just the file names and password status.

A couple of questions come to mind. What happens if another station enters a file with passwords without telling me what they are? The MSO has thought of this! When you enter the directory from the DS-3100 keyboard all the files are listed, along with their passwords. Well, then, what's to keep somebody from accessing the directory and finding the passwords and copying or deleting a file against my wishes? Again, the MSO is a jump ahead. When a remote input activates the directory, the passwords are omitted. There is another possibility. Suppose you find a "Private" message listed in your directory but with no passwords listed? This is the result of using a string of spaces as the password, and the file may be copied or deleted as appropriate by a similar string, or by "Brag//".

While transmission to and from another station on the air must be carried on at the data rate of the mode being used, usually 45-baud RTTY or 110-baud ASCII on the hf bands, local operations such as accessing the directory or reading a file may be done at computer speed. The MSO may also be used for cw operation by using the symbol $\overline{BT}$ in place of "Newline".

The MSO-3100 is available only as a factory installed option. Price class: $600. Manufacturer: HAL Communications Corp., Box 365, Urbana, IL 61801. — *Charles R. Bender, W1WPR*

K5SMG CODE PRACTICE TAPES

☐ The prospective Amateur Radio operator of today frequently asks how licensed amateurs learned the Morse code. Many attended classes and had Elmers to help them or they might have found assistance within the few home study courses available to them. The latter area is where the K5SMG code tapes enter the picture.

If you are in the market for beginner code practice cassettes, you might want to focus your attention on John Tarvin's course. This set of two 90-minute cassettes introduces the alphabet and numbers in Morse code at a rate of 2.5 wpm. This speed sounds slow (and it is). Tarvin uses what he calls the HI/LOW system to emphasize character sound recognition, however. The dots and dashes of each character are sent at the rate of 15 wpm, but each letter or number is equally spaced to the 2.5-wpm speed.

The teaching method can cause confusion to beginners at times, since they would try to group similar sounding letters together and the randomly sent code practice sometimes goes on seemingly indefinitely, with few breaks to review what was just learned.

Outside of that, there are a lot of pluses. Since the code is randomly sent, one cannot memorize the text. A check list, as well as an introductory sheet that briefly explains the purpose of the course and provides helpful studying tips, accompanies the course. All the cassettes are first-generation duplicates for the best signal-to-noise performance, and the code is computer generated.

Once you learn the code and want to increase your speed of reception, K5SMG offers a complete line of upgrading practice cassettes with speeds to 50 wpm. Each is priced at $5.95. A free catalog can be obtained by writing to John Tarvin, K5SMG, 14480 Shadowlane Ct., Morgan Hill, CA 95037. — *Maureen Thompson, KA1DYZ*

[2]"Product Review," *QST*, April 1980, p. 49.

Technical Correspondence

Conducted By
Gerald L. Hall,* K1TD

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

THE ULTIMATE VS. THE SPC TRANSMATCH

☐ In the March 1981 issues of both *QST*[1] and *WorldRadio News*, Lew McCoy, W1ICP, has directed unwarranted criticism toward the 1981 ARRL *Handbook* and recent issues of *QST*. The criticism concerns the Ultimate Transmatch, DeMaw's SPC Transmatch, T networks, a link-coupled balanced antenna matching network and other topics. McCoy's critical remarks cannot go unchallenged because they are technically incorrect.

In *QST* McCoy claims that, with the dual-section capacitor in the Ultimate Transmatch,[2,3] the capacitor section in shunt with the input provides 10 dB of second-harmonic rejection. He also claims that, without the shunt capacitor, the remaining T network has little or no rejection.

The schematic diagram of the Ultimate Transmatch is shown in Fig. 1, with its customary dual-section capacitor connected in parallel with the variable inductor. From this unfortunate arrangement of the components in the drawing, many amateurs inferred incorrectly that this apparent parallel circuit is a resonant tank — an inference that has led to erroneous explanations of its matching function. However, a slight rearrangement of the drawing without changing the circuit (Fig. 2) clearly shows the Ultimate to be a simple T network of the high-pass configuration with an extra shunt-arm capacitor, C2, across the input. My analysis and measurements have proved that C2 is not only useless in the impedance-matching function, but actually causes a slight degradation in efficiency.

Keep in mind McCoy's claim that C2 provides the 10 dB of second-harmonic rejection he attributes to the Ultimate Transmatch, and his further claim that without C2 the resulting T network (Fig. 3) has little or no rejection. Also bear in mind that since C2 must equal C1 (two sections of a dual capacitor), the value of C2 is determined only by whatever the value of C1 might be when adjusted for any random matching condition. Thus the value of C2 has no relationship whatever to any value required to obtain effective harmonic filtering. Furthermore, as the shunt arm of a filter with no series arm preceding it, the reactance of C2 remains too large to contribute substantially to harmonic rejection for the range of values normally encountered. For example, with C2 at 100 pF, the improvement in second-harmonic rejection of an 80-meter signal effected by adding C2 is less than 0.25 dB, and the third harmonic only 0.5 dB. Thus, contrary to McCoy's claim that 10 dB of second-harmonic rejection is provided by C2, we see that C2 may be omitted with no noticeable detriment to harmonic rejection. It follows that if 10 dB of second-harmonic rejection is provided by the T network with C2 added, as McCoy claims, the network must also provide substantially the same rejection *without* C2. Thus McCoy's further claim, that the T network without C2 provides little or no rejection, is also unfounded.

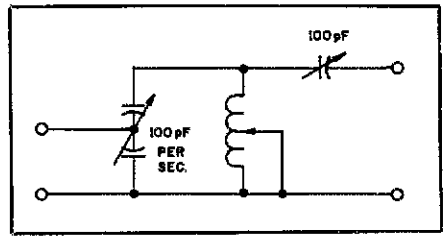


Fig. 1 — Original McCoy Ultimate Transmatch circuit.

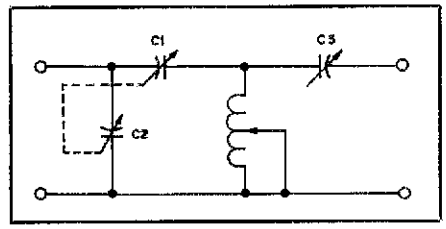


Fig. 2 — The circuit of Fig. 1 redrawn. The Ultimate Transmatch is actually a T network with a shunt input capacitor.

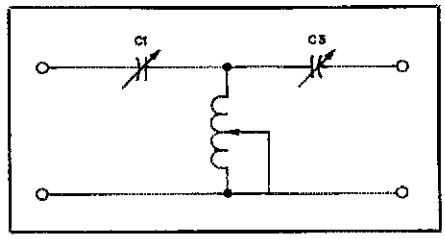


Fig. 3 — Simple T network of high-pass configuration, resulting from the removal of C2 in Fig. 2.

Using my own equipment, which includes a General Radio model GR-1606A rf impedance bridge, I demonstrated the ineffectiveness of C2 in the ARRL laboratory in October 1975.[4] To alert those Ultimate builders searching for a dual-section capacitor, I subsequently published information in *QST* about the lack of need for a shunt capacitor.[5]

The series capacitance arms and shunt inductance arm of the T network, which remain after dropping C2 from McCoy's Ultimate Transmatch, comprise the basic high-pass configuration shown in Fig. 3. Recognizing this, Doug DeMaw, W1FB, added a shunt capacitance, C4, in parallel with the inductance, as shown in Fig. 4. DeMaw calls this new configuration the SPC, for series/parallel capacitance.[6,7] C4 substantially improves the harmonic rejection of the network. The improvement is obtained because the shunt reactance of C4 in the SPC follows the series-arm reactance of C1, thus providing a voltage drop for the unwanted frequencies. McCoy's C2 in Fig. 2 is connected directly across the input line, with no series reactance arm to provide a similar voltage drop.

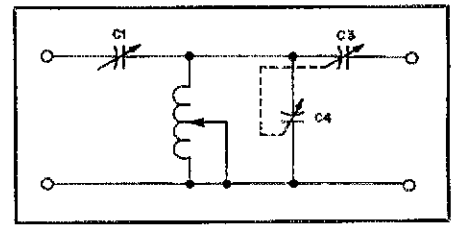


Fig. 4 — DeMaw's SPC Transmatch circuit.

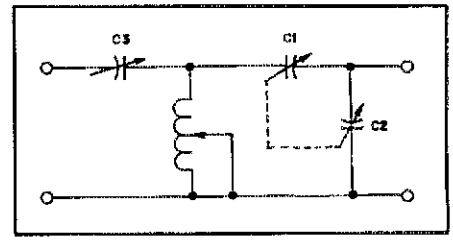


Fig. 5 — McCoy's Ultimate Transmatch circuit drawn backwards from the usual configuration, which would show the input on the left, output on the right.

Thus, contrary to McCoy's claim as quoted by Brooks, K6FO, in *WorldRadio News* (and as stated by Orr in his Fig. 7 of "Ham Radio Techniques," *Ham Radio*, July 1981, p. 30), it is clearly evident that DeMaw's SPC Transmatch is not simply the Ultimate Transmatch of Fig. 2 drawn backwards. In the Ultimate drawn backwards, shown in Fig. 5, C2 is in parallel with the *output* terminals of the network, and not in parallel with the shunt inductor as it is in the SPC Transmatch of Fig. 4. Therefore, because of the difference in the circuitry of the two Transmatches, the frequency response of the SPC Transmatch[8] does *not* represent the response of the Ultimate Transmatch, as McCoy further claims. On the contrary, the response of the T network of Fig.

[1] L. G. McCoy, "Set the Record Straight," "Correspondence," *QST*, March 1981, p. 56.
[2] L. G. McCoy, "The 50-Ohmer Transmatch," *QST*, July 1961, p. 30.
[3] L. G. McCoy, "The Ultimate Transmatch," *QST*, July 1970, p. 24.

*Associate Technical Editor

[4] See "Murch UT-2000-B Transmatch," Product Review, *QST*, April 1980, p. 50.
[5] M. W. Maxwell, "Another Look at Reflections," *QST*, August 1976, p. 18, Fig. 11B.

[6] D. DeMaw, "Ultimate Transmatch Improved," Technical Correspondence, *QST*, July 1980, p. 39.
[7] "A Transmatch for Balanced or Unbalanced Lines," *The Radio Amateur's Handbook*, 1981 ed., ch. 19.
[8] Ibid., Fig. 26B, p. 19-12.

3 is substantially the same as the response of the Ultimate, indicated in the reference,[9] considering the insignificant contribution of C2 in the Ultimate circuit.

It is now time to ask the question, "Since the T network resulting from the Ultimate Transmatch without C2 is of the high-pass configuration, can it really provide any harmonic rejection?" With its capacitive series arms and its inductive shunt arm, one would believe intuitively that no harmonic rejection is possible — yet harmonics are attenuated. As in any matching network consisting of reactive elements, this T network is also a frequency-selective filter. By utilizing mismatch reflections, the network attenuates power flow to some degree at all frequencies except the one at which it performs its intended impedance match. The theory behind wave reflections and complementary mismatches in filter networks may be an appropriate subject for another time. Suffice it to say here that the basic T network of the McCoy Ultimate Transmatch does provide some harmonic rejection. This is true because the network provides a complementary mismatch (or a conjugate match) at only the fundamental frequency. The harmonic energy is not matched. However, the harmonic mismatches provided by the McCoy configuration are not very severe, and thus the harmonic rejection is not too great. C4, which DeMaw added in his SPC Transmatch, increases the mismatch at the harmonic frequencies quite substantially, because the shunt-arm reactance of C4 decreases as frequency increases. In addition, C4 affords a greater shunt attenuation by following the series attenuating reactance of C1 than if an equivalent C2 were directly in shunt with the 50-Ω source line as in McCoy's configuration. The marked difference in response between the Ultimate and SPC circuits is shown in the *Handbook* spectographs.[10]

Concerning the link-coupled matching network, McCoy claims that the circuit shown in Fig. 28 of the reference[11] cannot remain balanced when the tap switch to the link-coupling coil is switched over to one side of the link. I believe McCoy is perturbed unnecessarily.

The only contribution toward unbalance that I can perceive is that, as a result of the coil construction, fewer turns of primary winding L2 are used to couple energy into L1 and L3 on the higher bands. The active portion of L2 is closer to L3 than to L1, and thus L3 is a bit more tightly coupled to the primary than L1. This simply means that, of the total voltage supplied to the feeders, L3 develops somewhat more voltage than L1. However, the voltages developed by both L1 and L3 are in series, and *floating relative to ground*. There is no ground connection at the junction of L1 and L3 that would force a neutral ground reference to appear at that point. Therefore, since any inequality between the voltages developed by L1 and L3 is not referenced to ground at the junction of L1 and L3, the voltage inequality cannot contribute to any unbalance of feeder current. Even if the junction of L1 and L3 were grounded, the unbalance in feeder current resulting from the difference in coupling would likely be insignificant when compared to the unbalance that results from bends in the feeders and unequal stray coupling to nearby objects in a practical installation. — *Walt Maxwell, W2DU, ARRL TA, 243 N. Cranor Ave., DeLand, FL 32720*

[9]Ibid., Fig. 26A, p. 19-12.
[10]Ibid., Fig. 26, p. 19-12.
[11]Ibid., Fig. 28, p. 19-13.

RFI TO AUTOMOBILE CRUISE CONTROL, PART 2

☐ After reading the item by Baker, W5QPX,[12] I felt a great deal of empathy for him, because this is the same problem that I had with the Sears control I put into my Ford. Since I am running essentially the same type of equipment, I thought my experience would help him and others. I put a Pace 25-W rig in my Mustang, with a Hustler collinear antenna. I noted that when I was transmitting with an SWR greater than 1.5:1, I had the lag or bogging down of the cruise control with a speed loss until I unkeyed. When I readjusted the antenna to a 1:1 SWR, the bogging disappeared. I also found that when I got close to 11-meter operators using too much power and modulation, I experienced the bogging down of the cruise control. Feeling that this interference was from harmonics in the uhf region, I watched carefully for uhf repeaters while mobile, and I did experience the same lag or bogging when I crossed the path of a uhf system. The effect was a loss of power to the control, necessitating a resetting adjustment.

A simple cure was foremost in my mind; hence I wrapped the control unit in aluminum baking foil to provide some shielding of the previously unshielded solid-state unit from rf. I have not experienced the problem since. The local repeater group still chuckles over the RFI problem another operator had in his car. Rf would get into his electric broadcast antenna system, and the antenna would glide up and down during his amateur transmissions. — *Bill Richards, II, WB5ZAM, 1925 Juanita, San Angelo, TX 76901*

[12]G. L. Baker, "RFI to Automobile Cruise Control," Technical Correspondence, *QST*, June 1979, p. 44.

BATTERY-CHARGER TVI

☐ One day as I was charging a battery with my Sears 12-V automobile battery charger (model 608.71280), I noticed some interference on the TV screen. I was watching channel 38 at the time. The interference was a herringbone pattern with 60-Hz modulation. When I unplugged the charger from the ac outlet the modulation stopped, but the interfering carrier remained until I disconnected the charger from the battery. A pair of 2N3903 transistors in the charger are connected as a differential amplifier, with a common connection for their emitters. It seemed that these transistors were oscillating. I opened the case and lifted the emitter leads of the 2N3903s. Then I slipped a ferrite bead over each lead and resoldered each back to the board. This modification cleared the problem.

If you are accused of causing TVI with your amateur transmitter and you know your station is clean, you might consider a battery charger as the potential culprit. — *Gerard E. Bachand, K1YYT, 7 Atwood Terr., Cherry Valley, MA 01611*

COMMUNICATION VIA UNGUIDED LIGHT BEAMS

☐ Of course we're all aware that fiber-optics have been used as effective parts of communications systems that use guided beams of light, but there hasn't been much said about "unguided" light beams since amateurs did some early work with modulated light sources, such as flashlights.

The *Wall Street Journal* for January 30, 1981, carried an interesting commentary by Richard A. Shaffer under the column heading, "Technology." It discussed at length the renewed interest in unguided light beams for a number of communications purposes. Owing to the innovative character of radio amateurs and the ability of hams to lead the way in some technical areas, it seemed worthwhile to provide this update. Perhaps some amateurs will be inspired to do experimental work with light beams. Those who are already conducting guided light-beam experiments are urged to let the ARRL know what you have achieved in this area.

One of the practical uses to which "unguided light" is presently being put include computer linking to permit computers to "talk" to one another from room to room or from office building to office building. American Laser Systems, Inc. of Santa Barbara, California, believes that this technique could become important in Third World countries where microwave transmissions are too easily monitored. It would certainly cut down the cost of communications systems where telephone cables would otherwise be used.

Some of the industrial work being done today with light beams is carried out at infra-red (between visible light and heat in frequency). Siemens AG is testing a cordless telephone that uses infra-red light. Another German company (Sennheiser Elektronic KG) is already selling infra-red headsets to permit wireless listening to TV and stereo. Meanwhile, Texas Instruments is working on infra-red circuits that will permit invisible linking of computer keyboards (portable) to a computer anywhere in the same room. Blue-green light beams are being experimented with by the U.S. Defense Department for underwater communications between submarines and shore stations.

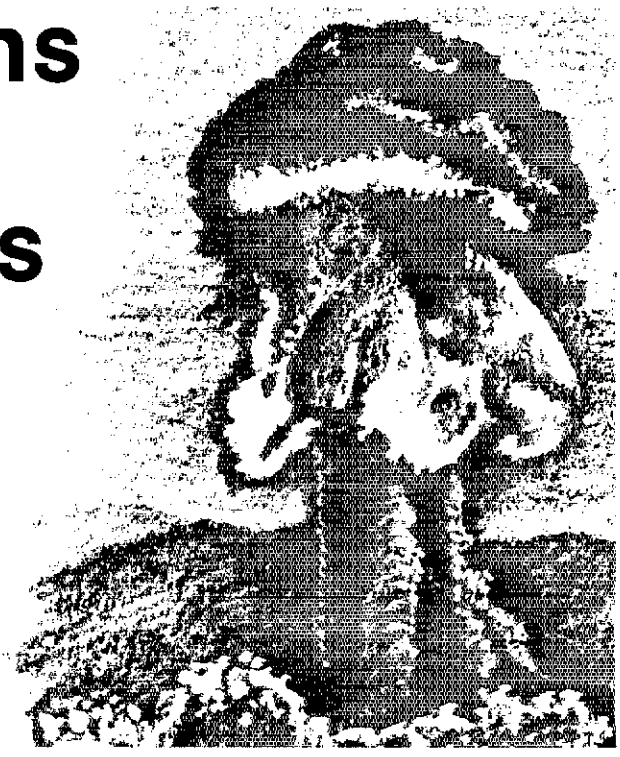
Some believe that the greatest present potential for unguided light-beam communication is in the area of satellites. In this regard lasers could be used to send large numbers of messages quickly between orbiting satellites. This would make possible the sending of signals around the world without bouncing them back to earth, as is done now. This more direct means involving unguided optics would eliminate the delay that results now from returning the signals to earth and retransmitting them. A spokesman from MIT stated recently that such a system should be practical by 1985.

Another application for unguided light that is being researched at present is microwave linking. This could be especially significant in geographical areas where temperature inversions are common, since this phenomenon disturbs the signal path and causes problems.

No doubt there are countless amateur applications for unguided light beams. We'd be happy to hear about practical applications and improvements in existing techniques. Edmund Scientific Co.[13] and others sell low-cost parts to those who want to experiment with infra-red light communications. This seems to be an untapped area of amateur experimentation during an era when many hams lament because experimenting has waned. — *Doug DeMaw, W1FB, ARRL Hq.*

[13]101 E. Gloucester Pike, Barrington, NJ 08007

Nuclear Weapons Effects on Communications Systems



If the unthinkable should happen, how would Amateur Radio communication be affected? A great deal, says the author.

By Robert Hendrickson,* AG3U

The Amateur Radio Service is well known for providing emergency communications resources in times of need. Radio amateurs have responded well to the local and national disasters of the past. Of all these incidents none can rival the potential destruction released by an atomic weapon. Fortunately the United States has never had to recover from such a disaster. However, we must not allow our good fortune to dissuade us from preparing for yet another challenge. As a public service, Amateur Radio incurs the responsibility to ready itself to provide vital communications functions during all emergencies, including operation during or after a nuclear explosion. The purpose of this article is to acquaint the reader with the major damaging or disrupting effects that nuclear weapons inflict on communications systems.

Many of the "side effects" of nuclear explosions were detected during developmental testing of weapons used against Japan in World War II. Since that time, atmospheric and underground tests performed by the United States and other countries have permitted the study of many direct and indirect nuclear impacts on man, his environment and equipment. One of the major, long-reaching effects on electronic systems was evidenced during atmospheric tests in the Pacific, when it was discovered that high-altitude explosions thousands of miles away were responsible for the popping of local circuit breakers and other system malfunctions, with no other discernible effects. Scientists named this phenomenon *Electromagnetic Pulse (EMP)*, an intense, short-duration burst of electromagnetic energy, capable of traveling thousands of miles and damaging or disrupting sensitive electronic systems.

NWE Can Be Pervasive

EMP is only one of a number of *Nuclear Weapons Effects (NWE)* that owners or operators of vital communications systems are concerned with. NWE are capable of disrupting message paths (both wire and radiated), introducing errors in data streams, kicking off circuit breakers, burning out vulnerable components or otherwise preventing electronic systems from performing their intended purposes. Some NWE are effective thousands of miles away from an explosion and can render systems useless while their operators remain physically unaffected. Thus, vital electronic systems can be attacked (intentionally or unintentionally) without incurring a single human casualty!

Unfortunately, there are a number of possible events that could result in the generation of NWE. Most governments are extremely concerned with the possibility of nuclear weapons use as an act of terrorism. Additionally, it is believed that NWE might be used to advantage by an aggressive country without resorting to a full-scale nuclear attack. An example might be the use of one or two weapons to produce EMP for the purpose of disabling communications defenses while simultaneously launching a conventional (non-nuclear) force. A third possibility is that a nuclear-tipped antimissile, deployed in defense against a conventional weapon, would produce NWE capable of disrupting most offensive and defensive systems in the vicinity of the explosion. Thus, the chance that a nuclear explosion might take place, with or without full-scale nuclear war, is more than a remote possibility.

Fig. 1 shows some of the primary products of a nuclear weapon detonation. The visible light, audible noise and associated mushroom cloud are familiar to many. Invisible emanations (such as heat, neutrons, and so on) are deadly to both

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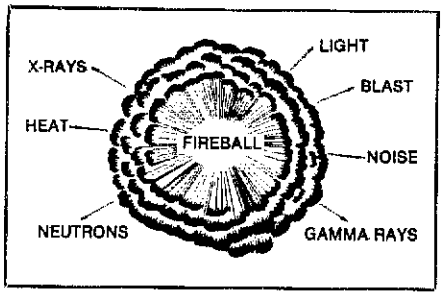

Fig. 1 — The invisible products of a nuclear detonation can be deadly — to both living things and electronics systems such as Amateur Radio equipment.

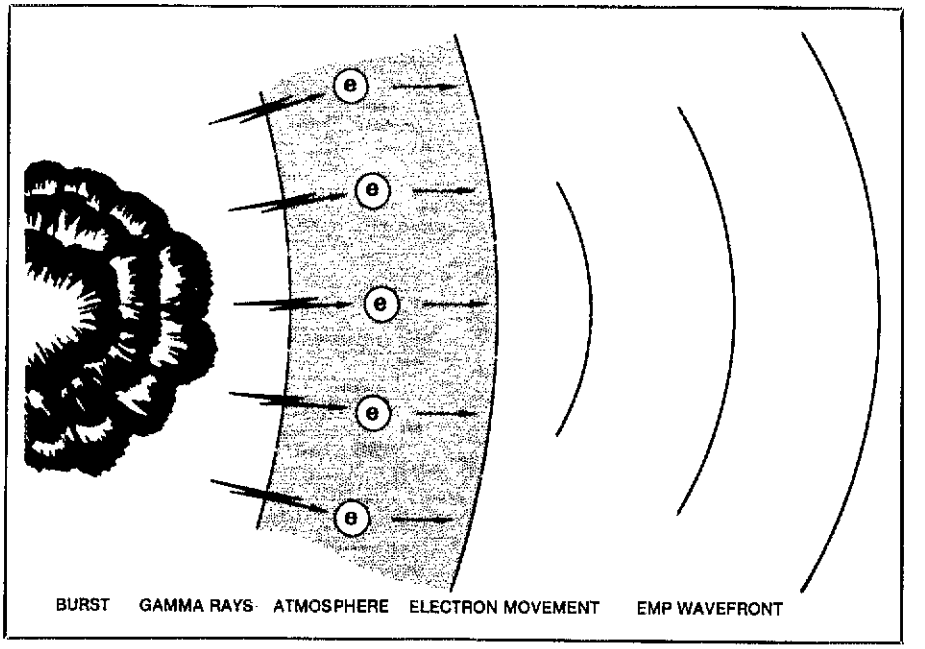

Fig. 2 — An electromagnetic pulse occurs when fast-moving free electrons created by the blast form an intense electromagnetic wave.

man and electronics systems. Secondary effects (that is, effects not produced directly by the weapon), such as EMP and disruptions of the ionosphere, are capable of rendering selected electronic systems useless while having no biological effects on man.

Nuclear explosions are responsible for increasing or decreasing the levels of ionization in the atmosphere, not only locally but at large distances away. Communications systems that rely on the "normal" characteristics of the ionized atmosphere may find that the intended propagation path is disrupted for a period of time varying from seconds to hours. Such disruptions might include an increase in noise level, raised or lowered reflection-producing ionospheric levels, signal absorption or blackout. The area affected may be local to the explosion or may cover very wide areas.

An Electromagnetic Pulse is generated when gamma rays resulting from the thermonuclear reaction produce free electrons (called Compton electrons) in the atmosphere surrounding the explosion. See Fig. 2. The outward movement of these fast-moving electrons, influenced by the earth's magnetic field, creates an intense electromagnetic wave whose spectral content extends from a few hertz to several hundred megahertz. A high-altitude detonation of moderate strength (yield) is capable of producing field amplitudes of up to 50,000 volts per meter at ground levels, over a diameter of thousands of miles, as illustrated in Fig. 3. This field couples into all metallic structures (pipes, wires, rain gutters and especially antennas) and may burn out sensitive front-end electronic components or at least cause internal disruptions to normal operation.

Nuclear weapons are known to produce energetic, liberated neutrons (subatomic particles) as a result of the thermonuclear reaction of the weapon. These uncharged subatomic particles travel at high speeds and may physically damage everything they meet. Solid-state electronics devices are particularly susceptible to neutron damage. So is the operator.

Gamma rays (an electromagnetic emanation) are produced directly by the weapon. Both prompt and delayed gamma rays are produced by the initial explosion and the debris, respectively, of the weapon. Gamma rays penetrate materials deeply and cause transients to be generated across semiconductor p-n junctions. The end result is the production of interference or false signals. Damage from burnout by intense transients is also possible.

Neutron and prompt gamma radiation induced responses are also called *Transient Radiation Effects on Electronics (TREE)*. It is possible for TREE phenomena to permanently damage or disrupt electronic systems while the operator survives. TREE impacts are especially important to managers of repeaters or other unmanned communications systems. Other weapon products such as heat, blast and shock wave are not treated here, as they do not have such a long-reaching impact as those effects discussed.

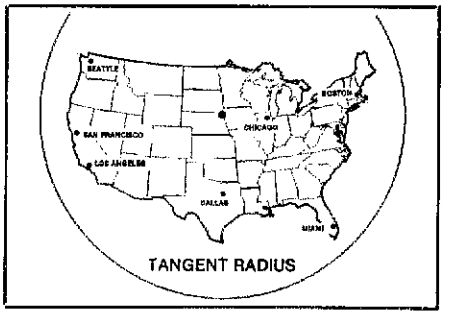

Fig. 3 — A high-altitude nuclear blast centered on the continental U.S. would create field amplitudes that could couple into antennas and damage sensitive communications equipment.

End Result: Trouble

The end result of this collection of effects is trouble for communications systems and their operators. Many miles away from a detonation operators may find their radio links unusable owing to blackout, abnormal reflections or absorption of signals in the atmosphere, phase distortion or increased noise. They may discover that EMP has burned out sensitive microprocessor-controlled equipment or field-effect transistor front ends of receivers. If they are close enough to the explosion, they may discover that temporary or permanent electronics damage prevents them from using solid-state equipment. Data stored in semiconductor memories may be altered or lost. Given the variety of possible problems, two or more of these effects may combine to produce a synergistic result, a product of simultaneous influences of more than one effect. The following paragraphs describe why these problems may occur.

In all radio-frequency communication systems, the atmosphere either helps or hinders in some way. The ionosphere aids hf communications by refracting (or "reflecting") signals from the ground, permitting propagation over long distances by multiple hops. At the same time, the atmosphere (particularly the lower or D layer of the ionosphere) also hinders communications by absorbing signals and by propagating undesired noise such as that from lightning. Nuclear explosions in the atmosphere generally

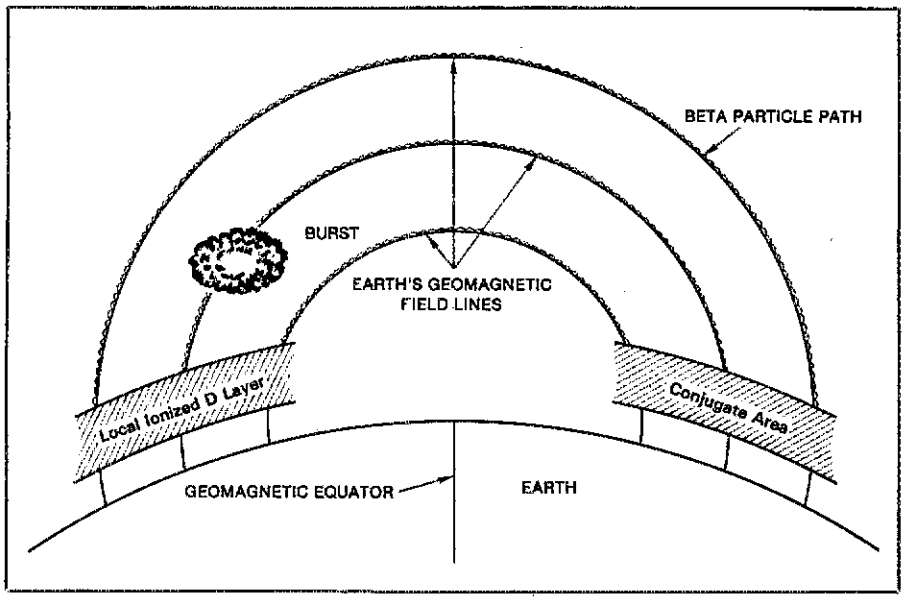

Fig. 4 — Local and remote ionization caused by an air burst is influenced by the earth's magnetic field. Propagation in the affected area may change suddenly — or make radio communication impossible.

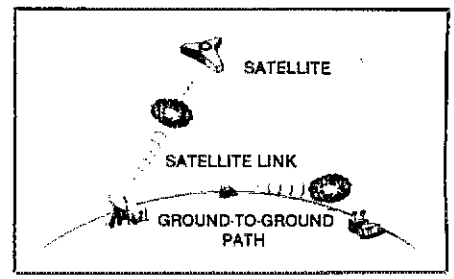

Fig. 5 — Although less susceptible to ionospheric disruptions, vhf, uhf and satellite communication may also be affected by a nuclear explosion.

produce free electrons and increase the level of ionization in the atmosphere. This results in either degradation or enhancement of the normal reactions of the atmosphere to radio signals.

A nuclear fireball carries an intense level of ionization that both increases radio-frequency thermal noise in the area and produces an opaque spherical volume that radio signals will not penetrate. A low-altitude burst at night within the D layer of the ionosphere may case absorption or refraction of ground signals by enhancing the level of ionization. A high-altitude burst near the F region of the ionosphere may either increase or decrease the "reflectivity" of the region depending upon yield, time of day, existing conditions, and so on. Users of the hf bands rely on F-layer reflectivity (skip) to work long distances as the signal reflects from the sky to ground with one or more hops. A high-altitude explosion also will generate beta particles, or free electrons, which spiral along the field lines of the earth's magnetic field. This creates an increase in the ionization of the D layer of the ionosphere, not only at the local area but also at the area known as the magnetic conjugate in the opposite hemisphere! The free electrons spiral along the earth's magnetic field lines and cause ionization at the two regions above the earth's surface where the lines touch the surface. See Fig. 4. This results in either an increase in the ability of the layer to absorb signals or an increased ability of the D layer to refract local signals and thus change the direction of propagation. An operator in both the local and the opposite hemisphere from a nuclear conflict may also find a sudden loss in his ability to communicate.

VHF, Satellites May Be Affected

Ionospheric disruptions mostly concern the hf band. Vlf, lf and mf bands are not as susceptible. Vhf and uhf communications links that rely on ground-to-ground line-of-sight links are also generally immune. However, it is possible for vhf-uhf links to be blocked, scattered or attenuated by explosions between the points of transmission and reception. Likewise, a satellite link that must penetrate or pass through a disrupted ionosphere may become impaired. Figs. 5 and 6 illustrate these concepts.

EMP is a nuclear effect that is somewhat similar to lightning, although EMP has a faster risetime and less power. It is a radio-frequency electromagnetic wave and as such has all the characteristics communications systems operators are already familiar with. It is of short duration, and if the equipment is not susceptible to damage or upset, the operator will otherwise not know of its existence. Its high-amplitude field intensity and wide spectral content cause it to couple to wires and other electrical conductors, pass through apertures and cause circuits to ring at their resonant frequencies. When large currents are allowed to couple to sensitive circuits there may be physical damage caused by overheating of low-power devices or arcing between conductors. All high-impedance, low-power, non-radio-frequency-shielded circuits are susceptible. Small calculators and commercial-grade processors with their plastic cases are notoriously affected.

If no damage occurs, the simultaneous coupling of large numbers of transients of high amplitude is likely to cause improper operation of all sensitive electronic systems. Commercial data processing equipment without error-correcting designs are quite susceptible.

Prompt gamma radiation produces a transient signal across p-n junctions in semiconductors. Vacuum tubes are immune from this effect. This transient is similar to semiconductor photoresponse and is thus known as a *photocurrent*. It is evidenced as a leakage current across the junction. In transistors with grounded emitters, it appears across the collector-base junction where it is called a primary photocurrent. It then couples to the base-emitter junction where it may be amplified and is then known as a secondary photocurrent. Primary and secondary photocurrents appear almost simultaneously across many semiconductor junctions in a typical electronics system, causing disruption of normal operation. Additionally, if the transients are of sufficient amplitude, permanent damage may occur. Or, if the power supply must support the amplification of many transients, it may become overloaded and trip circuit breakers. Operational impacts of a collection of simultaneous transients vary according to the function of each electronic system. A wide variety of equipment errors or disruptions is possible. Integrated circuits sometimes behave as discrete circuits as far as transients are concerned. Their construction, however, generally reduces their susceptibility compared to discrete circuits of similar function.

Fast neutrons affect semiconductors by physically altering the molecular structure of the bulk silicon material. The neutrons collide with and dislodge atoms from their normal positions and place them in abnormal spaces, called interstices, within the structure. Interstitial defects cause an increase in the resistivity and a decrease in the minority-carrier lifetime of the material. These changes, in turn, could cause an increase in the saturation voltage of a diode, or in transistors, a loss of gain might be experienced. Loss of gain could cause loss of function or failure in

amplifiers, oscillators, regulated power supplies, and so forth. A decrease in gain might also cause integrated circuits to display reduced performance.

Not all components in systems are affected by TREE impacts. Electromechanical parts, transformers, passive components and other non-semiconductor components are practically immune. Also, different types of semiconductors respond with more or less vulnerability. In general, those with small junction sizes and/or higher gain-bandwidth products (F_T) are more immune.

Hardening

Despite the variety of complex problems the communications operator is faced with, there are a number of useful approaches to prevent or work around difficulties caused by nuclear weapons. Using established guidelines, it is possible to design modern solid-state equipment with reduced susceptibility to nuclear effects. When a piece of equipment is designed to operate within a nuclear environment without degradation it is said to be "hardened." A number of hardening techniques have proven to be effective. As far as impacts on the atmosphere are concerned, there is not much that can be done except to be knowledgeable as to the effects one might experience and to alter operational methods (switch bands, for example) to bypass the impacts of such disturbances.

As discussed previously, altered ionization levels in the atmosphere will impact various bands differently. The probability of successful communications during ionospheric disruptions will be maximized when the operator has a choice of the medium-, high- and very-high-frequency bands and beyond. Terrestrial line-of-sight communications paths will generally be the most reliable. Additionally, being able to change antenna directivity will help. Barring other approaches, the method of waiting for the disturbance(s) to subside may be effective. Ionospheric effects may last from several seconds to several hours.

As far as TREE effects are concerned, it is not practical to consider major alterations internal to amateur station equipment to achieve hardness, or immunity to such influences. Perhaps the simplest approach might be to avoid discarding vacuum tube equipment when its apparent useful life has been reached. Such gear is not nearly as susceptible as solid-state equipment to TREE damage or disruption. An awareness that transient radiation may upset or damage equipment may explain why communications gear refuses to function properly. Some TREE effects are temporary. Under certain conditions the operator would be well advised to apply power and test the equipment after a few seconds have passed to determine if the phenomenon was truly transient or whether it had produced permanent damage.

Equipment can be "hardened" against EMP as well as TREE by protecting sensitive circuits against unusual voltage or current spikes. Again, for commercial equipment without rf-shielded cabinets this may not always be practical. Backup equipment may also be useful in this case, especially if it has been stored on a shelf, disconnected from antennas or power sources. The main threat is that of upset or disruption, which may de-energize equipment if circuit breakers pop. In such cases, normal operation may be restored by resetting the breaker.

Although there is a general awareness of nuclear weapons effects in the communications industry, there seems to be little protection of our valued resources in the event of a nuclear weapon explosion, outside of military circles. Thus, the impacts of such effects will be distributed more or less equally among all communications systems users. The Amateur Radio Service has provided vital communications functions in areas previously thought to be protected from communications disruptions. It is possible that this service might be one of a few that would survive such a powerful influence. The amateur community certainly possesses the flexibility to work around many obstacles through the use of diversified communications media.

Protecting Your Gear

The first step in solving a problem must be to acquire the knowledge that the problem exists. It is hoped that this introductory article has served that purpose. The hardening of Amateur Radio systems en masse as a result of public education would be as improbable as motivating the public to build private fallout shelters. Yet, there are simple practical approaches to ensure the survivability of either commercial or home-built equipment.

The first is to obtain *flexibility*. Maintain communications capability in more than one band. Participate in local traffic nets, if even only occasionally. Establish line-of-sight communications functions on vhf or ground-wave frequencies.

The second is to acquire *redundancy*. Don't discard old "spare" equipment, especially vacuum-tube equipment. Even backup solid-state gear may be valuable if it remains disconnected while not in use.

The third is to achieve independence, especially from utilities. Capitalize on any battery-powered equipment, or better yet build and maintain your own source of emergency commercial grade power. A word about microprocessors. These powerful communications-aiding devices are sure to be utilized more frequently in the future, but strict dependence on a single processor to control a communications station will probably increase the station's vulnerability.

Finally, awareness is needed to understand what is happening and why. Once the source of difficulty is identified most problems are easier to overcome. More descriptive information may be found in the references.

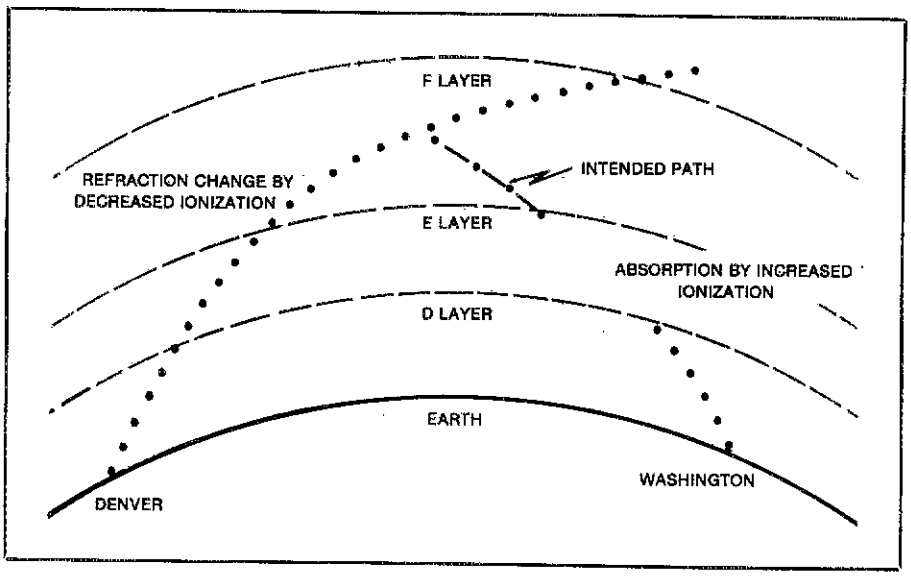

Fig. 6 — Propagation may be affected in various layers of the ionosphere.

Author Hendrickson is a communications engineer and nuclear survivability specialist employed at the Arlington, Virginia branch of ORI, Inc., a firm that specializes in defense-related research.

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QEX: The ARRL Experimenters' Exchange

Do you want to keep abreast of the state of the art in Amateur Radio? Would you like to share your experiments and technical ideas with other hams of similar interests? Then this new League publication is for you.

By Paul L. Rinaldo,* W4RI

The ARRL is underscoring its long-standing commitment to Amateur Radio experimentation by launching a new publication to be known as *QEX: The ARRL Experimenters' Exchange. QST* and other Amateur Radio magazines carry technical articles, so why isn't that sufficient? The facts are that magazines select and edit technical articles to appeal to their general readership and try to achieve a balance between many different interests. Controversial, highly technical or perishable articles may not be judged as appropriate for publication in a magazine. So, how do we help experimenters get the word around to others about their concepts, designs and test results? We need a newsletter by and for experimenters to meet this need among ARRL members and others who wish to join in.

QEX is to begin publication in December 1981. Its objectives are to:

1) act as a catalyst for technical development in the Amateur Radio and Amateur Satellite Services, by providing a medium for the exchange of ideas and information between Amateur Radio experimenters who may be geographically isolated from one another;

2) document advanced technical work in the Amateur Radio field that is not of sufficiently broad interest to permit detailed documentation in the pages of *QST*;

3) demonstrate the League's commitment to, and support for, efforts to advance the state of the Amateur Radio art.

*Editor, *QEX*, 1524 Springvale Ave., McLean, VA 22101

The Content

QEX will contain technical articles and correspondence from Amateur Radio experimenters in the U.S., Canada and overseas. Editing of these contributions will be limited to correcting of obvious grammatical, spelling or minor technical errors. The editing may also include substitution of standard technical terms and explanation of terms that would not be widely understood by most readers. In some cases, minor editing will be done to improve the comprehensibility of the material. But, the basic goal is to do the minimum amount of editing in order to expedite the publication of the authors' ideas. Submitted material that requires more extensive editing or rewriting will be returned to the author. This arrangement places most of the burden on the author to prepare the article in clear English with technical ideas properly introduced and supported.

All the articles and correspondence will be the work of the authors. Any opinions expressed will be those of the individual, not necessarily those of the editor or the League. That's not just a legal disclaimer. The whole idea is to give the experimenter a forum to air technical ideas and information. Also, authors will be the ones to defend their own material. So that we can benefit from each other's mistakes, follow-up correspondence to and from the authors will be included to the extent that it furthers an understanding of the topic. So, copies of such correspondence will be welcomed by the editor.

There will also be some regular columns on subjects of continuing interest to experimenters. Columnists will endeavor to keep up with developments within their areas of expertise and to report who is doing what. They will also be expected to get out front and pull whenever they feel it important to focus attention on technical problems.

QEX will sponsor competitions to stimulate activity in specific technical areas. Design competitions will be announced from time to time for hardware and software needed to fill a particular void in Amateur Radio technology. Recognition will also be given to individuals who make the greatest contributions to the state of the art through their articles published in *QEX*.

Information on new products of interest to experimenters will be included. This may include both news releases supplied by manufacturers and tips by experimenters. New product information will be published without ARRL endorsement and without any implication that the products have been examined in the ARRL laboratory. Before you buy, it will be advisable for you to check out both the seller and the product.

Initially, *QEX* will contain no advertising, either classified or display ads. After the newsletter is established, limited advertising may be considered by the League.

Call for Articles

Prospective contributors are invited to submit articles on a wide variety of technical topics including, but not limited to, the following:

• data communications and packet switching techniques;
• advanced modulation techniques such as spread spectrum;
• computer hardware and software related to interests of the radio amateur;
• space communications;
• microwave and optical communications;
• details of Special Temporary Authorities issued by the FCC for amateur experimentation as well as results of these tests;
• experimental conferences and events;
• image transmission techniques;
• state-of-the-art components and devices;
• signal conversion and processing;
• voice recognition, synthesis and compression;
• analog and digital circuit design;
• advances in antenna and propagation technology;
• spectrum management (including electromagnetic compatibility [EMC] and radio frequency interference [RFI] reduction techniques);
• sources, conversion and conservation of energy for electronic equipment; and,
• how-to-do-it and where-to-find-it information of interest to the experimenter.

It is preferable that the articles be written by the individuals doing the experimentation. In cases where writing is not a particular experimenter's cup of tea, we would like to see prospective writers work with experimenters to document their projects. Local Amateur Radio clubs can help by organizing this type of teamwork and by sponsoring technical projects.

You Want It When?

Material for the premier issue of *QEX* (with a cover date of December 1981) should be in the editor's hands no later than October 25, 1981. The first-in-first-out (FIFO) principle will apply to some extent, so the earlier you get your article in the mail the sooner you'll see it in print. The deadline of five weeks before the cover date will hold for subsequent issues as well.

Manuscripts should be typewritten and double spaced. Try to use everyday English as much as possible, but don't be afraid to use technical language and even math to get your point across. Standard ARRL abbreviations found on page 65 of the December 1980 issue of *QST* should be used and need not be explained. Nonstandard terms and abbreviations should be properly introduced the first time they are used in an article. For the most part, any artwork (schematics, flow charts, graphs and so on) submitted by the author should be camera ready (rendered in black ink, not pencil) and usually will not be redrawn by an artist. This is intended to minimize processing time and cost. When essential to the article, photographs may be included. Contributors should supply glossy, black-and-white positive prints of good definition and contrast, somewhat larger than the usual snapshot print.

All material for publication in *QEX* should be mailed to the editor's mailing address, which appears at the beginning of this article.

Subscriptions

QEX subscriptions will be available to ARRL members at the special rate of $6 for 12 issues. For nonmembers, the subscription rate is $12 for 12 issues. The foregoing rates apply only to subscribers with mailing addresses in the U.S. and possessions; Canadian and Mexican subscribers must add $1.74, and will be serviced by First Class mail. Overseas subscribers should add $6.78 for air mail delivery or $2.34 for surface mail. All rates are quoted in terms of 12 issues because the frequency of publication may change. The plan is to publish *QEX* at least every other month and to move to monthly issues as soon as possible.

Applications for subscriptions to *QEX* should be sent to the American Radio Relay League, Newington, CT 06111. Members are asked to include their membership control number, or a mailing label from their *QST* wrapper.

Warts and All

True experimenters probably win the prize for the messiest shacks. Their projects may follow a crooked trail. *QEX* may hit a pothole every now and then and will contain some flaws. But it promises to be an important exchange medium for experimenters as well as a record of Amateur Radio technical activities. Your participation is needed, both in contributing material describing your projects and by subscribing to *QEX*.

25 Years Ago

August 1956

☐ Welcome information is provided by "Notes on the Development of Yagi Arrays," by Telrex chief engineer Carl Greenblum. This 7-1/2-page part 1 considers multi-element beams; the second part will treat stacked arrays.

☐ "'Tattoo' — Automatic C.W. Transmitter Control," by Laird Campbell, W1CUT, is a description of "The Automatic Transmitter Turner Onner Offer," which does just that. Using two relays and a dual triode, it can be used with any transmitter, keyed in any circuit.

☐ "Changing the 6146 Oscillator into an Amplifier" is Lew McCoy's detailed account of the necessary modifications to a popular 75-W, one-tube transmitter he described a year ago.

☐ Lloyd Colvin describes the "Multiple V beams" he uses at DL4ZC to cover the world. It helps to have a little real estate available; each leg is 584 feet long! The four legs are switched at the apex by two dpdt relays.

☐ Ed Tilton, W1HDQ, tells about his "Portable Beam for 50 and 144 Mc." that he stores in a golf bag and sets up alongside his car for hill-top operation. There are three elements on 6, and 5 elements on 2, with gamma match and a 16-foot mast.

☐ "An Outboard Automatic Band Scanner" by Charles Arnold, W3YDF, tells how he drives his Collins receiver tuning with a 1 r.p.m. reversible motor. Adjustable stops permit excursions as small as 2 kc. or as much as 300. — *Byron Goodman, W1DX*

50 Years Ago

August 1931

☐ "Duplex Phone on 56 Mc." is Ross Hull's exciting account of the latest experiments in the 5-meter band. A companion transmitter (push-pull '71-As in a TNT circuit modulated by parallel '47 pentodes) to last month's super-regenerative receiver permitted two-way communication between the survey vehicle and the lab. By setting one transmitter near the 56-Mc. edge and the other near 60 Mc., duplex operation was readily obtained. The 5-page article concludes with the reminder that a special portable license is required for operation from other than the home location and, of course, mobile operation of a portable amateur transmitter is illegal.

☐ "A Companionable Portable Receiver," by Robert Brooke, W9CH, is a self-contained, battery-powered, detector-and-one-audio receiver using a pair of '30s. It covers 0.6 to 18 Mc. with six plug-in coils and is housed in a 5 × 6 × 9-inch aluminum box. The author uses it for everything — for checking man-made QRN, as a substitute or loaner receiver for another ham, for listening on vacations and for checking crystals.

☐ In the first of a two-part article, "The Standard Frequency Transmitter at W1XP," author Paul Hendricks describes the design considerations and the mechanical construction of the four-tube exciter. A separate article reminds the readers of the Frequency Measurement Tests scheduled for October, and it includes a list of frequency-measurement reference articles.

☐ Boyd Phelps, W2BP, asks "Why Not Frequency Tripling?" He points out that a crystal that triples to the 14-Mc band has good stability and can save one stage over the usual doubler-doubler approach.

☐ "Adding an Amplifier to the Low-Power Transmitter" is George Grammer's description of an '03-A breadboard job intended to follow the popular '10 high-C Hartley oscillator. It includes the author's usual complete treatment of construction and tuning considerations.

☐ James McLaughlin and Technical Editor Jim Lamb take 5-1/2 pages to give their answer to "What Is This Thing Called Decibel?" Written with a light touch but illustrated with graphs, tables and a few formulas, it probably scared off many readers who would have enjoyed it.

☐ Ev Battey reports on the "Fourth International Relay Competition Results" and calls the two-week affair a big success. *Six* U.S. stations, including leader W9UM and runner-up W8BKP, managed WAC during the struggle. G5BY led the entire world, with CM8UF second. VE2CA was first among the Canadians, followed by VE5AW (British Columbia).

Long-Range Planning — An Update

ARRL Board hears from LRPC on goals and objectives for Amateur Radio; report proposing detailed programs due in September.

By Victor C. Clark,* W4KFC and David Sumner,** K1ZZ

Long-range planning — everyone (well, almost everyone) agrees it is necessary. The failure to look ahead and accommodate future developments *can* be fatal.

But what do we have a Board of Directors and a Headquarters staff for?

Of course the Board and staff are concerned with planning, and they do endeavor to perceive the shape of the future and to prepare for it. But, given today's accelerated tempo of events and the rapidly expanding range of interests within Amateur Radio, opportunities for deliberate and organized long-range planning have become increasingly scarce for those who must cope with matters of more immediate concern.

Recognizing the need for greater attention to long-range planning, the ARRL Board of Directors at its January 1979 meeting authorized creation of a special committee to tackle the problem, both for ARRL and the Amateur Radio Service as a whole. Chosen to serve on this committee were:

Vic Clark, W4KFC (Chairman); Richard L. Baldwin, W1RU (General Manager, ARRL); Charles Dorian, W3JPT; Jay Holladay, W6EJJ (Director, Southwestern Division, ARRL); Herbert Hoover, III, W6ZH; Hazard E. Reeves, K2GL; Larry E. Price, W4RA (Vice President, ARRL); David Sumner, K1ZZ; Harry J. Dannals, W2HD (President, ARRL), ex officio.

The generally accepted criteria for selecting members of a long-range planning group call for a wide diversity in experience and background. The theory, of course, is that this will provide the committee with a broad perspective. For the process to work, different points of view must be represented. Indeed, the membership of the LRPC conforms to this requirement, and the group often has found itself in vigorous disagreement: Efforts to achieve a consensus on the many issues have been marked by lively and sometimes tempestuous discussions.

LRPC Chairman Vic Clark, W4KFC, presiding at one of the committee's meetings. *(W1RU photo)*

Soon after its creation, the LRPC issued a call to the Amateur Radio community for the input of ideas, proposals and opinions regarding the future of Amateur Radio and ARRL.[1] Notices appeared in all of the national Amateur Radio publications, and were repeated in many club newsletters.

The response was impressive. It confirmed that many amateurs have a genuine commitment to our avocation, and a deep concern for its future. Letters totaling thousands of pages of comment and advice on the shape of the future have been received by the committee, and they continue to arrive.[1] Some people have written two or more letters, some as many as five. Present and past members of the ARRL Board of Directors provided their views, as did former FCC Chairman Richard Wiley. Those correspondents whom we have been able to identify by call sign are listed elsewhere in this article. Many other individuals made their inputs to the committee through club and section surveys and in-person gatherings.

All this input has taken time to sort out and digest, and the committee has been diligently employed in that exercise through correspondence, via the telephone and in a series of nine lively in-person meetings. Also, since its last report appeared in *QST*[3] the Long-Range Planning Committee has completed a comprehensive survey of a sampling of U.S. and Canadian radio amateurs. This survey, conducted by the Institute for Social Research of Florida State University, has provided statistically sound information on radio amateurs: their demographics, their operating interests and activities, and their attitudes toward the League. This information will serve as a benchmark for identifying future trends in the Amateur Radio Service. A summary of the survey results appears in March *QST*.[4]

The LRPC Report

With all this *input* to the Long-Range Planning Committee over the past two and one-half years, it is time for some *output*. The formal report of the LRPC to the Board of Directors is to be provided in two phases. Phase I, presented to the Board prior to its meeting last March, is a 60-page document containing the follow-

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**Assistant General Manager, ARRL

[1]Notes appear on page 53.

ing:

- a rationale for long-range planning,
- a brief history of the LRPC,
- tentative assumptions about the environment in which Amateur Radio is likely to find itself through the end of the century,
- an outline of goals and objectives for the League and Amateur Radio, with some thoughts on the strategies that might be employed in achieving them,
- identification of six specific areas in which early action is particularly important, and
- a recommendation that long-range planning be made a permanent part of the League's organizational processes.

The Phase I report has been accepted by the Board, and the LRPC has been authorized to proceed with preparation of Phase II. The Phase II report will go into more detail, particularly with respect to the areas in which early action is needed. The Committee is developing specific recommendations for changes in the League's organizational structure and in certain of its programs for Board consideration. Space does not permit the reprinting of the entire Phase I report. However, here are the highlights.

Goals and Objectives

The following represents the efforts of the Long-Range Planning Committee to develop a current set of goals and objectives for ARRL and the Amateur Radio Service. In adopting any such set of planning goals and objectives, we must be continuously watchful, flexible and adaptable. We must also be prompt to make changes as circumstances shift, for it would be unwise to rely upon the comfortable assumption that the past is necessarily prologue.

I) To develop the Amateur Radio Service as a national and international resource to serve the public.

A) Provide emergency communications services during natural and man-made disasters.

B) Develop a national cadre of skilled operators and technical personnel.

C) Maintain cooperative relationships with state and federal agencies.

D) Contribute to and demonstrate telecommunications advancement through technical experimentation and research.

E) Promote international friendship and understanding.

II) To protect, preserve and represent the interests of the Amateur Radio Service.

A) Continue the orderly growth of Amateur Radio by recruiting and training desirable candidates.

B) Strengthen the public image of Amateur Radio.

C) Prepare for future general WARCs through participation in specialized WARCs and in the activities of CCIR and its Study Groups on a continuing basis.

D) Work closely with national societies in other countries through the International Amateur Radio Union.

E) Strive for cooperative relationships with government agencies at all levels.

F) Improve the effectiveness of ARRL as a fraternal organization and as the national spokesman for the Amateur Radio Service.

III) To encourage proper and efficient use of Amateur Radio frequencies and privileges.

A) Develop more efficient spectrum utilization techniques and systems.

B) Improve capability for self-discipline through monitoring, reporting and educational programs.

C) Increase support for disciplined band use through promotion of IARU and its member societies.

D) Encourage a cooperative attitude within the amateur community and toward other users of the radio spectrum.

Tentative Planning Assumptions

- The continuing threat of war may cause an increase in the level of defense spending. This may make necessary a tax rate that reduces disposable income available for expenditures on Amateur Radio.
- The military services may increase their demands for allocation of spectrum to meet the communications needs of our defense forces.
- The increasing use of nontechnical military communicators may place a premium on the ability of Amateur Radio to provide a cadre of skilled operators and technicians during an emergency or a need for mobilization.
- Potential increased government emphasis on civil defense, particularly with respect to the protection of the civilian population, may change the opportunities for involvement of the Amateur Service in the civil defense program.
- There will be no major depression in the level of business activity through the end of the century. However, inflation will continue to be a problem worldwide.
- Present trends in the demographics of the population will continue, with an increase in the average age of the populace. More retirees will participate in Amateur Radio. The migration toward the sun belt will continue, which will shift an even greater proportion of League members into the South and Southwest. This will bring further pressures on the structure of the League organization both in terms of workload on volunteer workers and in terms of equality of representation in the policy making of the League.
- The governmental regulatory process will become even more politicized during the planning period. Traditional justifications for privileges will no longer be completely persuasive since government administrators with little practical experience in telecommunications and no first-hand knowledge of Amateur Radio will dominate the regulatory scene. Citizen access to the spectrum may tend to further blur or eliminate the distinction between "personal radio" and the Amateur Service.
- In spite of increased reliability of communications circuits available to local governments and agencies, the historical capability of the Amateur Service to provide emergency communications will continue and probably increase.

Areas Requiring Early Attention

1) Expansion of public service involvement of Amateur Radio.

Amateur Radio must be recognized as serving the public interest by both government officials at all levels and by the general public. This is a two-step process — the first is public service, the second public relations. Both are important and necessary.

Amateurs recognize the importance of public service as a general concept, but more emphasis must be placed upon specific activities — the training of volunteer leaders, the organizing and training of operators, and the availability of equipment to enable operation under emergency conditions with little or no advance warning. Present efforts in this direction are good, but are not involving enough amateurs.

Matching the capabilities of the Amateur Radio Service to the needs of the disaster response agencies we serve requires the continuing attention of all parties. Amateurs must be both flexible and imaginative in meeting those needs. New technology may expand our capabilities dramatically.

Most of the job must be done at the local and section/state levels, by volunteers. The job at the national level is to provide motivation, assistance and general guidance to these volunteers.

2) *Effective working relationships with all levels of government.*

The protection of our interests requires that every official and opinion leader have, at minimum, a positive impression of Amateur Radio and an awareness that it is a valuable public-service resource. Those whose actions could have a direct impact upon the Amateur Radio Service must have more than an awareness; they must understand its needs in their area of responsibility. As we acquaint these officials with the needs of our Service, we also want to convince them to become active supporters of Amateur Radio. This approach applies equally to the local, county, state and federal levels, and is a never-ending task.

At the federal level the responsibility rests with the ARRL President, with the assistance of the General Manager. An effective presence in the Washington, DC area is required, using a combination of professional and volunteer personnel. Regular contact must be maintained with the FCC, other Executive Branch agencies, Congress, the military, the Department of State and nongovernment agencies such as the American Red Cross. The subject of Washington representation receives the regular attention of the

ARRL Board and, in view of its importance, should continue to do so. In particular, the Committee urges efforts to foster a cooperative relationship with the FCC wherever possible.

3) *Membership involvement in League affairs.*

The Committee believes the League's decision-making processes can be improved by providing greater opportunities for individual and affiliated club participation. As the U.S. and Canadian amateur populations expand, and as the scope of Amateur Radio broadens to encompass new frequencies, modes, and operating and technical activities, there is a need to provide members with direct access to the decision-making process. This becomes increasingly difficult as the number of members represented by the average ARRL Division Director, now at approximately 10,000, continues to climb. It is especially desirable to involve those members who have specialized knowledge in particular fields of Amateur Radio endeavor, and to ease the administrative burdens that rest on the shoulders of the Directors.

One idea, which looks especially worthy of development, is to give greater responsibility within the ARRL structure to local-level amateur organizations for the protection, promotion and advancement of Amateur Radio.

The Committee believes it is important for the League to have the broadest possible membership base to lend credibility to the organization's efforts as the sole representative of Amateur Radio at the national level. At the same time, a continuing high rate of inflation undermines the value of the League's reserves, making dues increases unavoidable if the long-term financial health of the organization is to be protected and if the present level of professional services is to be maintained. Unfortunately, dues increases cause some members to drop out, especially those on fixed incomes.

4) *The need for improvement of the ARRL organizational structure.*

The League has expanded considerably in the past decade, in terms of membership, gross financial activity and the scope of members' interests. This in turn has placed increasing demands upon the League's organizational structure and on the volunteers who have accepted positions of responsibility and leadership. ARRL Directors, particularly, face two conflicting responsibilities — to develop and support the policies and oversee the business of a multi-million-dollar corporation, and to deal with the individual needs of members in their divisions. The present method of electing Directors, while it has served the organization for decades, may cause incumbents to concentrate their limited time and energy on the second responsibility, perhaps at the expense of the first.

Contributors to the LRPC Effort

Among those who took the time to share their ideas with the LRPC were:

W1AZA, W1BB, KA1BIL, W1BVR, K1CC, K1CCL, N1DD, W1EOF, N1FB, W1FB, W1JFF, N1JS, K1KI, W1OT, W1QV, W1RAN, W1RST, W1SE, WA1STO, K1XA, W1XA, WA1ZXF, N2AWA, W2BAI, K2BDT, KA2CGU, WB2DVL, W2EQS, W2FVS, W2HAE, W2HDW, W2IHA, W2JTP, WA2KIR, WA2KLS, W2LX, WB2MCB, WB2MWI, K2MZ, WA2PLR, W2QHH, WB2ROV, K2SX, K2UAH, N2UN, AE2W, W2XD, W2YSM, W3ABC, W3ADE, N3AIU, AE3B, W3BBN, W3BBQ, KA3BLO, KA3CXX, WB3EYS, W3GRF, W3HXF, K3IXD, W3JW, WA3KNN, WB3KTH, WB3LTG, W3MSN, N3NL, W3OKN, W3PN, KN3TFM, N3WS, W3ZN, KC4AA, N4APK, WD4AVT, K4AXF, N4BSY, WA4BUV, W4BW, W4CEU, W4CYC, KS4D, N4DEE, K4DNC, WD4DSS, W4EVV, WD4FCS, W4FJ, KA4FLS, W4FX, W4FZ, KA4GHY, WA4GLS, W4GW, K4HOE, W4HU, W4IBU, W4IQA, W4IZI, WD4JLL, W4JM, WA4JMV, K4JST, WA4JTI, WA4JUO, WA4JYU, W4KOM, W4KOQ, K4KQ, K4KYI, WA4LAB, WD4LBI, WA4LJI, K4LMB, W4LMB, WD4LOO, KB4LX, W4MB, N4MI, W4MIB, W4MWI, N4NK, W4NL, WD4NPF, N4NV, WD4NZP, KF4O, WB4ODZ, K4OGT, W4OXC, W4PNK, K4QF, WD4RAF, W4RI, W4RNP, W4RV, WA4TJI, W4TK, K4TWJ, WB4WDM, N4XX, W4YKI, K4ZN, WA5AAO, WD5BRR, W5CBN, WD5CID, WD5EAE, W5EDZ, W5GHP, WD5GKD, W5KR, K5KWD, WA5LIX, W5NW, K5PC, W5QKF, WA5ROY, WA5SJZ, W5VRA, N5WA, AB5X, AG5X, K5YY, W6AKQ, N6ATS, WA6BJH, W6BSO, WA6CQW, K6DD, W6EKM, W6EL, KA6ERF, W6FGE, WA6GYD, W6INI, W6ISQ, WB6JPI, W6KW, K6LK, N6MA, W6MUR, WA6NRP, W6ORG, W6POU, W6RW, K6RXU, W6RZ, W6SAI, W6TAG, WA6TOO, K6TP, W6TZV, W6UA, W6UF, W6UOU, N6VI, W6VX, W6WEQ, N6WR, WA6WZO, W6XM, W6ZF, W6ZRJ, W7AY, W7BI, KA7CDR, W7CKZ, K7CR, N7CY, AC7D, W7DC, W7DO, N7EH, K7GR, W7IEU, W7JIE, WB7NVM, WA7NXL, WB7NZI, K7QWR, WB7SHN, WB7SLK, W7WQ, W7YS, WB8EUN, KA8FHB, W8GCD, W8GRG, WB8JGW, WD8LKI, WD8PHK/5, W8PR, AC8Q, WA8SJC, W8TET, WA8UDX, WA8WNK, W8YFB, WA9BSO, K9EYY, KB9FO, K9IT, W9KNI, K9LOC, WA9LRI, AG9N, K9NE, WA9NEW, AJ9S, K9UE, W9UMH, WA9VIR, WBØCJX, KØCY, KAØDQB, KØHR, WBØJZX, WØLER, WØLMD, WAØNMA, WBØQPP, WØRUS, WØSR, WØYBV, KH6IJ, KH6JYK, KL7CUK, VE1OC, VE1WF, VE4PG, VE5CU, VE7FB, DK3LP, DL1FL, HK3DEU, HS1ABD, LA6A, VK4QA, XE1SR, YV5BPG, ZL1HV, ZL2AZ.

A fundamental change in the method of selecting ARRL Directors cannot be considered without giving the members an opportunity to react to specific proposals. The Committee intends to include such proposals in its Phase II report, and to recommend that the proposals and the supporting rationale be shared with the members before further action is considered by the Board.

5) *Enhancing the technical interests and abilities of radio amateurs.*

U.S. and Canadian amateurs' stations generally use factory-assembled equipment, and it is less common today than in years past for a major piece of station equipment to be home built. There are many reasons for this. By no means is this trend toward sophisticated, relatively inexpensive, commercial equipment all bad, and in any case it is unavoidable. However, the LRPC believes it is important for amateurs to explore the alternatives to factory-built and professionally serviced equipment.

There are at least four reasons why amateurs should not be satisfied to be "appliance operators." First, to serve the public interest amateurs as a group must be technically competent, and building one's own equipment is an excellent self-training activity. Second, amateurs should be able to service their gear in the field, so they can maintain a radio circuit in an emergency even in the event of equipment malfunction. Third, the exploration of new frequency bands and new communications techniques often requires equipment that is not available commercially. Finally, building and maintaining one's own equipment provides unique satisfactions that should be a part of everyone's Amateur Radio experience.

The League should encourage every amateur to undertake a simple technical project, preferably early in his or her amateur career, as an initial step toward embarking on more-difficult projects. It should also encourage amateurs to explore new technical possibilities — new bands, new modes, digital techniques, spectrum conservation methods and so forth.

6) *International Amateur Radio organization and policies.*

The 1979 World Administrative Radio Conference underscored the international nature of the Amateur Radio Service. The world's radio amateurs worked together to protect and expand their operating privileges, and learned valuable lessons in the process. Future ITU conferences will require even better representation of international Amateur Radio interests. Other issues and problems facing amateurs also transcend national boundaries, and require effective communications and good working relationships among amateurs throughout the hemisphere and the world if they are to be properly addressed.

As a leader among national societies for the past half century, the ARRL will be expected by amateurs everywhere to continue to provide assistance, guidance and support in the years ahead. But we must take deliberate steps to accommodate and employ the emerging organizational strengths and resources of radio amateurs in other countries, as well, and to establish firm and viable bonds of support and cooperation with all of them. It is no longer appropriate simply to impose our views upon others less experienced but, rather, we should welcome and treat as equals the national societies of other countries. We must reflect upon their needs and attitudes, solicit their ideas and proposals, and establish working relation-

ships that will provide a basis for cooperative efforts in the defense and improvement of international Amateur Radio into the twenty-first century.

Future of Long-Range Planning

Ours is a changing world. Assumptions for the future change as new information becomes available. New goals become important. Thus, any long-range plan is a fragile thing that must be regularly reappraised, revised, modified and updated. For that reason, long-range planning in some form, at an appropriate level of activity, must be continued. However, to provide for fresh viewpoints and to permit an unbiased and critical review of earlier recommendations, there should be periodic changes among planning personnel.

Strategies

A lengthy appendix to the LRPC Phase I report sets forth possible strategies for addressing nearly 100 separate objectives identified in the body of the report. The thoughts and ideas contained in the appendix reflect many recommendations from the members and should be helpful to the Board as it contemplates future actions in these areas.

Phase II Due in September

While the Phase I report of the Long-Range Planning Committee is the product of thousands of man-hours of work, its acceptance by the Board comprises a milestone along the road and does not represent completion of the committee's work. Now underway is the task of developing more detailed planning assumptions, and of defining specific proposals for Board consideration in the areas identified as requiring early attention. The LRPC is now engaged in developing the second half of its report to be presented to the Board in time for consideration at the September meeting.

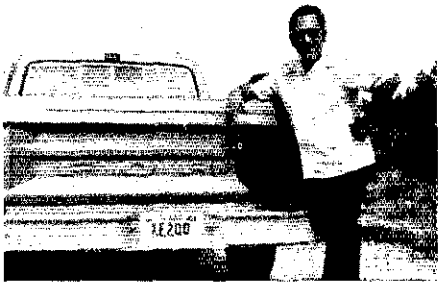
League members are indebted to the volunteers who, as LRPC members, have contributed so much of their personal time to charting a future course for Amateur Radio and the League. In turn, we are all indebted to the hundreds of amateurs and nonamateurs who freely shared their ideas and concerns in a spirit of cooperative enterprise. It is our earnest hope that the complete report of the ARRL Long-Range Planning Committee will be one we can be proud of, and one that will serve Amateur Radio well. QST

Notes

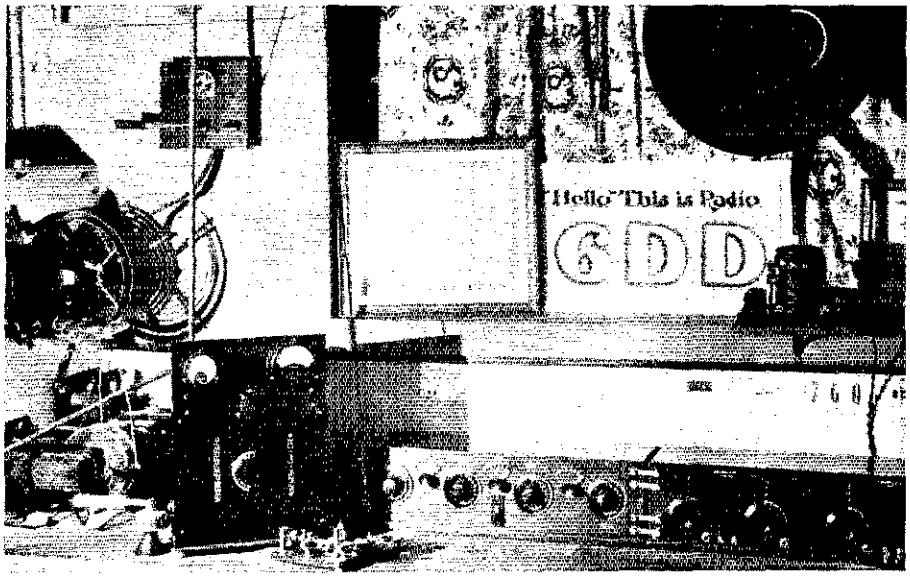
[1] "It Seems to Us," *QST*, April 1979, p. 9.
[2] V. Clark, "Long-Range Planning," *QST*, Dec. 1979, p. 65.
[3] V. Clark, "ARRL's Long-Range Planning Committee — A Progress Report," *QST*, June 1980, pp. 54-56.
[4] D. Sumner, "Survey of Amateur Radio, 1980," *QST*, March 1981, pp. 11-18.
[5] The CCIR is a permanent organ of the International Telecommunication Union which is responsible for preparing recommendations on technical and operating questions.

Strays

Larry Mulvehill, WB2ZPI (right), relaxes on the Great Wall of China during his photojournalistic expedition to that once-enigmatic country. Active in the Metroplex ACA of Leonia, New Jersey, Larry found Chinese Amateur Radio activity limited to training classes and low-power communications on 80 meters. *(photo courtesy WB2ZPI)*



The license plate of Roger Mireles, XE2QQ, caused Bill Edwards, K5CN, to do a double-take. Roger is a Mexican customs official at the Ciudad Mier border crossing near Roma, Texas, and was photographed by K5CN and K5ERF as they returned from a camping trip. *(K5CN photo)*



In 1919 6DD was issued the first amateur wireless station license in Nevada County, California. This station was in operation in the early 20s when wireless, aerial and 200 meters were common terms. *(photo by W6DD)*

MOVING? UPGRADING?

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

MATERIALS NO LONGER NEEDED

☐ The wife of Kushal Harvant Singh from Taiping, Perak, Malaysia, passes along the information that her husband has died, and she requests that all amateurs who were sending him Amateur Radio material please stop. The items already sent will be distributed to other hams in the area. — *Lawrence J. Moore, K6SLP*

QST congratulates . . .

☐ Dave Quest, WA7KQS, who was elected "lawman of the year" for Washoe County, Nevada.

160 Meters Lives Again!

Now, for the first time in 40 years, U.S. amateurs have a band that's exclusively theirs at 160 meters. How can we best use these much-needed new privileges?

By David Sumner,* K1ZZ

Remember when a U.S. ham could run a kilowatt, day or night, on 160 meters? If so, you're a real Old-Timer! Only those licensed before World War II will recall the days when the band was available to amateurs without unusual restrictions.

In those days, 160 meters was an exceptionally enjoyable and useful amateur band. Even though they were legal, kilowatts were the exception; much more common was the low-powered a-m phone equipment that was inexpensive and easy to build, and which thousands of hams built as their first rig. After the war we found ourselves displaced by a system for long-range navigation, called Loran-A, which was an important (but, we were assured, a *temporary*) user of the band. It wasn't until 1949 that portions of 160 were reopened for amateur operation under severe restrictions to protect Loran-A from any possible interference. The restrictions were relaxed somewhat as the years went by; even so, Top Band (as it is sometimes called because it is the longest-wavelength amateur allocation) has remained but a shadow of its former self.

That is, until now! On June 10, 1981, for the first time in 40 years, U.S. amateurs found themselves with a part of the 160-meter band to call their own!

Last July the League requested restoration of full amateur privileges in the band 1800 to 2000 kHz . . . on May 21 most of our request was granted.

Last December 31 saw the event that amateurs had been eagerly awaiting for *decades* — the shutting down of the domestic U.S. chain of Loran-A stations. In anticipation, last July the League filed with FCC a "Request for Agency Action" asking for the restoration of full amateur privileges in the band 1800 to 2000 kHz.[1] It took a bit longer than expected for the Commission to act, but on May 21 most of what we had requested was granted. The only restrictions that remain are for the protection of Loran stations in eastern Canada, which may continue to operate on 1950 kHz until the end of 1982. Since June 10[2] U.S. amateur stations have been authorized to operate with A1 (cw, on-off keying) and A3 (a-m or ssb) emissions in the segment 1800 to 1900 kHz with up to 1000 W input, day or night. Operation in the segment 1900 to 2000 kHz is limited as shown in Table 1.

One Threat Remains

To this point the news has been good; however, one problem remains to becloud the 160-meter sky. In a separate proceeding, FCC is making preparations to implement the decisions of the 1979 World Administrative Radio Conference (WARC-79), once the Final Acts of that conference are ratified by the Senate. The Commission has indicated that it intends to allocate 1800 to 1900 kHz exclusively to the Amateur Service, so the future of that segment looks reasonably secure. Unfortunately, in a departure from its stated policy of not re-examining issues that were settled during the lengthy WARC preparations, the Commission has proposed the eventual exclusion of amateur stations from the 1900- to 2000-kHz segment. This would create an exclusive allocation to the Radiolocation Service (not to be confused with the Radionavigation Service, of which Loran-A was a part). In this part of the spectrum, radiolocation is used mainly for offshore oil exploration. The League has filed a strenuous objection to the Commission's proposal, pointing out that the U.S. position entering the Conference was for radiolocation to be a secondary service in that segment, with amateur and certain other services primary.[3] Until this is settled the future of the 1900- to 2000-kHz segment remains somewhat in doubt.[4] We may have to work hard to defend that allocation.

What's the Band Like?

If you've never tried 160 meters, you may not know what you're missing. During the day, most amateur stations have a reliable working radius of 50 miles or so, with intervening terrain having little or no effect. Even low-power mobile stations are surprisingly effective in those parts of the country where ground conductivity is especially good. The whole character of the band changes as sunset approaches, especially in the winter and most particularly during periods of low solar (sunspot) activity. Strong signals roll in from hundreds of miles away, and on many nights worldwide DX is possible for the stations with good antennas. Earlier this year, once the ear-splitting emanations from Loran-A were but memories, a tantalizing sunrise ceremony on the East Coast was to listen for Japanese amateur signals on 1910 kHz — and, sure enough, on several mornings they were there!

Most of the time, though, the band is dominated not by DX activity but by friendly chats between stations a couple of hundred miles apart, often in roundtables. Propagation is quite reliable, the major problem being atmospheric noise from thunderstorms. Summertime static is bound to put a damper on our Top-Band celebrations for a while! One especially

Antennas can be an interesting challenge on Top Band. (Reprinted from December 1957 *QST*)

[1]Notes appear on page 56.

*Assistant General Manager, ARRL

Table 1

Power Restrictions in the Band 1900 to 2000 kHz, Effective June 10, 1981

Maximum DC Plate Input Power in Watts

States	*1900 to 1925 kHz*	*1925 to 1950 kHz*	*1950 to 1975 kHz*	*1975 to 2000 kHz*
Maine, Massachusetts, New Hampshire, Rhode Island	*Day/Night* 100/25	*Day/Night* 0	*Day/Night* 0	*Day/Night* 100/25
Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania, Vermont	200/50	0	0	200/50
Kentucky, North Carolina, Ohio, South Carolina, Tennessee, Virginia, West Virginia	500/100	0	0	500/100
Florida, Georgia, Illinois, Indiana, Michigan, Wisconsin	500/100	100/25	100/25	500/100
Alabama, Arkansas, Iowa, Minnesota, Mississippi, Missouri	1000/200	200/50	200/50	1000/200
The remainder of the states and territories	1000/200	1000/200	1000/200	1000/200

useful characteristic is that the skip zone that develops on winter evenings on 80 and 75 meters is almost unheard-of on 160. Therefore, the band is a good bet for the section-level activity that crowds the top end of 75 meters. There are no sub-bands here; General, Advanced and Extra are on an equal footing.

As new models of amateur equipment have been introduced with 160-meter capability, there's been a steady increase in the population of the band as more and more amateurs seek a respite from the more-hectic high-frequency bands. The easing of restrictions came not a moment too soon if 160 was to retain its nickname, "the gentlemen's band."

Some Planning Needed

If we amateurs are going to make the best use of our rejuvenated friend, 160 meters, we need to do some planning. There are both technical and operational problems to be faced.

An example of a technical problem is how to make an effective antenna that is small enough to fit in a typical city or suburban lot, yet is sufficiently broad-banded to cover the entire 200-kHz spread. Most of the popular antenna designs work across only a small portion of the band, which is no longer adequate.

The operational problems are potentially more serious. The band has a variety of uses, as do all of our amateur allocations, and, unless steps are taken to prevent it, some conflict between amateurs with different operating objectives is inevitable.

One thing that sets 160 meters apart from the other amateur bands is that there are no specific sub-bands for different modes of emission. Both A1 and A3 are permitted throughout the band and, because the band heretofore has been so segmented on the basis of geography, the FCC has made no provisions in its rules for the separation of the two. This is a departure from the practice on the other bands below 220 MHz, where telephony is excluded from portions of each band to encourage the narrower telegraphy emissions and protect them from interference. Regrettably, as the 160-meter population has mushroomed in recent years this lack of a definite dividing line between cw and phone has been the cause of some hard feelings.

Now that we know what the post-Loran situation is to be, at least below 1900 kHz, it's time to address that problem. Not that it's likely we will see FCC-sanctioned sub-bands; their thinking isn't running that way in Washington these days. The Commission has shown a predilection to deregulating even those things that would be better left regulated, so the chances of government action to solve the problem are slim. We're going to have to develop our *own* plan for sub-bands, within the amateur community, in a way that will gain broad support for that plan. That in itself would be no mean feat, but there's an additional complication: It must be done quickly, before the static levels die and Top Band activity picks up this fall, or our euphoria at the rebirth of 160 will evaporate in a cloud of confrontation.

Developing a Plan

Voluntary band plans are not new to Amateur Radio. In recent years they have been developed for the vhf and uhf bands and have helped considerably in reducing the likelihood of interference between amateurs pursuing different interests. They work best when everyone with an interest in the band has an opportunity to assist in the development of the plan, which brings us to the reason for this article. Here we want both to ask and to answer the question, "How should we go about developing a band plan for 160 meters?"

Should we begin by asking for suggestions? Ideally, yes; but looking at the calendar and at past experience it's apparent that 1983 would arrive before a plan could emerge if that step were included. Fortunately, a number of 160-meter activists have been giving thought to the subject for some time, and it is possible to propose a plan based on their work. In the interests of having a plan in time for the fall operating season, we must take the somewhat risky approach of proposing a plan and soliciting comments on that specific proposal. If your thinking departs radically from the proposal, of course, there will be every opportunity to share your reasoning before a plan is adopted.

Should the plan have the blessing of the ARRL Board of Directors? Absolutely; this is what gives the plan authority. The members elect the Board to establish policy for the League on their behalf. We must hasten to say that the proposal you see in Fig. 1 has not been approved by the Board, nor is it likely to be if there is significant membership opposition expressed prior to the next meeting of the Board in September. The draft plan is the product of staff work, because there is no Board advisory committee with responsibility for this area. We think it's a good plan, and one that takes all the relevant factors into consideration, or we wouldn't have gone out on a limb to propose it; but this certainly does not make it a *fait accompli*. The floor is open for alternative suggestions, so please don't say, after the fact, that you weren't asked!

What are the "relevant factors"? Some of them will be obvious, such as the relative amount of interest in cw and phone operation. However, others may not be so obvious, especially if you're not familiar with the band. One is existing activity in the band *that cannot be relocated* to another part of the band. For example, earlier we mentioned Japanese stations on 1910 kHz. The 160-meter band in Japan is 5 kHz wide, 1907.5 to 1912.5 kHz, so if one wants to work Japan there is not much choice as to a listening frequency! Amateurs in many other countries operate under severe frequency and power restrictions, and if we are not to preclude communication with them completely we must take their regulations into account.

Another important factor is that changes in our band plan will have to be made as the WARC-79 results are implemented worldwide. Especially in Europe, the band will undergo quite a transformation during the 1980s. Ultimately, though it may not be until the end of the decade, amateurs in most countries will be able to operate in the segment

1830 to 1850 kHz. Some will be limited to that segment; others will have broader frequency privileges.[4] Logically, DXing will tend to focus on this segment in the coming years. If we in North America want to contact the countries that are limited to this segment, we're going to have to listen there. But that's in the future; in the meantime, most Europeans who seek contacts with North America will continue to transmit in the so-called "DX window" of 1825 to 1830 kHz, where North Americans are asked *not* to transmit, and to listen elsewhere. Another place to look for DX signals is just above 1850 kHz, because amateurs in the USSR recently were authorized to use 1850 to 1950 kHz; whether this will change as a result of WARC-79 is anyone's guess. (Sometimes, when activity at 1825 to 1830 kHz is especially heavy, others who are permitted to do so move up to the vicinity of 1850 kHz. As the band occupancy increases, this is likely to occur ever more frequently.) Finally, as mentioned earlier, the future of U.S. amateur privileges in the segment 1900 to 2000 kHz is somewhat in doubt, so we must remain a bit flexible in case operations have to be relocated elsewhere.

You may ask, "Why are 'DX windows' needed on 160 meters, and not other bands?" A Top Band specialist might turn the question around and ask why a concept that has proven so useful has not been adopted for bands such as 80 meters! In general, DX signals on 160 are quite weak while signals from stations within a few hundred miles can be *very* strong. Unless North American hams practice a little self-discipline and avoid transmitting in the narrow listen-only segments, it becomes just about impossible for anyone to hear and work DX. If everyone called the DX station on his own frequency, no one would hear him when he returned a call (sadly, a situation that prevails on some of the hf bands). Therefore, for years it has been standard practice for DX stations to transmit on one frequency and listen on another. This approach has worked so well that it is likely to remain the standard for 160-meter DX operating. Incidentally, just because you aren't hearing any DX in the "window" is no guarantee that no one else is; the only safe approach is to avoid transmitting there entirely.

Our Proposal

Bearing all this in mind, the staff has developed the proposal shown in Fig. 1 for the *voluntary partitioning* of the 160-meter band. The key features of the proposal are:

- An exclusive cw segment of 25 kHz would be established at the low end of the band, following the pattern of the other amateur bands below 220 MHz where there is a cw band at the low end. Note that this segment would be available equally to General, Advanced and Extra Class licensees.
- A phone band 95 kHz or 145 kHz wide, depending upon one's location, would be created, although most of this band (i.e., that portion above 1900 kHz) would continue to be subject to some power restrictions and would be subject to future restrictions arising from the WARC implementation proceeding.
- The "DX-window" concept is recognized and expanded slightly.
- Flexibility in the 1830- to 1850-kHz segment is retained. (Gazing into the crystal ball for a moment, what we may see eventually is the shifting of the proposed "DX windows" into a part of this segment, but this is in the future.)
- Both routine phone and routine cw operation would have much more space than previously, without conflicting with one another or with DX operation.

It's Your Move

We think this is a good plan. Now it's time for you to say what *you* think and why, even if you agree. In fact, it's especially important that you take the time to express your agreement; human nature is to be silent when you're satisfied, and noisy when you're not. You and a majority of your fellow amateurs may like our draft proposal; but if you keep quiet about it and a noisy minority broadcasts its feelings far and wide, you may find that the plan has been modified in a way that is not as acceptable to you. Don't underestimate the power of *your* pen.

If there is enough support for the draft proposal, or if some minor changes will solve most of the problems, a formal recommendation can be made to the Board for consideration at its September meeting. If so, and if the Board acts at that meeting, we'll be in business before 160-meter activity begins to pick up in the fall.

Amateurs in most countries observe mode sub-bands voluntarily . . . can we do as well?

A big advantage of this approach, as contrasted with FCC rulemaking, is that it is possible to be much more flexible in adjusting the plan to meet future contingencies. The biggest challenge is this: Will it be accepted as a firm guide for the use of the band, or will it be subverted by "rugged individualists" who insist on going their own way in the face of what's best for the majority? Time — and the persuasive abilities of the amateur community — will tell.

Please study Fig. 1, reread this article and send your comments to: 160-Meter Band Plan, ARRL, 225 Main St., Newington, CT 06111. It wouldn't hurt to send a copy to your Director, who is listed on page 8; he or she will be making the ultimate decision.

If you think this business of voluntary band plans is something new and radical, rest assured that it isn't. Amateurs in most countries of the world are not required to observe mode sub-bands by their licensing authorities, but do so voluntarily. That mode restrictions in the crowded high-frequency bands are observed on a voluntary basis is a testimony to the amateur spirit overseas. Can we in the United States do as well? We're about to find out.

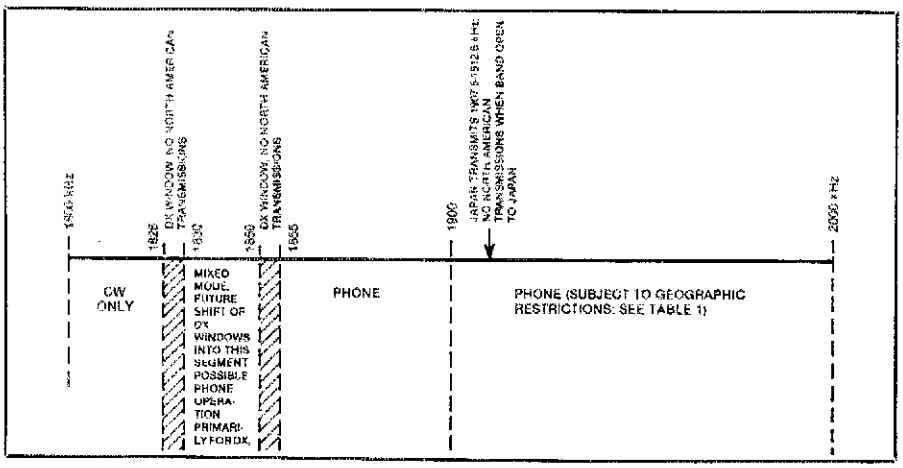


Fig. 1 — Proposed plan, not yet approved by the ARRL Board of Directors, for subdividing the 160-meter band by mode. See text for background.

Notes

[1] "Happenings," *QST*, Oct. 1980, p. 57.
[2] The change was announced immediately via W1AW and the volunteer ARRL Official Bulletin Stations across the country, and in "League Lines" in last month's *QST*.
[3] "Happenings," *QST*, April 1981, p. 66.
[4] Because of this uncertainty, the Commission advises amateurs ". . . not to invest heavily in equipment which can only be used for this frequency band. . .".
[5] DeMaw, "The Gentlemen's Band — 160 Meters," *QST*, Oct. 1977, p. 33. This article is an excellent source of background information on the band.
[6] See Feb. 1980 *QST*, pp. 55-56 and pp. 63-64, for details.

Happenings

Conducted By W. Dale Clift,* WA3NLO

FCC Proposes VHF/UHF Changes Based on WARC-79 Results

The Federal Communications Commission has made several proposals of importance to radio amateurs in its Second Notice of Inquiry in General Docket 80-739, Implementation of the Final Acts of the 1979 World Administrative Radio Conference. Deadline for comments on the Commission's proposals was July 15, which did not allow enough time for *QST* publicity after their release on June 15. However, a lengthy ARRL Bulletin transmitted by W1AW and other Official Bulletin Stations alerted members to the contents of the Notice as soon as copy was received at Headquarters.

The Notice concerns spectrum between 28 and 1215 MHz, and could result in changes to the amateur rules as early as January 1, 1982. No changes are proposed for the amateur bands at 28, 50 and 144 MHz, since no changes affecting these bands in the U.S. were adopted at WARC-79.

At 220 to 225 MHz, however, sharing with government and nongovernment Fixed and Mobile Services is proposed, as provided for in the international Table of Frequency Allocations adopted at WARC-79. (See February 1980 *QST*, page 52, for the complete story on the Conference results.) No immediate use of the band by either Service is mentioned. The reason given for the proposal is to permit future flexibility in domestic allocations decisions. Of course, any effort to reduce amateur privileges in the band would be fought strenuously by the League, in the same way such proposals have been fought successfully for the past decade.

At 420 MHz, to live up to the WARC-79 agreements, after January 1, 1982, U.S. amateur stations operating in the lower part of the band, 420 to 430 MHz, must not cause harmful interference to Canadian Fixed and Mobile stations operating in that segment. (Canada withdrew this allocation from its amateurs in 1980, substituting the 902-928 MHz band in its place.) FCC proposes to provide this protection by withdrawing the amateur allocation along the border with Canada. The 430- to 450-MHz segment would not be affected. The area in which amateur operation would not be permitted is north of the following line:

> from Aberdeen, Washington, by great circle arc to the intersection of 48° N, 120° W, thence along parallel 48° N to the intersection of 95° W, thence by great circle arc through the southernmost point of Duluth, Minnesota, thence by great circle arc to 45° N, 85° W, thence southward along meridian 85° W to its intersection with parallel 41° N, thence along parallel 41° N to its intersection with meridian 82° W, thence by great circle arc through the southernmost point of Bangor, Maine, thence by great circle arc through the southernmost point of Searsport, Maine at which point it terminates.

Major metropolitan areas that would be affected include Seattle, Detroit, Cleveland and Buffalo.

While the Commission's proposal perhaps places the least burden on the Commission's staff for avoiding harmful interference across the border, it is quite unfair to the amateur stations that have operated in the affected area for many years on 420 to 430 MHz, especially on amateur television. It is likely that they could continue to operate without causing harmful interference. The League's comments, not yet drafted at this writing, will explore alternatives that would have a less drastic impact upon amateur operations.

At 902 to 928 MHz there is good news. Except for parts of Colorado and Wyoming, FCC proposes an amateur secondary allocation for the entire band. This new allocation could be extremely useful to amateurs. To protect government operations, amateurs would not be permitted to use the band in the following area of Colorado and Wyoming: bordered on the north by latitude 42° N, on the south by latitude 39° N, on the east by longitude 103° W and on the west by longitude 108° W.

In another action to protect government operations, the Commission proposes to widen the area around the White Sands Missile Range in which a 50-watt power input limitation is in effect in the 420-450 MHz band. The area is now bounded by: latitudes 31° 53′ N and 33° 24 'N, and longitudes 105° 40 'W and 106° 40′ W. These would be changed to latitudes 31° 45′ N and 34° 30′ N, and longitudes 104° 00′ W and 107° 30′ W.

An extension of time for filing comments may have been granted by the Commission before you read this; if so, W1AW will have carried a bulletin to this effect. However, deadlines in WARC matters are seldom extended by more than a week or two. Further Notices of Inquiry dealing with the bands above 1215 MHz are expected soon. — *David Sumner, K1ZZ*

SPACE SHUTTLE *COLUMBIA* COMMEMORATIVE

The Marshall Space Flight Center at Huntsville, Alabama, held a worldwide Amateur Radio commemorative operation, starting at *Columbia* lift-off, 1200Z, April 12, 1981, and ending 1820Z, April 14, 1981. Thirteen operators manned four operator positions in the Marshall Amateur Radio Club (MARC) station, WA4NZD, on 2, 10, 15, 20, 40, 75 and 80 meters. A total of 2141 two-way contacts were made with radio operators in all 50 states and 30 foreign countries. Commemorative certificates from WA4NZD are being sent upon QSL request by the Marshall Amateur Radio Club. — *K. Hinkle, WA4WSE, Madison, Alabama*

A special certificate was presented to *Columbia* Commander John Young (right) and to Pilot Robert Crippen (left) by Ed Stluka, W4QAU, at the Marshall Space Flight Center picnic held on May 7. Congratulations to the astronauts were extended on behalf of the Amateur Radio community, who enthusiastically participated in this historic event. *(NASA photo)*

LEAGUE QUESTIONS EIA STATEMENT ON RFI BILL

The Electronic Industries Association (EIA) has come under fire from the ARRL for statements an EIA spokesman made to the Senate Subcommittee on Communications. The statements were in opposition to sections 2 and 3 of Senate Bill S.929, introduced by Senator Barry Goldwater, K7UGA. (See "Happenings," June 1981 *QST*, "Senator Goldwater Introduces Amateur Radio Bill.")

Sections 2 and 3 of S. 929 propose giving the Federal Communications Commission authority to establish minimum performance standards for audio and visual electronic equipment to reduce their susceptibility to radio-frequency energy. EIA's spokesman, from their Consumer Electronics Group, told the Subcommittee that, "A recent survey by the Amateur (sic) Radio Relay League indicates that less than 10 percent of its members receive complaints about interference, even from their own families. Amateur Radio operators are likely to regard malicious interference by fellow amateurs on UHF/VHF amateur bands as a 'very serious' problem."

In a letter written to EIA's J. Edward Day, League Hq. Assistant General Manager David Sumner, K1ZZ, pointed out that EIA's statement was a "classic case of apples being compared with oranges . . . In the case of malicious interference, amateurs were asked to express an opinion as to the severity of the problem; in the case of TVI/RFI, they were asked to report actual complaints of interference received. No doubt, had we asked amateurs to assess the severity of the TVI/RFI problem in the same way they were asked to assess malicious interference the numbers would have been quite different." The ARRL letter also pointed out that approximately 10% of the U.S. and Canadian amateur population received TVI/RFI complaints in the previous year, which translates to more than 40,000 individuals who must deal with a neighborhood public-relations problem that is not of their own making. Of the other 90%, the survey does not reflect how many have adjusted their amateur operating, perhaps to a point of cessation, to avoid provoking complaints from neighbors or family members who possess inadequately engineered consumer electronics devices. "The survey simply cannot be used to support the argument that a severe problem does not exist," Sumner

*Deputy Manager, Membership Services ARRL

wrote. The letter also took exception to a part of EIA's statement that implied that EIA had incorporated design corrections voluntarily in home-entertainment equipment to deal with the problem of audio rectification: "If better regulation is indeed not necessary, where is the glowing report of EIA/CEG accomplishments in areas such as audio rectification?" The League letter was also critical of the fact that the industry has not even developed standards for measurement of *susceptibility* to audio rectification, much less incorporated the design corrections it implied.

In closing, the League letter suggested that perhaps a survey of the general public might shed some light on the effectiveness of industry efforts in the area of RFI susceptibility. The envisioned survey would ask a random sample of the population to picture this scenario: They live next door to someone who operates a radio transmitter. When the radio transmitter is operated, the operation of their stereo is disturbed. Whom should they complain to?

a) The police
b) The operator of the transmitter
c) The FCC
d) The manufacturer of the stereo

According to Sumner, if the industry has faced up to this problem adequately, the answer should be overwhelmingly (d). "Would you [the EIA] like to enter into a small wager as to what the actual result of such a survey would be?" the letter asked. At press time, no reply had been received.

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE UPDATE: $48,155

Responding to the call "for the advancement of Amateur Radio," ARRL members and Life Members continue to add their support to the ARRL *Foundation and its Amateur Satellite* program. With the recent successful launch of an Ariane vehicle, it looks as though Phase III-B will continue to develop with a thumbs-up sign. Why not become a part of this exciting new facet of Amateur Radio today by sending your tax-deductible contribution to the ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent friends of the Foundation who contributed over $100 individually include: John H. Swafford, W4HU; Robert L. Williams, K6EMN; Harry Davis, Jr., K3WA(); Dewey M. Bassett, W8QE; William Hardie, VE3EFX; Martin Rosenthal, VE3MR; A Richard Rothe, Jr., KCØD; Stanley T. Andrews, K6MO; Albert T. Blanchard, N6QFY; Dr. Duncan M. Proudlock, VE6AD; Robert M. Smith, WØLD; William F. Martinek, W8JUV; Robert Y. Kosik, WB4YGM; Anthony T. Franc, WA7JRL/4X; Thomas Kravec, W8TK; Kenneth B. King, N6YE; Charles W. Tinsley, W9BPW; ARRL Foundation Director John H. Sanders, WB4ANX; Hester Clark, WA4PAE; Herman Cone, III WB4DBB; J. C. Lewis, Jr., W4LHS; Walter C. Snyder, W5IPH/W2DVC; Robert L. Kurth, MD, W5IRP; Elmer M. Ehasz, Jr., WB8MKB; Elise E. Hawkins, W2KYC; W. E. Booth, Jr., W5WJ; Ignaz Schwinn, II, W9ROS; ARRL Vice President Noel B. Eaton, VE3CJ; David L. Fayman, WØGI; Joel M. Rose, N8JR; Charles C. Ahlstrom, WB6UCW/KH6FOG; Francis A. Thompson, W9ML; Walter R. Larson, W6WL; Karl G. Roersma, K8UNZ; Terence Shilhanek, WØPFR; Frank F. Helton, KØFU; Emery Flinn, N4DX; Grosvenor Tavares, KH6DFF; John Ancona, WA8HTL; Joseph Mullan, W3RLR; Joseph Speroni, AHØA; Richard G. Price, K3RS; and Jack E. Hyde, WØSOJ. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

U.S. ATTORNEY EXPLAINS "PIRATE RADIO" DECISION; DANNALS REPLIES

Last month, "Happenings" published a letter by ARRL President Harry Dannals, W2HD, to the U.S. Attorney in Miami, Florida, critical of the U.S. Attorney's decision to drop charges against an illegal broadcasting station. (See July 1981 *QST*, page 54.) We reported that the FCC also had protested the decision to drop the charges against the alleged pirate broadcaster, Jose M. Gonzalez, whom the Commission investigated as the probable source of interference on the amateur 7-MHz band from the Miami area. The following letters have been exchanged:

Mr. Henry (sic) J. Dannals, President — May 4, 1981
American Radio Relay League, Inc.
16 Arbor Lane
Dix Hills, NY 11746

RE: *U.S. v. Gonzales*
Case No. 80-311-CR-WMH

Dear Mr. Dannals

As the Assistant United States Attorney responsible for the prosecution of the above-referenced matter, your letter of April 16, 1981, to the United States Attorney Wampler has been referred to me for reply.

As you may know, the ability of a federal prosecutor to discuss with members of the general public the reasons for the institution or termination of a criminal proceeding is severely circumscribed. Within such limitations, however, I can assure you that the decision to terminate the *Gonzalez* case was taken after intensive discussions with a large number of federal agencies and federal officials involving considerations of wider significance than amateur radio band interference.

Although I am not at liberty to discuss the nature of *these considerations they included the personal review* by me of national security files in two different cities. Further, the defense raised by Mr. Gonzalez entailed the subpoenaing of classified government documents that would likely have had to have been revealed to the defendant if the case continued. Further, Mr. Gonzalez' defense was such that, in my opinion as a prosecutor of substantial experience in the Miami area, *the likelihood of obtaining a conviction of Mr. Gonzalez* was minimal. Needless to say, an acquittal of Mr. Gonzalez would hardly have served the interests of either your members or the government.

In view of the above, an agreement was entered into with Mr. Gonzalez whereby he stated the following, on the record, to Judge Hoeveler: (1) Gonzalez agreed to cease all broadcasts from his present location; (2) If he violated the above stipulation, the government could reinstitute all charges against him; and (3) The government retained all rights to prosecute him for any illegal radio transmission from any location.

By this agreement it was hoped that the rights of Amateur Radio broadcasters would be best protected under the facts and circumstances of this particular case.

In summation, the decision to enter into the above agreement with Mr. Gonzalez was not made hastily (or "irresponsibly," as *stated in your letter*), but was rather the result of the review of national security documents, discussions with persons in a number of government agencies responsible for our national security and pragmatic litigation decisions. In attempting to balance the ends of justice with numerous points of view it is often impossible to convince all persons that any given decision is proper. One can *only hope that before one is condemned for making a* decision that those doing the criticizing would make the effort to realize that no malice toward any group or individual is intended by such decisions. We, as federal prosecutors, can only try to further the interests of the government as best we perceive those interests to be in all good faith. Such an effort was most assuredly made in this case.

Sincerely,
Atlee W. Wampler III
United States Attorney
by: Kenneth W. Lipman /s/
Assistant United States Attorney

Mr. Kenneth W. Lipman — June 16, 1981
Assistant United States Attorney
155 South Miami Ave.
Miami, FL 33130

Dear Mr. Lipman:

Thank you for you letter of May 4. I appreciate your courtesy in replying.

Events of recent years have caused people who normally would trust their government to be somewhat skeptical when "national security" is used as a rationale for seemingly indefensible government actions. In this case, it appears that one of the "number of government agencies" you mention as being involved in the case may be guilty of sponsoring or encouraging activities which are highly prejudicial to the rights of a large number of U.S. citizens: this nation's amateur radio operators. *This simply has to stop. We would* appreciate your putting us in touch with the agency concerned, so this point can be made directly.

We remain very concerned that the government has missed an ideal opportunity to make an example of an individual who has apparently admitted to willful and deliberate violations of the Communications Act of 1934. A conviction would have deterred others from engaging in similar practices. As it is, we are left with a very undesirable situation in southern Florida. I hope your office will make every possible effort to prosecute more effectively any violators who come to your attention in the future.

Sincerely yours,
Harry J. Dannals, W2HD/s/
President

BEHIND THE DIAMOND

The Frequency Measuring Test of May 9 brought to a close a glorious chapter in the annals of ARRL history: It marked the retirement of ARRL's beloved umpire of over a quarter century. This month's "Behind the Diamond" is an *exclusive* revelation of the identity of the stalwart FMT referee, heretofore known but to a very few. We speak fondly of Lloyd W. Root, K7AS, of Sun City, Arizona, who recorded his first FMT umpire's decision on November 16, 1955. It's been an unbroken string of quarterly frequency measurements ever since. All who have played the FMT game, *and the many Official Observers down through* the years who have qualified for OO status by displaying frequency-measuring prowess, owe a debt of gratitude to Lloyd. He was always there to devote himself to giving his frequency measurements only the best of professional attention.

Lloyd was an active FMT participant himself for many years before becoming the official standard. It was his intense interest in the program that prompted him to publish a newsletter that was circulated among the top FMTers of the late 40s and early 50s. It was through this medium that it became obvious to the FMT sharpies that the then commercial umpire, RCA, was not measuring to the same high degree of accuracy as the top participants! It was then that Lloyd and his "gang" prevailed upon Communications Manager F. E. Handy

Frequency Measuring Test umpire Lloyd W. Root, K7AS, at the W8HB laboratory/shack in Dayton, Ohio.

Second Notice — ARRL Elections

Attention all ARRL members! Nominations are now open for candidates for ARRL director and vice director in each of the following divisions: Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern.

What do ARRL directors and vice directors do?

The ARRL Board of Directors is the governing body of the nonprofit, educational and scientific corporation chartered under the laws of Connecticut as the *American Radio Relay League, Incorporated.* The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and services that will be made available to the membership. There are 16 directors, who are elected by the membership on a geographical basis. Half of the directors stand for election in the even-numbered years, half in the odd. At the same time directors are elected, vice directors are also chosen, who can fill in when directors are unable to serve. For this reason, candidates for vice director must meet the same requirements as the candidates for director.

Who is eligible to run for director or vice director?

In order for a candiate to be eligible for the office of director or vice director, he or she must submit a nominating petition bearing the signatures of 10 (or more) full members of a division naming him or her as a candidate for director or vice director. This petition must be received by League Headquarters no later than noon on September 1, 1981. Each candidate must also provide information (on a form provided by Hq.) that will allow the Executive Committee of the Board of Directors to determine the eligibility of the candidate in accordance with the provisions of the ARRL Bylaws, and a statement of not more than 300 words setting forth the candidate's qualifications, which will be included with the ballot mailed to members. There must also be a signed statement that the information is true to the best of the candidate's knowledge and belief. The candidate's statement of qualifications shall be reprinted without content editing. No candidate will be allowed to make any derogatory statement about any person or entity.

The nominee must reside in the ARRL division he or she seeks to represent. He or she must also be the holder of at least a General class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a full member of the League for a continuous term of at least four years at the time of the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. Accordingly, the primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. Neither is a person eligible who is engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature intended in whole or in part for radio amateurs. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from Headquarters on request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned Full Members of the ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1982-1983 term.
(Signature . . . Call . . . City . . . ZIP . . . Date . . .)

Who is eligible to vote?

Whenever there is more than one candidate for either office, ballots will be sent to all full members of the League in that division who were in good standing on September 1. The ballots will be mailed no later than October 1 and, to be valid, must be returned to Headquarters by noon, November 20. A group of nominators can name a candidate for director, for vice director, or for both, but there are no "slates" as such. Each candidate appears on the ballot in alphabetical order.

Absentee Ballots

All ARRL members who are licensed by FCC or DOC but temporarily residing outside the U.S. or Canada are now eligible for full membership. These members overseas who arrange to be listed as full members in an appropriate division prior to September 1 will be able to vote this year where elections are being held.

Even within the U.S., full members temporarily residing outside the ARRL division they consider home may now notify the Secretary of the League prior to September 1, giving their current *QST* address and the reason why another division is being considered home (as for instance, holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern division, but your *QST* goes elsewhere, please let the ARRL Secretary know, as soon as possible but no later than September 1, so you will receive a ballot for your home division.

What if one person is nominated for both director and vice director?

If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

The Incumbents

These persons presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year: *Atlantic* — Jesse Bieberman, W3KT, and Hugh A. Turnbull, W3ABC; *Canadian* — Mitch Powell, VE3OT, and Frederick H. Towner, VE6XX; *Dakota* — Garfield A. Anderson, KØGA, and Tod Olson, KØTO; *Delta* — Lionel A. Oubre, K5DPG, and O. D. Keaton, WA4GLS; *Great Lakes* — Leonard M. Nathanson, W8RC, and George H. Goldstone, W8AP; *Midwest* — Paul Grauer, WØFIR, and Claire Richard Dyas, WØJCP; *Pacific* — William J. Stevens, W6ZM, and Ross W. Forbes, WB6GFJ; and *Southeastern* — Frank M. Butler, Jr., W4RH, and Evelyn Gauzens, W4WYR.

In Summary

Petitions need 10 or more signatures of full members and are due at League headquarters by noon, September 1. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to full members of record September 1. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1982.

Additional Information

Nominees or, indeed, any member, may obtain a copy of the ARRL Articles of Association and Bylaws, along with a pamphlet outlining the duties and responsibilities of elected League officials. Interested persons should write or call ARRL Headquarters, 225 Main St., Newington, CT 06111, tel. 203-666-1541.

For the Board of Directors:
July 1, 1981.
R. L. Baldwin, W1RU
Secretary

to appoint a new umpire. Though he never sought the job for himself, it was a foregone conclusion as to who was best qualified — who else but Lloyd? Even when W1AW's signals did not display good oven stability (which was often), Lloyd's objective measurements put to rest forever all arguments with the umpire. Lloyd was fully in charge on the FMT basepaths!

Scientist and humanist, Lloyd was the "Elmer" of the old gang, who knew him as a great guy and a great ham. He still sees some of the old crew whom he has been known to treat to beer and tacos. He loves best to demonstrate his frequency-measuring gear and has helped many with divider circuits and crystal oven design. He appeared many times in the 50s at the Dayton Hamvention lecturing on "New Techniques in Precision Frequency Measurement."

Known best under the call W8HB, Lloyd was Professor of physics at the University of Dayton. He later served as research director at Behm Glass in Dayton working in precision optics. He then was involved in optical research at the large government installation at Heath, Ohio. This eventually led to consulting work in optics and frequency measurement and the origin of the Root Electronic Laboratory.

First licensed as a W9 in Wisconsin, Lloyd met his life-long partner, Lillian, who was also licensed. They met via Amateur Radio of course. Lillian has pursued other hobbies, namely bridge and shooting pool. Like Goren, she is an excellent teacher of bridge. And before you chalk your cuestick, beware: Lillian is a pool "sharkess."

Retired now in Sun City, we pay special tribute to Lloyd Root and his amazing record of frequency-measuring umpiring, as he steps out from behind the diamond, unmasked for all to see and salute. — *John F. Lindholm, W1XX (with a special thanks to W8CUJ, W4GH and W1JH who assisted with this profile)*

Moved and Seconded

MINUTES OF EXECUTIVE
COMMITTEE MEETING No. 384-A
January 19, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 3:43 P.M., January 19, 1981, by means of telephone conference call. Participating in the call were: President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also participating in the telephone conference call was General Counsel Robert M. Booth, Jr., W3PS.

Mr. Dannals asked Mr. Baldwin to review the latest developments in the suit by Mary Lewis.

Mr. Baldwin reported that on Friday, January 16, he had received a telephone call from Seattle Attorney Val Tollefson reporting that there was to be a pre-trial conference on Monday morning, January 19. Mr. Tollefson said that he had inspected the court calendar and that the Mary Lewis vs. ARRL suit would be tried somewhere in the period between January 23rd and February 27th. Mr. Tollefson promised to call Baldwin again after the pre-trial conference. After discussion, Mr. Dannals and Mr. Baldwin had agreed on Friday that there was no need to alert the Executive Committee until additional information became available as a result of the pre-trial conference.

Mr. Baldwin then went on to report the results of the conversation this afternoon (Monday, January 19) with Attorney Tollefson, who was calling at the suggestion of the judge who was scheduled to hear the case. It appeared that, regardless of the merits of the case, the cost of the trial made little economic sense and it had been suggested that the Executive Committee again examine whether some settlement might be reached. After extensive discussion, during which all those participating in the telephone conference call had an opportunity to ask further questions and express their opinions, the General Manager was directed to contact Attorney Tollefson and describe in detail the terms under which the Executive Committee felt a settlement of the litigation would be fair and equitable to both parties. A basic philosophy expressed by all members of the Executive Committee was that it was important to put this matter behind us and get on with the work of the League.

The General Manager was instructed to report further developments promptly.

There being no further business, the meeting of the Executive Committee by telephone conference call was completed at 4:13 P.M.

Respectfully submitted,

Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 388
May 22, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 11:00 A.M., EDST, on Friday, May 22, 1981. Present on the line were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, William J. Stevens, W6ZM, and Stan Zak, K2SJO; General Manager Richard L. Baldwin, W1RU; and General Counsel Robert M. Booth, Jr., W3PS.

President Dannals reviewed the current status of Docket 80-729, Revision of the Amateur Service Rules into "Plain Language." The request for extension of time of the comment filing date, ordered by the Executive Committee at its May 13th meeting, had been filed with the Commission on May 21, 1981. Also on May 21, 1981, Carlos Roberts, Chief of the Private Radio Bureau, acting under delegated authority, had denied the petition for a six-week extension in comment date filed by Robert Dyrutf, W6POU.

At Mr. Dannals' request, Mr. Baldwin then communicated some views of the staff, to the effect that there is an indication in correspondence that a growing number of our members see no need for the so-called plain language rules in the Amateur Radio Service. Mr. Baldwin then read the text of a proposed Directors' Letter (which was later that day issued as Directors' Letter No. 1771-A). After a number of editorial changes suggested by the several participants in the meeting, the draft was approved by a vote of 4-0, and the General Manager was directed to submit the letter and its attached resolution to the entire Board for mail vote, in accordance with the provisions of Article 6.

At the suggestion of Mr. Booth, the General Manager was directed to prepare a letter for President Dannals' signature, transmitting a copy of Directors' Letter No. 1771-A to each of the FCC Commissioners, as a means of directly expressing our concern.

The General Manager was further directed to have the staff continue with their preparation of comments in response to Docket 80-729 and to work on the premise that there is no extension of comment date beyond the already-established date of June 19.

There being no further business, the meeting by telephone conference call was concluded at 11:39 A.M., EDST.

Respectfully submitted,

Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 389
June 19, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:21 P.M., Friday, June 19, 1981, at the Downtown Marriott Inn, Atlanta, Georgia. (With the consent of all members of the Executive Committee, the Committee began its deliberations at the above-mentioned hour, rather than the originally scheduled 9:00 A.M. of June 20, on account of the extensive agenda that had been published by the Secretary.) Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Directors Jesse Bieberman, W3KT, Frank Butler, W4RH, and Gay Milius, W4UG; and General Counsel Robert M. Booth, Jr., W3PS.

On motion of Mr. Zak, the Committee recognized the names of 395 members who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Stevens, the affiliation of the following clubs was approved: ARARAT Amateur Radio Shrine Club, Kansas City, Missouri; ARROW, Ann Arbor, Michigan; Caribe DX Association, East Glastonbury, Connecticut; Conyers Amateur Radio Group, Conyers, Georgia; Del Norte Amateur Radio Club, Crescent City, California; Delaware Valley VHF Society, Fairless Hills, Pennsylvania; Eastern Pennsylvania VHF Society Inc., Lehighton, Pennsylvania; Explorer Post 599 — Analy High School (BSA), Sebastopol, California; Florida Institute of Technology ARS, Melbourne, Florida; Greater Milwaukee DX Association, Greendale, Wisconsin; Green Valley Amateur Radio Club, Green Valley, Arizona; Hawkins County ARC (HARC), Rogersville, Tennessee; IBM Radio Club — Atlanta, Atlanta, Georgia; Illinois Central College ARC, East Peoria, Illinois; John Ross Amateur Radio Club, Rossville, Georgia; Lincoln Trail Amateur Radio Club, Inc., Elizabethtown, Kentucky; London Bridge Radio Association, Lake Havasu City, Arizona; Madison County ARC, West Jefferson, Ohio; Melfort Amateur Radio Club, Melfort Sask, Canada; Melpar Amateur Radio Club, Falls Church, Virginia; Olympia Radio Amateur Club (ORAC), Philadelphia, Pennsylvania; Port Chester High School ARC, Port Chester, New York; Rubber Circle Contest Club, Woodinville, Washington; South Hillsborough Amateur Radio Klub "SHARK," Apollo Beach, Florida; Tamarac Amateur Radio Association, Tamarac, Florida; Tompkins County ARC, Ithaca, New York; Victoria VHF Ritty Club, Victoria, Texas; Villisca High School ARC, Villisca, Iowa; Vulcan DX Club, Birmingham, Alabama; West Alabama ARS (WAARS), Northport, Alabama; Winterset Radio Club of Florida, Palmetto, Florida; Yates Amateur Radio Club, Bellona, New York. (With the above action, the League now has 1968 Category I affiliated clubs, 9 Category II clubs and 366 Category III clubs.)

On motion of Mr. Anderson, approval was granted for the holding of the following ARRL Conventions: Alabama State, August 15-16, 1981, Huntsville, Alabama; Illinois State, August 23, 1981, St. Charles, Illinois; Great Lakes Division, September 26-27, 1981, Louisville, Kentucky; Louisiana State, October 17-18, 1981, Kenner, Louisiana; Florida State, February 6-7, 1982, Miami, Florida; CRRL Midwest Canadian, July 2-5, 1982, Saskatoon, Saskatchewan.

The Committee took note of correspondence from the Central Missouri Radio Association, Inc., concerning a conflict in hamfest/convention dates involving Columbia, Missouri, and Kansas City, Missouri, during the first weekend of April, 1982. After discussion, the problem was referred back to the director of the Midwest Division, with a request that he meet with the Executive Committee in September and discuss a possible solution.

The Committee noted that the Indiana State Convention, scheduled for July 12, 1981, had, at the request of the sponsor, withdrawn its request for ARRL sanction.

The Executive Committee then proceeded to an extended discussion of current matters in the Central Division and wording of By-Law 20. It was the decision of the Committee that the entire problem was one which warranted discussion by the full Board, and that the earliest opportunity for such discussion would be at the September meeting. Attorney Droker's letter of May 27, 1981, was discussed, and the Committee agreed unanimously that General Manager Baldwin's response of June 2, 1981, was adequate.

In response to Minute 64 of the annual meeting, the Committee discussed at length the election procedures and eligibility requirements for honorary officers. The General Manager was directed to prepare a set of procedures, to replace Standing Order No. 95, to be circulated to the Committee for review prior to the September meeting of the Board, with these revised procedures to be presented to the Board at its September meeting.

Mr. Baldwin reported that the ITU Administrative Council was in the process of seeking approval of all ITU members to postpone the 1982 Mobile WARC until 1983, because of the workload at ITU Hq.

The meeting was recessed at 11:13 P.M. and reconvened on the next morning, Saturday, June 20, 1981, at 8:03 A.M., with all those previously reported present except Director Butler and General Counsel Booth. Director Lionel Oubre, K5DPG, joined the meeting at 8:06, Mr. Booth at 8:11, and Mr. Butler at 8:13. Director Jay Holladay, W6EJJ, joined the meeting at 8:37 A.M.

The Committee proceeded to a discussion of the "plain language" rules proposed in Docket 80-729. The Committee had before it the motion adopted at the March meeting, the resolution adopted by mail vote in response to Directors' Letter No. 1771-A, and the draft comments prepared by the staff. After extended discussion, in which there was reference to the response from the membership, the Committee voted unanimously to accept the concept of the "plain language" rules, based on appropriate modifications, and the General Manager was directed to advise the membership of the latest developments by means of a "League Lines" item in August *QST*, by means of a W1AW bulletin and through suitable notice to affiliated clubs. The membership will be urged to file any additional comments promptly.

Director Butler and General Manager Baldwin reported on membership response to the Board's March action relating to the handling of phone-patch traffic by alien operators, and the committee agreed that any further action on this matter should be deferred until it could be considered again at the September meeting of the Board.

The Committee reviewed a number of cases of litigation involving members, in which financial assistance of the League had been requested. (A) In the case of James Stitt, WA8ONQ, review of the material available to the Committee indicated that Mr. Stitt had erected a 90-foot tower without seeking a zoning variance of the 60-foot restriction, despite knowing that such a variance was necessary. The Committee agreed that this case did not meet the League's guidelines for financial participation, and declined financial support. (B) The Committee took note of the letter from Donald Sleeper, W1ONK, in which Mr. Sleeper thanked the League for its help in his litigation, even though he was unsuccessful. (C) General Counsel Booth reported on the successes achieved by Attorney Fred Lawson and the status of funding supplied for the several cases handled by Mr. Lawson. (D) The Committee briefly reviewed the case of Don Jellinek, K2AHL, noting that he had voluntarily signed an agreement to stay off the air. The Committee believes that there is no appropriate action to be taken by the League at this time. (E) The Committee reviewed the case of Thomas Boudreau, NØCBX, and the request by Attorney Hugh Jaeger,

(continued on page 75)

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

LEAKY LINES

☐ The small article in "Happenings" (April 1981) concerning CATV interference to amateur operations was discouraging to read. Keep in mind, however, that not all cable radiation problems are the fault of the CATV operator. Our industry abounds with "subscriber-induced" rf leakage. For example, it is not uncommon to find customers who inadvertently connect their TV antenna leads and cable leads together at the set antenna terminals. Since the typical cable signal level at the TV set is 1000μv, the radiation produced by the customer's antenna can be quite high.

Another source of subscriber-induced radiation is illegal connections and/or additional outlets. One of the reasons CATV companies insist upon installing all additional outlets is to maintain the rf integrity of the system. I am sure all hams will recognize the importance of good coaxial connections, but the average subscriber does not. They may be inclined to add additional TV outlets using twin-lead and electrical tape.

Hams should not conclude that cable television assignments in the 144- to 148-MHz region will always present interference to 2-meter operations. On the contrary, GE CATV systems in Decatur, Illinois and Evansville, Indiana have, for a number of years, permitted local hams to operate 2-meter repeaters on CATV receiving towers. To date there have been no cases of mutual interference.

Since there are a number of hams in the CATV industry, I suspect that GE is not the only cablevision company that allows repeater installations. — *F. C. Baxter, K2ZLA, Schenectady, New York*

QRS . . . ALL THE WAY

☐ Fellow hams who, by necessity or choice, indulge in a nice slow-speed cw QSO, please don't speed up when you sign. Maybe you speed up because your own call is so familiar, or you may be bored and impatient having to give your call so often. But I know most of you are friendly, and would talk to me next if I could only call you when you get to any "SK." In fact, I have heard many of you in QTH's I would like to contact. Please, if you, too, have to go slow, or if you are being kind and indulgent to some other slow poke like me, give me a chance!!

I suspect most of you are Technicians, or Novices like myself, who, someday will upgrade and get privileges in other parts of the bands, so you may never have gotten the above admonition/request.

Think it over. If you are available to talk to someone else at the end of an existing QSO, sign so that those who can follow your QSO speed can also get your call! — *Bruce E. Lackey, WB3HAE, Rockville, Maryland*

*Membership Services Assistant, ARRL

DRESSED TO KILL

☐ First off, I should state my complete satisfaction with *QST*. I have adopted it as my primary Amateur Radio magazine — forsaking all others.

However, your cover on the May issue leaves me very concerned and embarrassed. I had no idea that the "uniform of the day" for operating my station was shirt, tie and sportjacket!! No wonder I'm having trouble with DX while operating in a sportshirt and sweater. Those people must think I look like a slob!! Now, of course, the cover model has a computer, and I don't. Perhaps that relieves me of some of the responsibility for formal dress.

I do appreciate your bringing my slipshod attitude of operating to my attention. I am concerned about the added expense in my hamshack. Tell me, is some special kind of jacket required, or will any of those in my closet get me off the hook? — *Charles S. Russell, WB8SRD, Muskegon, Michigan*

DX RAG

☐ I was away from ham radio for about 15 years, low bands that is. I returned about two years ago and after a short stint of ragchewing on cw, I decided to try for DXCC. As I began combing the low end of 40, 20, 15 and 10, I suddenly became appalled at what I was hearing! And I'm not talking about rare DX. I am talking about the exceedingly sloppy operating habits that seem to have become the modus operandi of DXing. What it actually sounds like is a bunch of lid operators practicing sending their call signs! And if that isn't bad enough — some just keep relentlessly sending and sending in hopes that they are big gun enough to drown out all the others. If you get three of these boys on at the same time, you have a real henhouse of QRM, with new arrivals on the frequency really wondering when they'll get a chance to even listen for the DX station. How is it that this practice is condoned without a lot of wrist slapping in *QST* editorials? I have heard so many "assumed" two-way contacts that I'm beginning to wonder just what constitutes a valid contact. Surely, if you never send the DX call sign you haven't made a valid exchange. How is it that "hamming" has slipped into this muck and mire? Is it a "spin-off" of the grand and glorious FCC blunder of the century — citizens' band "radio"? But the worst offenders are the 2-letter calls. Not just the new calls, but the old 1 × 2 calls, also.

I'm not suggesting that in a pileup a DXer should *never* call the DX station without sending his call. I'm saying that the call sign should be interspersed now and then and most definitely sometime during the actual two-way contact — at least when "signing." I feel that a measurable amount of this practice stems from the pressure put on the stateside ham by expedition DX stations and other rare DX in their quest to work as many stations as possible. But the small amount of time it takes to send a call sign really doesn't burden the DX station that much.

What can be done? Can these bad habits be broken? Sure. Just give OO's the authority to invalidate improper DX exchanges — on a sample basis, of course. When a U.S. DX operator gets turned down for a low count for DXCC, I quite suspect he will change his ways. And word *will* get around.

I have noticed that most foreign operators are much superior to U.S. operators. Why don't we clean up our act and at least pull up alongside? — *Ace Simpson, N6BJG, Anaheim, California*

[Editor's Note: The issue may be moot if the FCC adopts its proposal in PR Docket 80-136 to remove the present requirement to transmit the call sign of the other station at the end of a contact unless international third-party communications are involved. The League, in supporting the Commission's proposal, further recommended an additional amendment to allow stations to identify only once during an exchange of less than 30 seconds duration.]

ON CUE

☐ On many occasions I have heard the statement that the Q signals should *not* be used for phone. In fact, the League publication "Operating an Amateur Station" implies that the international Q signals are for cw, and specifically limits the informal QN signals to this mode.

The International Radio Regulations provide that the Q code signals are for use by all services. The list of Miscellaneous Abbreviations and Signals carries the footnote, "when used in radiotelegraphy, a bar over the letters composing a signal denotes that the letters are to be sent as one signal." And the phonetic alphabet specifically includes use in spelling out "call signs, service abbreviations and words."

Some general comments about this: A major advantage of the Q signals is that they read the same in all languages. With their use, a short, but informative, QSO can be made without the participants knowing a word of each other's language. On phone, this does require another step — use of the standard phonetic alphabet, spoken as specified. This use is also important — the sounds come through easily in all of the major languages. The "cute" phonetics often heard don't do this: Also, they may even be insulting. And, strictly speaking, they are contrary to the International Regulations.

I call upon the League to start a campaign to correct the present misunderstandings about Q codes and service abbreviations, and to call for their use when they will serve their extended purpose — reducing transmission time and increasing accuracy. Every operator should keep a list of Q codes on the operating table, and phone operators should have the standard phonetic list and pronunciation also. League publications should be revised to conform. — *R. P. Haviland, W4MB, Daytona Beach, Florida*

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

FCC Scorecard

The Amateur Radio Service is a dynamic entity always in a state of flux. Accordingly, rules governing the service often change to meet the continuing needs of the amateur community. This month, we present a summary of rulemaking proceedings currently before the FCC and a guide for those interested in becoming a part of the rulemaking process.

Anyone who feels a change in the rules is desirable may file a *Petition* for rulemaking. The original, plus five copies, should be sent to the Secretary, Federal Communications Commission, Washington, DC 20554. When the Commission receives a petition for rulemaking, it assigns the petition a number and issues a public notice stating that the document has been received and is available for inspection at the Commission's document room in Washington. Normally, interested parties have 30 days in which to comment on the merits or demerits of the petition. In practice, however, it is usually several months before the Commission acts on the petition, and comments may be accepted up to that point. RMs (*R*ule *M*akings) are listed in the "Happenings" column of *QST* whenever possible.

At some point the Commission will either dismiss a petition for rulemaking (if it appears to have no merit or deals with an issue already decided) or, if it appears to have merit, assign it a docket number and release it to the public in the form of a *Notice of Inquiry* or *Notice of Proposed Rulemaking*. A Notice of Inquiry (NOI) simply shows that the Commission wishes to explore the subject further, but does not propose any specific changes to the rules. The latter is the purpose of a Notice of Proposed Rulemaking (NPRM). On rare occasions, if a petition for rulemaking requests a minor editorial change to the rules, a lifting of restrictions or a procedural change of no substantive impact, the Commission may proceed directly to a *Report and Order* and bypass the intermediate stage of Notice of Inquiry or Notice of Proposed Rulemaking.

A Notice of Proposed Rulemaking eventually leads to a Report and Order in which the proposed rules may be adopted as proposed, adopted in part or rejected. Upon publication of a Report and Order in the *Federal Register*, an individual has 30 days in which to file a *Petition for Reconsideration* should he or she be dissatisfied with the new rules.

Some decisions in FCC matters affecting Amateur Radio and other services may be made at staff level under delegated authority. Other decisions are made by the full Commission in formal session. *QST* carries reports of FCC actions in "Happenings" and "League Lines." A copy of the League publication, "Pending Dockets and Petitions for Rulemaking In The Amateur Radio Service," is available from Hq upon request (s.a.s.e., please).

The table lists FCC matters, now under consideration, affecting Amateur Radio.

*Assistant Manager, Membership Services, ARRL

Pending Dockets Affecting Amateur Radio

Docket	Subject(s)
20654*	An inquiry into interference from spark-type ignition systems in motor vehicles. Reviewed in 1980, continued without action. See "Happenings" September 1980 *QST*.
20777**	*New Rules permitting use of ASCII* (American Standard Code for Information Interchange) in the Amateur Radio Service. See "Happenings," April 1980 *QST*.
20990*	Allow security and remote-control devices in the amateur bands above 220 MHz on a shared basis.
78-205*	NPRM proposes program to reimburse the needy who participate in Commission rulemakings. See "Happenings," May 1980 *QST*.
78-250*	Inquiry into the administration of code tests to blind and handicapped applicants. See "Happenings," October 1978 *QST*.
78-307*	NOI on investigating a consumer-oriented grading system for TV receivers. See "Happenings," January 1979 *QST*.
78-352***	Establish Quiet Zone for repeaters in some areas of *West Virginia and Virginia*. See "Happenings," January 1979, May 1981, June 1981 and July 1981 *QST*. ARRL has filed a Petition for Reconsideration.
78-369*	Concerns RFI to electronic equipment. See "Happenings," February 1979 *QST*, and March 1979 *QST*, pp. 9 and 48.
79-140*	NOI to create new Personal Radio Service in 900 MHz. See "Happenings," August 1979 and March 1980 *QST*.
79-144*	NOI to solicit comment on effects of rf exposure standards on radio services and equipment; and whether FCC should adopt interim regulations to protect health of employees exposed to radiation in excess of national standards. See "Happenings," March and August 1980 *QST*.
80-7*	NPRM to provide frequencies and standards for nationwide Civil Disaster Radio Response Program. See "Happenings," May 1980 *QST*.
80-136*	NPRM to simplify amateur station-identification rules. See "Happenings," June and September 1980 *QST*.
80-184*	NOI into changes to international Regulations for Mobile Services WARC. See "Happenings," August 1980 *QST*.
80-252*	NPRM released 6/12/80 to permit facsimile and television transmissions on additional frequencies. See "Happenings," August 1980 *QST*.
80-440*	NOI into amendment of the Commission's rules governing land-mobile radio stations to provide for additional technologies for improving spectrum efficiency. See "Happenings," December 1980 *QST*.
80-729	NPRM proposing plain-language rules for the Amateur Service. See February 1981 *QST*, p. 49, and July 1981 *QST*, p. 9. Comment deadline extended to August 21, 1981; see "League Lines" this month.
80-739	Inquiry into implementation of 1979 WARC Final Acts. See "Happenings," April 1981 *QST*. For ARRL reply, see July 1981 *QST*, p. 54. Second NOI, see "Happenings" this month.
80-740*	Rulemaking proposal to amend the Commission's rules regarding use of hf radio spectrum below 25 MHz by stations in the Fixed and Land Mobile Services. See "Happenings," February 1981 *QST*.
80-741*	Inquiry into preparation for 1984-85 WARC on geo-stationary satellite orbit access and use by radio satellite services. See "Happenings," February 1981 *QST*.

* Filing deadlines for comments passed, awaiting Commission action.
** Adopted.
*** Adopted by the Commission, awaiting outcome of petitions for reconsideration.

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Moved and Seconded . . .

INTERIM MINUTES OF CRRL BOARD MEETING NO. 3, June 6, 1981

Pursuant to due notice, the Board of Directors of the Canadian Radio Relay League, Inc., met at 0900 EDT, Saturday, June 6, at the Airport Hilton Hotel, Montreal, Quebec. Present were President Mitch Powell, VE3OT, in the Chair; and Directors Thomas Atkins, VE3CDM, Albert Daemen, VE2IJ, and George Spencer, VE6AW. Also present as observers were Honorary Vice President Noel Eaton, VE3CJ; Assistant Directors Harry MacLean, VE3GRO, and Ray Perrin, VE3FN; and Counsel Robert Benson, Q.C., VE2VW.

In the absence of Secretary Fred Towner, VE6XX, Harry MacLean, VE3GRO, was appointed to record the minutes.

The Board discussed and APPROVED the following items:

1) Minutes of CRRL Board Meeting No. 2.

2) The concept of a single Canadian report to appear in future annual reports of the American Radio Relay League. This year two reports appeared, one from the president of CRRL and a second from the president as ARRL Canadian director.

3) Reports submitted or about to be submitted to DOC. These reports had to do with (a) reciprocal licencing for foreign amateurs (b) removal of restrictions on the 160-meter band (c) introduction of repeaters on the 10-meter band and (d) 70-MHz beacons. On the last item, the Board agreed to support individual requests to DOC, but would not ask DOC for a rules change.

4) Opposition to DOC's latest revision of TRC-24. If implemented, the Amateur and Advanced Amateur certificates would be more differentiated by subject material than by level of difficulty. The Board felt this would create amateurs with insufficient knowledge in certain subject areas to operate their stations properly.

5) A rewording of Tariff Item 44534-2, proposed by Counsel Benson, which would result in duty-free entry into Canada of (a) amateur transceivers having provisions for new WARC bands (b) amateur transceivers having a general-coverage receive function and (c) amateur antennas. The rewording also deleted the word "linear" from the reference to amateur amplifiers.

6) A request to the ARRL Executive Committee for additional time before an increase in cost of League membership. This would permit Canadian League members to receive a letter of explanation, similar to one already received by U.S. League members, encouraging them to renew at present rates.

7) Production of League membership application forms, with rates given in Canadian funds, and text in both English and French.

8) Actions taken in the case of Bob Forbes, VE3QI, of Mississauga, Ontario, who was convicted of interfering with a neighbour's stereo system under a local anti-noise bylaw. An appeal was under way. CRRL arranged for legal assistance in the case.

9) Preparation of a handout, warning of the effects of restrictive covenants on amateur operations.

10) A study of the best way of disseminating Amateur Radio news to Canadian amateurs. Consideration would be given to sending the *CRRL Newsletter* to all Canadian League members and to sending weekly *CRRL Bulletins* to all clubs.

11) Actions taken by Counsel Benson, to oppose the attempt by the Canadian Amateur Radio Federation, Inc., to register the trademark CARL, which stands for Canadian Amateur Radio League. The Board felt that the Federation was acting in bad faith and, that in any event, the proposed trademark was too close to CRRL and would become a source of unnecessary confusion to Canadian amateurs.

12) Continued CRRL representation at both full and subcommittee meetings of CRTPB. Bill Loucks, VE3AR, and Ray Perrin, VE3FN, were recognized for their excellent work to date.

13) A CRRL Forum at the 1981 RSO Convention, to be held in Kitchener, Ontario, October 2-4.

14) Procedures for the October CRRL elections. The mailing to all members will include two ballot sheets and two return envelopes. Ballots for ARRL Canadian director and vice director will go to ARRL Headquarters in Newington, Connecticut, as in the past. Ballots for CRRL regional directors will go to CRRL, in London, Ontario.

15) A study of the CRRL Constitution, to eliminate certain inconsistencies having to do with nomination procedures for candidates for CRRL office. None of these are serious or will become a problem in the upcoming CRRL elections.

16) Expansion of the CRRL Board from three to five regional directors. This would give British Columbia representation separate from the Midwestern provinces and Quebec representation separate from the Atlantic provinces. The change would require a vote of the membership and could not be accomplished before the upcoming CRRL elections.

The Board recessed from 0945 to 1030 to receive a presentation from Gisele Rousselle, General Manager of RAQI, Radio Amateur du/of Quebec. Mrs. Rousselle brought greetings from RAQI. She thanked CRRL for obtaining permission to translate *QST* technical articles into French for publication in the *RAQI Journal*. She outlined arrangements that had been made to publish the CRRL *Licencing Manuals* in French. She expressed RAQI's desire to work with CRRL in every way possible.

The Board also recessed from 1215 to 1330.

During the course of the meeting, the Board also discussed the following items, with no formal action being taken at the time:

1) The re-establishment of the Intruder Watch program in Canada. Dr. William Skidmore, VE3AUI, was recognized for his excellent work to date.

2) CRRL participation at the recent CARF Symposium, held in Winnipeg.

3) The CRRL Midwest Convention, to be held in Saskatoon next year, July 2-4, 1982. Percy Crosthwaite, VE5RP, was recognized for his excellent leadership in planning this event.

4) CRRL publications, crests, badges and logo stickers. A revised CRRL *Questions Book* was at the printer. Crests, badges and logo stickers would be available for summer hamfests.

There being no further business, the meeting was adjourned at 1745.

Respectfully submitted,
Harry MacLean, VE3GRO

CRRL ELECTIONS — SECOND CALL

Elections for CRRL Board of Directors will be held this fall. The following are required for a two-year term beginning January 1, 1982: a CRRL vice president, who is also ARRL Canadian director, and a CRRL secretary, who is also ARRL Canadian vice director. For details concerning their nominations, see "Happenings," page 53, July 1981 *QST*. Also required are three CRRL regional directors. For details concerning their nominations, see "Canadian NewsFronts," page 59, July 1981 *QST*.

MISSISSAUGA CONVICTION OVERRULED

Last January, Bob Forbes, VE3QI, of Mississauga, Ontario, was convicted of interfering with a neighbour's stereo system, under a new Mississauga anti-noise bylaw. At Bob's request, CRRL said little about the matter. Publicity about the case would have adversely affected Bob's sentencing and created difficulty in launching an appeal. With CRRL assistance, an appeal was launched and, on June 8, the original conviction was overruled. In summarizing the case, the presiding judge made several significant points. He held that an amateur transmitter was not an auditory-signaling device and, on that alone, he allowed the appeal. He further stated, that in his opinion, even if an amateur transmitter were an auditory-signaling device, regulation of amateur transmitters was the sole prerogative of the Parliament of Canada, and could not be subject to municipal or provincial regulation. Bob wanted to publicly acknowledge the role of CRRL in achieving this success. Bob felt that CRRL's quiet, behind-the-scenes work make the success possible. CRRL did arrange for legal aid in Bob's case, a case that could have set a dangerous precedent for all amateurs across Canada. QST

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

On Line

Conducted By Stan Horzepa,* WA1LOU

A Computer In The Shack

"On Line?" Does a computer occupy a corner of your shack? If you are on line or thinking about getting on line, this is your column. Bimonthly, "On Line" will present the computerized world of Amateur Radio to the readers of "QST." Various uses of the computer in ham radio will be discussed, software and hardware will be presented, programs will be run, questions will be answered.

The uninitiated may question the purpose of a computer in the ham shack. Simply stated, the computer in Amateur Radio may perform three functions: It may serve as (1) a bookkeeper (2) a calculator for ham activity, and (3) a ham communications device. Examining these general categories will reveal much of what a computer in Amateur Radio can do.

Computer As Communicator

A computer may communicate within our realm. If you are an RTTY operator, you have probably contacted someone using a computer for RTTY communications. Cw operators are liable to encounter computer-generated Morse stations on the airwaves, too.

In general, computer ham communications may be achieved in two ways — via terminals with their software and hardware totally dedicated to ham communications or by means of general-purpose computers with added ham communication hardware and software. (Both means have advantages and disadvantages that will be discussed in a future column.)

RTTY communications offer a wide range of options. For starters, there are two different communications codes that may be used, the Baudot code and the ASCII code. Each may be used at different speeds — Baudot at 60, 66, 75 or 100 words per minute (wpm), ASCII at up to a maximum of 19.6 kilobauds depending on the frequency used for communications (refer to 97.69 of the FCC Rules and Regulations). Baudot at 60 wpm is the most popular operating mode today; however, with the influx of computers that can be programmed for different codes and speeds, 100-wpm Baudot and 110-baud ASCII are becoming more popular. (W1AW broadcasts its RTTY bulletins at 60-wpm Baudot and 110-baud ASCII.)

Computerized RTTY on vhf and uhf fm repeaters has opened a whole new world of communications. Higher speeds of operation are possible and permissible: possible, because on fm there is negligible interference and multipath propagation that would otherwise cause errors in the received information; permissible, because the FCC allows higher speeds on vhf and uhf. Repeater mailbox systems permit communication flexibility. The computer at the repeater is the heart of the mailbox system. Users may access it and deposit messages in its mailbox for other users of the system to retrieve at will.

Packet radio is another form of ham communications that utilizes computers and repeaters for efficient data transfer. Computer-generator data packets are transmitted at very high speeds to the repeater, which temporarily stores the packet, verifies its reception and retransmits it to receiving stations. (Distance and terrain between the originating and receiving stations often preclude direct communication; thus packet repeaters are used.)

Morse, the oldest ham communication code, has been computerized, too. When computers were first used for cw, only the best sending fists, usually of machine or computer origin, could be decoded successfully. Today, new program algorithms make it possible to receive the various styles of sending cw.

Ham computer communications are not limited to the airwaves. Computers may be interfaced with the telephone system to permit a user to dial up a central computer system that conducts a ham net and to deposit and retrieve messages as one would using a repeater mailbox system. Some systems have radio and phone access, making communication between the wire and wireless worlds is also possible.

Keeper of the Records

You can generate a lot of paper operating a ham station. Logging, contesting, QSLing and award hunting exhaust reams of paper. A computer can provide an alternative.

If you have ever done some serious contest operating, you know what a chore it is to check for duplicate contacts. Using a dupe sheet is a cumbersome and imperfect way of performing the task. Using a computer can achieve the same task quickly and cleanly.

Everyday logging may also be performed by a computer. A QSO file and QSL record may also be kept by a computer. Working for DXCC or Five-Band WAS? A computer can make your climb toward that award a little easier.

Calculating Computer

A computer can be used as a calculator. Program it to tell you which direction to point your beam to the Laccadives or to track OSCAR 8. With interfacing hardware, the computer can actually turn the antenna in the calculated direction.

Computers may also be used to calculate and design antenna systems and rf circuits. Whatever a ham needs to calculate may be performed with a computer. Once you have a computer in the ham shack, you will continually find new uses for it, and you will wonder how you ever got along without one before!

WRU?

Now that I have introduced the column, let me introduce myself. In tandem with "On Line," I write "FM/RPT" bimonthly and, as Section Communications Manager for Connecticut, I write Connecticut "Section Activities" each month. My computer is a Radio Shack TRS-80 Model I with 48 K of RAM, two 40-track disc drives and a Paper Tiger printer. When my computer is not busy processing words for "*QST*," I plug its umbilical cord into a radio and get on the air.

Let me repeat that this is your column. It is "full-duplex." If you have something interesting to present to "On Line" readers, send it in, and I'll run it. Let the readers know what you are doing with your computer. Share the programs you have written. Let's hear from you. QST

*72 Stiles St., Waterbury, CT 06706

What Does "On Line" Mean?

algorithm — a set of steps in a computer program, which is used for problem solving.
ASCII — the American Standard Code for Information Interchange, a seven-bit code used by computers for communications.
Baudot — a five-bit code used by the teletypewriter equipment currently utilized by mostamateur RTTY operators.
baud rate — the number of code elements transferred in one second based on the length of the shortest element: If each element consists of one bit, the baud rate would equal the number of bits per second.
bits — contraction of "binary digit," a single unit of information that is either on or off. It is used in combination with other bits to represent alphanumeric and control characters for ASCII, Baudot and other communication codes.
full-duplex — simultaneous transmission and reception between two communication systems.
modem — contraction of modulator-demodulator, a device that enables a computer to use phone lines for communications.
on line — to be linked directly to a computer.
RAM — Random Access Memory, a temporary storage device in a computer. Data may be read from and written to RAM rapidly.

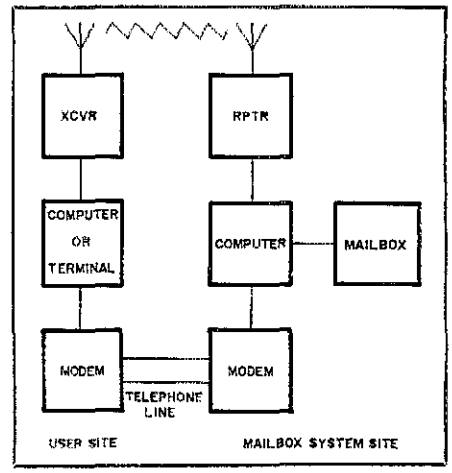


Fig. 1 — The basic building blocks of a mailbox system that a user may access via radio or telephone. The "mailbox" usually consists of the software that controls the system and a mass storage device, such as a disk drive, to hold the mailbox messages.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

2304 MHz Preamplifier

The preamplifier described here had a measured noise figure of 2.65 dB (single stage into a 6-dB converter) at the Eastern VHF/UHF Conference this year. Assuming 10 dB gain this would indicate an intrinsic noise figure for the preamp itself around 2 dB. It is constructed using simple microstrip techniques on 1/16-in Teflon glass board (dielectric constant of 2.5). For a description of microstrip design and construction techniques the reader is referred to an article by Paul Shuch, WA6UAM, in *Ham Radio*, April 1975, p. 12.

Photoresist etching techniques are not required to build this preamp. Small pieces of Scotch tape or similar adhesive material can be cut to the required microstrip dimensions and stuck to the copper surface of the board in the required pattern. The tape then acts as an etch resist during the etching process. It might be worth checking first that the particular tape that you use does indeed protect the board beneath it during the etching process that you intend to use. Elevated temperatures may cause some tapes to peel from the board. I use room-temperature etching in an agitated bath of ferric chloride solution. One side of the board should of course be completely covered with resist so that it acts as a ground plane for the microstrip circuit. Thanks are due to Californian Eastern Laboratories, Inc. (3005 Democracy Way, Santa Clara, CA 95050) for providing the transistor used in the development of this preamplifier.

A final note: I have not measured the bandwidth of this preamp, and therefore I do not have any information on how well it works away from its design frequency of 2304 MHz. QST

*c/o ARRL, 225 Main St., Newington, CT 06111

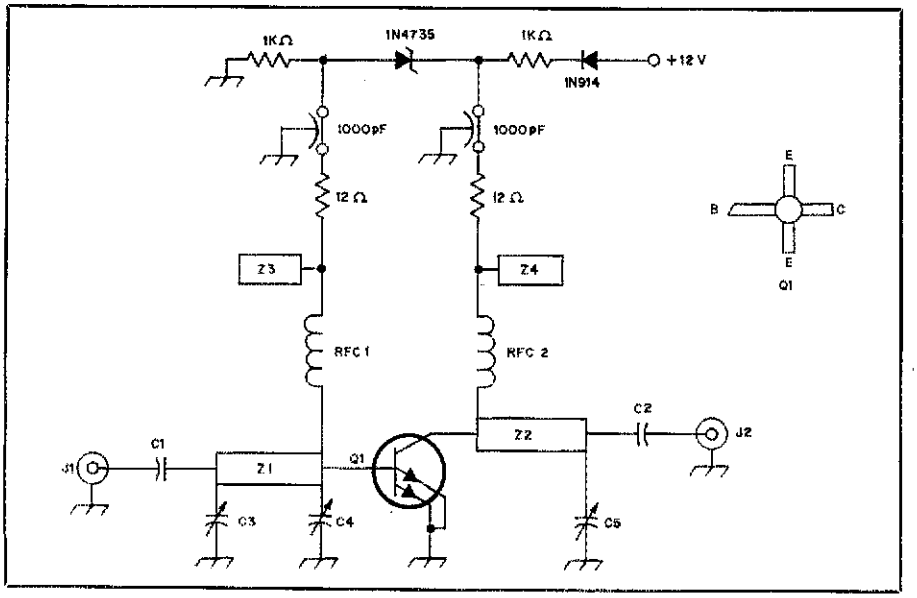


Fig. 1 — Schematic diagram of the 2304-MHz preamp.
Q1 — NEC 64535.
C1, C2 — ATC chip capacitor, 11 pF, dc block (ATC 100-B-110-J-MS-X-500).
*C3, C4, C5 — 0.4- to 2.5-pF ATC Microtrim or equiv. (ATC MTR502 or ATC MAV01A03.)
**Z1 — 8.1 × 22.9-mm Microstrip (λ/4, 32.4 ohm).
**Z2 — 2.5 × 22.9-mm Microstrip (λ/4, 69.6 ohm).
**RFC1, RFC 2 — 1.6 × 23.3-mm Microstrip (λ/4, 100 ohm).
**Z3, Z4 — 11.5 × 21.9-mm Microstrip (λ/4, 25 ohm rf short).
J1 — Input connector, SMA or N type preferred.
J2 — Output connector, SMA, N, TNC or BNC.
*For economy, C3 and C5 may be omitted with only a small degradation in noise figure.
**Pc board ε = 2.5 Teflon/fiberglass, 1/16-in. thick (3M Cu-Clad 250 or equiv.).

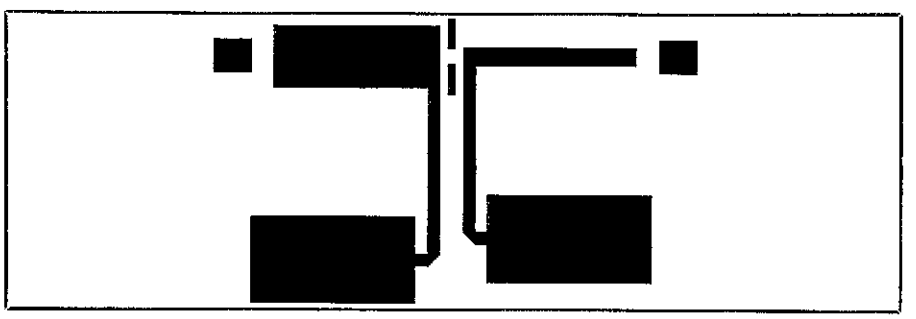


Fig. 2 — Circuit-board etching pattern for the 2304-MHz preamplifier. Black represents copper. The pattern is shown at actual size from the component side of the double-sided board. The opposite side of the board is unetched and acts as a ground plane.

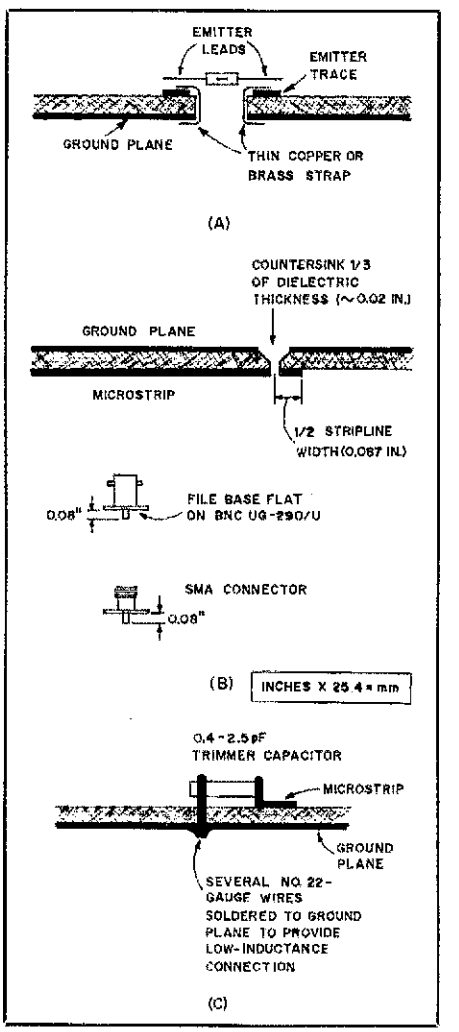


Fig. 3 — At A, method of mounting Q1. Thin straps of copper or brass provide connection between the emitter leads on the component (etched) side of the board and the ground plane on the opposite side of the board. The method of mounting the input and output connectors is shown at B. In this view, note that the board has been inverted; the connectors are mounted on the ground-plane side of the board. The trimmer capacitors may be mounted as shown at C.

Silent Keys

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

W1AWG, Charles M. Dwyer, Newport, RI
W1CSS, Ralph H. Carter, Lynn, MA
W1DOX, Charles A. Routhier, Amesbury, MA
K1EAJ, Albion L. Weeks, Danielson, CT
W1EHS, Charles M. Vander Pyl, Attleboro, MA
W1EPN, Luther G. Clark, Sherman Mills, ME
Ex-W1EYM, Nathaniel Bishop, Fairfield, CT
WB1EYT, Richard S. Gozzo, Old Saybrook, CT
W1FSK, Donald A. McBeth, Wolfeboro, NH
W1HJK, Paul L. Lambert, Meriden, CT
W1HNE, Bart J. Poopor, Jr., Dalton, MA
W1HXC, Lloyd A. Paquette, Beecher Falls, VT
W1IP, Louis E. Jacob, Pembroke, NH
W1IPK, George L. Danforth, Old Mystic, CT
Ex-W1KWT, Stuart A. Allen, Portland, ME
W1MD, Sylvester J. Connolly, Hingham, MA
K1NMP, John F. Fowler, Millinocket, ME
WA1OPH, James J. Pezzulo, Windsor, CT
W1PDC, Charles N. Gillespie, Wayland, MA
W1RZF, Arthur W. Holmes, Cochituate, MA
W1SFS, Oliver D. Ellis, Sr., Falmouth, ME
W1TAG, Fred M. Fuller, W. Brattleboro, VT
W1TTO, Lester L. Harrison, Barrington, NH
K1UNA, Herbert W. Aronson, Barrington, RI
W1VB, Walter L. Glover, Newtown, CT
W1VJP, John W. Cronin, Providence, RI
WA1YUH, Thomas J. Williamson, Pawtucket, RI
K1YXU, Albert R. Hetu, Acushnet, MA
K1ZYG, John F. Weatherly, Newton, MA
W2ABY, Theodore Sirois, Jr., East Berne, NY
N2AUI, Robert N. Hamerle, Jersey City, NJ
W2BCO, Edward W. Prichard, Hyde Park, NY
W2BEK, Clarence L. Taylor, Bronx, NY
W2BLF, William E. Freeman, Newark, NJ
W2BXY, Edward Gundrum, Tuckerton, NJ
WA2CGO, John J. Oliver, W. Keansburg, NJ
W2CPA/ex-WB2QEH, Joseph Battaglia, Schenectady, NY
W2EXJ, Roger B. Maslowski, Bloomfield, NJ
W2FMU, Monroe G. Sutliff, Walton, NY
WB2GEK, Fred L. Cowgill, Paulsboro, NJ
WA2HKF, Donald E. Vollmar, Boonville, NY
WA2HSC, Richard Mazur, Morristown, NJ
W2JVD, Robert C. Emmons, Pennellville, NY
W2NUT, Howard Geberth, Pawcatuck, CT
W2ROL, Samuel C. Calaty, Tonawanda, NY
W2WQU, Carl R. McCoy, Walton, NY
W2YLE, Louis B. Kaufman, Scarsdale, NY
W2ZC, Harold B. Churchill, Princeton, NJ
W2ZTC, Everett Squires, Hancock, NY
W3AW, John A. Fitch, Philadelphia, PA
W3BSS, E. Raymond Hardy, Delmar, DE
W3BWH, Joseph P. Vancheri, Punxsutawney, PA
W3CDZ, Joseph P. Harris, Baltimore, MD
W3ECR, Robert E. Hatfield, Lancaster, PA
WA3FXQ, Edward C. Brown, Jr., Inverness, FL
K3HYC, Joseph D. Brandenburg, LaVale, MD
W3JOO, George H. Caffrey, Hatboro, PA
W3KN, George B. Weed, Wyncote, PA
W3KRG, William C. Schmezer, Pittsburgh, PA
W3NIO, Frederick J. Quinn, Ft. Lauderdale, FL
K3PTT, Roy R. Look, Harrisburg, MA
W3RCI, Albert S. Spunar, Wilkes-Barre, PA
W3TR, Frederick H. Wise, St. Mary's, PA
W3VHP, Wesley R. Cook, Erie, PA
K3WY, Raymond Wynkoop, W. Barnstable, MA
WA4AEP, Willaim R. Thomas, Anniston, AL
WD4AEX, Robert Harris, Springfield, VA
W4AFI, David G. Stewart, Andersonville, TN
WA4AWS, James O. Holmes, Hayden, AL
W4BNM, Arthur H. Wedde, St. Petersburg, FL
WA4CJL, Leslie M. Newton, Savannah, GA
W4CK, James S. Thomas, Jackson, TN
N4CUE, Maurice W. Houghton, Springhill, FL
WA4DEN, Lowell K. Johnson, Panama City, FL
WB4DGM, Robert M. Cooper, Ft. Lauderdale, FL
K4DYW, Bryant V. Walker, Salem, VA
WB4EQX, Jerry A. Hardison, II, Humboldt, TN
W4ERN, Douglas L. Vaughan, Jr., Sewanee, TN
WA4HIJ, Charles O. Stimpson, St. Petersburg, FL
ex-K4INI, George E. Tierney, Clearwater, FL
K4JBS, Charles Newton, Greenville, SC
W4JQF, James M. Winget, Brevard, NC
WB4KWG, John C. McCampbell, Orlando, FL
KA4MGT, Edwin S. Rinau, DeLand, FL
AA4MK, Mahlon S. Knott, Maitland, FL
W4NHO/ex-W1CFR, C. Frank Reed, Bradenton, FL
W4NRF, Michael Wahl, St. Petersburg, FL
W4OOO, Forrest F. McClure, Longwood, FL
W4PGZ, Wilfrido V. Nunez, Athens, GA
WB4PYV, James B. Hall, Millington, TN
WA4RHH, William Phillips, New Port Richey, FL
WA4SRG, Edward E. Waldrop, Riverview, FL
W4TPA, Wesley T. Edmonds, Lakeland, FL
W4VJW, Richard C. Brown, Gallatin, TN
W4VPB, Erle H. Pike, Cocoa Beach, FL
KA5ATU, Howard J. Smith, New Roads, LA
K5AX, Howard M. Williams, Roswell, NM
N5CDA, James L. Ross, Yukon, OK
W5DCR, George E. Tolle, Albuquerque, NM
W5DUI, Dan W. DeLay, San Antonio, TX
K5ENL, Edward A. Block, Grandview, TX
W5EYK, Norman W. Smith, Tulsa, OK
W5FAB, Wilfred E. Varley, Oklahoma City, OK
KA5GMH, Hilton H. Mills, Burleson, TX
W5GP/ex-W5FRE, Lewis C. Gallagher, Dallas, TX
W5HIV, Clarence G. Warner, Fort Worth, TX
W5HKH, Frank B. Frank, Tulsa, OK
WB5IIY, Joe E. Scully, Ft. Smith, AR
W5IVW, Thomas H. Cornwell, Ralls, TX
WB5KEX, Benjamin F. Tapp, Roswell, NM
WN5KRR, William B. Borton, II, Sherman, TX
WB5MEU, Terry A. Breeding, Metairie, LA
W5MGA, George J. Maras, Tulsa, OK
WB5NXO/ex-W5ALD, William L. Peterson, Oklahoma City, OK
W5PW, Gladman W. "Uppy" Upchurch, Dallas, TX
*W5QEK, Robert S. Hursh, Fayetteville, AR
W5SBT, John D. Browne, Socorro, NM
W5SMK, Eldred C. Tinsley, Ballinger, TX
K5SZU, Paul A. Truitt, Madill, OK
W5TEN, David "Dick" Strange, Dallas, TX
W5WFK, Audrian L. Beck, Sherman, TX
W6AAK, Andrew B. Lopez, Azusa, CA
K6ACX, Frank Wright, Riverside, CA
N6APU, James W. Kington, Hemet, CA
K6ATB, Robert R. Fisher, Rialto, CA
*W6BD, John E. Pitts, Jr., San Carlos, CA
WD6BKV, Frank B. Trefethen, Ft. Bragg, CA
K6BP, Ray Fulton, Sr., Manteca, CA
W6CLQ, Melvin Willey, Arcadia, CA
N6CMM, Raymond E. Broell, Placentia, CA
WA6COW, Carl M. Christensen, Madera, CA
WB6CZR, Christian J. Reimuller, Cherry Valley, CA
WB6DLS, Stanley H. Daver, Belmont, CA
K6FY, Kenneth F. Hicks, Altadena, CA
ex-W6GGZ, Cedric Canter, Montebello, CA
W6GH, Vance Phillips, Santa Barbara, CA
K6GJY, Maurice W. Schmitz, North Hollywood, CA
W6HQC, Elliott F. Hoff, Whittier, CA
W6HTC, Elwood A. Dintaman, Lancaster, CA
K6JDK, Geaorld R. Miller, San Carlos, CA
W6JTS, Mark W. Church, Lodi, CA
WB6KPZ, Henry J. Desjardin, Pittsburg, CA
WB6MFH, Franklin C. Schell, Salinas, CA
W6NIX, Scribner Birlenbach, Monticeto, CA
W6NYJ/ex-W1AMT, Frank S. Herrick, La Crescenta, CA
WB6PDV, Ordell L. Wolfe, San Jose, CA
WB6PGG, Thomas O. Edwards, Carmel, CA
W6PQ, Victor Hilian, Peacham, VT
K6QMA, Otto I. Mathlin, San Pedro, CA
W6SLX, Edward R. Kirkwood, Eureka, CA
W6SYO, Orville C. Ward, Junction City, CA
W6TMB, Charlotte B. Fredericks, Montecito, CA
W6VKC, Harold J. Griffin, Santa Barbara, CA
WA6VPI, Winfred E. Wollen, Arroyo Grande, CA
W6YXW, Walter W. Rollins, Yuma, AZ
W6ZY, George W. Shields, Dixon, CA
W7AEV/ex-WA6TKU, Francis W. Crist, Oakland, OR
N7AQ, Barrett H. Erickson, Bellevue, WA
Ex-W7BCE, Paul Sandbaken, Sacramento, CA
KA7CIJ, Jack O'Brian, Tucson, AZ
W7ECI, Edmund A. Zochert, Scapoose, OR
W7ETO, Albert E. Freeman, Wenatchee, WA
W7GGR, Douglas Eldredge, Salt Lake City, UT
W7JXC, Thomas O. Moore, Kettle Falls, WA
W7IEH, Joseph W. Baker, Tucson, AZ
W7KHU, John A. Lang, Reno, NV
W7MUQ, Charles A. Ruthstrom, Weston, OR
WB7OSR, Kenneth Burnell, Glendale, AZ
WB7RWN, Dale M. Stevens, Seattle, WA
WA7VZW, Robert C. Friedrich, Tucson, AZ
WA7YLF, Alexander Bremner, Jr., Boise, ID
W8AGT, Lester L. Yarger, Albion, MI
W8BDS, Edwin F. Raab, Flint, MI
W8FBZ, August C. Arnal, Aurora, OH
W8HOL, M. Lawrence Applebaum, Southfield, MI
W8IB, Robert C. Higgy, Columbus, OH
WD8IJO, Arthur D. Copeland, Vermilion, OH
WB8JRR, John Ray Jackson, Clearwater, FL
WA8KJZ, Jack R. Conley, Detroit, MI
Ex-K8KLW, Joseph W. Hardesty, Frazeysburg, OH
WD8NJQ, Robert F. McLuckie, Midland, MI
W8NVD, John E. Walton, Warren, MI
K8NWH, William E. Wheeler, Jr., Dearborn Heights, MI
WD8QDD, Percy I. Van Brunt, Toronto, OH
W8QDW, George Ben Forster, Moundsville, WV
K8RKE, Harold W. Barnhart, Alexandria, OH
WB8USE, Paul M. Barney, Dade City, FL
K8YJO, Edward J. Schultz, Lincoln Park, MI
WB8YXS, Kenneth Weaver, Troy, OH
K9ADD, Lionel E. Byfield, Indianapolis, IN
W9ASG, Jack N. Weiland, Chicago, IL
K9CPM, Harold D. Doe, Land O Lakes, WI
K9DQE, Elmer Spillers, Jr., Ft. Wayne, IN
W9EVL, Lester E. Asmus, Appleton, WI
W9GYP, Joseph N. Kessler, Kettle Falls, WA
W9HHG, Clarence W. Maerz, Lodi, WI
W9IZX, Orles G. Hart, St. Francis, WI
WB9JJH, Carl R. Cook, Winnetka, IL
WB9JMJ, Claude O. Smalley, Richmond, IN
W9KZQ, Norman K. Brushaber, Milwaukee, WI
W9MDC, Charles T. Miser, Garrett, IN
W9NFO, Willard R. Blood, Springfield, IL
WB9OJZ, Nelson M. Reynolds, Lafayette, IN
W9QGR, Raymond J. Bayer, Racine, WI
K9RCR, Raymond J. Cunningham, Arlington Heights, IL
WB9UDC, Eugene F. Krause, Hanna City, IL
W9VFO, Bart Nemetz, Ashland, WI
K9VFW, George R. Westfall, Bloomington, IN
W9WSV, Karl Oberreich, Neenah, WI
W9YBJ, Julian F. Franke, Sr., Ft. Wayne, IN
NØBBR, Ray M. Klein, Manchester, IA
WØBHS, Everett Bartlett, Scottsbluff, NE
WØBZL, Charles E. Kimmel, Pratt, KS
KAØDUQ, Paul R. Peterson, Zim, MN
WBØDXM, Darrell Arden King, Palo, IA
KØEFU, Max B. Ives, Des Moines, IA
WØENC, Robert Eide, Rapid City, SD
WAØERN, Floyd W. Scheel, Holdrege, NE
KAØFLN, Gordon S. Fogdall, Austin, MN
WØFUW, Lyle Johnson, Griswold, IA
KØFXV, Charles L. Barker, Bloomfield, IA
WØGNX, Woodson O. Bennett, Kansas City, MO
WØHAQ, Jerry W. Keefe, LeClaire, IA
KØKPE, Bert Hickman, Cross Timbers, MO
KØKRO, Dorothy M. Yaeger, Rochester, MN
KØKYL, Robert P. Stone, Eldon, MO
WØMJB, Ronald W. Brown, Dubuque, IA
WØNQM, Ladislav J. Hamous, Cedar Rapids, IA
WØNXR, Clyde V. Weatherford, Arvada, CO
WAØOEF, Milton S. Wetzel, St. James, MN
KØPGE, Victor Faith, Hoyt Lakes, MN
WØRQE, Arnold E. Johnson, Kramer, ND
*WØTGQ, Lee F. Blodgett, Marion, IA
KØTWH, Wilbur P. Sheppard, Mandan, ND
ex-WØVYB, Milo Washa, North Mankato, MN
WØZJQ, Martin J. Walter, Pueblo, CO
KH6BZP, Hiroyuki Toyota, Kurtistown, HI
VE1AKR, George E. H. Raine, Halifax, NS
*VE1YX, Donna Hesler, Sackville, NB
VE1YY, Donald F. Baker, Moncton, NB
VE3ADX, Frederick M. Struke, Stratford, ON
VE3DM, Mord S. Millard, Sherkston, ON
VE3GUU, Carl A. Wittie, Kitchener, ON
VE3PR, Granton H. Brandon, Dresden, ON
VE4IC, Ivor F. Cross, Winnipeg, MB
VE4YZ, William W. Wright, Winnipeg, MB
VE5AC, Marvin N. Thorstad, Buchanan, SK.
VE5DF, Frank W. D'Arcy, Saskatoon, SK
VE6ART, Eric J. Hooke, Calgary, AB
VE7CGF, Francis Alexander, Vancouver, BC
VE7MT, William M. Martin, Port Washington, BC
EA7DJ, Santiago A. Carvajal, Malaga, Spain
F8ZZ, Albert Voituiez, Tourettes sur Loup, France
Ex-OH2QA, Matti S. Siukola, Degero, Finland
PY7CJ, Amaro de Barros Cavalcanti, Olinda, Brazil
PY7NR, Fernando Falcao, Recife, Brazil
VK1JK, John Knight, Higgins, Australia
VP9BU, Steve Lynam, Somerset, Bermuda

*Life Member

Feedback

John L. Zimmerman, AA9U was inadvertently listed in the Silent Keys column of the July issue of *QST*.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed only to the family of the deceased.

How's DX?

Conducted By Ellen White,* W1YL/4

W6AM — A DX Legend

Don Wallace, W6AM, in his 83 years has bridged remarkable historical periods in which his radio interests helped him to play vital roles. His power of positive thinking has turned what might have been liabilities for others into assets for him.

DXing in the grand manner for the then 6OC in 1912 was from Long Beach to Piedmont, California, some 400 miles away. Even then his admiration for long wires was evident with an antenna three blocks long, strung over two power lines on 80-foot poles! (The chief operator of the nearby Marconi station had to take turns with Don to use the airwaves.) That 1910-1916 station used a homemade receiver. Don secured copies of Armstrong's patents and a test tube and made all circuits oscillate (i.e., tuned antenna, tuned grid, tuned filament return from the grid and tuned filament return from the plate). He feels that we never have duplicated that particular type of sensitivity and care in construction. China ship stations were so loud he could hear them in the house, some 60 feet away. The transmitter was comprised of a homemade transformer, rotary gap and an antenna meter (using an old alarm clock set of bearings).

At the time of the First World War, 6OC joined the Navy and almost immediately began operating NPG in San Francisco, a fulfillment of his still-boyhood dream operating the 300-kW Bolinas Marconi transpacific station. Though still a teenager, Don was placed in charge of the 36 operators onboard President Wilson's Peace Conference ship, the *U.S.S. George Washington,* which became a classic communications center on trips to and from France. On the staff were famous radio men of the era, such as Beverage of Beverage wire antenna fame.

In 1922 Don held the call 9ZT in Minneapolis. His station used a water-cooled tube, tube rectifiers and a separate pole line transformer; he was heard in 16 countries. His 1923 station was awarded the Hoover Radio Cup for best in the USA. In the early '20s 9ZT worked Leon DeLoy, 8AB (France) on 110 meters — Leon's farthest contact. When WAC was started in this period 9ZT was one of the first four USA charter members. About that time the old Federal Radio Commission issued Don the call 9XAX ". . . anytime, any power, any wave length."

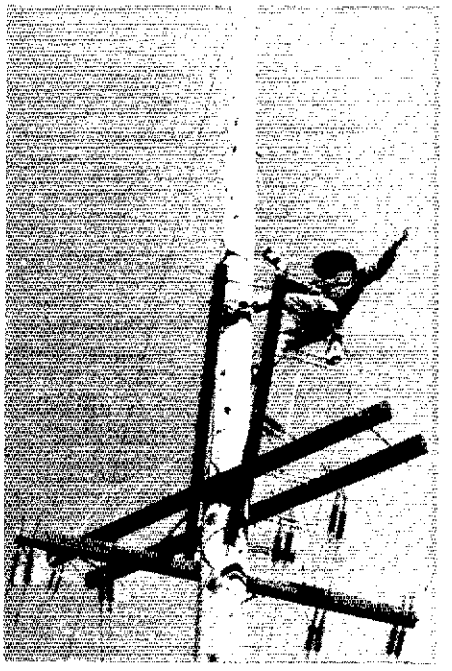
Always a high-speed cw operator, Don has won numerous cups, plaques and awards. He helped Press Wireless locate their west coast transpacific receiving station. Later, when Press Wireless moved back to San Francisco, Don bought the 104 acre, 1234-foot-high location, with antennas and buildings, on the Palos Verdes Peninsula. W6AM now has 18 rhombic directions on the remaining 24 acres.

Other facets of Amateur Radio have been important to Don. He served as Section Communications Manager in both Minnesota and Los Angeles, and has been instrumental in encouraging many clubs to affiliate with ARRL. He was the first paid member of the Northern California DX Club, which preceded the formation of the Southern California DX Club (of which he is a charter member and past president). His contest exploits are numerous, and some of his records still stand.

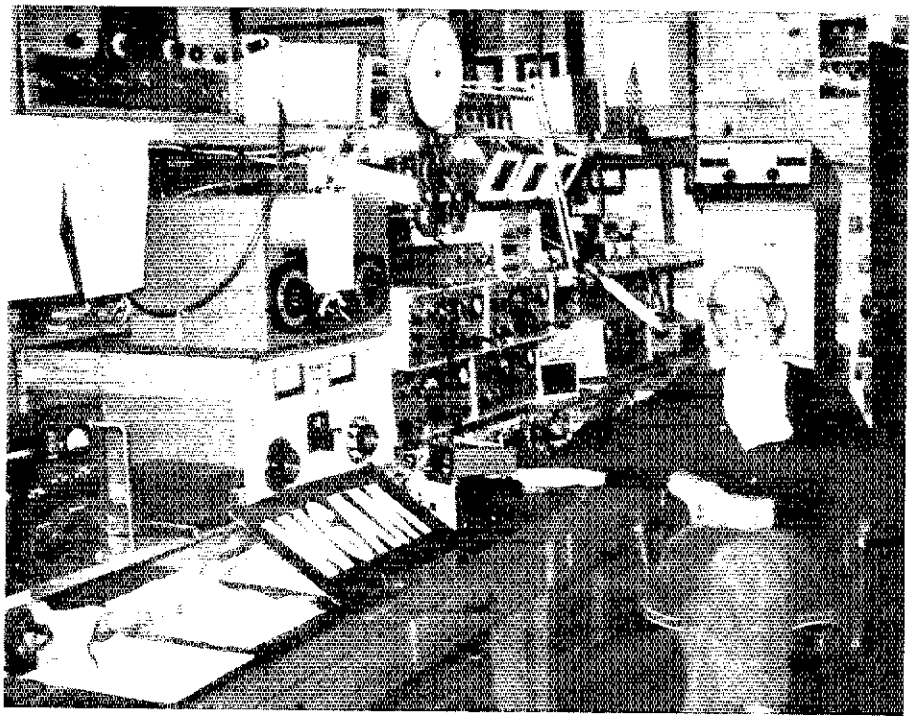
W6AM has been a well-known fixture on the DXCC Honor Roll and has often occupied the coveted number 1 position. Several years ago when Headquarters announced a $25 plaque for those who could demonstrate that they had at some time been in that number 1 position, Don wrote Bob White at Hq. to go ahead and send him the plaques he was entitled to, and bill him later. The conservative W1CW wrote Don first, however, and asked him if he really wanted to panel the W6AM radio room with 64 plaques at a cost of $1775! (Don settled for two representative plaques, one phone and one cw).

There are rarely any pet peeves on his "list." "In all endeavors there is 1% trying to disrupt what the other 99% are doing. They're normal — like sand traps, hills, lakes and bunkers on a golf course. Without them the game might be dull."

Don's lifelong dreams have come true, and he notes that "the reality is even better than the dream."



Although 83 years young, W6AM likes to personally service the 15 miles of wire (mostly No. 8 Copperweld), and the thousands of standoff insulators, eyebolts and strain insulators. Lately he has had occasional help for the tops of the 10 140-ft poles.



The W6AM station has been many years in building. It currently includes an Alpha 77D driven by the Collins S Line in duplicate (extra cw crystals are installed so either exciter can be used on cw or phone, transceive or split). The Henry amplifiers may be seen to the right. Under the 32S-3C transmitter is the rotary switch permitting instant switching of 108 relays to connect any one of the 18 rhombic antenna directions. *(photos by Virginia Reynolds)*

*19620 SW 234 St., Homestead, FL 33031

SECOND OP

Those of you in the DX and contesting game for any period of time are probably quite familiar with Larry LeKashman (now a silent key), of W2IOP, W8IOP, W9IOP, W2AB, W8AB fame. Larry's popular "Second Op" was found in many ham shacks, making many aspects of DXing easier. His achievements now have been carried forward by N6RJ in the new *Ham Radio* computerized Second Op (*Ham Radio*, Greenville, NH 03048).

The 10-1/4-inch circular format allows you to "dial up" the country prefix and get a direct readout of continent, zone, country name, beam headings (generalized on east, midwest, southwest, west), time differentials (EST, CST, PST) and postal rates as of January 1981 (air, first-class QSL and required IRCs). Included is the always-useful ITU call-sign prefix blocks plus a listing of ARRL QSL Bureaus. An additional outer rim permits you to keep track of countries worked/confirmed.

THE DX EDGE

DXers are always looking for an "edge," and along comes such a "natural" — nicely packaged — that makes you wonder why someone didn't do something like this before! The DX Edge is a slide-rule device allowing you to determine quickly those areas of the world that are in daylight and those in darkness at any given time of day and any month of the year, sunrise and sunset times throughout the world, and the location and the shape of the "gray line," an important propagation indicator. In addition, it provides an easy visual way to determine local times throughout the world. The unit consists of a plastic carrier, imprinted with a double map of the world (showing zones and many prefixes), plus 12 transparent monthly slides showing the gray line and areas of daylight and darkness. By sliding the insert along you can easily determine all the conditions just described.

Quick and easy problems solved include (1) what direction should you look for unusual DX at any time of the day? (2) when will a desired propagation path see the most sunlight of the day so that a 10- or 15-meter QSO is most likely? (3) when should you look for the soon-to-appear DXpedition on 40/80 to catch it just at its sunrise or sunset? This quality product is nicely made, a joy to use and comes complete with good directions. Send for the flyer from Xantek, Inc., Box 834, Madison Square Station, New York, NY 10159.

DXING — 1956 STYLE

Part of the problem involved with unpacking cartons marked "old *QST*s" is that you can't bear leaving them unlooked at as they come out of the boxes. This writer couldn't resist August 1956 at all! In particular, the venerable Rod Newkirk, W9BRD, summed up the summer of 1956 as one with the best conditions in years — DXpeditions to both St. Martins, the Comoros, Aves, Revilla Gigedo, Easter, San Marino, Liechtenstein, Monaco, Luxembourg, Zanzibar, Seychelles and Nauru, plus the superlatively exciting period of Russia "opening up" to ham activity. It was a stimulating period to have been through and reflect upon.

DXING — SUMMER 1981

☐ SMØCCM, KS6O, KR6Q and K6TMB operated the July 1ARU Radiosport Contest from OH2BH's QTH on Aland. Contacts before, during and after go to the calls used (note that KS6O's cards go to his old call, KB6YU). The operating crew specially thanks SMØCCM, SMØGMG, SM5AQD and OH2BH for their help in getting the operation underway.

☐ KP2A was undeniably big news in June from Desecheo. QSLs for this International DX Foundation operation go to Jay Musikar, AF2C, RFD 2, Putnam Valley, NY 10579. Cards for KP2A home operations in the U.S. Virgin Islands go via WB2MSH. IDXF information may be obtained by writing IDXF, P.O. Box 117, Manahawkin, NJ 08050.

☐ Pacific N.W. DX Convention (Aug. 8-9) will be in Portland, Oregon, at the Greenwood Inn in Beaverton. A stimulating program is planned to include AA6AA and N6ZV presenting their African and Indian Ocean tour, WB4ZNH and some hair-raising experiences in 5X land, PJ2CC with movies/slides of a world-record CQWW DX multi-multi operation, YB7AAU and DXing from Indonesia, K7JA chairing a contest forum, W7NJ engineering the "big array," and VE7APU on a hot topic now and in the future — "Packet Radio."

☐ Effective June 10 full power on 1800 to 1900 kHz was restored to U.S. hams. Some restrictions still apply to 1900 to 2000 Hz (check July "League Lines" for details). W1BB, the squire of 160, continues to put out his superb, newsy, twice-yearly flier to top-band aficionados at the beginning and end of "the season." Details from Stew Perry, W1BB, 36 Pleasant St., Winthrop, MA 02152.

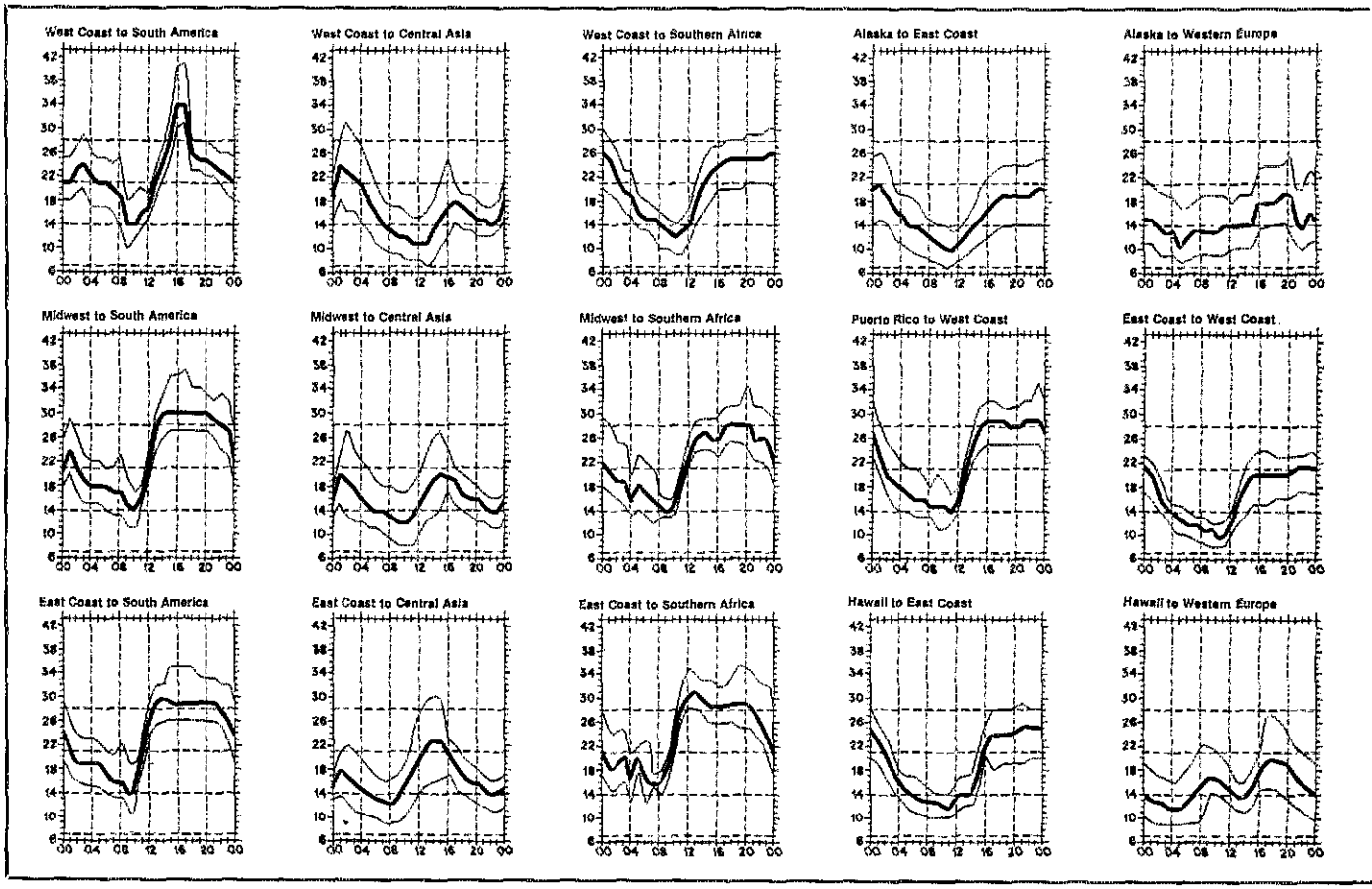
☐ KA6IYE and wife in active search of two DX stations to manage QSLs for. Terry is concerned about the burden of QSLing for DXers and would much rather see them operating than concerned with paper work.

☐ K1KI has started up a Russian Oblasts "Need List," generating a mailing to interested parties. Some good info therein shows that UJ8XCV and friends were QRV in May from UJ8K; UA1P is continental land only in Oblast 114, and so on. Tom would welcome contributions to an operating aid made up of useful sentences. Good luck, Tom! (BSEGO HOROMMEGO!)

☐ K4JLD (ex-6O6BW) looking for directions for cards from A9XBM (1978), 5R8AA (1975) and S2KZ (Feb. of this year).

☐ VE3FRA started up *The DX Report* earlier this year (he's former long-time editor of the Canadian DX Association's paper *Long Skip*). The newsletter format is concise and orderly, informative and easy to use. The report is published every second Tuesday, and you'll find that the composition lends itself nicely to desk-top use while operating.

☐ W4OO concluded a 6-meter WAC in well under a year, which adds to his current 6-Band WAC to make 7 banders from 160 through 6 meters! The cards Gene used represent QSOs with JA4MBM, EL2FY, CP8AZ, VE8BY, EI2W and ZL2QK. The June VHF QSO Party added two more countries (KP2A and HH2PR) to make his 50-MHz tally 36. Gear in use includes a 1965 Swan 250 and a home-built four-element beam (à la *Handbook*) up at 100 ft. Anyone for 8-BWAC?



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

DX PERSONALITIES

A big thing these days involves studies of interpersonal relationships and resulting personality-categorization analysis. AC6V, in the NCDXC *The DXer*, sees some application to ham radio DX types as follows:

Driver — Uses stacked linears, stacked microphones and stacked beams as necessary to break the pileup. After breaking the pileup the "driver" takes charge and becomes a list master.

Amiable — Joins the pileup merely to keep from being lonely. When a turn comes up in a list operation, "amiable" gives it to a buddy.

Expressive — Calls CQ for the "strongest BY station only" *using stereo mikes and an echo-verb.* After breaking a pileup, "expressive" tells his or her 25-year-old gear to the DX station.

Analytic — Works DX only after calling Don Search to be sure the papers are in. "Analytic" also *runs reams of data through a computer in an* effort to determine when the optimum time is to call. Typically misses out and makes a call after the DX station goes QRT or leaves the island.

ETHICS

"The Principles of Conduct Governing an Individual or a Group"

One of the hottest topics during this long hot summer has been the scheme to denigrate the DXCC Award by perpetrating phony QSLs. While this was covered in the June editorial, a bit more philosophizing might be in order.

Hams, as a group, like to view themselves as somehow magically superior to the rest of the human family. Thus it does indeed come as a distinct shock to realize, now and again, that we hams are very human. As such, we come in the usual mixed bag of good, bad and even indifferent. Sure, bogus cards have gone out, but that is only *one* side of the story. With your ethical "right" to participate in the DXCC program goes your "responsibility" to participate in an appropriate *manner. You assume the obligation to submit cards* received that do indeed verify contacts in your log; cards scrutinized by you to affirm the correctness of information — cards unaltered in any manner. It is *your* responsibility to follow the rules.

The episode in progress pointed up some points well worth reiterating: The DXCC Award, the "open-ended DX Contest" of all time, for decades nurtured by W1CW and now carefully tended by W3AZD, continues to be looked at closely in an effort to maintain its integrity and value to participants.

There is perhaps even more to all of this. Take a close look at *how* you operate, your own on-the-air conduct. Operate in a manner to reflect good things about *you*, which will ultimately reflect good things about all DXers and hams in general. Yes, this *is* your obligation — assume it willingly.

Persons of honor should never forget what they are because they see what others are.

DXAC NOTES

In line with the recent ARRL Board of Director's motion, the Board-appointed DX Advisory Committee has been reviewing the rules concerning the single-mode DXCC Awards.

The *intent/spirit* of all single-mode Century Club awards is that contacts be two-way. Not all cards submitted indicate two-way mode contacts. However, it goes without saying that it was never meant that chaos be created on the bands by stations trying to get a cw report from a rare phone DX station (on *his* frequency!).

Increasing numbers of these types of contacts are creating both QRM and criticism. If this type of activity continues, the DXAC may again have to take a hard look at the rules for single-mode DXCC with an eye toward possible changes. QST

QSL Corner

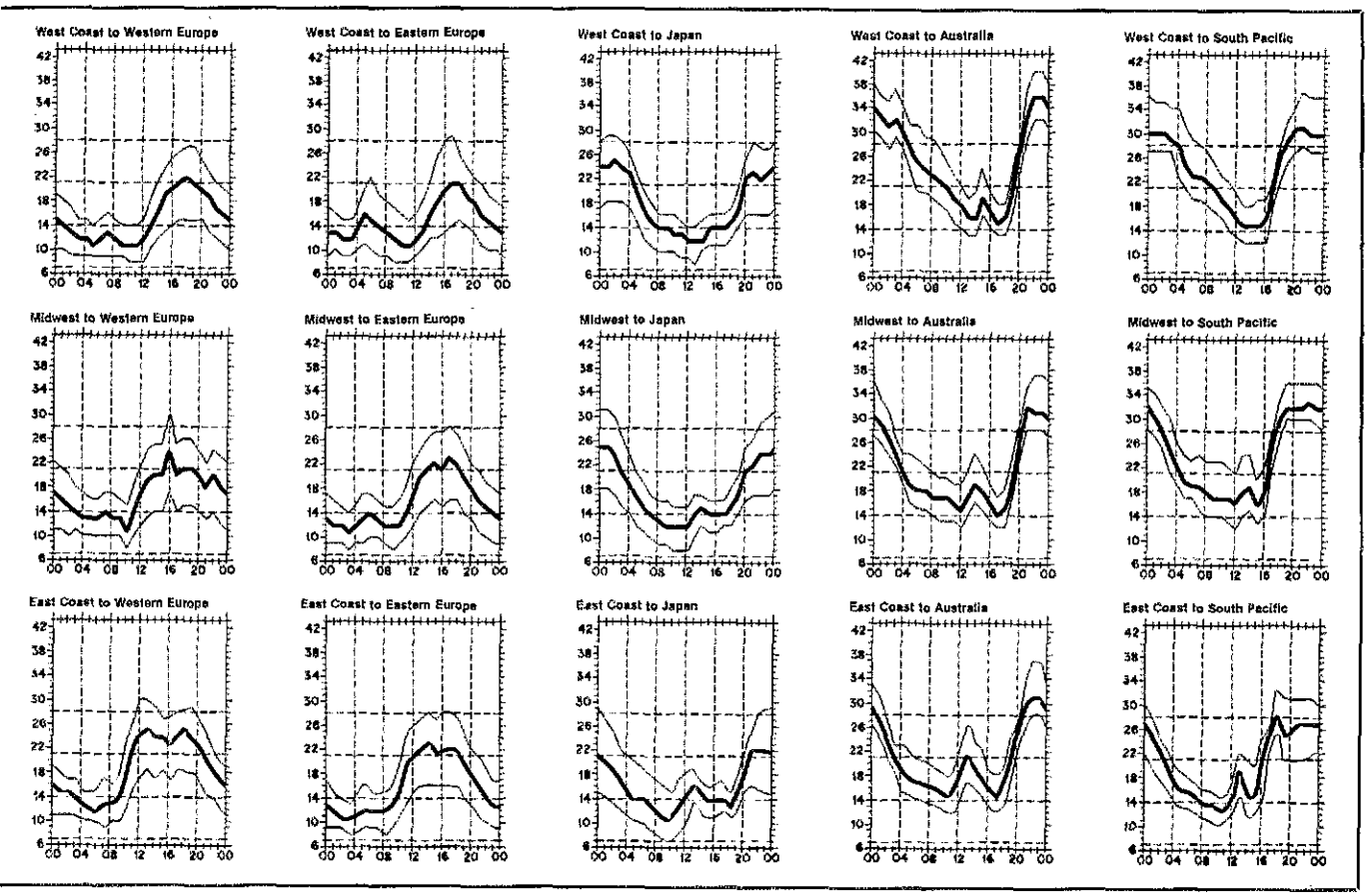
Administered by Joan Becker

Here is some QSL information for those of you who *would like to QSL direct to the station location. It is* passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

AX7E (DF4NW)
CN8AN (WB3DNA)
CT2DP (W4PKM)
CT2DQ (W4PKM)
C31WK (KB9AW)
DJ4SN/OA4 (DJ4SN)
EA4AXW (K5BDX)
EA8RV (K5MHZ)
ED5FPV (EA5TX)
EL2P (WD9UF)
FØGIF (K1KVV)
GI3OLJ (WB7AEX)
H44RW (ZL1MO)
K2LE/DU2 (W2AYJ)
M1IPA (F6CXJ)
N4EDE (KL7FX)
OA4AWD (VE2AQS)
OD5RZ (VE5QY)
OX3CO (WB3KGY)
SVØAU (W3FYT)
TJ1BB (AF4BB)
TL8RC (F6EZV)
TR8MX Box 177, Libreville, Gabon
VK9ZD (VK3OT)
VP2KAW (N6ST)
VP2MKU (N6ST)
VP2VHL (N6DX)
VP2VEG (WØDVZ)
VP5FP (WB4OSN)
ZF1AC (N5BUF)
4X4XK (WB3EGD)
6O1TI (IØSSW)
8P6OR (K5MHZ)
8Q7BH (JH4RUG)

Note

In May 1981 "QSL Corner," page 69, appears a list of *Incoming Bureaus and addresses. June 1981 "QSL* Corner," page 63, contains information about the ARRL-Membership Outgoing QSL Service. For information on bureau operation (Incoming and Outgoing) send a self-addressed, stamped envelope to ARRL *QSL* Bureau, 225 Main St., Newington, CT 06111. QST



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. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for August 15 to September 15, 1981, assume a sunspot number of 132, which corresponds to a 2800-MHz solar flux of 177.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 20 through May 18, 1981. 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

DF3EC/110 DF5DN/179 DF6NW/110 DJ1BC/127 DJ5TW/139 DJ7JC/215 DJ8RI/288 DK8BI/110 DL1NN/119 DL6YH/104 DL8WD/109 DL0HC/107 EA3XM/101 G3YEC/107 GW4IUK/100 HB9BQT/104 HC4JL/208 JA1VS/112 JH1ARJ/303 JH1BCY/116 JR2XJO/202 JA3AQ/325 JR3JWZ/188 JA6CBY/150 JA8SD/108 NH6D/139 LA8DY/100 OK1ODS/221 ON4EC/110 OZ7YY/315 PP5VK/154 PY7ZZ/318 SM4EAC/322 SM5IMO/156 SM6AVM/108 SM6BGG/162 SM6KQK/106 SM6NT/148 VE1CAW/101 VE3LWL/131 VK2DFE/288 Y32VJ/107 YV5CEZ/124 YU1OHF/163 YU2CRM/108 YU3DTN/167 YV5HZV/100 YU3THU/111 ZD9GG/101 ZE1DL/160 4Z4NUT/105 7P8BH/107 K1TU/105 KA1CXC/102 KA1KE/103 KA1Q/107 W1DC/101 WB1FPF/101 AG2M/106 KA2EYR/115 KA2HTH/113 KJ2H/124 N2ZM/112 W2RUK/104 WA2GIB/108 WB2FTK/135 WB2KKS/108 WB2QNF/101 WB2SOU/102 WB2SZM/103 WB2YET/102 K3GQJ/189 WB3FJQ/100 WB3FKP/134 WB3FYT/110 WA3LNQ/101 K4JYO/293 K4KSV/214 K4MLR/100 KA4ETL/100 KB4EN/246 KB4RV/101 KB4YG/228 KB4ZM/103 KC4LE/100 KE4E/276 KM4Q/105 KR4F/189 N4DRG/100 N4DSR/104 NE4L/106 WB4MAT/SV/111 W4SYY/173 WB4GFO/107 WB4HDX/105 WB4BXT/142 WD4LMJ/102 WD4RJQ/103 AA5F/102 AC5U/101 K5YPV/123 KA5GHR/109 KC5HU/250 N5APA/104 WB5BSB/106 WB5LBR/102 WB5SVG/110 WD5DOM/100 AB6M/106 K6QJO/102 K6JAD/302 KB6NU/167 WB4GBI/108 KB6SP/142 KD6DY/102 KF6R/113 KR6Z/192 N6AFN/105 W6MUO/121 WA6DJO/100 WB6JXU/228 AG7P/127 KD7P/148 N7BIJ/103 WB7TPK/101 K8LSB/100 K8MBH/230 K8QJO/102 KA8FNY/110 N8BQB/155 W8UIZ/118 WD8IFX/200 K9VAL/285 K9BKW/106 KA9DAO/114 W6ØWOM/102 W6SE/115 WB7TPK/100 AE8W/105 K8MBH/115 KB8GQ/102 KB8MG/112 KB8WR/110 KG8M/110 WA8KMK/100 WB8VZB/109 WD8BZL/100 WD8IFX/106 W7YR/101 AC6V/103 W6CRF/109 W6NWS/100 AF7S/100 KB9DK/101 KB9TN/152 KC9C/103 KC9W/237 K9BV/183 WA9HNU/131 WB9CPT/101 WB9VJT/100 KØAFN/101 KAØFNY/110 KF8Z/105 KG8N/107 NØBIZ/105 NØLLJ/104 WAØQID/102 WBØWOM/102 K9BB/275 K9GHP/100 K9VAL/282 K9ZOO/107 KB9QW/112 KB9TN/146 KC9W/200 N9AOB/113 N9BEM/105 WA9TAH/138 KBØBO/100 WAØRVK/106 W7SE/103 AK8Z/100 KC9W/165 W9HI/104

Radiotelephone

DF2AL/115 DF3FR/141 DF7XY/102 DJ7JC/177 DJ8RI/282 DK1WN/139 DK5XN/OHØ/110 DK6KK/198 EA5ADX/134 EA7FP/155 G4EJA/102 I2KKL/109 I2ODZ/110 I2YJO/107 JH1ARJ/296 JK1GOO/207 JA3AQ/307 JA8CRE/183 JA8KSD/105 KP4AWS/138 OZ8ZY/104 PY4DY/118 SM4EAC/322 SM5IMO/144 SM6AVM/108 SM6BGG/159 VE3JPJ/100 VU2IF/102 XE1OK/101 YU1US/240 YV1BJY/149 YV5CEZ/124 K1DWQ/164 K1QKW/108 KA1KE/102 W1SE/125 WA1DHM/103 KA2DUQ/105 KA2EYR/101 KC2X/113 N2YQ/140 N2ZM/112 W2ATM/104 WB2CJL/170 W3JZP/148 K4KKQ/105 K4KSV/210 K4TKR/106 KB4EN/235 KB4IY/108 KB4JI/103 KB4RV/100 KB4WT/100 KC4HO/120 KE4E/269 N4DRG/100 WA4UYB/100 WB4GFO/106 KA5AGB/108 KB5HS/125 KB5QV/108 KB5RF/264 N5AMA/110 N6BEH/108 N6BUV/177 N6BUV/101 W5DRH/107 W5GZI/109 W5ODD/115 WD5GAT/107 WD5HEG/105 KA6DAV/112 KD6AP/103 KD6AT/185 KD6BE/104 KR6Z/147 N6BEH/108 N6BUV/177 KB6GQ/102 KB6MG/112 KB6WR/110 KG8M/110 N9AOB/113 N9BEM/105 WA9TAH/138 KBØBO/100 WAØRVK/106 W7SE/115 WB7TPK/100 AE8W/105 K8MBH/115 KB8GQ/102 KB8MG/112 KB8WR/110 KC9W/200 N9AOB/113 N9BEM/105 WA9TAH/138 KBØBO/100 WAØRVK/106

CW

DK8KC/142 DL7NB/143 JF3AUA/110 JR3GWZ/154 JA9AQE/175 LA2KD/110 LA7XB/115 NH6D/134 OH2CE/100 OZ1EOL/109 VE1ACK/103 VE2YU/167 VE3IPR/178 VE3LWL/102 XE1VV/123 K1EM/118 K1MM/249 KA1R/125 KA1W/103 W1YRQ/100 W1ZT/108 AK2O/105 K2LFL/100 W2XL/106 AK3X/105 KA3CDQ/101 K4KKQ/104 KB4UX/103 KE4E/176 KR4F/122 W4NZR/105 W5VGX/106 AC6V/103 W6CRF/109 W6NWS/100 AF7S/100 W7SE/103 AK8Z/100 KC9W/165 W9HI/104

RTTY

K8NN

5BDXCC

W5ZPA F6ANF I2JQ I3OBO W7EKM VE6RA WØMLY OZ7YY EA3SF OK1DDS OK2BLG W2HZ W4MGN LA8CG JI1WRM G3MJT K7NHV N6VR AA4MM W2TQC OK3WN W4WJ LZ1XL WB9TIY W2PK ABØX VE3AIA

Endorsements

Mixed

DF3FR/151 DJ6OZ/251 DJ7YM/209 DJ8CR/321 DK8KC/175 DL1NG/171 DL2OV/161 DL6KG/328 DL7LV/291 DL7NB/295 F8QB/248 G3IMK/179 G3IOR/342 GM4FDM/143 HB9AIB/220 HB9BZA/155 I1APQ/324 I5EFO/280 I6CCI/219 JA1DNZ/159 JA1JAN/324 JH1QOJ/311 JH1XUP/150 JA2ADH/328 JA2AH/324 JA3ANW/249 JA3GM/316 JA5CKD/175 JA7BMR/250 JA7HMZ/271 JA9AQE/291 KL7H/278 KP4V/230 LA3XI/313 LA5HE/347 LA6TW/127 NL7P/235 OE1CP/290 OH2CE/174 ON7EJ/274 ON7WW/266 SM5RH/224 SM6HTC/265 SM7GCP/154 SMØDJZ/297 SMØGMG/303 TG4NX/293 VE3AMJ/301 VE3DMC/290 VE3II/308 VE3IPR/288 VE3LNW/223 VE4AFO/185 VE7DP/302 VE7GI/362 VE7HP/320 VK3YL/345 VK6HD/326 VP2MM/136 YU4VBR/229 ZL1AV/337 ZL1BIL/302 ZL4BO/342 ZL4LZ/293 6Y5DA/201 9H4G/313 K1BV/320 K1EM/288 K1KI/317 K1KNM/272 K1MM/305 K1PNS/215 K1ZSI/320 KA1CMP/131 KA1DS/235 KA1KD/168 KA1W/205 N1AEC/127 W1ESN/301 W1EW/320 W1LJ/290 W1OOP/236 W1ZT/209 WA1GTQ/152 WA1ZLK/251 WA1ZVI/127 WB1AIE/159 WB1ANT/226 WB1FRZ/210 AI2K/200 K2BSM/226 K2JGG/301 K2PF/175 KA2CLQ/130 KB2HZ/226 KG2A/202 N2YO/232 W2AK/252 W2GK/341 W2HZ/334 W2LNB/339 W2RS/319 WA2CBB/330 WA2FUE/254 WA2GEZ/282 WA2JLM/164 WB2HJW/198 WB2QEU/209 AF3T/282 K3EW/227 K3OTY/315 KA3BDW/195 KB3HE/226 N3AKD/157 W3BTX/319 W3DDG/156 W3LPL/320 W3NF/297 W3SO/326 WA3LJP/280 WB3CAI/166 WB3EWB/209 WB3JBF/268 AA4CJ/319 AA4KY/186 AA4NC/250 AF4M/292 K4AIM/344 K4HAV/192 K4JEZ/226 K4KJZ/272 K4KPH/278 K4KUZ/266 K4MG/318 K4RA/326 K4UTE/318 K4XR/289 KA4BFT/254 KB4GO/227 KB4UO/163 KC4CM/300 KQ4M/202 KU4N/246 N4AII/126 N4CQ/301 N4GG/305 N4JF/327 N4KE/319 N4ZC/330 NC4U/253 W4AOU/317 W4DFU/126 W4DZZ/303 W4EO/354 W4FHI/154 W4OHZ/300 W4OYI/175 W4PNY/200 W4TL/178 W4WEG/246 WA4FKK/168 WA4MIT/190 WA4QBX/299 WA4ZBK/152 WB4FOT/240 WB4IWW/249 WD4MLD/150 WD4NWW/129 WD4PVI/126 WD4RIL/163 K5JG/283 K5RW/290 K5TSQ/271 K5WE/300 KA5AGB/125 KA5W/274 KB5EK/128 N5DD/300 N5FW/304 N5GM/305 N5IH/272 W5JM/238 W5ODD/211 W5VGX/177 W5VJG/242 AI7H/200 K7EG/280 K7RDG/290 KA7AUH/291 W7ALZ/201 W7DAA/237 W7EDA/270 K6QH/339 K6UD/310 K6VL/157 K6ZOR/220 KA6CQQ/168 KG6S/200 KK6X/210 KM6N/192 KR6O/218 W6BJH/311 W6DSY/153 W6INH/272 W6JZU/320 W6KPC/323 W6MUS/290 W6TMD/274 W6VUN/201 W6ZZ/298 WA6FIT/306 WA6OIU/290 WA6TKT/205 WB6WIW/290 WD6EKQ/153 K9BLY/204 K9DID/290 K9EVB/304 K9JF/327 K9JU/151 K9LHA/254 K9SU/148 KB9EZ/313 KB9OF/206 W7JUO/305 W7SE/152 WB7QXK/260 K8CX/283 K8IAI/127 K8NN/312 K8ST/320 K8TMK/270 KA8T/293 KB8MG/134 KB8WR/110 N8BLZ/209 N8DE/281 N8RA/201 W8DX/324 W8HN/324 W8JBI/356 WB9OTX/211 WD9ADB/270 WD9HWY/150 AIØO/187 KØARR/125 KØDEQ/263 KØIFL/321 KØSW/181 KØVGB/150 WØAIH/354 WØBF/150 WØDEI/349 WØJLC/174 WØRYW/225 WØSL/148 WAØTKJ/306 WD9BNC/280 WD8JFE/253 WD8MKL/280 WD8NQE/279 AB9E/287 K9FYZ/299 K9LHA/254 K9OVB/281 KB9OF/206 KB9UG/175 N9JK/225 N9ABA/309 W9CZI/220 W9NUD/152 W9AEP/226 W9RW/262 WA9EKA/225 WB9NKH/272 WB9YJW/251 WD9ADB/269 WD9AHI/175 WD9HWY/150 KØIFL/294 KBØHJ/202 WØRTB/179 WØSL/137 WBØDHS/155 WDØCQI/259

Radiotelephone

CT1RM/317 DF2XC/203 DF9RB/168 DJ3CP/289 DJ6XG/202 DK3EG/205 DL6KG/326 DL6QW/204 DL7LV/277 DL7NB/281 DL8KS/310 EA3BDE/140 EA7BLU/200 F6BFH/315 F6DPE/139 F6DZU/294 F8HB/149 G3VOF/251 G3YJI/269 G4IJW/178 GM4FDM/135 HI8LC/291 I1APQ/324 I2JQL/291 I2SYG/120 I5EFO/280 I5ISF/231 I6CCI/218 ISØBYR/251 JA1JAN/316 JA2ADH/328 JA2AH/323 JR2XJO/202 JA3GM/292 JA7HMZ/224 KL7H/269 KL7ITG/234 LA3XI/306 LA5HE/341 LU7MAJ/208 LU8MBV/199 OZ2YE/250 PY1NCJ/199 PY2GWE/128 PT2PT/136 SM6HTC/226 SM7GCP/152 SMØAJU/334 SMØDJZ/264 SVØAP/202 TG4NX/292 VE3AMJ/296 VE3IPR/147 VE3LNW/202 VE3MRS/287 VE4AFO/178 VE4JK/275 VE7AFY/226 VE7BBD/176 VE7HP/313 VK6HD/313 VP2MO/136 XE1YO/260 YS9RVE/296 YV5BPU/290 ZL1BIL/302 ZL1BOQ/253 ZL4BO/321 ZL4LZ/293 ZP5CD/242 ZS6JM/350 3D2DM/147 9H4G/313 K1KI/227 K1KNM/272 K1MM/292 K1WH/189 K1ZSI/307 KA1AWH/178 KA1DS/176 KA1KD/165 W1BH/182 W1JR/260 WA1PEL/250 WA1SMI/174 WA1ZLK/251 WB1EAZ/213 AI2K/178 K2UGG/291 KB2HZ/225 KB2MY/163 W2HZ/324 W2MPI/289 W2NZG/253 W2RS/251 WA2CBB/260 WB2HJW/158 WB2QEU/201 AF3T/281 K3EW/207 K3OTY/315 KB3HE/225 N3AKD/144 W3IQS/260 WB3CAI/136 WB3CIW/281 AA4CJ/281 AA4KY/146 K4AIM/344 K4FA/247 K4HAV/186 K4IKR/332 K4KJZ/272 K4KUZ/251 K4MG/315 K4NJS/301 K4RSB/298 K4UAS/287 K4WHN/201 K4FQZ/149 KB4GO/223 KB4YG/228 KD4DQ/128 KQ4M/196 N4AVB/284 N4CQ/298 N4CRU/244 N4CSF/174 N4JA/270 WB3CAI/136 W4AOU/316 W4BBL/322 W4KKP/174 W4NYN/325 W4PNY/180 W4WEG/245 W4XI/279 WA4QBX/255 WA4VCX/125 WB4FOP/224 WB4GOI/204 WB4IWW/240 WB4RFZ/260 WD4GSE/203 WD4JDV/164 K5MLG/166 K5OA/319 K5PID/156 K5TSQ/226 K5ZTI/127 KA5W/247 KB5EK/125 KB5IW/260 KC5CR/125 N4KE/316 N5AJW/286 N5AXB/201 N5IH/272 W5JM/230 W5KC/334 W5UAW/328 W5VGX/133 W5VJG/242 WB5LSV/141 WB5RQM/205 WB5YGS/151 WB5ZCG/201 K6CBL/235 K6EID/263 K6JAD/306 K6QEH/130 K6UD/300 KA6CQQ/163 KK6X/131 KM6N/138 N6AUA/133 N6BLN/167 N6BUV/177 W6BDI/302 W6GN/274 W6GR/331 W6KPC/322 N5AJW/286 W6UQU/148 W6ZZ/294 WA6KMS/203 WA6OIU/282 WA6VHZ/198 WB6ALO/153 WB6DFX/283 WB6WIW/290 WD6ERX/127 AI7H/200 K7EG/233 KA7AUH/288 W7AEP/226 W7ALZ/175 W7DAA/179 W7DSZ/274 W7GOM/205 W7KTI/260 W7CLU/270 K8CX/260 K8NN/294 K8TMK/270 N8BQB/149 N8DE/193 WA8HFN/283 W6MUS/282 W6UQU/148 W6ZZ/294 WA6KMS/203 WA6OIU/282 WA6VHZ/198 WB6ALO/153 WB6DFX/283 WB6WIW/290 WD6ERX/127 AI7H/200 K7EG/233 KA7AUH/288 W7AEP/226 W7ALZ/175 W7DAA/179 W7DSZ/274 W7GOM/205 W7KTI/260 W7CLU/270 K8CX/260 K8NN/294 K8TMK/270 N8BQB/149 N8DE/193 WA8HFN/283 WD8JFE/253 WD8MKL/280 WD8NQE/279 AB9E/287 K9FYZ/299 K9LHA/254 K9OVB/281 KB9OF/206 KB9UG/175 N9JK/225 N9ABA/309 W9CZI/220 W9NUD/152 W9AEP/226 W9RW/262 WA9EKA/225 WB9NKH/272 WB9YJW/251 WD9ADB/269 WD9AHI/175 WD9HWY/150 KØIFL/294 KBØHJ/202 WØRTB/179 WØSL/137 WBØDHS/155 WDØCQI/259

CW

DF8ZH/179 DL7LV/231 HI8LC/150 I1SBU/228 JA1DNZ/137 JA3GM/257 JA7BMR/200 JA7HMZ/231 KL7H/200 LA5HE/179 OH2BSQ/179 ON7EJ/242 ON7WW/169 SM6HTC/151 SMØAJU/289 SMØDJZ/241 SMØGMG/276 TG4NX/191 VE1AXT/140 VE3BX/263 VE3II/158 WB1FRZ/205 K2IJ/259 K2PF/158 KG2A/152 N2YO/194 W2RS/228 K3EW/130 WB3CAI/131 AA4KY/138 AA4NC/129 KU4N/201 N4CQ/155 N4MM/270 W4DZZ/202 W4LQO/150 W4ZR/130 K5KV/230 K5RW/276 K5TSQ/225 KA5W/192 W5ODD/180 K6CBL/270 KK6X/162 W6JI/240 W6MUL/170 W6MUS/141 K7EG/144 W7EKM/200 K8CX/200 K8LJG/250 N8DE/196 WD8IFX/161 AB9E/224 K9JU/151 K9QVB/274 W9AG/200 W9RW/225 WA9EKA/199 WB9PXR/133 AIØO/152 KØDEQ/227 KØJCF/175 NØZA/175 WØJLC/164

YL News and Views

Conducted By Jean Peacor,* K1IJV

St. Vincent's Mary

St. Vincent is one of the beautiful islands situated on a volcanic ridge in the Caribbean Sea. Mary Barnard lives on a plantation, Orange Hill Estates, on the northern end of the island on the flanks of the mountain, Soufriere. She was living there on April 13, 1979, when the 4048-foot peak burst forth with its volcanic eruption.

"Unsettling, to say the least," is Mary's description of the months that followed. The mountain rumbled for a long time. For four months, she and her husband lived in the shadows of the smoldering mountain with no telephone and no way of knowing what was going on. During this period someone suggested Amateur Radio to Mary and Martin. At that point, they knew very little about Amateur Radio, but they did know who could help them.

Bill Providence, J88AQ, has perhaps created more interest in Amateur Radio on the island than any single individual. He's virtually a walking Chamber of Commerce for radio amateurs. He gladly gave of his time and experience and, as a result, Mary is now J88AM. Vince Cambridge, former VP2SAZ, who now has a new J88 call, also helped when the time came for antennas. They raised an inverted V for 10, 15, 20, 40 and 80 meters. This became lovingly known as "the spaghetti antenna." Mary and her husband used it for a year, received a few compliments on their signal and fell in love with the Amateur Radio scene.

Mary's enjoyment of hamming is greatly enhanced because of her ability to speak four languages. Born in Czechoslovakia, she also lived in Bavaria for two years, Italy for six and Canada for eight (where she met Martin while attending McGill University) before moving to St. Vincent. Mary and Martin have four children, all of whom Mary tutored up to the high-school level. They are all doing very well in their respective boarding schools, proving her experiment most successful.

Mary helps Martin by keeping the estate accounts. (To read about their QTH further, see *National Geographic*, September 1979.) She's also interested in digging for Carib Indian pottery in the surrounding countryside. Then, there is Amateur Radio! Every Caribbean radio amateur knows Mary through her activities during emergency situations and her participation in Caribbean nets. Having lived through the volcanic eruption and a devastating hurricane, they well know how important their link to the rest of the world via radio can be. Mary learned that in 1979 and, as J88AM, is always ready to put her knowledge to effective and helpful use.

St. Vincent's Mary Barnard, J88AM

YLRL CONVENTION 1982

YLs worldwide, mark your calendar and start feeding your piggy bank. The next YLRL convention is to be held in the Virginia suburbs of Washington, DC, on June 18-20, 1982.

The Washington Area Young Ladies' Amateur Radio Club (WAYLARC) is sponsoring the convention with management assistance from the Northern Virginia Amateur Radio Council (NOVARC). Big plans are well under way. To get on the mailing list for update information, send an s.a.s.e. to WAYLARC's YLRL Convention Committee, 2012 Rockingham St., McLean, VA 22101. Let us know if you have any suggestions about things to make this the best convention ever.

GERT POND, W7KOY

Last fall, Gert Pond of Phoenix, Arizona, was the subject of the nationally broadcast show called "The American Character," which features Norman Vincent Peale. Dr. Peale's message follows:

When I say the word 'hero,' can you picture a middle-aged woman in a wheelchair, crippled by arthritis? You might if you lived in Phoenix and knew Gert Pond. Gert doesn't get out much, but she stays in touch with her friends — in fact, with the whole world — through her 'ham' radio.

For example, she was listening when two engineers had motor trouble in the desert. They weren't carrying enough water to survive the hot day, but they did have a radio set. When they called for help, they reached Gert — and were rescued.

During the past three years, Phoenix has suffered through a series of floods, each more devastating than the one before. Bridges have been washed out, streets hidden under deep water, and entire communities washed away. Through each new emergency, Gert has worked her radio constantly . . . going for days and nights without sleep . . . listening for distress calls . . . directing disaster volunteers . . . relaying messages from stranded people . . . and notifying public officials of crisis situations. When she was named Arizona's Amateur Ham Radio Operator of the Year, Gert modestly said, "I like doing something to help in my own small way."

Gert Pond of Phoenix — a wheelchair hero, always in touch with The American Character.

*Country Club Dr., Monson, MA 01057

Gert Pond, W7KOY

Gert first became licensed in 1947 — in "self defense." Her husband, Ken, was already a ham, W7MAE. For many years now she has not been very far from a rig. Stricken with a disease, thought to be Parkinson's, Gert was treated for that for 23 years. The disease turned out not to be Parkinson's but rather a crippling arthritis that now keeps her close to home.

With a rig beside her lounge chair in the living room, another in the radio shack and a hand-held in her bedroom, Gert keeps in touch with every emergency situation that arises and has provided valuable assistance many times. In between times, she chats with people all over the country, often into the wee small hours.

All this has resulted in many friendships. During a hospital stay in 1980, Gert discovered just how many friends she has made. "I had to bring all my cards home in several large grocery bags." Such are the friendships made via Amateur Radio.

LADY OF THE YEAR

Beverley Stoner, K8ZJU, of DeWitt, Michigan, had a succession of exciting events occur during the month of April. It began with her receiving the Amateur Radio Operator Lady of the Year Award presented to her by Jim Seeley, WB8MTD, Michigan's SCM. This event took place at the ARRL Michigan Section Convention at Muskegon on April 4. It was the second time the award was given; last year's recipient was Donna Burch, W8QOY.

On April 10, Beverley and her husband Marion, W8VWY, visited Detroit's FCC office where Marion passed his Extra Class test and Beverley the Advanced. For them to upgrade in April was especially exciting because it marked W8VWY's 40th year in Amateur Radio, and Beverley's 20th year.

On April 11, the Central Michigan ARC held its annual Ladies' Night and Awards Program. Beverley was presented the Zeigenbein Award, named for Ralph Zeigenbein, W8PLP, now a Silent Key. It is for outstanding participation in CMARC activities, and has been presented annually since 1961. Beverley is the first YL ever to receive it.

K8ZJU's hamming centers around being an ORS and traffic handler with 17 BPLs to her credit. She is secretary and net control for MACS (Michigan Amateur Communication System); former president of TASYLS (The Auto State Young Ladies); and now editor of their newsletter. Beverley's CMARC activities include being finance person for the yearly hamfair, heading their operation from the Capitol lawn for two years, being "card and flower person" for several years and Field Day food chairman for one year. The song, "I'll Remember April and Be Glad," could well have been written for Michigan's Lady of the Year.

Beverley Stoner, K8ZJU, Michigan's Lady of the Year

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

An Untapped Resource

Most vhfers are aware of the utility of beacons for determining propagation conditions. Particularly on 50 MHz, where the likes of FY7THF, ZB2VHF and KH6EQI are well known to regular inhabitants of the band, beacons have proven their usefulness. In this country the value of beacons on the higher bands is not as well demonstrated. This is, undoubtedly, because of our rules that prohibit unattended operation of amateur stations except those in repeater operation. Thus only those with Special Temporary Authorities (STAs) or who have set up elaborate monitoring and control systems have consistently operated beacons.

Particularly in Europe and Australia, things are quite different. Their amateur magazines regularly publish lists of vhf and uhf beacons, and many reception reports of the beacons form parts of descriptions of various band openings. Often, it is the beacons that provide the first indication of an opening. A number of attempts have been made to secure a change in FCC rules that would foster beacon operation in this country. One such attempt involved the filing of a Petition for Rule Making by the Radio Club of the Johns Hopkins Applied Physics Laboratory, where this conductor is employed. This petition followed over six months of operating a 2-meter beacon by the club station, W3VD, under an STA issued by the Commission. Two years have since elapsed with no action on this petition. The most recent effort that has come to my attention involves a similar petition filed by T-MARC, The Middle Atlantic FM and Repeater Council. We can only wait and see if they have better luck.

There are, however, a group of beacons operating continuously in various parts of the world that vhfers, especially those interested in 6 meters, can use to gauge conditions. I am referring to the 10-meter beacons listed in the accompanying table. Many of us may have been aware of these beacons without appreciating how they can be useful as barometers of conditions above 50 MHz. Ed Tilton, W1HDQ, the originator of this column, addressed this subject in the September 1973 issue. At that time Ed noted the relationship between 10-meter and 6-meter Es. He observed that a rapid rise in muf from 28 MHz to 50 MHz might well indicate that it will shoot up much higher, possibly all the way to 144 MHz. He also pointed out the fine opportunity provided us by the Bermuda beacon to get an advance warning of upcoming Es. Too bad we don't have similarly located beacons on 6 and 2 meters as well as 70 cm. What was not known in 1973 was the existence of long-haul Es. Since then, we have seen 50-MHz Es openings from the West Coast to Japan and the East Coast to Gibraltar. Even on 2 meters, long-haul Es may be possible. Two years ago there was a report of a 2500-mile, 2-meter Es contact between Portugal and Lebanon. Rumors fly almost every time we have an "E-Skip" opening on 144 MHz about transcontinental QSOs taking place, but to date I have not been able to verify any of them. A number in the 1600-mile range, well beyond classical single-hop distance, are known to have taken place. (See 2-meter section.) Probably our best opportunity to bridge the Atlantic on 2 meters without moonbounce is via multi-hop Es. It may never happen, but let's not write it off. Watching the 10-meter beacons should provide at least the first indication of suitable conditions necessary for such momentous contacts.

Nor is Es propagation the only mode in which observation of 10-meter beacons might prove fruitful. Regular recording of their strength and other signal characteristics may well be useful in spotting possible trans-equatorial propagation or the existence of some of the FAI modes recently uncovered. Only a systematic program of monitoring, recording and correlating with other conditions will tell us the whole story of the usefulness of these ever-present landmarks.

All operating 10-meter beacons are not on the accompanying list, which was supplied largely by W1HDQ. Some are omitted because of their part-time nature. Ed and I agree that only 24-hour-per-day operation constitutes a "real" beacon. He quips: "Who ever heard of a part-time lighthouse?" Other beacons not listed are operating on odd frequencies. Except for W6IRT, which many 6-meter operators will recognize because of its proximity to the 6-meter liaison frequency of 28.885, all listed beacons are within the agreed-upon IARU beacon band.

Ten-Meter Beacons

Frequency (MHz)	Call	Location	Frequency (MHz)	Call	Location	Frequency (MHz)	Call	Location
28.200/ 28.205*	DLØIGI	Southern Germany	28.231	ZS3HL	Southwest Africa/ Namibia	28.270	ZS6PW	Pretoria, South Africa
28.2025	ZS5VHF	Natal, South Africa	28.235	VP9BA	Bermuda	28.276	DFØAAB	Germany
28.210	3B8MS	Mauritius	28.237	LA5TEN	Oslo, Norway	28.280	YV5AYV	Caracas, Venezuela
28.215	GB3SX	England	28.245	A9XC	Bahrain	28.283	VP8ADE	British Antarctic
28.220	5B4CY	Cyprus	28.250	VE7TEN	Vancouver, BC Canada	28.290	VS6HK	Hong Kong
28.222	HG2BHA	Hungary				28.302	ZS1STB	Cape Town, South Africa
28.225	VE8AA	Northwest Territories, Canada	28.257	DKØTE	Germany			
			28.260	VK2WI	Crowsnest, N.S.W., Australia	28.315	ZS6DN	Pretoria, South Africa
28.227	ZL2MHF	New Zealand						
28.230	BBC Harmonic	England (probably)	28.260	VK5WI	Adelaide, South Australia	28.887	W6IRT	Hollywood, California

*Alternates between the two frequencies approximately every five minutes.

W1HDQ will provide updates to this list for those sending s.a.s.e.s to his *Callbook* address.

LAST-MINUTE FLASH

Sunday evening of the VHF Contest brought record-breaking 2-meter tropo conditions from the Caribbean to the southeastern part of the country. KP4EOR had a field day working East Coast Florida stations from Jacksonville to Miami. VP2VGR in the British Virgin Islands was also favored by the unusual over-water tropo conditions and provided a rare country to many Florida stations, including many with low power and simple antennas. And that's not all. The Montserrat DXpedition was also under the influence of the widespread airmass. They also worked several Florida stations as well as KB4NW in South Carolina. This same group put Montserrat on the 2-meter moonbounce map for the first time, working K1WHS and K1MNS. More details next month.

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

ON THE BANDS

6 Meters — The last few days of May and the first few in June were certainly interesting ones on 6 meters.

Not only was Es particularly productive with multi-hop across the country and the Caribbean, but F2, or something, brought LUs into many parts of the U.S. as well as the Maritime provinces of Canada. W4CKD in Virginia, near Washington, reports contacts with LU9AEA, KB4KD/C6A and C6ADV on May 26. The following day, Bob came up with 8P6KX, VP9IB and KP2A while hearing the FY7THF beacon. Then on the 28th, C6ADV, VP5D, KV4FZ and LU3EX went into the log. LU3EX was quite busy during the short 15-minute opening at about 2115 that day, working W1RIA, K1IKN, W2UTH, WB2WSV and K2QIE in addition to W4CKD. Bob reports that, according to his card, Alfredo is now up to 58 countries. In addition to 8P6KX, other Caribbean goodies that excited the eastern part of the country and swelled DX totals that week included, in addition to the aforementioned, FM7AB and HI8DAF. The other end of the country wasn't left out, as witnessed by the letter from WA6BYA. Bob noted the appearance of LU3EX and LU6DLB on the 23rd, and LU9AEA, LU5BBD and LU3EX again on the 26th — as if those guys didn't have enough LU, ZLs and VK back in April. Nor was it over. On June 6, it was the VE1s who had the good fortune. VE1BNN says that at about 2100 that day he QSOed LU3DCA, LU6DLB and LU3EX. VE1ASJ was also in on the fun. That same lucky day, on which the FY7THF beacon was widely heard, VE1BNN was one of the fortunate few to land VP2ET as was W4CKD. The VP2ET/VP2EK Anguilla DXpedition by VE1AVX and VP2VGR, unfortunately did not get especially good propagation to the East Coast during their short stay on the island. It is understood that they did well to the Midwest and West, and they did work ZB2s BI. and GW on June 6 after hearing the ZB2VHF beacon for over an hour. So all was not lost! It happened again the afternoon of June 16. This conductor arrived home from work at 2140Z in time to catch LU3EX on cw for a new country. Within the next hour, FM7AB, HI8DAF, 8P6KX and VP2MNQ/VP2MX were also worked. Both FM7AB and HI8DAF also represented new countries. Quite a day — three new countries in an hour!

Nor was international DX all the band had to offer, the double-hop, east-west opening of May 28 was quite widespread and produced some very strong signals, as noted by N4CD of Virginia. For example, Bob states that, during the month of May, he worked 40 states using 100 watts and a five-element beam. Many of them were on that day. Another who took good advantage of the fine early-season conditions is very deserving indeed. He is WD8QDA of West Virginia. Steve has been responsible for providing his rare state to numerous 6-meter operators, enabling many to complete their WAS. The May 28 opening gave him his chance, coming up with W7LFL and WA7KYM of Wyoming for Steve's last state. N8CMH, who almost missed working the elusive state himself in the process of helping WD8QDA, fortunately also got through on a second opening a few minutes later. A few phone calls were necessary to alert the western stations that there were weaker stations out there under the heavy single-hop competition. One way to help alleviate this problem is to spread out. If we use the 50.2 area for more of our operating, we will all be able to work more with less QRM. Also, if stations in rare spots would listen for other call areas than those currently producing the strongest signals once in a while, it might facilitate more extended-propagation-range contacts.

Wyoming may not be quite as elusive in the future with the addition of a very active 6-meter op, Jim Lommen. Jim, who, as NP2AE, helped put the U.S. Virgin Islands on the 50-MHz map, has moved to Green River, Wyoming. WB7AXA is to act as manager for all outstanding cards until Jim gets established.

Another just completing his WAS may well be the youngest to accomplish the feat on 6 meters. He is N7AKB, the 15-year-old son of K7ICW. Again it was the big double-hop opening of May 28 that did it, bringing in Kentucky. Congratulations, Todd.

It happened again this year! KB7WW near Portland, Oregon, reports an Es opening to Japan that began about 0230Z June 9 for the Seattle gang and worked its way down the coast about 30 minutes later. During this opening, Art worked 10 JAs. If they can do it out there, we Easterners should be able to get across the Atlantic on Es, including crossbanding the Gs on 70 MHz. We have a group trying, in any case. Speaking of JAs, N7DB's OVS Report notes that Dave has received two Japanese awards, the AJD (All Japan Districts) and WAJA (similar to our WAS). Fine work, Dave.

Another excellent double-hop opening took place the evening of June 3 (June 4, UT). This conductor was happy to hear how many stations are now active from Utah. That should be a rare state no longer. Arizona, Nevada and California were also very much in evidence. It was nice to renew acquaintances with a number of western friends, and there was a lot of action around 50.2, which made things a lot more pleasant.

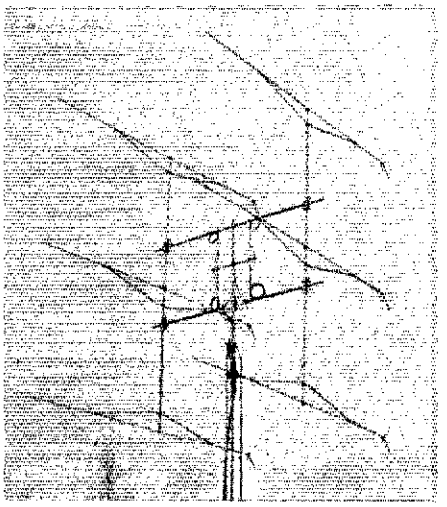
2 Meters — The principal 2-meter news is "E Skip," and so early in the season! Two major openings occurred even before June arrived. One in the West took place the evening of May 23 (May 24, UTC time). One turning in a very complete report is NØLL of Smith Center, Kansas. Larry worked a total of 13 California stations, plus KA7FZU of Tonapah, Nevada. All California contacts were between Monterey and San Francisco, and the opening lasted from 0240Z until 0323Z. He says that nearby WBØZKY also took part working a total of 21 stations. NØLL furnishes a very interesting map showing many of the contacts that took place that evening. W7LUX's QSOs with Montana and western Washington, and several W5FF hookups with Oregon stations are noted. From this it is clear that the cloud was over central Utah at the time. A card from W7LUX of Flagstaff, Arizona, confirms this, listing a contact with WA1JXN/7 in Montana at 0300Z and one with W7FHI in Washington at 0407Z. WA7JTM of Phoenix also notes working WA1JXN/7 at 0300Z as well as Washington stations KA7BZJ and W7FHI at about 0410Z. On the other end of the circuit, WA1JXN/7 of Missoula, Montana, reports working eight Arizona stations. WA8LLY/6 in Santa Rosa says that this was his first Es on 2 meters in 18 years of operating. Steve was alerted at about 2300Z to the possible unusual conditions by OSCAR 7 QSOs made when the satellite was below the horizon and 5s were heard on the 2-meter upline passband. Then at 0258Z came a contact with WBØTEQ in Kansas with signals running well over S-9. He puts in a plea for those operating outside of the district indicated by their call to state clearly where they are. He says that he has been fooled by this on several occasions.

The opening around 0300Z was not the only one that day. WA8LLY/6's OSCAR observation is indicative of this. W9AAG of Woodhill, Illinois, reports a contact with W5JTZ in Farmington, New Mexico, at 0015Z and WA7EPU of Phoenix, state number 42, six minutes later. A strange program on TV channel 5 was WA6LHD's tip-off that something was going on. Ed worked AIØL of Laplata, Missouri, at 0232Z followed by WBØTEQ of Garden City, Kansas, and K5IS of Jerome, Texas. In addition to WA6LHD, AIØL reports WA6WJN of San Jose and WB6ODX in Fresno. Dean estimates the distance to Fairfield as very close to 1600 miles (2560 km) with the other California cities somewhat closer.

The eastern Es opening took place the evening of May 26. Reports are not as numerous as from the western opening. I don't know what this says about reporting from the two sections of the country. K1FJM/4 of Homestead, Florida, near Miami, is one who did write about what transpired. Pete worked a total of 14 stations from southern New Jersey to Connecticut between 2300Z and 2330Z. Included in his list of contacts were N2BFJ, WA1ZIK, WA2TIF, WB2BUR, KA1BU, WB2CMI, K2BWR, WB2QBT, K2ZRJ, WA2WIH, WA2HCI, K1EM, N1AFW and K2BWS.

Transatlantic DX on 2 meters, without benefit of moonbounce, continues to be an elusive dream. VE1ASJ conducted m.s. tests with England during the Perseids the past two years with some positive results, but have not been able to complete a two-way contact so far. However, a tantalizing report comes from G3IOR. Pat, an inveterate satellite operator, had just finished working OX3WS on OSCAR 8 Mode A at 2146Z, March 3. At 0215Z, when the bird was well beyond the horizon to the northwest, he checked the uplink passband, only to hear OX3WS direct on 145.890 MHz. The signal was weak, about 2 × 1 with aurora, and it was heard for about 30 seconds before disappearing. Very weak signals were heard for another few minutes, including one that he thought was signing VE1??. It is well known that contacts have been made on 6 meters between the eastern U.S. and Alaska following some strong auroras. It might also be possible on 2 meters and, if so, such propagation should be capable of bridging the Atlantic. Speaking of bridging long over-water paths, W3EP/9 speculates in a letter to this conductor and W1JR that ZD8TC's reception of KP4EOR on 144 MHz a few months ago might have been by means of tropospheric propagation rather than some type of TE as originally thought. Emil also wonders if reports of reception of TU2EF of the Ivory Coast by PY2OD, referred to in the October 1978 *QST* article on FAI by W1JR and KØJHH, could not have also been via the troposphere as well.

K1WHS reports that the 1981 EME Contest was one of his biggest thrills. Dave completed 90 QSOs including seven with French stations, 10 in Germany and a Ukranian, UT5DL. A single Yagi station, DJ5MS, ws worked through a pileup in one and a half minutes! Nevertheless, K1WHS, along with others, complains about conditions, hampered as they were by aurora.



The somewhat unusual 2-meter EME array at WAØLPK/KL7. Jim's approach uses six F9FTs in a 12 × 20 ft "H" frame. He is being transferred but would like to complete WAS before tearing the station down. He lacks only three states.

How many QSOs would the 336-element "Maine Monster" have produced if propagation had been normal? Next year may tell.

In the m.s. skeds-wanted department, WA8MIL of Michigan is looking for Florida, Texas, Wyoming, New Mexico, Colorado, Utah, Massachusetts and Rhode Island. Stan can be reached evenings at tel. 616-861-4345. From one of the above states, Utah, N7BHC is also looking for m.s. skeds. Dave, who runs 200 watts to four Boomers, can be contacted at tel. 801-967-5896.

KB9NM in Wausau, Wisconsin, wants Midwesterners to know about a nightly sked at 0000Z on 144.180 MHz. All within earshot are welcome.

1-1/4 Meters — Another proof that EME can be worked on this band with four Yagis is turned in by K1WHS. Dave tried it during the Moonbounce Contest with WB6NMT. He used his tropo antenna consisting of four 220B Boomers at 90 feet. Feed-line loss is estimated as 2 dB, and a 3SK-48 preamp was located in the shack. W6PO also heard the signal, attesting to the fact that it wasn't a fluke. This conductor also heard Dave's signals on tape during a recent visit to WB6NMT. I believe that 220 is a very viable moonbounce band. A longtime 1-1/4 stalwart, W3GPY of Slatington in eastern Pennsylvania, reports that he now has his 8877 amplifier going, replacing the single 4CX250 used for the last five years. Mike now has 20 states on the band. There are a lot of Westerners waiting for you to get an antenna on the moon, Mike.

70 Cm and Down — WB5LUA, near Dallas, has come up with state number 9 on 23 as a result of a QSO with WA4PGJ of Jackson, Tennessee. WA4FGJ is running 1.3-watts output from a Microwave Modules transverter to two 28-element loop Yagis. WB5LUA also reports that the now-famous Dallas-to-Corpus Christi tropo duct is still in operation. He and W5HN have experienced it several times this year, as evidenced by contacts with the 3-watt station, W5GVE.

KB6CO of Bishop, California, reminds everyone in mountainous areas that they may be missing a bet if they don't try "mountainbounce." Larry, having just acquired an IC-451, is having a lot of fun seeing what it can do. Using the rig to drive a KLM 100-watt amplifier to a 15-element quagi, he finds that he can regularly work KA7FZU in Tonapah, Nevada, over a 110-mile path obscured by 14,000-foot mountains — if they both beam at the 13,500-foot mountains to the west of Bishop.

W1JR furnishes a report on the preamp and antenna competitions held at the recent Eastern VHF/UHF Conference. The battle in the 70-cm preamp division seems about over with many in the 1.0 dB or less region. Joe and W1UHE tied with 0.5 dB. Joe's uses a V-244, and Norm's a Dexel D-432. In 70-cm antennas, a Boomer prototype, consisting of 26 elements on a 17-foot beam brought by K1WHS, won top honors with a 16.9-dB gain reading. An interesting result was that an RIW and one of the new Tamas, designed like it, both produced the same gain of 16.6 dB. Another Cushcraft prototype using 23 elements and a 21-element F9FT displayed this figure also. QST

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1F

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

California: The Valley of the Moon's second annual "Ham" breakfast and swap meet will be held Sunday, Aug. 9, at the Sonoma Community Center, 276 East Napa St., Sonoma. Breakfast will be served from 9 A.M. until noon. Adults, $3.50; children under 12, $1.75. Swap tables are $4, room for 100 spaces; 30 tables available on first-come basis, others bring your own. Admission for adults, $1; children free. Open and club auction at 2 P.M. Talk-in on 146.43 simplex; local 13/73 repeater will be monitored. Any questions, call Darrell Jones, WD6BOR, at 707-938-8086.

Delaware: The sixth annual New Delmarva Hamfest will be held Sunday, Aug. 16, at Gloryland Pk, Bear, DE, from 8 A.M. to 4 P.M. Admission is $2.25 in advance, $2.75 at the gate; nonham family members free. Tailgating or table space under pavillion is $3.50. Limited tables free, or bring your own. Refreshments and prizes. Talk-in on 52 and 13/73. For map, info or advance tickets, send s.a.s.e. to Stephen J. Momot, K3HBP, 14 Balsam Rd., Wilmington, DE 19804. Make checks payable to "Delmarva Hamfest."

†Florida: The 16th Melbourne Hamfest will be held Sept. 12-13 at the Melbourne Auditorium. Program will include prizes, swap tables, commercial exhibitors and meetings; talks on spread spectrum, RTTY, QRP, ATV, TVI and other topics. Also a report on the September ARRL Board of Directors meeting. Send s.a.s.e. for program schedule. Talk-in on 25/85. Tickets, $3.50 advance or $4 at door. Write to PCARS, Inc., P.O. Box 1004, Melbourne, FL 32901.

†Illinois: The 25th anniversary "Silver Jubilee Hamfest" sponsored by the Shawnee Amateur Radio Assn. will be Aug. 30 at John A. Logan College, Carterville. Air-conditioned flea market, forums, computers, contests, prizes and refreshments. Talk-in on 3.925, 25/85 and 52. Tickets $2 in advance; $3 at the door. For details contact Bill May, KB9QY, 800 Hilldale, Herrin, IL 62948, or call 618-942-2511, days.

†Illinois: The Illiana Repeater System, Inc. will host the 12th annual Danville Area Hamfest on Sept. 5-6 at the Georgetown Fairgrounds. Flea market, parking, forums, family entertainment, prizes and much more. Gates open at 6:30 A.M. Tickets $1.50 in advance; $2 at the gate. Talk-in on 22/82 and 52. More info on tickets and/or tables contact Lowell Wells, WD9AFG, RR 3, Box 215, Danville, IL 61832, or call 217-759-7560.

Indiana: The Tippecanoe Amateur Radio Assn. will hold its 12th annual hamfest in Lafayette on Sunday, Aug. 16, at the Tippecanoe County Fairgrounds, Teal Rd. and 18 St. The grounds open at 7 A.M. Large flea market, manufacturers, dealers, fun and prizes. Talk-in on 13/73 or 52. For early tickets and additional information, write J. B. Van Sickle, K9KRE, RR 1, Box 63, Westpoint, IN 47992. Make checks payable to "Lafayette Hamfest." See you there!

Indiana: The annual LaPorte County Hamfest sponsored by the LaPorte and Michigan City Amateur Radio Clubs will be held rain or shine, Sunday, Aug. 30, at the County Fairgrounds on Hwy. 2, west of LaPorte. Overnight trailer parking for early birds. Paved flea-market area outdoors. Indoor tables $1 each. Satellite TV demonstration. Advance tickets $2 with s.a.s.e. to P.O. Box 30, LaPorte, IN 46350.

Indiana: The Bloomington Area Amateur Radio Hams will hold their 4th annual "Hoosier Backyard Hamfest" on Sunday, Sept. 6, from 7 A.M. to 5 P.M., at 2335 Vernal Pike, Bloomington. Admission is $2. Features include prizes, swap 'n shop, vendors, free set-ups, balloon rides, refreshments, ATV demonstrations and an Aptron Lab. Rain or shine. Talk-in on 78/18, 04/64, 223.26/224.86. For information contact Bob Myers, K9KTH, at above address, or call 812-332-2433.

†Iowa: The Des Moines Radio Amateur Assn. will hold the annual Hawkeye Ham and Computerfest on Aug. 16 from 9 A.M. to 5 P.M. at the air-conditioned Veterans Memorial Auditorium off I-235 in downtown Des Moines. Admission in advance, $3; $3.50 at the door. Parking is $1.50. Amateur and microcomputer dealers. Large, indoor flea-market area. Outdoor tailgating space. Indoor-space reservations must be made by July 15. DMRAA consignment table available — DMRAA gets 10% of selling price. Outdoor acution at 5 P.M. for unsold items. DMRAA gets 10% of selling price. ARRL Forum at 1:30 with Midwest Division Director Paul Grauer WØFIR, and Harold Steinman, K1FHN, manager, ARRL Membership Services Department. Prizes, food and many activities for the whole family. Nearby attractions include Des Moines Science Center, Art Center, Adventurelands, Botanical Center, the Iowa State Fair and a shopping center. For additional info and reservations write to DMRAA, Box 88, Des Moines, IA 50301.

†Iowa: The Iowa 75-Meter Net will hold its annual picnic on Aug. 23 at Ewing Park, Des Moines. Potluck meal at noon, program at 2 P.M., with prizes following. Talk-in on 34/94. For further information contact Lovelle Pedersen, WBØJFF, 2327 W. Reinbeck Rd., Hudson, IA 50643.

†Louisiana: The Shreveport Amateur Radio Assn. Hamfest '81 will be held at the convention center on Saturday, Aug. 22, from 9 A.M. to 5 P.M. and Sunday, Aug. 23, from 9 A.M. to 2 P.M. Dealers, prizes, swap tables, non hams' activities, forums both days. Dinner-dance Saturday night. Talk-in on 22/82 and 63/03. For information and reservations write to SARA-Hamfest, P.O. Box 7033, Shreveport, LA 71107.

Maine: The Sandy River Amateur Radio Club/Somerset Amateur Radio Assn. hamfest will be on Saturday, Aug. 22, at the Farmington Fairgrounds, Farmington. Donation is $1. Free camping 5 P.M. Friday until Sunday morning. Light refreshments. Talk-in on 37/97, 615/015, 52. For information send s.a.s.e. to Charles Stenger, W1HTG, Box 111, East Dixfield, ME 04227.

Massachusetts: The Southeastern MA ARA will hold its annual picnic and flea market on Sept. 13 from 9 A.M. to 4 P.M. Rain date Sept. 20. Picnic to be held at SEMARA Club grounds, 54 Donald St., South Dartmouth. Parking, food, beverages, entertainment for the whole family. Talk-in on 60/00. To reserve space and tables, write to: SEMARA Picnic, P. O. Box P-105, South Dartmouth, MA 02748.

Minnesota: The St. Cloud Amateur Radio Club Hamfest will be Aug. 9 from 8 A.M. to 4 P.M. at the Whitney Senior Center in St. Cloud. Swapfest, prizes and refreshments. Talk-in on 34/94. For further information contact Mike Lynch, KAØHQS, 2115 1st St. South, St. Cloud, MN 56301, tel. 612-251-2297.

†Missouri: The St. Charles ARC presents Hamfest '81 to be held at the Wentzville Community Center on Aug. 23 from 8 A.M. to 5:30 P.M. Admission $1 in advance; $1.50 at the door. Forum, cw contest, flea market, dealer exhibits, food, prizes, cake walk, bingo. Talk-in on 07/67 and 52. No reservations. Info available from Bill Graham, WBØZEH, 215 Bermuda, O'Fallon, MO 63366.

†Nevada: The Nevada ARA and Sierra Nevada ARS will hold Sierra Hamfest '81 on Aug. 22 in Reno. Gates open at 8 A.M. Pre-registration: Adult tickets $14 each ($15 after Aug. 12). Tickets for children through 16 are $7 each. Swap tables $2 each. Barbeque, refreshments and prizes. Talk-in on 90/30 or 01/61. Make checks payable to Nevada Amateur Radio Assn., Inc., P.O. Box 2534, Reno, NV 89505.

†New Jersey: The Gloucester County ARC will hold its annual hamfest on Aug. 30 from 8 A.M. to 3 P.M. at the Gloucester County College, Tanyard Rd., Sewell. Tailgaters and dealers set up at 7 A.M. Speakers: Dale Clift, WA3NLO (ARRL Hq.), speaking on "What's Happening Now!" and Miles "Brownie" Brown, W2PAU (RCA antenna expert), speaking on "Amateur Antennas." Prizes, contests and FCC exams for Technician through Advanced. Admission $2 advance; $2.50 at the door. Tailgaters and dealers $6. Talk-in on 52 and 78/18. Info and reservations, send s.a.s.e. to GCARC Hamfest Committee, P.O. Box 370, Pitman, NJ 08071, tel. 609-456-0500 or 338-4841 (days); 629-2064 (evenings). Please write or call for details on FCC exams.

†New Jersey: The Ramapo Mountain Amateur Radio Club, WA2SNA, presents its 5th annual flea market on Aug. 15, at the Oakland American Legion Hall, 65 Oak St., Oakland, only 20 miles from the GW Bridge. Talk-in on 147.49/146.49 and 52. Indoor tables, $6.50; tailgating, $3. Admission $1, nonham family members free. Prizes, quality open kitchen. For information, contact Walt Zierenberg, WD2AAI, 344 Union Ave., Bloomingdale, NJ 07403, tel. 201-838-7565.

†New Jersey: The Sussex County Amateur Radio Club will hold SCARC '81 at the Sussex County Fair Grounds, Plains Rd. off Rte. 206, Augusta, on Saturday, Sept. 12, rain or shine, from 8 A.M. to 3 P.M. Registration $2, nonham family members free. Indoor tables: advance, $5; at the door, $6. Tailgating: a vance, $4; at the door, $5. Acres of tailgating spa (no electricity, bring tables). Large indoor selling ar tables provided, some electricity available. Parki refreshments, prizes. Talk-in on 90/30 and 52. For fo and reservations, contact Lloyd Buchhol WA2LHX, 10 Black Oak Dr., RD 1, Vernon, 07462, tel. 201-827-6062.

†North Carolina: The Shelby Radio Club will ho its Shelby Hamfest Sept. 5-6 at the Cleveland Cour Fairgrounds, 1/2 mile east of Shelby on business R 74. Enclosed dealer area, paved flea-market ar camping available on site with full hookups. Mot available. Food served on grounds, plus famo Shelby barbeque. Talk-in on 146.88 and 145.15. P registration is $3; at the gate, $4. For info and regist tion contact Dave Rose, WD4DJA, 1516 Knox D Shelby, NC 28150, tel. 704-487-5654.

†Ohio: The Warren Radio Assn. will hold its 24 annual hamfest on Aug. 16 at the KSU-Trumbl Campus, Rte. 45 (on the outer belt), Warren, from A.M. to 4 P.M. Advance tickets, $2.50; at the doo $3. Prizes, programs on Amateur Radio in general a DXpeditions. Breakfasts, lunch and snacks availab Talk-in on WARA repeater, 37/97, W8VTD. Info a reservations from Dave Walters, WB8VXX, 82 Anderson Ave., NE, Warren, OH 44484, t 216-356-1121.

†Ohio: The Union County Amateur Radio Cl will hold its hamfest Aug. 22-23 at the Union Coun Fairgrounds, Marysville, rain or shine. Advan tickets $2; at the door $3. Our flea market has be greatly expanded — plenty of room, indoors or ou No tables available. Prizes, food, overnight campi available. Talk-in on 99/39 or 52. For information dealer space contact Union County Amateur Rad Club, 13613 U.S. 36, Marysville, OH 43040, t 513-644-0468.

Oregon: The Willamette Valley DX Club will spo sor the 1981 Northwest DX Convention Aug. 8-9 the Greenwood Inn, Beaverton, just west of Portlan Speakers will include Carl and Martha, WA4ZNH a WB4FVU. Write P.O. Box 555, Portland, OR 9720 for convention information.

†Pennsylvania: The South Hills Brass Pounders Modulators 44th annual hamfest will be Aug. 2 from A.M. to 5 P.M. in West Mifflin, on the South Car pus of Allegheny Community College. Indoo facilities will house commercial dealers only, and on by advance reservation. Large outdoor flea market f all. Prizes, food, ATV demonstration, talks on MAR and other ham activities. Talk-in on 13/73 and 52. I fo and reservations from Andrew L. Pato, WA3PBI 1433 Schautfler Dr., W. Homestead, PA 15120, t 412-462-0350.

Pennsylvania: On Saturday, Aug. 29, the Tiog County Amateur Radio Club will hold its 5th annu hamfest at the Tioga County Fairgrounds just off Rt 6, between Wellsboro and Mansfield, from 8 A.M. 4 P.M. Free outdoor flea market, inside spa available. Food, prizes, demonstrations. Near Penn sylvania's Grand Canyon. Talk-in on 19/79 and 5 Registration $3. For more info write P.O. Box 5 Mansfield, PA 16933.

Rhode Island: On Sunday, Sept. 13, the Brist County Amateur Radio Association will hold its a nual indoor/outdoor flea market at the V.F.W. Ha in Tiverton, from 12 noon to 4 P.M. Flea-mark spaces are $6.50; admission is $1. Talk-in on 63/0 and 52. Prizes awarded. For maps send s.a.s.e. to An M. Carro, KA1DNB, 652 Old Colony Terr., Tiverto RI 02878.

†Texas: VHF '81 will be sponsored by the Aust Amateur Radio Club and the Austin Repeat Organization at the Hilton Inn, Austin, Aug. 14-1 Admission prior to Aug. 1, $5; afterwards, $6. ARR forum, technical sessions, swapfest, dealers display QCWA, SMIRK, QRP, SWOT meetings and mar prizes. Talk-in on 19/79. For tickets and general inf write to VHF '81, P.O. Box 13473, Capitol Statio Austin, TX 78711.

†West Virginia: Bluefield Hamfest '81, spunsore by the East River Amateur Radio Club, will be he Sunday, Aug. 23, from 9 A.M. to 4 P.M., at th Bluefield Armory Civic Center, 1 mile north Bluefield on U.S. 52. Admission $2 in advance, $3 the door; children under 12 free. Prizes, forums demonstrations, food, dealers, flea market. Table (dealers and flea market) $5; $4 each, 3 or more. Tal in on 144.89/145.49 and 52. General info and reserva tions write to Bluefield Hamfest '81, 2113 Hemloc Hill, Bluefield, WV 24701. Dealers and clubs onl Jim Perdue, tel. 304-325-3058.

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Coming Conventions

August 1-2
N. Florida Section, Jacksonville

August 15-16
Alabama State, Huntsville

August 23
Illinois State, St. Charles

September 18-20
Dakota Division, Rochester, Minnesota

September 26-27
Great Lakes Division, Louisville, Kentucky

September 26-27
Roanoke Division, Virginia Beach, Virginia

October 2-4
South Florida Section, Clearwater

October 2-4
Texas State, Houston

October 3-4
Midwest Division, Salina, Kansas

October 9-11
Southwestern Division, Scottsdale, Arizona

October 10-11
Delta Division, Memphis, Tennessee

October 17-18
Louisiana State, Kenner

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

ALABAMA STATE CONVENTION

August 15-16, 1981, Huntsville

The Alabama State Convention/Huntsville Hamfest (formerly the North Alabama Hamfest) will be held Saturday and Sunday, August 15-16. All events and activities will be in the Von Braun Civic Center Exhibit Hall. The hamfest is open to the public from 10 A.M. to 5 P.M. on Saturday and 9 A.M. till closing on Sunday. There will be many commercial exhibits and a large, indoor flea market. Prizes will be awarded both Saturday and Sunday. Two concession areas will be available inside the exhibit hall, and several groups will have hospitality rooms.

DX, computer and other technical forums are planned; meetings for the QCWA, MARS and female hams will be held. There will be an ARRL forum with SE Division Director Frank Butler, W4RH, and representatives from League Hq. Activities for nonhams are also scheduled, and tours of the Alabama Space and Rocket Center are available for the entire family. Big Spring Park is adjacent to the VBCC, and Point Mallard receation area is located in nearby Decatur.

There is no hamfest admission charge for the public, though parking in the VBCC garage and lots will cost $1. Flea-market tables will cost $3/day. Motel reservations may be made through the Huntsville Hilton, tel. 800-241-5838. Talk-in will be on 3.965 and 34/94. For more information, write: Huntsville Hamfest, Box 4563, Huntsville, AL 35802.

ILLINOIS STATE CONVENTION

August 23, 1981, St. Charles

This year, the Fox River Radio League will host the Illinois Convention in conjunction with its annual hamfest — one of the oldest in the state with a history dating back to 1929. The combined event will be at the Kane County Fairgrounds, with most of the activities in the main exhibition hall. FRRL members have a reputation for holding one of the best-run and friendliest hamfests in the Chicago area, and this year should be no exception.

Convention activities planned are forums on DX, antennas and ARRL operations. Specialized-communications-mode demonstrations are scheduled along with three contests: cw copying, estimating antenna wavelengths and a "black-box" (figure out the circuit inside) competition.

Advance tickets are still only $1.50 and $2 at the gate. For tickets, send an s.a.s.e. to Jerry Frieders, W9ZGP, at 1501 Molitor Rd., Aurora, IL 60505. Commercial exhibitors contact Mike Pittard, KA9EVT, tel. 312-896-7383. Talk-in frequency will be 146.940 simplex. QST

Moved and Seconded...

(continued from page 60)

K4ESQ, for financial support for this and other cases involving height ordinances. The Committee decided that this was not a precedent-setting case and therefore did not meet the League's guidelines for financial assistance. The General Counsel was directed to contact Mr. Jaeger and explain that at the present time this was not the type of case that justifies the expenditure of membership money. (F) The Committee next reviewed the case of Mr. Charles M. Guschke, N5SW, who has a problem with a restrictive height ordinance. General Counsel Booth recommended that further information be obtained, which he will solicit for the September meeting of the Committee. (G) The Committee reviewed correspondence involving William Prichett, K2QXS, and his problems in a cooperative apartment. The General Counsel had no recommendation to make, and no action was taken in this case.

The General Manager distributed copies, for the information of the Committee, of a planned August *QST* article, which discusses the rationale for a voluntary 160-meter band plan. The article emphasizes that the plan is voluntary, has not had Board approval and seeks membership input.

The Committee then proceeded to a review of correspondence that had been received from Albert Deines, W7VAZ, and Louis Huber, W7UU, regarding the settlement of the Mary Lewis case. The General Manager noted that he had not printed the minutes of the January 19, 1981, Executive Committee Meeting in *QST*, but that he would do so in an early issue. General Counsel Booth was directed to write Messers. Deines and Huber on behalf of the Executive Committee in order to answer as completely as permitted by the terms of the settlement agreement and to conclude, if possible, the exchange of correspondence.

The Committee reviewed the text of the informational pamphlet for director candidates. A number of editorial suggestions were submitted, which the General Manager will incorporate in the version to be printed.

On motion of Mr. Stevens, in light of the recommendations of our Connecticut Corporate Counsel, the General Manager was directed, by unanimous vote of the Committee, not to enforce the requirement adopted at the September meeting of the Board that each candidate for director execute a covenant not to sue. The Board will be asked to consider this item again at its March meeting.

After discussion, on motion of Mr. Stevens, the General Manager was authorized to accept Canadian renewals of membership at the pre-July-first dues rate until October 1, 1981, in order that the CRRL president may make a mailing to all Canadian members similar to that recently made to U.S. members.

The General Counsel reviewed a report received from the Personal Communications Foundation and its request for funding of $7000. Action on this request was held over until the September meeting.

AMSAT had requested a list of ARRL affiliated clubs in order to make a fund appeal based on an offering of T-shirts. The Committee declined to provide a list of clubs for this purpose.

The General Manager reported on his response to action items assigned at the March meeting. Action on 24 Minutes, out of 40 assigned, has been completed. Action has been completed on Minutes 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 34, 35, 36, 37, 72, 79, 86, 89, 93, 96, 103, 108. Action is in progress on Minutes 14, 15, 16, 32, 57, 67, 71, 77, 95, 97, 98, 100, 103, 104, 105, 120. By action of this meeting, action on Minute 92 is being held in abeyance.

Mr. Dannals announced that, for personal reasons, Vice Director Smithwick of the Pacific Division had tendered his resignation, and Mr. Dannals would appoint a successor promptly.

Mr. Zak presented to ARRL, on behalf of the Hudson Amateur Radio Council, a contribution of $1000. (Applause.)

General Counsel Booth reviewed the status of various legislative matters before the Congress, the status of a solar-powered repeater in El Paso and the suit of Lindberg vs. Paradise Valley (the city has refused to issue a court-ordered permit).

Director Holladay presented a revised convention application, changing the dates of the 1982 Southwestern Division Convention to June 4-6, 1982. On motion of Mr. Stevens, the Committee approved this change.

During the course of this meeting the Committee discussed, without formal action, the additional following matters: 1982 and 1984 conventions in the Hudson Division; the naming of special assistants to the Board; pre-Board meeting dinners and other arrangements; an appeal for funds from an Arizona amateur who had run afoul of the law; the lack of advertising in *QST* by Long's Electronics; the recent mailing to U.S. ARRL members and the current cash-flow situation; the appointment of a 900-MHz advisory committee; the Interference Task Force; possible changes in the modus operandi of the ARRL Board meetings; SPAR — the Society for the Protection of Amateur Radio; VUAC assignments.

During the course of the above the Committee was in recess from 10:10-10:30 A.M. and again from 12:05-1:01 P.M.

There being no further business, the meeting was adjourned at 3:59 P.M.

Respectfully submitted,

Richard L. Baldwin, W1RU
Secretary QST

Rules, September VHF QSO Party

There's till time to get ready for the last event of the vhf contest season. With the September VHF QSO Party we've come full cycle from the January VHF SS to the EME Competition, the June VHF QSO Party and the UHF Contest in August. If nothing else, September is the perfect time to get out and make those station and antenna improvements that you've been putting off all summer long with an eye toward boosting the club's aggregate score in the January SS. And what better way to check out those station/antenna mods than in a little friendly competition in the September VHF QSO Party? We can't promise fantastic September band conditions, but there should be enough activity to make your efforts worthwhile. Consider this your invitation to the September VHF QSO Party on the weekend of September 12-13.

A self-addressed, stamped envelope to ARRL will bring a set of official entry forms to your mailbox. Be sure to give the following rules a thorough reading. Good luck.

Rules

1) **Object:** To work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

2) **Contest period:** Begins 1900 UTC Saturday, Sept. 12, and ends at 0600 UTC, Monday, Sept. 14. Operate no more than 28 out of the 35 hours. Off-time must be in increments of 30 minutes or more. Listening time counts as operating time.

3) **Categories:**

(A) Single Operator.

(B) Multioperator. Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Name of section. Must be acknowledged by both operators for credit by either. A one-way exchange does not count.

5) **Scoring:**

(A) Score 1 point for 50 or 144 MHz QSOs; 2 points on 220 or 420 MHz; 3 points for higher uhf bands. Multiply the sum of these points by the total number of different ARRL sections plus different DXCC countries (*not* included in an ARRL section) worked *per band*. Note that KP4, KP2/KV4 and KG4 are in the West Indies section; KH6, KH2, etc. are in the Pacific section. Crossband QSOs do not count. Aeronautical mobile stations may not be counted for section multipliers.

(B) Stations may be worked once per band, regardless of mode. Example: W6XJ (San Diego) works A16V (San Joaquin Valley) on 50, 144 and 220 MHz. This gives W6XJ 4 points (1 + 1 + 2) and also three section multipliers. W6XJ may contact other SJV stations on these bands for contact points, but no additional section multipliers.

(C) Foreign stations may only work stations in ARRL sections, giving their country name in the exchange.

6) **FM restrictions:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted.

(B) Only these recognized simplex frequencies may be used: 144.90 to 145.10; 146.49, .52, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz. This restriction prohibits use of all repeater frequencies, including 146.76 and .94.

(C) Use of the national calling frequencies 146.52 and 223.50 MHz is restricted to 4 hours total operating time on each frequency, in increments not to exceed one hour each (mark clearly in log). An off period of at least 15 minutes must follow each operating period.

7) **Miscellaneous:**

(A) Fixed, portable or mobile operation under one call from one ARRL section only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest perio (with the exception of family stations wher more than one call is assigned to one locatio by FCC/DOC); one operator may not give ou contest QSOs using more than one call sig from any one location. The intent of this rule i to accommodate family members who mus share a rig, not to manufacture artificial con tacts.

(B) Only one signal per band (6, 2, 1-1/ etc.) at any given time is permitted.

(C) While no minimum distance is specifie for contacts, equipment should be capable o real communications (i.e., able to com municate over at least a mile).

(D) Multioperator stations may not includ QSOs with their own operators except on fre quencies higher than 2.3 GHz. Even then, complete, different station must exist for eac QSO made under these conditions.

(E) Above 300 GHz, contacts are permitte for contest credit only between license Amateurs of Technician class or higher usin coherent radiation on transmission (e.g., laser and employing at least one stage of electroni detection on receive.

8) **Reporting:** Entries must be postmarke no later than Oct. 5, 1981. Use ARRL VH QSO Party forms or a *reasonable* facsimile Note that *complete* QSO data including ca sign of the station worked, complete exchang (name of section), time in UTC, band and dat must be indicated for each and *every* QS claimed in your log for contest credit.

9) **Awards:**

(A) Top single-operator station in eac ARRL section.

(B) Top multioperator station in each sec tion from which three or more entries ar received or where exceptional effort has bee displayed.

10) **Disqualifications:** See January *QST* page 79.

ARRL April Midnight Special

Despite the relatively late (early?) hour of the April Midnight Special, activity was good and several stations managed to top the 100-QSO mark. This contest required a little more planning than the others because of the standard-to-daylight time change. I hope you didn't get up on Standard Time and find yourself an hour late for the beginning of the contest. (Hmmm, I thought the first hour was supposed to be on 40 cw . . .)

Morning had broken on the east coast by the end of the contest, and coast-to-coast communications might have been better if the event had started an hour or two earlier. It's interesting to note that less than an hour after the contest ended, a solar flare wiped out communications on the hf bands.

To answer a few questions, final score was the total number of QSOs. There was no multiplier, and you could have worked the same station once on 40 cw and once on 75 phone. All entries received by May 20 are listed below, and complete results were sent to all participants. Watch "Contest Corral" for news of the next Midnight Special. — *Mark Wilson, AA2Z*

Results, ARRL April Midnight Special

Call, Score, 40-M QSOs, 80-M QSOs, State		*Call, Score, 40-M QSOs, 80-M QSOs, State*	
KA1R	98-60-38-MA	N5HD	82-42-40-TX
W1ECH	96-54-42-CT	KG5U	79-52-27-TX
W1XX	95-47-46-CT	WD5EGK	59-23-36-TX
W1JP	53-20-33-MA	WBØMYS	49-0-49-LA
WB1FVO	41-23-18-CT	WA5IYX	30-0-30-TX
W1SE	41-18-23-CT	W5NR	29-29-0-TX
A82E	85-35-50-NJ	W3PC/5	16-0-16-NM
WA2YWP	57-22-35-NY	K6YK	101-55-46-CA
W2XW	47-21-26-NY	AA6DP	76-30-46-CA
WB2PWR	43-12-31-NY	N6NF	55-13-42-CA
K3CR (WD8PUH, op)	91-50-41-PA	W6YMH	36-18-18-CA
K3LHD	88-32-56-PA	K6LL/7	139-74-65-AZ
WB3JRU	73-28-45-MDC	K5MM/7	112-67-45-OR
KC3N	67-28-39-PA	K7NW	52-49-3-WA
WB6FHK/3	56-22-34-MDC	K7WA	47-35-12-WA
WA3NTJ	52-30-22-PA	WB8JBM (WB8DQP, op)	155-56-99-OH
K3IXD	45-0-45-MDC	K8DL	101-56-45-OH
W3TS	45-8-37-PA	K8SB (+ KE8X)	98-37-61-OH
W3CEI	20-20-0-PA	K9PW	124-54-70-IL
N4FS	108-49-59-VA	K9GDF	103-61-42-WI
NI4R	93-30-63-VA	ADØH	40-16-24-IL
WB5YMS/4	54-54-0-SC	KA9IHR	27-8-19-WI
N4UZ	36-27-9-GA	KØNW	82-41-41-CO
KI4Y	27-0-27-GA	WAØWWW	46-14-32-MN
N5JJ	149-86-63-TX	WAØDEL	34-17-17-MN
W5JW	145-79-66-NM	WDØGVY	28-13-15-IA
WD5BIK	124-72-52-TX	VE2QST (VE2BP, op)	25-17-8-PQ
N5GE	116-68-48-OK		

Public Service

Conducted By Robert J. Halprin,* K1XA

Planning in White Plains

On Thursday evening, April 9, 1981, an important meeting was held in White Plains, New York. This meeting was the culmination (actually the beginning) of the efforts of Dennis Baumgarte, KB2TM, who is the SEC for Eastern New York and an employee of the Indian Point Nuclear Power Project. ARRL illuminaries present included the Hudson Division Director and numerous ECs, SCMs, SECs, STMs and Net Managers from New York and New Jersey. Also attending were Charlie Jackson, vice president of Nuclear Power, Con Edison Electric Co.; Harvey Harth, four-county coordinator (Westchester, Rockland, Putnam and Orange counties) for evacuation planning; and a host of others.

The basic idea for the meeting was to ascertain the needs of Con Ed and the surrounding communities in the event of an emergency declaration at the power-generation site. Jackson gave a slide presentation that described the facility and explained the types of emergencies that might occur on site. He explained the definitions of the new Nuclear Regulatory Commission terminology and the communications gear available to Con Ed.

In general, Con Ed would notify the Westchester County Executive who would alert civil defense officials who, in turn, would take over the supervision and notification of the surrounding counties and coordinate their efforts. Con Ed has under construction a "hotline" Tel-Co-System and is building a large microwave relay facility to New York City to back up the expected failure (because of overload) of the existing landlines. That would be the extent of Con Ed's communications (site to county supervision and also to automatic radiation-monitoring devices).

After some discussion, Jackson agreed to allow amateurs to put a station and equipment on site *and* to notify the ham population at the same time other government agencies would be notified of a problem on site. This could be done automatically using the National Tone Alert System on one or more local repeaters.

Harth then began an explanation of how the local county supervisors would handle their communications. As it turns out, the fire and rescue companies have a fairly good system of intercommunications. The police and auxiliary police interfaces with Red Cross on the local level (town, city, village) are virtually nonexistent.

Staffing evacuation centers in Northern New Jersey, Connecticut, Western Massachusetts, Western New York and New York City/Long Island from the communications' standpoint, would be the responsibility of ham radio. This is the sort of thing our national agreement with the American Red Cross covers anyway.

The size of this evacuation is twofold. A 10-mile radius will cover over 250,000 people. This is the emergency population zone, requiring evacuation within six hours of an on-site emergency. The second area is 50 miles in radius and will cover over 10 million people. (There are four levels of emergency in the plan, and only the highest will require evacuation of people.)

After the formal meeting, we held an impromptu get-together to discuss what we had heard. It was quickly decided that strict NTS notification procedures would be followed. The local ARES/NTS organizations would get the first notification and in turn would activate the local 2-meter nets. The local Net Manager would notify the section-level Net Manager (who would activate the phone/cw/RTTY nets). The section Net Manager would notify the region Net Manager, and so on. Realistically, we would expect approximately a six-hour delay from the initial notification to the actual handling of welfare traffic outbound from the various evacuation centers.

The handling of welfare traffic from these centers will present problems for ARES/NTS if no coordinated plan is made to deal with the unusual circumstances. In the past, all, or at least most, welfare traffic (incoming and outgoing) involved the same area. Because of the movement of a large amount of people to the centers, lists of people and where they are located must be maintained. Coordination from League officials is important.

How to handle the large volume of welfare traffic and separate it from priority traffic between Red Cross officials and other governmental agencies is also a matter of careful consideration. We will begin shortly to develop a plan that could not only be used at the Indian Point Nuclear Power Plant, but also at any other similar disaster situations in our section. Stay tuned for further details. A trained, informed Amateur Radio community will be most important should we ever be called upon for assistance.

The Federal Emergency Management Agency (FEMA) and FCC have guidelines for developing emergency communications plans; these guidelines recommend that government and industry work closely with radio amateurs in emergency preparedness. If you would like more information on this, please contact Dennis Baumgarte, KB2TM, at 18 Mildred Ave., Poughkeepsie, NY 12603. Be sure to include a stamped, self-addressed envelope. Dennis would also like to hear from amateurs who work for other nuclear plants or who are employed in some capacity in the nuclear field. Please remember that the plan being developed by KB2TM and associates has not yet been approved by government agencies. — *Joe Krone, WA2SPL, ARRL section traffic manager, Eastern New York*

MARS ADDRESSES

Information on the Military Affiliate Radio System is available directly from the following:

Air Force MARS
Chief, U.S. Air Force MARS
HQ AFCS/DOYR
Scott AFB, IL 62225

Army MARS
Commander
U.S. Army Communications Command
ATTN: CC OPS OM
Fort Huachuca, AZ 85613

Navy MARS
Chief, Navy-Marine Corps MARS
Building 13
U.S. Naval Communications Unit
Washington, DC 20390

NATIONAL WEATHER ASSOCIATION AWARDS

The National Weather Association has announced its Award Program for 1981 and, as was the case last year, organizations and members of the Amateur Radio community may well qualify for recognition under two of the award categories. Those two categories are:

1) The greatest contribution to meteorological operations by an organization that is not directly a part of the professional meteorological community. This category could include organizations such as clubs, the Amateur Radio Emergency Service or Radio Amateur Civil Emergency Service groups, or nets that are distributing vital forecast information that results in prompt evacuation of people from an area where severe weather has been forecast.

2) The greatest contribution to meteorological operations by an individual who is not a member of the professional meteorological community. This could be an Amateur Radio operator who transmits observations to the National Weather Service during a hurricane or heavy rain from an area where there is a scarcity of data, or distributes warnings of severe weather to an area where normal communications are limited or have been disrupted.

Narrative nominations, with comments or endorsements as might be applicable, should be forwarded to: Mr. Edward J. Maree, Chairman, NWA Awards Committee, 25 Hillcrest Dr., Pembroke, MA 02359. Nominations should be received by the NWA committee prior to September 30, 1981. The presentation of award plaques and possible honorable mention certificates will be made at the National Weather Association's annual banquet. If you need additional information on this program, feel free to contact me by mail or phone (617-861-2552). — *Darell R. Whitehead, Member NWA Awards Committee, 11 Patterson Rd., Bedford, MA 01730*

*Assistant Communications Manager, ARRL

Don Welling, VE1WF, completing an evening's entertainment in the National Traffic System. Don is the section communications manager for Maritime/Newfoundland and is active at the section, region and area net levels of NTS.

THIRD-PARTY TRAFFIC AGREEMENTS

The United States has made special arrangements to permit U.S. amateurs to exchange third-party traffic *only* with amateurs licensed by these countries:

North America	Canada
	Costa Rica
	Cuba
	Dominican Republic
	El Salvador
	Guatemala
	Haiti
	Honduras
	Jamaica
	Mexico
	Nicaragua
	Panama
South America	Argentina
	Bolivia
	Brazil
	Chile
	Colombia
	Ecuador
	Guyana
	Paraguay
	Peru
	Trinidad and Tobago
	Uruguay
	Venezuela
Europe	4U1ITU
Asia	Israel
	Jordan
Africa	Ghana
	Liberia
	The Gambia
Oceania	None

Canada has made special arrangements to permit Canadian amateurs to exchange third-party traffic *only* with amateurs licensed by these countries:

North America	Costa Rica
	Dominican Republic
	El Salvador
	Guatemala
	Honduras
	Jamaica
	Mexico
	Nicaragua
	United States
	Haiti
South America	Bolivia
	Chile
	Colombia
	Guyana
	Paraguay
	Peru
	Trinidad and Tobago
	Uruguay
	Venezuela
Europe	None
Asia	Israel
Africa	None
Oceania	Australia.

ARRL SECTION EMERGENCY COORDINATOR REPORTS

For May, 37 SEC reports were received denoting a total ARES membership of 19,464. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, EBay, Ill, Ind, Kans, Ky, La, Me, Mich, Minn, Nebr, Nev, NH, NLI, NNJ, NTex, Ohio, Ont, SV, SCV, SDgo, SJV, SBar, Sask, SC, SFla, SNJ, Va, Wash, WMass, WPa, WVa and Wis.

NATIONAL TRAFFIC SYSTEM

We regret to report the passing of Lee Marshall, W4JK, a stalwart in the Fourth Region, the Eastern Area and the Transcontinental Corps. His tireless efforts on behalf of the system will be sorely missed.

W6MLF, KN6C and W6INH received RN6/c4 certificates. First-time BAN/c2 certificates were issued to K1GF, WB1CPF, WB1HIH, N1BHH, WB3GAU, WB3CAJ, K3JSZ, K4ZN, NJ4L, KA8CPS, WD8LRT, KB8MX, VE3KK and VE3HTL.

REPEATER LOG

According to reports received between May 21 and June 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures		Total
WR1ABW								1			1
K1FFK							1				1
W1PW								1			1
W1XJ							1	1			2
K1YFY							1				1
WR2ABG					2						2
WR2ADJ					2			2			4
WR2AGH								1			1
WR2AIS					1			3			4
WA2HWW								1			1
WB2NQV	1			2	2	1		1			7
WA2TTP								1			1
W2VL					2		2	1		2	7
WR3AEU					3	1					4
WR3AGI								1			1
N3AIA				1	5	1					7
W3CBW							1				1
W3CWC	3				5		5				13
W3EEK		1			1		4				6
WA3III							1				1
K3JSZ					2		5				7
K3PSP								2			2
W3UER				1	4	1		3			9
WA3ZXG	2				2		8				12
WR4ABN								1			1
WR4AVI								1			1
WR4AZD								1			1
WA4GIC								1			1
W4LBL		1		2	29	1					33
WB4NQH							1				1
KB4TZ								1			1
K4VYN					3						3
K4WRM							1				1
WR5AKZ	4	2			1						7
WB5RDD	3										3
VE5SS								2			2
WB5VFF	3				4						7
WR6AEN		2			14	1					17
WA6ATY							2	1			3
N6AUB	1				2			5			8
WR6AZO								2			2
N6BAE							1				1
WA6EUZ		1			13	1					15
WB6HUK								1			1
W6IYY					2		4	3	1		10
W6PVR				1	1	1	5	2			10
K6TZ		1			8		1				10
WA6WTT		1			3			1			5
WC7AAT					1			2			3
K7CC				2	4			1			7
K7DDI								1			1
W7WGW					3						3
WR8ADO		1					5				6
WR8AES					1		3	7			11
WR8ARB					3						3
W8NXD		1									1
WA8ULB					1						1
W9FUL	1							2			3
WR0ACD							1				1
WR0AEV							2	1			3
WR0AEZ	1										1
W0AIX	1										1
WR0AMX	64										64
WA0DKW							8				8
K0RAJ	1										1
WA0REX								1			1
TOTAL	85	11		9	124	8	2	61	55	3	294

May Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	877	28.3	.635	88.7	
CAN	31	747	24.1	.311	98.9	
PAN	55	546	10.3	.319	96.5	
Region Nets						
1RN	50	168	3.4	.255	53.0	96.8
2RN	52	254	4.1	.263	83.6	96.8
3RN	31	161	5.2	.304	97.6	48.4
4RN	62	639	10.3	.390	78.3	100.0
RN5	31	340	10.9	.288	88.3	100.0
RN6	86	386	4.5	.209	53.2	87.1
RN7	61	526	8.6	.555	98.4	83.9
8RN	54	209	3.9	.298	77.9	96.8
9RN	63	367	5.8	.245	100.0	100.0
TEN	62	288	4.6	.136	59.1	96.8
ECN						80.6
TWN	57	198	3.5	.270	57.7	87.1
TCC						
TCC Eastern	111[1]	504				
TCC Central	81[1]	383				
TCC Pacific	86[1]	217				
Cycle Four						
Area Nets						
EAN	31	1804	58.2	1.357	94.1	
CAN	31	899	29.0	.735	100.0	
PAN	31	998	32.2	.961	98.4	
Region Nets						
1RN	58	694	11.9	.550	91.6	90.3
2RN	93	692	7.4	.517	96.8	100.0
3RN	62	365	5.9	.553	96.8	90.3
4RN	56	724	12.9	.416	85.5	96.8
RN5	62	592	9.5	.429	88.7	100.0
RN6	62	607	9.8	.345	94.0	98.4
RN7	62	586	9.4	.802	100.0	100.0
8RN	53	448	8.4	.428	84.0	87.1
9RN	62	395	6.3	.341	96.0	100.0
TEN	62	311	5.0	.270	79.0	100.0
ECN	62	216	3.5	.356	75.3	100.0
TWN	61	463	7.6	.549	93.2	96.8
TCC						
TCC Eastern	95[1]	407				
TCC Central	85[1]	459				
TCC Pacific	120[1]	672				
Sections[2]	8580	32,127	3.7			
Summary	10,319	50,268	4.9			
Record	7655	46,469	18.4			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (290): ATN (AB), AENB AEND AENJ AENK AENM AENX (AL), ATEN HARC (AZ), BCEN (BC), NCN NCTN (CA), CN GWN HNN (CO), FAST FMSN FPON MEN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), CGVHF GVEN GCN GSN GSSBN GTFCN (GA), 75MPN IANEBPM ICN ITEN (IA), BSN CD FARM IMN MSN MTN (ID/MT), IEN ILN ILPN NCPN (IL), HVHFN IGN IPN ITN IWN QIN (IN), CSTN KPN KSBN KWN QKS (KS), 4ARES 5ARES 6ARES 11ARES BARES CARN KEN KNTN KPON KRN KSN KTN KYN MKPN PAEWTN PAWN TSTMN (KY), LAN LRN LTN (LA), EM2RI EMRI EMRIPN EMRISS HHTN NEEPN NENN RIEM2M WMBCEN WMFN WMN (MA/RI), APN (MR/NF), MAN MEPN MTN (MB), MDD MEPN WC2MN (MD), AEN BN CMEN MPSN MSN OCRN PTN SEN SPSN (ME), BR GLETN MACS MEN MITN MNN QMN SEMTN UPN WSSBN (MI), MNAMWXN MSN MSPN WRIN (MN), CMOEN MBN MEOW MOSSBN NEMOE (MO), CAEN GSEN MN MSBN MSN MSRACES MTN (MS), BR2MN CMA CN CNCTN CNN D6MSSBN FMTN JFK L2MN M2MEN NCARES NCSSBN P220 PCTN RARS S2MN SCNTN SCSSBN THEN TRN WSCEN (NC/SC), DATA (ND), CCTMN MNARES NCHN NE4Ø NE75 NMPN NQCN PARC2MN WNN (NE), GSPN NHN (NH), NJRTTY NJVN NWNJVN OBTTN UCETN (NJ), BC NMRRC SWN Y2MN (NM), NSN (NV), BAVHFTN BSN CDN CNYTN EPN HVN JCARCN NLIPN NYPON NYS NYSDN OARCN

OCTEN ONET SDN SLVARES STAR THIN WDN (NY), ALERT BNR BRTN CCOMF COARES FRCN HCARC LCNWOA MASER O6MN ONN OSN OSSBN RARA TATN TSRAC VWCEN (OH), ONON ONZ OTWN (OK), KTN LN OLN OPN OSND OSNE (ON), BSN LBLARES LCARES MPARES OARES OSN PDXARES PTTN SOARES WCN (OR), D3ARES D10ARES EPA EPAEPTN HARCTN NWPATMTN PFN PTTN WARCVTN WPA WPAPTN WPATMTN (PA), WQARES (PQ), PWXN SATN SPN (SK), TNCEN TNPN TNVHFN (TN), TEX TJM TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN WARC (VA), VTN (VT), EWTN IETN NTN NWSSBN PSTS SCARES WARTS WSN (WA), BEN BWN GBR NWTN WIN WNN WSBN XPO (WI), HN KFC2M WVARES WVDN WVFN WVN WVNN (WV), WCN (WY).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

K1XA received a TCC-E/c2 certificate.

1	2	3	4	5
Cycle Two				
Eastern Area	124	89.5	1008	504
Central Area	93	87.1	661	383
Pacific Area	124	69.4	430	217
Summary	341	82.0	2099	1104
Cycle Four				
TCC Eastern	125	76.0	1355	407
TCC Central	93	91.4	903	459
TCC Pacific	124	96.8	1349	672
Summary	342	88.1	3607	1538

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (May) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s CQB RQ XD ZOJ, WB2IQJ, K3JSZ, WB3GZU K4DHX, W4s JK SQQ, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s ATU CWA GOL. Central Area (W9JUJ, Director) — W4OGG, WD4HIF, K4VM, W5s CTZ KLV, KA5BSN, KB5s TC UL, WA5EQQ, WB5s NKC YDD, K5s BNH KJN, W9s HOT JIJ JUJ NXG, WB9WGD WDØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE N7RG, WA7GYQ, WB7TQF, WØs EJD HXB RE, WBØMTA, NØTU, WDØAIT, KØDJ, NØBDE. *Cycle Four* — Eastern Area (W4SQQ, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — K5GM W4ZJY, W5s RB SBE TFB, N5s BB BT RB TC, K5TL, W9s CXY DND NXG, K9BVE, WB9UYU, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW, W7s DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ TER, WØHXB, WDØAIT, VE7ZK.

Independent Nets (May 1981)

1	2	3	4
Amateur Radio Telegraph Society	31	568	326
Central Gulf Hurricane		184	2316
Clearing House	31	127	360
Early Bird	31	790	301
Empire Slow Speed	31	73	379
Hit and Bounce	31	422	502
IMRA	26	517	1032
Midwest RTTY		65	125
Mission Trail	31	215	1385
North American SSB	26	11	117
Southwest Traffic	29	72	1046
Washington Region Public Operations	22	28	319
20-Meter ISSB	26	602	787
75-Meter ISSB	31	386	988
7290 Traffic	48	579	2672

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll May 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

884
KA9CPA
249
WP4BDS
176
N1BHH
159
WD4COL
155
KA3T
KZ4K
154
WD8LRT
150
W9JUJ
141
KA1ON
W7VSE
134
NG4J
129
KA3CDQ
126
NP4F
WA4PFK
125
WB4FVV
123
AF8V
121
W7LNE
120
W2AHV
117
W4NFK
W2XD
116
W9YCV
114
WD4HIF
N8BJD
N4EDH
KU4W
N9BYK
113
WA4JDH
WB7DZX
WB1HIH
K4SCL
112
WB1CPF
N9AUG
WD6CSL
WD4AWN
111
WB5YDD
W4ANK
110
W5DTR
109
W2MTA
108
WA3PXA
WD4ALY
107
KA1FE
106
WA3WIY
WA7MEL
WA4STO
KT6A
105
WB2EAG
KE7I
KB5NX
104
K3CR
WØOYH
KA1BBI
W4WXH
KBØMB
VE3GOL
NJ4L
KA4LNA
103
KA2GSL
102
KA4ASZ
AA4FG
WA4CCK
W4NWM
KB3DT
AK1W
WA1TBY
101
K3JSZ
WD4CNR
K2VX
K8OZ
100
KB5TC
W5VMY
WA5RVT
WB4WYG
99
K7GXZ
WB8DIZ
98
KA2CTU
N1ARI
WB4AID
97
WD8IBY
W6NTN
N7AKX
WB3GZU
W9DM
96
KC5NN
KA1BJY
W7GHT
WB8JGW
95
KN6C
WA3NAZ
WD8RHU
W4GPL
94
WA4SRD
W4OGG
KF8J
93
W1EOF
WA4EIC
WB2OWO
WØOTF
W5HMR
WB3CAI
VE3DPO
WA2KOJ
VE1WF
W2GLH
AG9G
W7LRB
92
KA4GFU
KA4MZY
WD5JYI
N2APB
W8VPW
WB8MTD
K3JL
91
N5TC
W2YJR
N4BZH
90
W1RWG
K4EV
NB4L
89
WØFT
W7BS
KB4OZ
WDØAIT
WA5RKU
N5AMK
W4CKS
KA2BHR
88
WA2ZIP
87
WA3EOP
W4FMN
WA7LGN
86
N5BT
WB5UZS
WA4YIU
WB2MCO
KB2WI
WB7TQF
VE5WM
KK8L
85
W9NXG
KA8CPS
WD8KBW
WA7IHS
N2BNB
84
KØEZ
N9AEI
K5TL
WD4CNQ
WB8SIQ
83
KA1DZV
WA8HGH
W5JOV
N6AWH
AG2R
82
NN4D
N1NH
NP4D
N6GW
WB7OEX
81
KA9HPQ
W5VMP
WA2CUW
VE3OI
W5CTZ
WB9YPY
KC1G
80
K4IWW
KG5L
W6RNL
W7FJZ
W3VA
WB8YDZ
WB8SYA
N5RB
WB5UVX
AFØO
VE3GT
W5KLV
WDØAHV
79
KB4WT
WB5MMI
W9QLW
78
WB3HTU
WD8KFN
77
KAØE
WP4AOH
WA3EHD
WA7DPK
76
KA5CFP
KA3BMU
WBØHOX
75
WB9YPZ
KB8MX
KK5B
KA2CLQ
KA2ELB
W9IOH
74
N2BXB
W8GGX
W1TN
WA6LVO
K1BSO
73
VE5AE
WD5AAH
WB6QBZ
KG9B
N8BQK
72
N2CFF
KA5AVQ
KA7JEX
N4PL
71
N2BDW
KB2KW
KØSI
WD4JJK
WA4EYU
N4AXN
KA4ODX
KE8X
KS6T
WA2SEL
WB9JSR
69
VE3KK
N6ANL
N2BLX
VE5HG
K5PC
68
K3RZR
W8UE
W8EK
67
K6YD
WB3FDT
WB1GXZ
KCØT
WB2IDJ
VE2PJ
W7TGU
66
AA3B
KØPIZ
WD8PEI
KA9GBE
WB4TZR
N4UF
WA8GMT
65
AC3N
VE3BVG
WA8DHB
K4EJ
K1OSM
KC5FX
W4HON
64
WB2IXR
W7EP
KI2D
KB2GT
WA4ZPZ
63
VE5AAT
KA3DTE
W1TM
AJ5F
K4ZN
WA3WQP
K8DTG
N9AZI
N2BC
62
KP4DJ
W5SBE
KØJCF
WD9EVV
61
K4KDJ
W4ZJY
WA8PIM
WØOUD
AF2L
WB3FKP
W9JIJ
60
N6EDS
N3BKV
W9IEM
51
WA8JNQ/T
50
N5CRR/T
KA2GTE/T
KA5IWF/T
49
KA7GSP/T
48
KA4SAA/N
47
KA8DEZ/N
46
WD8PMW/T
42
KA4IKH/N
KA5AUR/N
KA5KRI/T

Brass Pounders League May 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N1BHH, WA2HSB, AB4J, VE1RO, W9NXG, WD8LRT, WØHXB, WB8DMF.

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	673	969	1371	74	3097
KA9CPA	40	978	173	825	2016
NØBQP	35	1060	207	644	1966
WØWYX	46	748	332	461	1623
W9JUJ	1	585	590	44	1220
WAØHJZ	31	544	41	483	1099
WA4JDH	0	507	463	12	1082
WP4BDS	259	191	378	178	1004
WB1CPF	398	160	433	9	1000
KCØAS	3	672	155	13	843
N1BHH	1	392	365	70	828
WB8UBR	1	398	410	0	809
W7DZX	4	388	373	4	769
NG4J	34	298	268	54	649
W7VSE	9	337	253	49	648
W3VR	231	201	191	14	647
W7SQT	5	380	1	260	646
WP4AOH	181	191	212	58	642
WB5YDD	6	303	270	52	631
WB7TQF	117	183	300	27	627
KA8IUK	0	304	304	2	610
NP4F	121	182	216	50	569
KT6A	2	255	256	17	530
N6ANL	8	251	259	0	518
KBØMB	120	149	203	46	518
N8XX	193	62	248	7	510
KA9EUY (Feb.)	0	6	495	6	507
Multioperator station:					
W4PAY	185	835	185	835	2040

BPL for 100 or more originations plus deliveries:

K8JE	424
K1BZD	138
W7TGU	133
K4TH	123
WD4COL	109
W2AET	106
WA8PIM (March)	111
VE4IX (April)	118
WD4SIG (March)	107
WD4SIG (April)	107
W1YNE (April)	143
Multioperator station:	
WD4IIO	191

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

VHF Contesting

Twenty years ago marked the high-water mark in vhf contesting with the receipt of 1561 logs in the 1961 VHF Sweepstakes. The June VHF QSO Party of that same year saw 558 logs submitted, again, numbers not to be duplicated since. In a world that is accustomed to seeing everything always get bigger and better, this is a bit strange.

But 1961 was a different era. John Kennedy was president. The Bay of Pigs dominated the news headlines. Alan Shepard and Yuri Gagarin were launched into space. And vhf contesting was presided over by the wary green eye of Gooney-boxes across the land. Contact totals were run up by working Novices on 2-meter phone. A-m was in. Heathkit lunchboxes were more numerous than locusts. But does that explain the subsequent decline in vhf contest participation?

The past three decades have seen many regulatory assignment changes that have affected participation in vhf activities. Originally, Technician class licensees were only authorized frequencies above 220 MHz. Six meters was added in 1955, followed by the middle half of 2 meters in 1959. During the late sixties and early seventies, Techs were precluded from operation in the cw segment, 50.0-50.1 MHz. It took nearly 10 years for the FCC to enact the League proposal to open up the entire 2-meter band for Techs. In 1968, Novices lost phone privileges on 2 meters, and in 1972 they lost all 2-meter privileges. The 50-watt power restriction on 420-450 MHz went by the boards in 1963. All such regulatory realignment has had an impact on vhf contest doings.

From briefkits to riceboxes, from a-m to fm, from halos to ringos, from crystals to synthesizers, the world above 50 MHz has evolved amidst a basically stagnant vhf contesting program. Two examples will illustrate this lack of attention.

Commencing with the 1971 contest, the hf November Sweepstakes simplified and shortened its contest exchange. The VHF Sweepstakes did not adopt a similar shortened format until three years later, 1974. Three years it took! With brevity of exchange being an enhancement to weak signal work on vhf, it would seem that greater regard to objectives was warranted.

Case two involves the perennial matter of "... fm, or not to fm. That is the question." Surely the use of fm in the vhf contests had become a known quantity well before the 1974 June QSO Party. Yet it was not until results appeared in the November issue of *QST* that year, that the call for input on the fm question was posed (congratulations to then Contest Advisory Chairman W1BGD, now W1RM, for soliciting input). I maintain that this indifference was another case of static contest rules skipping merrily along amidst a changing vhf world.

If my criticism seems too sharp, it's not that I feel we have done much better in more recent times. To the contrary, attempted solutions to perceived inadequacies of the vhf contests have been addressed by the repeated application of Band-Aids. The patient bleeds profusely from every orifice, and instead of asking, "Is there a doctor in the house?" we apply salve and send the poor soul back into battle for another run.

But the inadequacies are more basic than that. They lie within the very chromosomes. The genealogy of the vhf contests is that they are patterned after the hf contests. Although operation on 20-meter sideband bears no relation whatsoever to sporadic E on 50 MHz or tropo on 144 MHz, you couldn't prove it by the rules. If N6TR works two stations in West Virginia in the hf November Sweepstakes, there is no compelling reason to reward the second contact highly. But if N6NB/1 works two stations in West Virginia on 2 meters, the second contact is worthy of significant reward. Present rules discourage such QSOs. Vhf has its own special vagaries that compel a different set of objectives from those of hf. Thus, the format of the vhf contest program should satisfy those objectives.

But what are the objectives? And how should the rules be structured to meet them? These are questions that reveal that a mere superficial massage will not do. The Band-Aid box is empty. Rather, an all-encompassing review of the vhf contesting program, with all blinders removed, is called for. To be done by whom?

In advising on contest matters, the Contest Advisory Committee, in conjunction with the ARRL Awards Committee, has recognized the need for expert input. And so, "League Lines" in the May issue of *QST* put out the call for interested amateurs to serve on an ad hoc committee for vhf/uhf contesting. The response has been tremendous with about 40 amateurs of broad knowledge and experience in vhf operating volunteering to serve. This blue-ribbon panel will consist of about a dozen highly reputable vhf enthusiasts including liaison members to both the Contest and VHF/UHF Advisory Committees. While funding is not provided for in-person meetings, it is hoped that many committee members will be able to meet in Dayton in 1982. Regular business will be conducted by mail. The committee will be chaired by the communications manager to provide organizational and secretarial assistance. Although diverse geographical distribution of membership is sought, it is secondary to vhf expertise. Different from the advisory committees, ad hoc committee members will have no constituency as such. No honors or recognition will be forthcoming, only hard work in carrying out what is expected to be a heavy exchange of correspondence.

Meaningful deliberation is fostered by meaningful input — input from you, the vhf enthusiasts. As well as receiving your opinions (any letters addressed via Hq. to the Ad Hoc Committee for VHF/UHF Contesting will get full distribution), the Committee may very well be touching base with you periodically with its consensus on improving the overall vhf contest program. Two-way dialogue may thus be established. Since such exchange involves time, the Committee is not expected to discharge its task hastily.

With expert analysis fueled by broad membership input, the vhf operating program of the League can only improve. Start collecting your thoughts for committee consideration. And open up your receptors to what may be some novel concepts. In short, let's develop a comprehensive vhf contest program that will again enhance vhf operating activities to flourish as in years gone by.

SCM ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, September 4, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1981, and returns counted November 17, 1981. SCMs elected as a result of the above procedures will take office January 1, 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposi-

*Communications Manager, ARRL

tion, for a two-year term beginning January 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited in January *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

SCM ELECTION RESULTS

The following were elected for a two-year term of office beginning October 1, 1981. *Uncontested:* Colorado — Lawrence E. Steimel, WØACD; Georgia — Edmond J. Kosobucki, K4JNL; West Virginia — Karl S. Thompson, K8KT.

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 94. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

FREQUENCY MEASURING TEST

Reports of Doppler, and "less-than-ideal conditions" accompanied a number of the May 9 FMT reports. The umpire measured the transmitted frequencies for the early run at 14,051.285, 7002.196 and 3509.217 kHz. The late run checked out at 14,073.999 (rapid Doppler noted by the umpire), 7088.802 and 3531.203 kHz.

Of the 69 participants who submitted 1015 measurements, 60 measured within 100 Hz of the umpire, a requirement for OO "precise frequency measurement." They are as follows with average error preceding their calls: (0 Hz) K1KI WA4CAW W6CDF W6OQI W8CUJ; (1 Hz) K2RG WA3RXE WA4AXA W4IBU K5VRF W9TJ; (2 Hz) W1JH K1ME W1PLJ W2ND W2YTO W3WD K4CXX K5DL K5JV W5ZTN W6RQ W8OK WB8UPN WØKL WØUSL VE3FVU; (3 Hz) W4ANK N4NE K6ASK; (4 Hz) N4DC W6CBX; (5 Hz) W2SBI W4NTO; (7 Hz) W2AIQ KØMOZ; (8 Hz) W3KEK AJ5P K6MZN W9ZJS; (9 Hz) N6IN; (10 Hz) WØEJK; (11 Hz) W3FYK K6SUO DJØSG; (12 Hz) K9GDF; (13 Hz) W3BFF Park; (19 Hz) KE8X; (24 Hz) W3PLI; (26 Hz) KF5A K1BNQ; (28 Hz) WB1H1H; (31 Hz) W4QN; (33 Hz) K5FSA; (35 Hz) W4UCL; (41 Hz) W9TGN; (49 Hz) K2BEV; (51 Hz) AJ1E; (57 Hz) W3GVR. All entries over 100 Hz have been notified individually.

The next scheduled FMT will be September 13 (UTC). Your report must be received at ARRL no later than September 24 (be sure to double check your figures before they are mailed).

Excerpts

Output of the detector in TS-120S was fed back to VFO RIT, locking the rig to zero beat the incoming signal. LO and BFO signals were counted with a DSI-3550 counter. The phase-lock scheme also worked nicely for reception of a-m signals (K1ME). I used a Collins KWM-380 and Heathkit IB-1103 counter to measure these frequencies. Audio is measured through a 140-Hz filter at 2000 Hz above WWV, and the built-in error of the receiver is noted. During the FMT, the unknown frequency is tuned to give approximately 2000-Hz audio to the counter. The KWM-380's built-in error is then applied to the counter reading, and the result is subtracted from the dial reading of the receiver to give the exact frequency of the unknown signal. This is the simplest method I have heard of anyone using for the FMT. It appears to work very well and can be adapted easily to any receiver using digital techniques to establish dial resettability. This procedure works very well with receivers using digital mixers (must mix VFO, HFO and BFO) as presented in past issues of *QST* for the Collins and Drake receivers (K5JV). Equipment used: Heath counter (IB-101), BC-221 frequency meter, LM-7 frequency meter (used as audio generator), B&K Oscilloscope and Panasonic RF-2200 receiver. I used the BC-221 to beat against the incoming signal and measured the audio beat note with the scope in x-y mode with 500-Hz input from the LM-7. One hundred-kHz calibrator was fed to the LM-7, which was adjusted for a 500-Hz beat note. The frequency counter was used to measure the BC-221 output (AJ5P). — *Jeannie DeMaw, W1CKK*

OSCAR Operating Schedule

Date (UTC)	OSCAR 7 Orbit No.	Time (UTC) Hr Mn	EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	Mode	Time UTC Hr Mn	EQX W. Long. (Degrees)
1 Aug.	30,698	0137	104.8	17,360	J	0025	68.8
2 Aug.	30,710	0036	89.6	17,374	J	0029	70.0
3 Aug.	30,723	0131	103.2	17,388	A	0034	71.2
4 Aug.	30,735	0030	88.1	17,402	A + J	0039	72.3
5 Aug.	30,748	0124	101.7	17,416	X	0043	73.5
6 Aug.	30,760	0023	86.5	17,430	A	0048	74.7
7 Aug.	30,773	0118	100.1	17,444	A + J	0052	75.9
8 Aug.	30,785	0017	84.9	17,458	J	0157	77.0
9 Aug.	30,798	0111	98.5	17,472	J	0101	78.2
10 Aug.	30,810	0010	83.4	17,486	A	0106	79.4
11 Aug.	30,823	0105	97.0	17,500	A + J	0111	80.6
12 Aug.	30,835	0004	81.8	17,514	X	0115	81.7
13 Aug.	30,848	0058	95.4	17,528	A	0120	82.9
14 Aug.	30,861	0152	109.0	17,542	A + J	0124	84.1
15 Aug.	30,873	0052	93.8	17,556	J	0129	85.2
16 Aug.	30,886	0146	107.4	17,570	J	0133	86.4
17 Aug.	30,898	0045	92.2	17,584	A	0138	87.6
18 Aug.	30,911	0140	105.8	17,597	A + J	0043	88.8
19 Aug.	30,923	0039	90.7	17,611	X	0004	64.1
20 Aug.	30,936	0133	104.3	17,625	A	0008	65.3
21 Aug.	30,948	0032	89.1	17,639	A + J	0013	66.5
22 Aug.	30,961	0127	102.7	17,653	J	0018	67.6
23 Aug.	30,973	0026	87.5	17,667	J	0022	68.8
24 Aug.	30,986	0120	101.1	17,681	A	0027	70.0
25 Aug.	30,998	0019	86.0	17,695	A + J	0031	71.2
26 Aug.	31,011	0114	99.5	17,709	X	0036	72.3
27 Aug.	31,023	0013	84.4	17,723	A	0040	73.5
28 Aug.	31,036	0107	98.0	17,737	A + J	0045	74.7
29 Aug.	31,048	0007	82.8	17,751	J	0050	75.8
30 Aug.	31,061	0101	96.4	17,765	J	0154	77.0
31 Aug.	31,073	0000	81.3	17,779	A	0159	78.2
1 Sept.	31,086	0054	94.8	17,793	A + J	0103	79.3
2 Sept.	31,099	0149	108.4	17,807	X	0108	80.5
3 Sept.	31,111	0048	93.3	17,821	A	0112	81.7
4 Sept.	31,124	0142	106.8	17,835	A + J	0117	82.8
5 Sept.	31,136	0041	91.7	17,849	J	0121	84.0
6 Sept.	31,149	0136	105.3	17,863	J	0126	85.2
7 Sept.	31,161	0035	90.1	17,877	A	0130	86.3

Orbit predictions by Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7372° W. per orbit in a period of 114.9415 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1892 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesdays and Fridays — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL Hq.

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

AUGUST

1-2

Illinois QSO Party, July *QST*, page 84.

5

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z Aug. 6 (9 P.M. PDT Aug. 5). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify 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 s.a.s.e. will help expedite your award/endorsement.

8-9

ARRL UHF Contest, July *QST*, page 78.

European DX Contest, cw, July *QST*, page 84.

13

W1AW Qualifying Run, 10-35 wpm at 0200Z on Aug. 14 (10 P.M. EDT Aug. 13). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Aug. 5 listing for more details.

15-16

SARTG WW RTTY Contest, sponsored by the Scandinavian Amateur Radio Teletype Group. Three eight-hour periods: 0000-0800Z and 1600-2400Z Aug. 15 and 0800-1600Z Aug. 16, 80-10 meters. Single op or multiop, single transmitter. Exchange signal report and serial number. Count five points for QSOs with your own country, 10 points for different country and 15 points for different continent. U.S., Canadian and Australian call districts considered different countries. Same station may be worked on each band. W/VE/VK call areas plus DXCC countries count as multipliers. Score equals QSO points times sum of multipliers per band. Logs must contain band, date, time (UTC), call sign, exchanges sent and received, points, and multipliers. Use separate log for each band. Multiop stations must list all operators with call signs. Logs should be received no later than Oct. 10 by C. J. Jensen, OZ2CJ, P.O. Box 717, 8600 Silkeborg, Denmark.

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug. 15 until 0700Z Aug. 16, and from 1300Z Aug. 16 until 0200Z Aug. 17. Phone and cw. Suggested frequencies: phone — 1810 3900 7235 14,280 21,355 28,610 kHz and vhf; cw — 1810 3535 7035 14,035 21,100 28,100 kHz; Novice — 7135 21,105 28,105 kHz. Exchange serial number, signal report and ARRL section or country (county for NJ stations). NJ stations count one point per W/VE QSO, three points for DX. Multiply QSO points by number of ARRL sections worked (including NNJ SNJ). Stations not in NJ multiply NJ QSOs by NJ counties (max. 21) for final score. Mail entries so they are received by Sept. 12 (enclose large s.a.s.e. for results) to Englewood ARA, P.O. Box 528, Englewood, NJ 07631.

Rhode Island QSO Party, sponsored by East Bay Amateur Wireless Assn., from 1700Z Aug. 15 until 0500Z Aug. 16, and 1300Z Aug. 16 until 0100Z Aug. 17. Exchange signal report and QTH (city or town for RI stations; state, province or country for others). Count two points per phone QSO, three points per cw QSO. Novices count five points per QSO. RI stations multiply by number of states, provinces and countries worked. Others multiply by number of different RI cities and towns worked (max. 39). Suggested frequencies: phone — 3900 7260 14,300 21,360 28,600 50,110 14,200 fm simplex; cw — 1810 and 50 kHz from lower edge; Novice — 3710 7110 21,110 28,110. Club aggregate scores also earn awards (min. three entries). Mail by Sept. 15 (s.a.s.e. for results) to EBAWA, Box 392, Warren, RI 02885.

22-23

All Asian DX Contest, cw, June *QST*, page 82.

Ohio QSO Party, sponsored by the Cuyahoga Falls ARC, from 0000Z Aug. 22 until 2400Z Aug. 23. Exchange signal report and QTH (county for OH stations, ARRL section or country for others). 160-2 meters; 5 kHz up from bottom of each General-class portion, both phone and cw. Work stations once per band/mode. Count 2 points for each contact with an OH station, 10 points for each CFARC member and 25 points with club station W8VPV. OH stations count 5 points for out-of-state QSOs plus bonus points. Multiply by sum of OH counties (plus sections and DXCC countries for OH stations) worked per band. Logs must show date, time (UTC), band, mode, call sign and complete exchange. Dupe sheets for more than 300 contacts. Awards. Log deadline (s.a.s.e. for results) Sept. 21 to: Cuyahoga Falls ARC, Box 6, Cuyahoga Falls, OH 44222.

23

W1AW Qualifying Run, 10-35 wpm at 2000Z (4 P.M. EDT) Aug. 23. See Aug. 13 listing for more details.

29-30

Alabama QSO Party, sponsored by the Chattahoochee Valley ARC, from 0000Z Aug. 29 until 2400Z Aug. 30. Exchange signal report and QTH (county for AL stations; state, province or country for others). Frequencies: phone — 3965 7265 14,285 21,365 28,565 kHz; cw — 65 kHz up from bottom band edge; Novice — 25 up from bottom of Novice band. Work stations once per band/mode. Count one point per QSO. AL stations multiply by total number of states, provinces and countries worked; others multiply by total number of AL counties worked. Awards. Mail logs (enclose large s.a.s.e. for results) by Oct. 31 to: Johnny Royster, WA4VEK, P. O. Box 494, Fairfax, AL 36854.

Occupation Contest, sponsored by the Radio Assn. of Erie, from 1800Z Aug. 29 until 2400Z Aug. 30. Exchange signal report, occupation and QTH (state, province or country). Frequencies: cw — 50 kHz up from the bottom band edge; phone — 50 kHz down from the top band edge. Any amateur bands permissible; no repeater QSOs. Count one point per QSO. One multiplier point for each five stations with similar occupations, one multiplier for every three retirees worked. (Example: work 10 farmers and six retirees for four multiplier points.) Awards. Mail logs by Oct. 1 (enclose s.a.s.e. for results) to: Chris Robson, KB3A, 6950 Kreider Rd., Fairview, PA 16415.

SEPTEMBER

1

West Coast Qualifying Run, 10-35 wpm at 0400Z Sept. 2 (9 P.M. PDT Sept. 1). See Aug. 5 listing for details.

5-6

Four-Land QSO Party, sponsored by the Brightleaf ARC, from 1800Z Sept. 5 until 0600Z Sept. 6, and 1300Z Sept. 6 until 0100Z Sept. 7. Exchange signal report and state/province/country (fourth-call-area stations send state and county). Suggested frequencies: phone — 3940 7260 14,340 21,360 28,600; cw — 3575 7055 14,070 21,070 28,090; Novice — 10 kHz from lower end of Novice bands. Fourth-call-area stations multiply QSOs by sum of states/provinces/countries. Others count two points per QSO; multiply by sum of fourth-call-area counties plus states worked. Send s.a.s.e. for results. Mail entry within 30 days to Bob Knapp, W4OMW, 105 Dupont Circle, Greenville, NC 27834.

North American Sprint, sponsored by the National Contest Journal, from 0100Z until 0500Z Sept. 6. Single operator, cw, 80-40-20 meters only. Suggested frequencies: 3530-3550, 7030-7050, 14,030-14,050 kHz. Stations outside of North America work NA stations only. Stations may be worked once per band. Exchange his call, your call, serial number, your name, state (or VE province) or country. Proper logging requires the time for each QSO. Serial numbers start with 001 and must be consecutive. An operator may only use one call sign during the contest. Multiply total valid QSOs by the sum of states, VE provinces and other North American countries to get final score. USA and Canada don't count as countries. KH6 not counted as state or country. VE multipliers are Maritime (VE1, VO1, VO2) and VE2 through VE8. Non-North American countries do not count as multipliers. Special QSY rule: If any station solicits a call by sending CQ, QRZ? QRZ, etc, he is permitted to work only one station in response to that solicitation. He must then move at least 1 kHz before working another station, or at least 5 kHz before soliciting other calls. Team competition: Each team has a maximum of 10 members. To qualify as a team, the name, call sign of each operator and call sign of the station operated, should the operator be a guest at a station other than his own, must be registered with W6OAT. The team information may be contained in a letter, which must be received before the start of the Sprint, or be contained in a Western Union Mailgram dated at least 24 hours before the start of the Sprint. No distance/meeting requirements for a team entry. Entries should be mailed in time to reach W6OAT no later than Oct. 6. A complete entry consists of a summary sheet showing name, address, score computation, etc. and a log (including dupes marked as such with new multipliers numbered. Separate dupe sheets for each band. Send to Rusty Epps, W6OAT. 948-H Kiely Blvd., Santa Clara, CA 95051.

LZ DX Contest, sponsored by Bulgarian Federation of Radio Amateurs, 24-hour period Sept. 6, cw only. Single-operator all band and single band, and multioperator/club station categories. Exchange signal report and ITU zone. Avoid lower 10 kHz of each band, except only lower 5 kHz on 7 MHz. Count six points per LZ QSO, three points for QSOs on other continents and one point for QSOs on your own continent. Multiply total QSO points by sum of ITU zones worked per band for final score. Separate logs for each band. Mail by Oct. 7 to BFRA Contests, Box 830, Sofia 1000, Bulgaria.

9-11

YL Howdy Days, sponsored by the YLRL from 1800Z Sept. 9 until 1800Z Sept. 11. YL/XYL operators work YL/XYLs only. Exchange status (member or nonmember). Work each station once only, regardless of band or mode. Score two points for QSOs with YLRL members, one point for nonmembers. Log must show whether member or nonmember and be signed. Mail entry by Oct. 12 to Kay Eyman, WAØWOF, RR 2, Garnett, KS 66032.

12

ARRL Frequency Measuring Test, begins with a call-up at 0200 and 0500Z Sept. 13 (10 P.M. EDT Sept. 12 and 1 A.M. EDT Sept. 13). W1AW transmitters will be on the air simultaneously on 20, 40 and 80 meters for the duration of the test but, to correlate your readings with those of the umpire, measurements should be made during the specified periods. Approximate frequencies and measuring periods for the early run are 14,100 kHz between 0207 and 0212Z, 7120 kHz between 0215 and 0220Z, and 3520 kHz between 0223 and 0228Z. For the late run, 14,025 kHz between 0507 and 0512Z, 7000 kHz between 0515 and 0520Z, and 3535 kHz between 0523 and 0528Z. Submit your averages for each period to be compared with the umpire. Indicate how many readings you took to form your average. Your report must be received at ARRL Hq. by Sept. 24. W1AW will transmit official results in an ARRL bulletin beginning Sept. 26.

12-13

ARRL September VHF QSO Party, this issue, page 76.

European DX Contest, phone, July *QST*, page 84.

New Mexico QSO Party

Washington State QSO Party

Foxhunt Contest

15

W1AW Qualifying Run

19-20

CAN-AM Contest

College Scrimmage Contest

Scandinavian Activity Contest, cw

Maryland-District of Columbia QSO Party

26-27

Classic Radio Exchange

Delta QSO Party

Maine QSO Party

Scandinavian Activity Contest, phone.

*Assistant Communications Manager, ARR

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ ORS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SEC: E. Roy Ellis, VE6XC, ASCM: VE6AMM. STM: VE6ABC. NMs: (ATN) VE6ABC (APSN) VE6APO. Mitch Powell, VE3OT, Pres CRRL, paid a visit to NARC on 20 May. Our busy STM, VE6ABC, will just have to slow down since breaking his leg, but it won't be much if our guess is right. Would like to hear about all FD activities. The Three Hill ARC supplied communications for a walkathon. Red Deer area has a new auto patch repeater on 147.78/147.18. The call VE6RCO. Traffic: VE6CHK 63, VE6HO 36, VE6ABC 34, VE6BBL 33, VE6AFO 9, VE6QN 7, VE6XC 3, VE6YW 3.

BRITISH COLUMBIA: SCM, H. Ernie Savage, VE7FB — BCARPS Net 3755 kHz. They remained on standard time at 0200Z which has changed the number of check-ins, but has increased on time check-ins, so the net does not drag on past closing time. VE7QC, Net Manager, reports High 164 — Low 103 — Total 3004. Dogwood Chapter QCWA holds a breakfast at end of month and last breakfast saw 43 OM's and XYL's enjoying themselves. BCFM Group last meeting had an enjoyable talk by VE7All on Frequency "X." Greater Vancouver Communication Group has had a busy month supplying public service communications for the Hyack Festival. Traffic: VE7ZK 59, VE7FB 28, VE7BLO 22, VE7CCJ 9, VE7COA 6.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: VE4JP. SEC: VE4HK. STM: VE4RO. NMs: VE4s TE VJ NM ACX. Band conditions have been poor half the time in May. VE4JA is back from Saskatoon and we extend our sympathy to a loss in the family. Our congrats to VE4HK as our new SEC. We are sorry to lose VE4TR, but business pressures just wouldn't allow time. The CARF symposium was an interesting event and much has been suggested. MTN QNI 111, QTC 57, sess 19. MEPN QNI 775, QTC 19, sess 31. MMN QNI 379, QTC 24, sess 31. WRIN QNI 104, QTC nil, sess 5. Traffic: VE4PG 48, VE4UM 41, VE4TE 27, VE4ACX 23, VE4FK 18, VE4AAD 15, VE4CR 12, VE4ID 10, VE4EAD 7, VE4AAU 6, VE4LB 6, VE4NM 6, VE4AJE 4, VE4AAT 3, VE4JP 3, VE4ADS 2, VE4AFO 2, VE4JA 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — A/SCM: VO1FG. NM: VO1JN VE1WF. SEC: VE1EI. STM: Open. Hospital — VE1RF VE1MK VE1UX. Very successful seminar of NBASRA held in Fctn. May 23. Approx. 50 in attendance. LCARC held annual banquet, many in attendance. MAARC and EMO held exercise May 19. Involved simulated aircraft crash in Riverview area and EMO very satisfied with results. Interesting item on radio jamming in recent issue of HARC Bulletin. VE1KI repeater in Saint John was down for a short period, now back in operation. Silent Key VE1APG. APN 31 sessions, QNI 149, TFC 44, Time 348. Traffic: VE1WF 296, VE1XF 45, VE1LCR/RO 39, VO1AW 6, VE1BXA 4, VE1BPM 1.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI: VE3ISW has turned the management of the evening sessions of OSN to NTS stalwart VE3CYR. Our thanks to John and congrats to Den. The Burlington ARC has an informal breakfast club for members and guests as well as visiting amateurs every Saturday morning at Harvest Table Restaurant, Fairview Ave. in Burlington between 9 and 11 a.m. VE3QI addressed members of the London ARC on the NTS. VE3GFN and the OLN gang met at VE3BLW's farm for a head start on SET activities. DX report is being published by weekly by VE3FRA. The executive officers of the London ARC are: VE3JGT, pres.; VE3WM, 1st v.p.; VE3ADK, 2nd v.p.; VE3LDY, secy.; VE3JFD, treas. The ARES Emergency Plan for the City of London — Counties of Middlesex and Oxford is one of the most comprehensive I've seen. Through the efforts of the London ARC and the section's SEC, VE3GV, a great deal has been accomplished in this vital field. Agencies served include Red Cross, Salvation Army, local hospitals, police and fire depts, utilities, newspapers, radio-TV and REACT. Amateurs in communities interested in emergency communications through Amateur Radio would do well to contact VE3GV and discuss similar planning as a blueprint for their communities. Kingsmere Traffic Net registered with the NTS with VE3AJN as NM. Regretfully the following are Silent Keys: VE3FV and VE3VG. The Burlington ARC and VE3GFN, with the help of the Toronto FMCS, recently held successful communications assistance in bike-a-thons for the mentally retarded and the Variety Club of Ontario. The League's Annual Report — 1980 makes interesting reading. Ladies in Amateur Radio Day at the CNE in the Arts and Crafts Bldg. on August 25. VE3KHQ worked many special events stations at key locations during the launch and landing of Space Shuttle Columbia. Traffic: (May) VE3GOL 405, VE3QI 248, VE3KK 173, VE3GT 151, VE3GNW 108, VE3DPO 102, VE3CYR 47, VE3DVE 45, VE3GFN 45, VE3BVG 42, VE3FGU 40, VE3ISW 37, VE3BZB 35, VE3AJN 30, VE3WM 30, VE3LNN 24, VE3IXB 20, VE3KXB 20, VE3DUK 16, VE3AYZ 12, VE3EWD 11, VE3DZH 9, VE3KLX 8, VE3WG 5. (Apr.) VE3EFX 9.

QUEBEC: Harold Moreau, VE2BP — SEC: VE2DEA. NMs: VE2PJ VE2FSA. Repeater VE2RAU, 146.31/91, moved to new location on Montreal's West Island. VE2s AQU DFO and SH visited Eastern VHF/UHF conference at Roxboro Mass. All won prices in draw! VE2BDM is now VE2FW. Congrats to VE2AWE and VE2GAG who now are 'Advanced Amateur'. Bravo! A RAQI qui vient de faire la distribution du repertoire tres bien reussi. Avec regret, j'ai a vous annoncer le deces de OA4QJ, de qui nous conservons que de bons souvenirs. Traffic: (May) VE2PJ 124, VE2EC 40, VE2BP 34, VE2FFE 32, VE2EKC 28. (Apr.) VE2PJ 112, VE2FFE 26.

SASKATCHEWAN: SCM, W. C. "Bill" Munday, VE5WM — SK amateurs were busy with public service work during May. For the 20th consecutive year, the Moose Jaw ARC provided communications to the annual Kinsmen Band parade on May 16. Congrats to the MJARC for a most worthy achievement. The Regina ARA handled the communications for the Canadian Marathon Championship on May 16 and the Boy Scouts Beaver Day outing on May 30. Congrats to VE5OI on becoming net manager of the RARA 2-Meter Net and to VE5AE on receiving his DXCC award. Good luck and 73 are extended to VE5AAW VE5AEW VE4QI/5 and VE4AKI/5 on their move from VE5-land. They will be missed. Traffic: VE5KS 32, VE5HG 19, VE5WM 13, VE5UX 7, VE5AAT 6, VE5XS 5.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: WA3WIY 106, K3JL 92. Many thanks to WA3WIY for writing the last column while I was hospitalized. Congratulations to KA3AFC and KA3CFZ, new Generals; WB3JKA and KA3FYP, new Techs: KB3PD, ex A3BSM, Advanced; and Extra KC3G. More New Castle and Kent County stations still needed on DE nets. W3FEG is providing patches for DE based Maritime Mobiles. Will WB3FOC and WA3ZBI soon be /MM? First State ARC now meeting at the Washington St. YMCA and AWARE Club at Talley Ho, Naamans Rd. & 202. DTN: QNI 323, QTC 42; DEPN: QNI 66, QTC 14. April DEPN: QNI 46, QTC 8. Traffic: WA3WIY 78, N3AKC 70, W3QO 67, K3JL 54, WB3DUG 45, W3DKX 31, WB3FOC 26, N8NA 15, WA3ZBI 15, K3ZXP 6, W3WD 3.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ.

Net	Freq.	Time	QNI	QTC	Sess.	Mgr.
EPA	3610	7/10 P.M. Dy	524	268	58	AA3B
EPAEPTN	3917	6 P.M. Dy	415	130	31	WA3EHD
PFN	3958	5 P.M. M-S	241	288	26	WA3WQP
PTTN	3610	6:30 P.M. Dy	226	72	29	K3JSZ

OBS reports: AJ3R KA3FKD W3CL W3ID W3VA WB3CAI and WB3FVJ. OO reports: KC3B W3FAF and W3GVR. PSHR reports: K3JSZ WA3WQP W3VA AA3B WA3EHD N3BFL WB3FKP WB3HTW WB3CAI N3AZT WA3VIL W3YZW KA3EAQ K3QXC WB3FYT N3AIA KA3DZD and WA3TKU. Local and vhf nets reporting: D3ARES D10ARES HARCTN Luz Co ARES Mtg Co AREC and WARCVTN with a total QNI 367, QTC 32 in 29 sess. New appointments: W3YZW to DEC for District 6. I want to thank WA3YOE, now KB3QW, for the fine job he did as DEC for District 6. Good luck in your new QTH. EPAEPTN welcomes KB3JW N3KZ and WB3FFE. New gear: K3MW a KWM-380, AD3L a IC2AT. W3FAF a TS130V. WB3HUX an Azden and LC2AT. Upgrades: KA3AQF to Extra and waiting for new call sign. WB3FVJ to Advnaced and KA3FNO to Tech. Congrats gals. KA3AIY now N3CDE, KA3CBL now N3CDF, KA3ETS now KB3NQ, KA3FRK now N3CDK. New officers for Schuylkill Amateur Repeater Assn: W3EEK, pres.; WA3ZCJ, v.p.; WB3CRM, secy.; KA3AVN, treas.; K3SLJ, pr. K3JSZ would like to hear more new calls on PTTN. W3CL reports Pack Rats celebrated 25th anniversary on May 2nd and he was awarded the "Pack Rat of the Quarter Century" Award. WB3HTW sez new 500 ft long wire ant doing swell. W2HD was guest speaker at W3OI LVARC banquet May 30. WB3BOT sez new QTH just fine for antennas. K3MWA operating 2 fm from his motorcycle. WA3NUT/rpt new repeater on 147.87/27 in the Wilkes Barre area and operates from WBRE's tower. W3YZW reports area ARES members provided communications for Red Cross Disaster Drill. New officers for Hazleton ARC: WB3KNJ, pres.; K3PGI, v.p.; KA3CAS, secy.; KA3CAN, treas. W3ID and WA3CKA fighting bugs and mosquitoes instead of QRM, hi. KA3DZD reports D10ARES members participated in TMI Nuclear Disaster Drill. Congrats to KA3CAN for winning EPA Section in recent Novice Roundup. New officers for Warminster ARC: WB3DNI, pres.; KB3JW, v.p.; K3QXC, secy.; WB3KNU, treas. KA3EAQ reports his brother, KA3HJZ a new Novice, and now entire family licensed hams. W3FAF having lots of fun with new QRP rig. The gang from EPA wishes WA3VIL well with his new job with ARRL at Hq. WA3PZO showed slides of the Olympic Torch Run at recent Carbon ARC meeting. Traffic: K3JSZ 261, WA3WQP 257, W3IPX 148, W3VA 116, AA3B 114, WA3EHD 114, W3FAF 106, W3DP 97, N3CD 80, AJ3R 70, WB3FKP 68, K3EIP 63, WB3HTW 60, WA3OFD 51, W3ID 43, N3BFL 42, AD3X 39, WB3CAI 37, KA3FKD 35, W3ADE 24, N3AZT 24, K3ARR 18, W3CL 14, WA3VIL 13, W3YZW 10, KA3EAQ 9, WA3CKA 8, WB3FVJ 8, K3QXC 8, N3BMH 6, WB3FYT 6, N3AIA 4, KA3DZD 4, K3KW 2.

MARYLAND—DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — KA3BVI to Advanced. KD3G made it to Extra as did W8LXV. Congrats to you all. KA5BQF and dad, W8LXV, are being transferred to Denver. W3MSN is trying to catch a wild bird that sends a perfect CQ! and after 49 years of hamming is trying for DXCC. W3CVE the leader of WB3IVO has a new wagon. WB3LTA had a real weather emergency experience. W5NZ/3 has made it all the way to 440 MHz. KB3LV is a new OO. W3IK is dusting off the old measuring gear for renewed OO activity. KA3DXZ is QRL RACES. W3ZNW is looking for 2-meter RTTY activity. W3CDQ has 3 states to go for WAS/YL. K3HPG was active Armed Forces Day. WB3GEJ keeps the Washington County 2-Meter Net going. WB3BFK has a lot of MARS traffic. WA3EOP managed to QNI on cw a minimum of 30 times! W3DFW has had his vacation. KA3CDQ and WA6EES/3 are holding the fort in Upper Marlboro. W3LDD and W3HTB are chasing DX between net skeds. WA3VPL has found the MEPN. W3OYY longs for the return of snow. W3FZV celebrates 30 years a ham. W3HVS is enjoying OES drills in two counties. WB3GZU reports his trip to Germany was fabulous. W3DQI is getting new gear. N4DR/3 was suprised at his own totals. KA3T was busy helping W3PQ and WB3GZU with their chores. W3CYQ handled International Festival traffic. K3OMN has been busy with the ARES gang, and the Mt. ARC in the thick of public service. WA3AVL is being transferred to Maryland — welcome. KB3NL is taking it easy, and K3ORW is enjoying outdoor life. With the nets: Net/Manager Sessions/Traffic/QNI average. MEPN/WB3GZU 30/178/26.8. Topper W3HTB. Others KA3ARH WB3BFK W3FA W3GDU WA3IHW and W3LDD. MDD/W3PO/62/228/6.9. Tnx to KA3T for the May stats. WR PON/W3DFW 22/28/14.5. MDC PON/W3OYY 4/6/18. WC 2-Mtr Net/WB3GEJ 4/3/18. Tnx to K3KMO for MDD April 54/232 and 7.1. Don't forget WA3TAI is the Sec. Traffic: (May) KA3T 240, WB3GZU 217, WB3IVO 172, W3FA 164, KA3CDQ 114, WA3EOP 75, N4DR/3 62, W3FZV 56, W3CYQ 48, WB3BFK 44, W3DQI 25, W3HVS 10, W3LDD 10, WB3LTA 7, WA3VPL 4. (Apr.) WB3IVO 288, K3KMO 172, AK3X 4.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. As promised last month, here is a rundown on the Gloucester County Amateur Radio Club's 3rd annual hamfest, to be held at Gloucester County College on Sunday, Aug. 30 from 8 A.M. til 3 P.M. Admission is $2. in advance, $2.50 at the door. Indoor and outdoor selling spaces are $6 including one admission. Prizes will be awarded all day, and there will be plenty of contests, speakers and seminars. FCC exams will also be given, so bone up on the latest theory! For further information, directions or to order tickets contact the hamfest committee at 609-629-2064 evenings or by writing Box 370, Pitman 08071. Next month we'll highlight the Sept. SJRA hamfest. The month of May was a sad one for New Jersey Traffic handlers due to the passing of W2UEZ. He was an avid traffic man, the cream of the crop, and during his turns as manager of NJSN and NJN he did much to further the cause. He will always be remembered and sorely missed in New Jersey. In his memory and at the suggestion of AF2L, the W2UEZ Memorial Award will be presented each year at the nets picnic to a new traffic handler, one who shows interest, enthusiasm and the love for public service work. This year's award, the first, will be presented at the picnic in July to N2CER. During his brief career in traffic handling, N2CER has actively participated in all New Jersey nets and actively represented us in 2RN and EAN. Congrats and keep up the good work. Traffic: WA2ONW 208, KC2A 176, KA2GSL 143, WA2CUW 90, W2ZO 62, KA2GTE 41, N2CNR 30, WB2JCE 28, N2AEP 26, WB2LCC 25, KM2E 24, WA2HEB 20, N2CEO 15, WA2TWK 13, K2UL 11, WB2GFM 9, WA2PTQ 7, WA2GTJ 5.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV (Niagara), WB3CUF (Mohawk), WA2DHZ (Southern), WB2NAO (Northern). Appointments: (ORS) KA2s BHB CTU WA2HSB, (OES) WA2HSB, (OO) WB2MMB, (EC) WA2HSB, (DEC) WB3CUF, (NM) KI2D KA2CTU. BPL: W2AET.

Net	Freq.	Time/Dy	QNI	QSP	QND	Mgr.
NYSCN	3677	1000/Su	49	14	5	W2MTA
THIN	3913	1600/Su	60	—	5	WA2KOJ
NYPON*	3913	1700/Dy	496	219	31	K2KQC
NYSPTEN	3925	1800/Dy	659	83	31	AA2Y
ESS	3590	1800/Dy	379	73	31	W2WSS
OCTEN*	34/94	1815/Dy	336	74	31	WA2MFV
STAR/E*	325/925	1830/Dy	149	60	29	KI2D
Q NET	31/91	1830/Dy	447	2	31	KA2CMQ
BSN	93/33	1900/Dy	280	10	28	WA2DMK
NYS/E*	3677	1900/Dy	413	252	31	KA2CTU
OSWARES	75/15	1930/Su				KB2RK
JCARCN	10/70	2000/Dy	409	5	29	WA2WAX
WNYECN	3955	2000/3rd Su DEC/EC				W2BCH
OARCN	25/85	2015/We	75	0	4	K2VTT
SLVARES	31/91	2100/Su	30	0	4	WB2NAO
CNYTN*	90/30	2115/Dy	478	101	31	WA2PUU
WDN*	04/64	2130/Dy	851	154	31	N2APB
NYS/L*	3677	2200/Dy	773	559	31	KA3CTU
STAR/L*	325/925	2215/Dy	81	29	22	KI2D

*Part of NTS. (Apr.) OCTEN QNI 408, QSP 118, QND 30 PSHR: KA2s BHR CTU KB2GT KI2D N2s APB BLX BXB CFF W2s GLH MTA WA2s KOJ ZJP WB2s IDS OWO. OO: N2NW (7) KI2D (1). OVS: K2QR W2SEU worked VP9-8P6-C6 on six meters. W2ZOJ stepped down as NYS Manager after a splended year. WB2AZW turned over STAR to KI2D. STARC fest at Owego was big success: Rochester convention also, despite WX and G-men: Rome WX great and 1400 gate. K2IXN Rome Ham-of-the-Year. W2ODA went Silent Key. Mohawk Valley QCWA and Rome RC's loss. WA2UYH honcho General Clinton Canoe Regatta ways thanks to all. Good Golly, Goat Run, Hope Run, Milk Run, Census Run and many others with FB support around WNY. K2VV copied over 40 wpm in Second Annual W2RUF Memorial Code Contest at Rochester. K2MP recognized as Ham-of-the-Year. UNYREPCO nominees WA2FLX K2OC K2DLL KA2S W2ODC. Auburn ARA officers WB2MVX N2AYR WA2NGX WA2JIF. Seaway Valley Hamfest at Louisville Sept. 12. Hamburg Hamfest Sept. 19. Traffic nets picnic, Newark Valley, Aug. 8. WDN picnic Letchworth State Park Aug. 16. Syracuse RAGS Fest Oct. 3. Interested in an appointment? Contact your SCM. ECs still needed too. Have a great summer. Traffic: (May) W2MTA 310, WA2ELD 278, W2AET 228, KA2CTU 221, N2APB 217, W2FR 147, WB2IDS 125, WA2KOJ 109, W2GLH 106, KA2BHR 103, WB2OWO 79, N2CFF 74, N2BXB 65, WA2ZJP 60, WB2LJK 54, N2BLX 53, WB2NAO 52, KA2CLT 50, WB2QIX 50, KB2GT 49, KI2D 45, AF2K 42, W2TZ 34, KA2GOH 31, WA2MFU 28, WB2TXK 28, KG2D 26, WB2SGI 25, N2ARD 24, W2ZOJ 20, AF2A 16, WA2RXO 16, K2RN 15, KA2BHB 11, KA2DBD 10, KB2YU 9, WA2AIV 8, KA2HCB 7, K2VR 6. (Apr.) KB2YU 16. (Feb.) KA9EUQ 507.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — Asst SCM & STM: N3EE. SEC: AB3Q. DECs: WB3JDI & WB3EFQ. NMs: N3FM W3NEM W3MML & WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	31	390	200	3585	7:00 P.M. Dy
WPAPTN	31	553	137	3983	6:15 P.M. Dy
WPA2MTN	31	597	87	146.28/88	8:00 P.M. Dy
NWPA2MTN	30	388	10	146.04/64	9:00 P.M. Dy

I have two Silent Keys to announce: K3VAS and W3YBR. W3YBR was our rep at the office of the Pittsburgh Division of the American Red Cross and was active in getting equipment for the amateur station there. We extend our sorrow to their families. Horseshoe Radio Club News has been given an excellence award by ARNS and our congrats to WB3EFQ, editor. The WACOM ARS News has had an excellent series on constructing an RDF unit and it is well written. WB3HZM KA3FKK & WB3KNK upgraded to Advanced, congrats. AB3Q has rewritten the WPA Section Emergency Plan and it will be distributed to the DECs and ECs. Anyone interested may obtain a copy. Remember the ARES net after the

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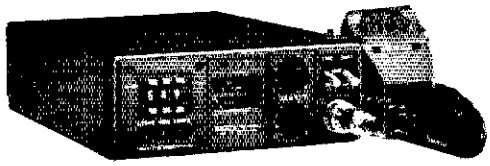

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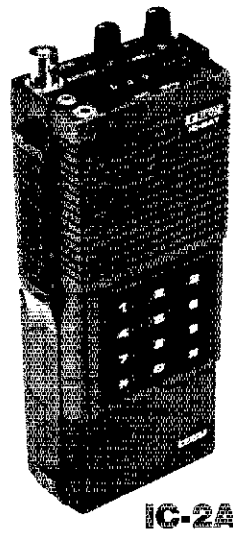

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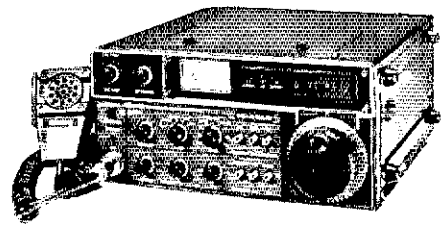

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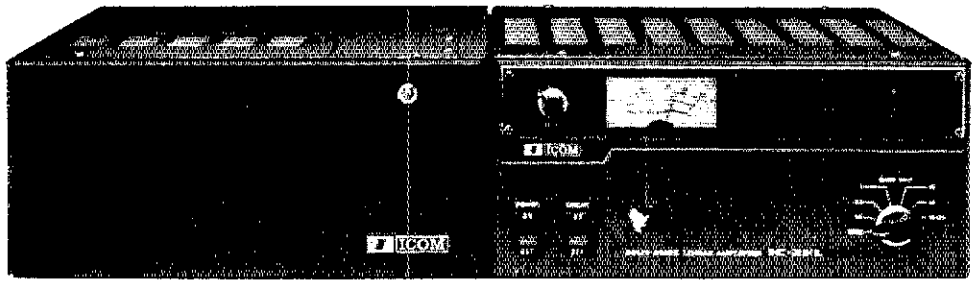

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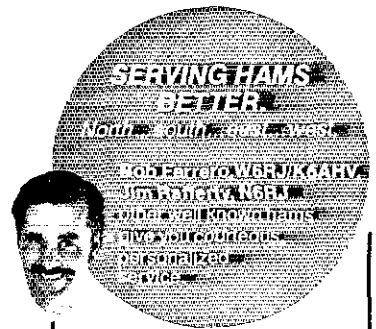

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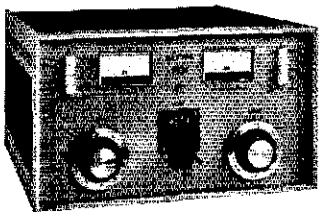

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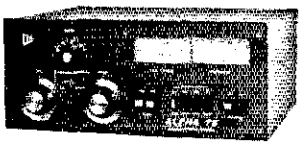

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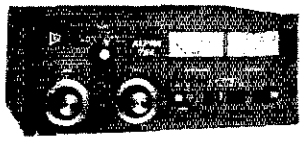

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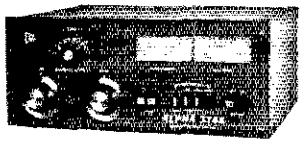

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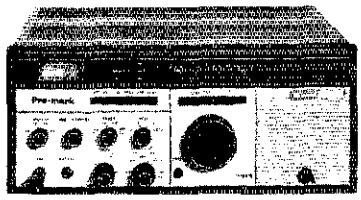

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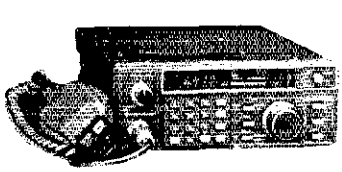

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WPAPTN on the second and last Mondays of the month. The SEC needs stations to monitor river conditions, rainfall and possible local conditions that could cause flash flooding. If you would be able, tell AB3Q our SEC. If your call has been changed please let me know. Traffic: (May) N3ADU 190, K3CR 166, N3FM 159, KB3DT 155, N3EE 116, WA3PXA 114, AC3N 75, KA3BMU 68, WA3QNT 65, N3BKV 53, WA3UNX 48, WB3GUK 38, WB3GXG 34, W3MML 32, K3SMB 31, K3HCT 30, WB3JGD 24, W3NGO 24, N3KB 22, W3KMZ 22, W3RUL 22, WB3KJH 21, WB3IAB 15, KA3DEH 13, WB3JDI 12, W3KUN 10, W3SMV 10, W3AS 9, KB3NY 9, W3SN 9, W3TF 9, W3TTN 8, K3VQV 6, KA3BGC 4, W3LOD 1. (Apr.) N3WS 44.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. Asst SCM: W9RYU.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0300 Dy	201	62
Ill Phone	3915	2130 Dy	97	31
NCPN	3915	1200/1700 Dy	134	67
IEN	3940	1400 Su	8	4

DRN9 100% stations W9NXG WD9FDB W9JIJ W9HOT WD9EVV. 9RND 100% stations K9BVE WD9EVV WD9FDB W9HOT W9JIJ W9NXG WB9WGD. Dan Hoover Memorial Net, W9VEY, 22/82, had a QTC of 8 during 4 sessions. The Dan Hoover Memorial Net was started after his death in 1976 to encourage Amateur Radio in the area between Springfield and East St. Louis. Shortly after WWII, W9VEY began teaching Amateur Radio to friends and they in turn taught others, giving Amateur Radio a shot-in-the-arm. Now, liaison is maintained with the Ill Phone Net and two weather nets, Centralia Wireless Association and Greenville Radio Club, use the Memorial Net. This is a fine example of cooperation between areas started by W9VEY. The Sterling-Rock Falls Amateur Radio Society celebrated their 25th anniversary in May. The S-RFARS also conducted a very successful Cerebral Palsy Walk-a-thon, by providing communications. W9IAD, a charter member of S-RFARS and a very civic minded individual, passed away during May. The McLean County ARES used the new equipment on the Central Illinois Amateur Radio Club repeater 34-94 during the Special Olympics and Recreations Marathon Run to provide communications for the May 30th event. Comments were received that the repeater out performed the commercial two-way radios they were using. Great job, W9EX. On the 3rd of May, a group from the Hamfesters Radio Club provided communications for the Lake Alexander Campground motorcycle enduro race, the sponsors and management were greatly appreciative of their efforts. Congratulations go to KA9EJJ for organizing the group and adding smoothness to the operation. WB9YJF reports that the Vermilion County, Illinois ESDA RACES station, WC9ABO, will be operating on 147.285 MHz simplex in the event of any natural/man made disaster using 250 watts ERP at 150 feet. WA9LRI is now N5CSU and is looking for contacts "back home in Illinois." The SARA Hamfest will be August 30th at John A. Logan College in Carterville. The 12th annual Danville Hamfest will be September 5 & 6th at the Georgetown Fairgrounds; talk-in on 22/82 and 52. Central Illinois was shocked to hear that W7OK of Los Vegas was a Silent Key. Knox County amateurs provided communications for the Bed Races in the Railroad Days Celebration held in Galesburg. W9TZN of Chicago became a Silent Key on March 22, he was a member of CRTA and a good frequency measuring expert. Traffic: W9NXE 375, W9HOT 346, WD9EVV 157, WB9JSR 155, KB9X 146, W9JIJ 120, W9OK 105, K9BVE 103, WB9QFO 71, W9OYL 52, WB9CEB 47, KN9BAM 44, W9TLH 43, W9LNO 42, WD9FDB 26, WB9WGD 22, W9KR 18, W9IZI 8, WB9EDP 7, KA9BYB 4, W9KSU 4, W9HPG 3, W9SSP 3, KA9EGW 2, WD9HZF 2, KD9L 2.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF

Net	Freq.	Time/UTC/Daily	QNI	QTC	Sess.
ITN	3910	1330/2300	2305	287	62
QIN	3656	1430/0100/0400	824	424	92
ICN	3708	0014	208	34	31
IPN	3910	2130	1050	168	31
IWN	3910	1315	1284		31

Hoosier VHF Nets report: QNI 4843, QTC 185, Bulletins 42, Time 7086 minutes for 22 nets. 9RN QNI: W9JUJ W9QLW W9EI WA9QCF K9WWJ KB9IT WD9GXW N9HZ N9AEI WB9UYU W9XD WB9VJE. QTC 396 in 1145 minutes. CAND QNI: W9JUJ K9CGS W9DLF W9QLW. QTC 747. D9RN QNI: K9CGS W9DLF W9JIJ WB9MIK W9QLW. QTC 367. Appts: STM W9JUJ; DEC for Posey, Pike, Vandenburg, Warrick, Spencer, Perry, Gibson, Dubois, Knox Davies, and Martin Counties WD9DVA; ECs-Clark County W9TDI, Fountain County K9FAR, Spencer County WA9AWG, Washington County KA9DOS, Warrick County WA4PXE, Vandenburg County WD9DVA. Indiana Radio Clubs by counties. Decatur, Floyd, Franklin, and Gibson none. Deleware: Muncie Area ARC KA9CXY, pres. Deleware ARA WD9IDQ, pres. Dubois: Patoka Valley ARL KE9F, pres. Dubois County ARES and RACES Club N9AHP, pres. Elkhart: Goshen ARC KB9OY, pres. Goshen College ARC WB9UXN, pres. Elkhart Repeater Group Trustee WB9VTZ. Elkhart Red Cross ARC AD9V, pres. Fayette: White Water Hills ARC WD9EQU, pres. Fountain: Fountain County ARC WD9FML, pres. Wabash and Erie Canal ARC K9FAR, pres. Fulton: Fulton County ARC W9AXK, pres. Thanks to HAMS Inc., there is a new repeater list out, contact K9LSB. Indiana Repeater Council officers are: WB9VTZ, chmn.; WB9QLA, vice chmn; WD9IZA, treas.; N9WB, freq. coord. The Council needs your support. May brought lots of rain but little Skywarn activity. WD8QBB reports new c.d. interest in Skywarn in Jefferson County. Congrats to WB9WDW, Clark County Amateur of the Year. Raft races, canoe races, boat races, marathons, walkathons, etc. Congrats to all who participated. Traffic: W9JUJ 1220, W9QLW 224, K9SFQ 191, WB9UYU 164, W9FC 141, W9EI 102, W9QYY 102, K9FZX 80, N9AEI 76, W9WKM 73, W9PMT 64, W9XD 60, K9DCX 51, W9DLF 50, W9IOH 44, K9WWJ 35, N9PS 32, KB9VD 30, W9URQ 19, WD9JAA 18, WA9OHX 16, WB9AWI 14, WA9KWH 14, WD9ART 12, N9CDQ 11, K9DIY 11, WA9OKK 11, N9ACG 10, W9BUQ 10, K9CGS 10, K9OUP 10, N9BJX 9, W9UEM 9, WB9YAY 9, W9QWI 8, N9CBC 7, WD9EXI 7, AJ9C 6, W9UPI 6, W9WEI 6, W9ZGC 6, WD9DWD 5, WA9JNC 5, N9AST 4, W9BDP 3, WD9CIV 3, W9EUP 3, W8LKU 3, WD9DIM 2, W9RTH 2, W9KMY 1.

WISCONSIN: SCM, Roy A. Pederson, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3985 1115Z QNI 994 QTC 1130 WB9YPY. BEN 3985 1700Z QNI 629 QTC 168 WB9ESM. WSBN 3985 2200Z QNI 1008 QTC 351

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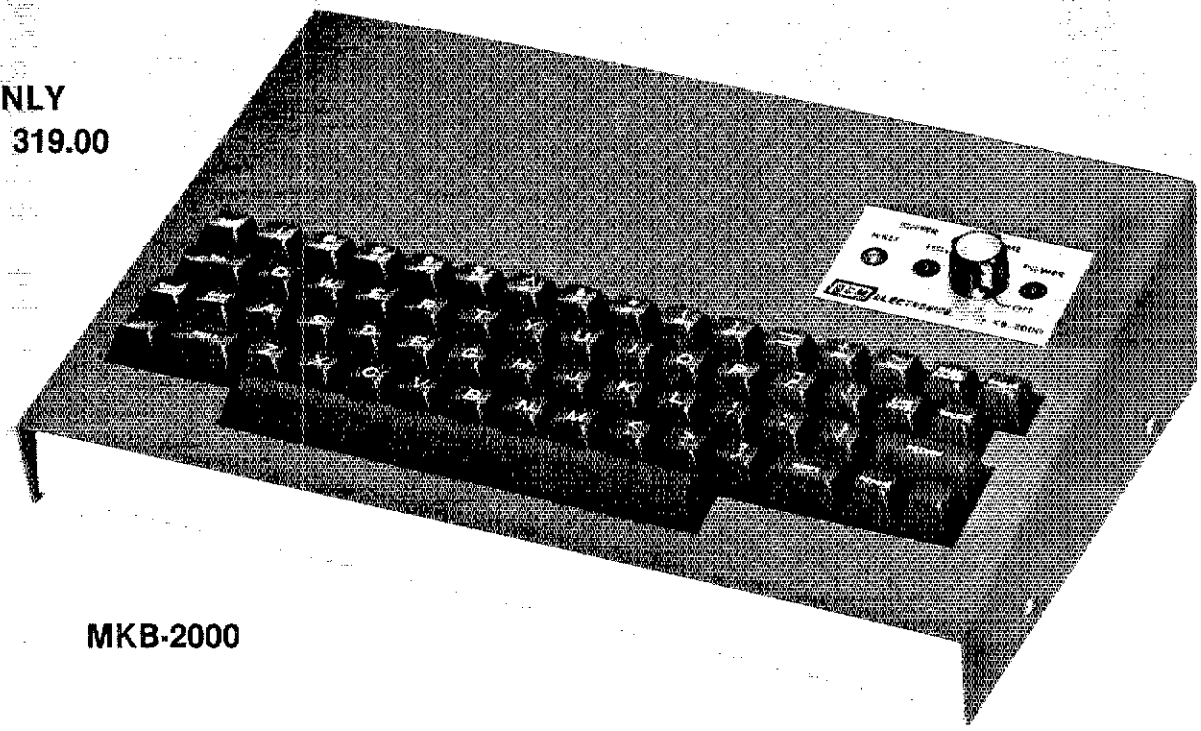

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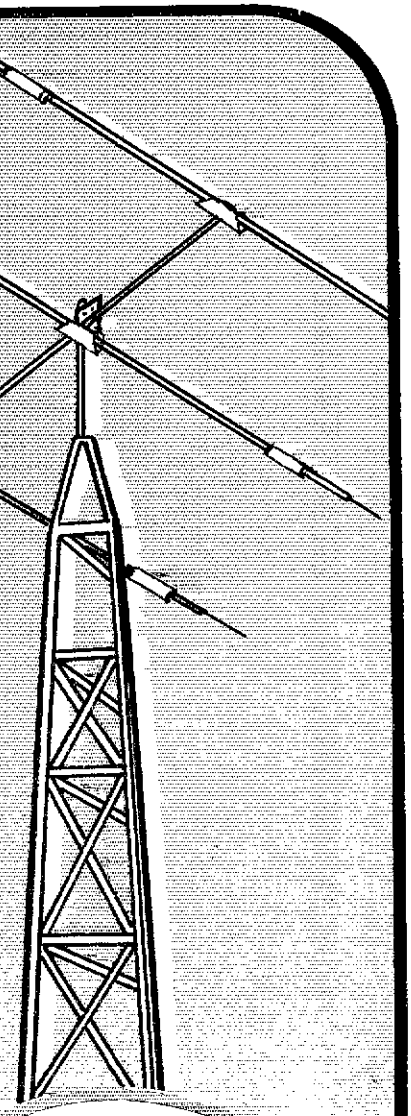
Hustler Tribander 3-TBA



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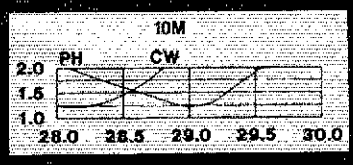
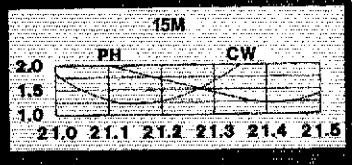
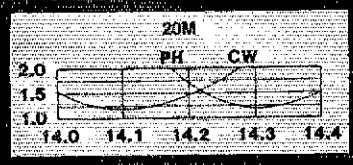
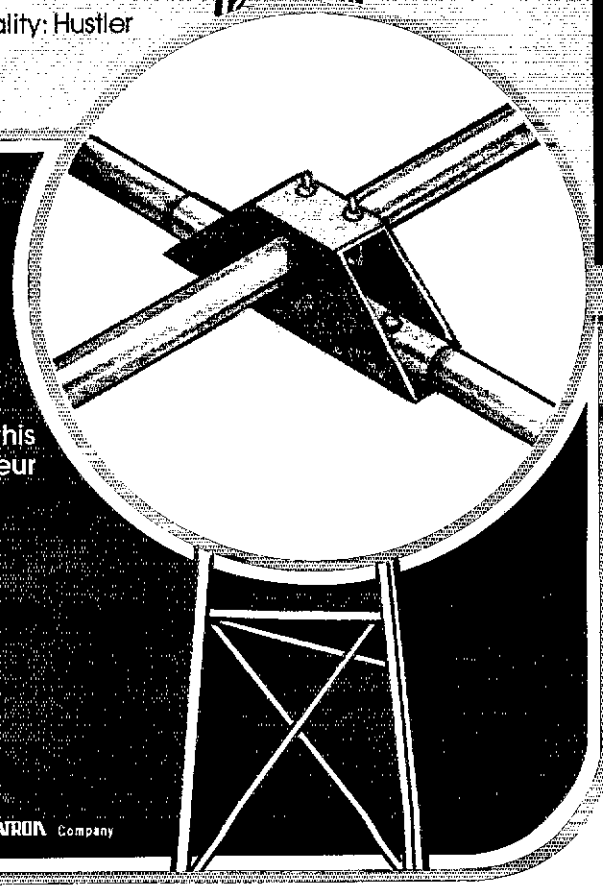
All in all, you can't surpass the Hustler 3-TBA for top triband quality: Hustler — still the standard of performance.









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WD9ESZ. WNN 3723 2300Z QNI 213 QTC 43 N9AUG. WSSN 3682 2330Z QNI 162 QTC 36 N9BYK. WIN-E 3662 0000Z QNI 304 QTC 101 W9YCV. WIN-L 3662 0300Z QNI 243 QTC 109 K9LGU. XPO 3925 1701Z QNI 352 QTC 32 WA9NIX. NWTN 3.41.94 2330Z QNI 532 QTC 34 WB9YPY. Gr. Bay 7.21.12 2330Z Wed. QNI 16 QTC 4 WB9NRK. WB9UMT now N9CDY. New Novices Madison: KA9KFF KA9KNR KA9KKZ KA9KSK KA9KUM KA9KUD KA9KTX KA9KTV. KA9GYD has General. New Generals Sheboygan area: KA9GMF KA9AZA KA9KFP. KA9HYQ KA9GSX have Techs. KA9JVI has General. WB9SLJ now N9CEE. W9CJE has Advanced. KA9ITI has Advanced. KA9EAI now N9CAS. KA9CPA made BPL. N9BAF has Island DX award. WD9HWY is QSL manager for CX1AS. K9UTQ has Extra. Congrats to Bill and Diane McGuire, they are the proud parents of Quinten Richard McGuire born May 30. Please note the little fellows initials are QRM. N9ATP has General. N9BYK has ORS. WD9AJA now KG9B. Please fellows and gals, send me tidbits and info for this column. Have a good summer. Traffic: (May) KA9CPA 2016, W9YCV 329, WB9YPY 275, W9CXY 245, WD9ESZ 228, N9AUG 212, N9AZI 155, K9FHI 153, AG9G 150, W9IEM 142, N9BYK 139, W9RH 139, WB9YPZ 131, WD9DHF 116, K9AKG 109, W9DND 92, KA9HPQ 89, W9UCL 78, W9DM 76, WB9ESM 62, K9GDF 62, K9JPS 57, WB9NRK 54, W9LDO 47, WA9WYS 44, WB9PKL 43, W9SO 43, KB9NG 39, KG9B 38, WD9FRI 37, K9LGU 36, WB9JSW 35, WA9YVC 35, N9BDL 34, W9FDY 34, W9UW 34, K9AO 32, WA9GGH 32, N9BCX 28, K9VSY 28, W9CJE 27, W9IHW 26, W9SQJ 26, K9UTQ 26, WA9ZTY 26, KA9EMF 25, WB9ABF 24, K9UU 23, K9HDF 20, W9KTG 20, WB9ICH 15, KA9GYD 14, KE9C 13, KB9FM 11, WB9FYK 11, KA9GBE 11, K9ANV 9, KA9IHR 7, KA9IKR 6, N9ATP 4. (Mar.) N9CP 24.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — STM: AFØO. SEC: KAØALF.

Net	Time	Freq.	QNI	QTC	Mgr.
MSN/1	2330Z	3685 kHz	198	70	AFØO
MSN/2	0300Z	3685 kHz	102	47	KØJCF
MSPN/N	1710Z	3945 kHz	532	53	WAØAIN
MSPN/E	2245Z	3929 kHz	840	225	KCØT
MNAMWXN	2315Z	3929 kHz	484	303/36	WDØCGM
MSSN	2215Z	3710			WBØWXU

With reluctance we say good-bye to WAØQIT, and thanks for a job well done. With enthusiasm we say hello to KAØALF who is the new SEC for Minnesota. WAØQIT felt it necessary to resign and KAØALF has promised to keep up the good work began some two years ago. If your county does not have an EC please contact KAØALF, Rt. 2 Box 297A, Forest Lake, MN 55025. We would like to see an EC in every county, be the county large or small. Our congrats go to KBØMB who cracked the BPL column for the first (but probably not the last) time this month. Not only did he make it for originations and deliveries, but also with more than 500 pieces of traffic. Keep up the good work. Recent upgrades: General to Extra (in one sitting) WØQMY; General to Advanced: KØZZT; Novice to General: KAØIAO; Novice to Tech: KAØKLY KAØKAR KAØKAT KAØKAO. Hope all of you have lots of fun hamming. The sympathies of the section go to the families of WAØDQD who was active on the Mora repeater, and WØEQJ who was an active member of Army MARS. Both became Silent Keys. After a wait of three months and one day, KBØMC became KJØR. KBØYI, formerly WBØGSY, didn't have to wait that long. Traffic: KBØMB 518, WAØTFC 282, WØDFX 143, WDØCGM 118, AFØO 110, KCØT 92, WBØHOX 85, KØJCF 64, WBØNZB 49, KØPIZ 48, KØCSE 39, WAØQIT 33, WAØAIN 29, N9CLS 14, WAØYVT 13, WØOPX 12, NØJP 11, WØRIO 11, NØBRC 8, KAØEPY 8, WBØLRK 8, WDØGUX 2.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: KJØS. Congratulations to Novice of Fargo, KAØLFH, 8 yr. old YL of KIØE and sister of KAØAPB. Other upgrades: KAØDNN to Adv. and WDØCLD to Ex. with new call KJØS. KAØFXC is now NØCMC. NØBQW is new elected pres. of the Minot ARC. We express our sincere sympathy to the family of WØRNS who became a SK on May 3. WDØDAF, WAØVGJ and WAØWRM went to the MARS conv. at the U.S. Naval Base, Great Lakes, IL and toured their radio station. Traffic: WAØRWM 52.

SOUTH DAKOTA: SCM, Erwin Heimbuck, KØOTZ — SEC: WAØTNM. NMs: WØHOJ WØWE WAØTNM. WBØFPK now NØCPY. NØCIL now KCØAV. NØCKG KAØIYA and WAØTTH all upgraded to Advanced. KAØDXO and KAØHJV upgraded to General. Congratulations! WØHOJ (Morning Net) QNI 328, 41 formal, 11 sessions. WØMZI Morning Net 375 check ins, 42 traffic, 12 sessions. W5ALV CAND, 747 msgs, 31 sessions. DTEN rep 96.8% SD stations WDØBMS WDØBMR. Traffic: KØAIE 132, WAØVRE 105, WØHOJ 64, WØMZI 56, WBØOMF 40, WØRWE 12.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC: K5TML. New Net Control, Razorback Net, KC5CE. Asst Net Control, N5ASP. Regret passing of WB5WWA. Our sympathies to his friends and family. W5POH resigned as Net Mgr, Ark Phone Net due to illness, after 8 years of service. Thanks. Net members requested to give SCM recommendations for new mgr. NWAARC set up a Field Day operation May 9 to promote Rogers Centennial. Blytheville Swapfest May 31 success. NWAARC Hamfest May 16 a success. New repeaters: N5CMA 147.75/.15, N.L.R., Central Ark DX Assn. 144.89/145.49 for DX info N.L.R., Ark DX Assn. ADXA, meets 0200Z Monday 3.815 to exchange DX info. W5QKZ & W5ACE have worked entire DXCC list, Congrats. 3.41.94 & .98/.36 L.R. & Malvern repeaters linked during severe WX Net. Traffic: WB5GQH 25, W5UAU 7.

LOUISIANA: SCM, Jim Giammanco, N5IB — Many thanks to WD5EAE, who is stepping down as manager of LSN. He did a fine job keeping the net strong and growing. Hurricane preparedness drills occurred all over LA during May. Twelve BRARC members helped to staff the state EOC. Welcome to W4MXA, who will be the new EC for Lafayette Parish. AARA is operating a Novice net on 28130 kHz at 9 P.M. each Tue. and Thurs. JARC reports that the New Orleans office of FCC will administer exams at the hamfest in October, time and place to be announced. Also at JARC, W5NVU described Amateur Radio as he observed it in the USSR last year. SELARC members K5EEB and N5AKG assisted the police and cd officials with comms during the Ponchatoula Strawberry Festival in April. N5AVV reports that the LCARC will operate from the Lake Charles EOC this Field Day. Don't forget that the Shreveport Hamfest is on tap this Aug. 22 and 23.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	241	131	K5TL
LTN	3910 kHz	8:30 P.M. Dy	238	53	N5EK

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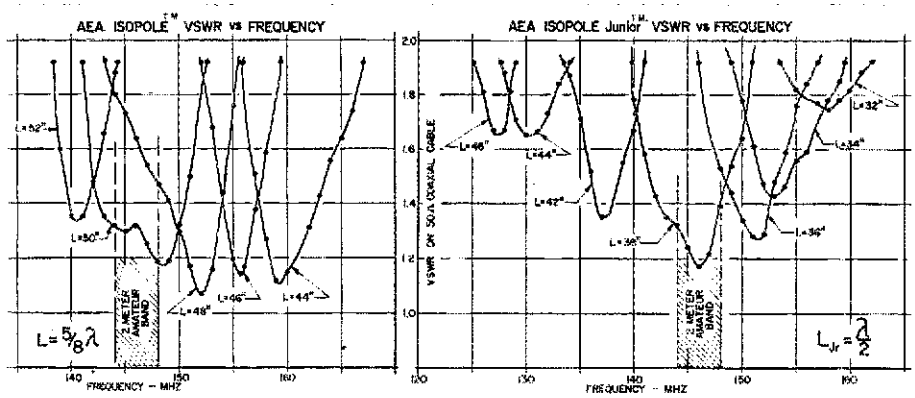

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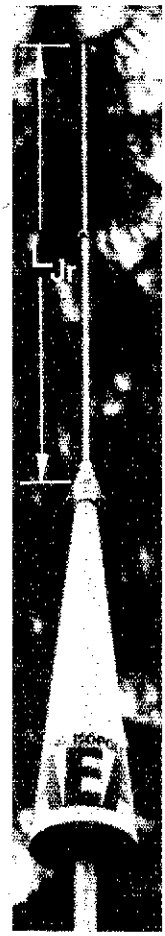

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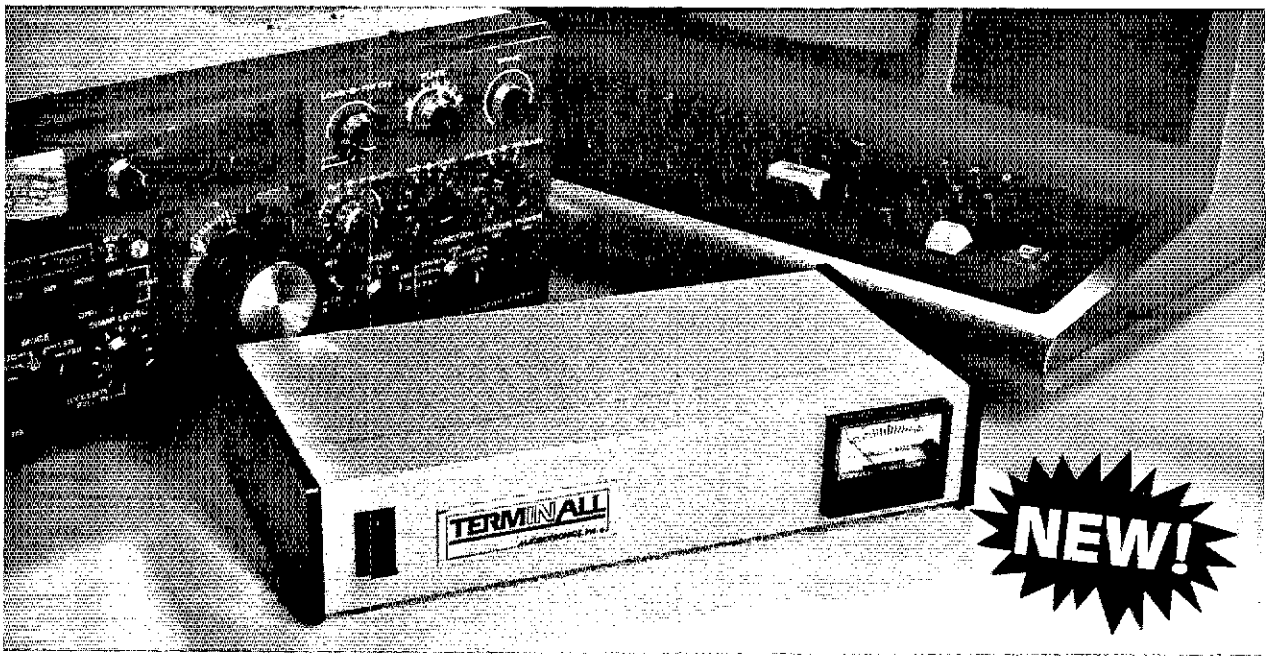

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TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code or radioteletype (RTTY). Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code - it's fully automatic - and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

More for your money

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost because separate terminal units usually cost at least $225 assembled, and most do not even have a crystal controlled AFSK. TERMINALL eliminates not only the higher cost of an external terminal unit, but also eliminates the hassle of interfacing to another piece of equipment.

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■ **Built in software backup** - set up the program parameters and messages the way you like to operate - then have the program save a new copy of itself on either cassette or disk!

■ **Software** supplied on both cassette and auto-run diskette at no additional cost.

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■ **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF application. A must on many VHF RTTY repeaters.

■ **Built in hardware clock** - one second readout maintains correct time even during cassette I/O. User programmable time/date format.

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LSN 3703 kHz 7:30 P.M. M-F
LRN 3987.5 kHz 6:30 P.M. Su 12 5 N5RB 8P W
LEN 3910 kHz 8:00 P.M. Su
Traffic: (May) K5TL 147, WB5UVX 101, N5RB 90, N5BFV 77, WD5GKP 49, KA5DLV 44, WD5FLM 36, W5VMY 27, WB5JZP 26, N5IB 24, K5WOD 10, N5ADF 7, WD5CWK 7, KA3BER 2. (Apr.) KA3BER 7.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. Skywarn group forming in Jackson and Harrison Counties. New repeater in Rolling Fork, 146.07/.67. Frequency Coordinator for state is WD5DCI, contact him for help in selecting new pairs. Good turnout for MSBN picnic at Ackerman. Tnx to WB5HAS WA5OKI KC5T & WD4LOL who assisted in locating a lady in Fla. thru the traffic system regarding the death of her father. CAND (W5KLV) sess 31, QTC 747. DRN5 rep 100% by MS sta N5AMK N5CIO W5EDT WA5OKI. DRN5 (WB5YOD) 31 sess, QTC 340. MSBN (WD5EYM) sess 31, QNI 2094, QTC 64. MN (WB5RMW) sess 31, QNI 538, QTC 11. MTN (K5OAF) sess 31, QNI 101, QTC 39. MSN (KA5GGG) sess 20, QNI 112, QTC 15. CAEN (KA5AGD) sess 4, QNI 98, QTC 4. GSEN (KB5W) sess 21, QNI 511, QTC 83. RACES (N5AMK) sess 4, QNI 210, QTC 1. Traffic: KB5W 426, N5AMK 297, K5OAF 107, W5EDT 44, WA5OKI 25, KA5GGG 15, WD5EYM 5, WB5HAS 2.

TENNESSEE: SCM, John C. Brown, WB4PRF — STM: K4YOL. SEC: W4NZW. As most of you know by this time Earl Leonard, KB4G, resigned as SCM Tennessee Section. John C. Brown, WB4PRF, has been appointed to serve the remainder of the term (31 Dec. 1981). K4YOL has been appointed as the STM when WB4PRF moved up as SCM. W4NZW will continue as SEC. W4CSY has been appointed evening phone net manager to replace K4YOL. Many reports of upgrading such as NM4W (WA4CGK) NN4D (KC4MW) to Extra class, KD4HQ (KA4HJD) WD4KTX WB4HQJ WB4GUW and many more going into the Advanced class ranks. Many more are getting their first ticket. Keep up the GOOD work. The Special Olympics were held in Nashville with W4CJY turning out some FB effort, sending out about 100 messages. Traffic Nets: CW — 54 sessions, QNI 696, QTC 241. Phone — 182 sessions, QNI 6330, QTC 828. CW Net Honor Roll: TNCW Net — W4WXH W4DDK WB4PRF and NG4J; TSN — KA4BSG NN4D N4DZW N4EAM N4EFB WA4IDN NG4J WD4KCW KY4L WA4LXP KA4OVE KA4PWU KA4RJC KA4RUE WB4YSN and W4ZJY. Congratulations for another fine month on cw activity. Net certificates were awarded to NM4W (WA4CGK) NN4D (KC4MW) and NG4J. Knoxville had a fine hamfest at the Bearden High School. Same place next year, so make plans as ARRL Convention is scheduled. Humboldt had another real fine hamfest this year, and no rain. Meet your SCM, STM and SEC at the next hamfest. Traffic: (May) NG4J 649, W4WXH 276, WB4BKF 189, W4ZJY 158, W4OGG 115, KY4L 65, W4MRD 55, W4DDK 43, WD4SGI 40, WD4NJR 37, KA4BSG 23, W4PFP 23, K4WOP 23, W4CSY 21, NM4W(WA4CGK) 16, W4TYV 15, W4EWR 14, K4YOL 13, NN4D(KC4MW) 10, W4PSN 10, WA4BWW 9, W4DPO 9, WA4GLS 8, W4NZW 6, W4RUW 6. (Apr.) K4YOL 18, W4NZW 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: N4EEL. Nets reporting:

Net	QNI	QTC	Net	QNI	QTC
KRN	538	37	MKPN	1033	92
KTN	1240	155	KNTN	398	138
KYN	241	119	KSN	197	48
KEN	109	4	KPON	66	4
8ARES	57	7	CARN	180	26
PAWN	339	39	TSTMN	443	37
4ARES	58	5	5ARES	69	3
6ARES	112	2	11ARES	10	0

New net managers: WA4IUW/KRN, WA4SWF/KEN. 11-ARES net mgr KB4OZ. WB4ARF now NN4H. Upgrades: W4NBD KA4OFC KA4NOG & KA4NKU. New Novice is KA4UEK. 10/70 in B.G. on RTTY. W4RHZ is QRL on OSCAR after DXCC with QRP. Lexington ARES fine job on Equestrian event. Louisville fest is Sept 26 & 27 and is Great Lakes Division Convention. New ORS appointments: KA4MZY KA4SAA KA4MBF. PSHR: KA4GFU KA4MZY KB4OZ KA4SAA/N KA4IKH/N. Traffic: WD4BSC 142, KA4MZY 112, WB4APC 104, KB4OZ 97, KA4GFU 81, KC4XM 73, KC4VB 61, KS4V 58, K4JLX 50, KZ4G 42, KC4WN 42, WA4EBN 41, WA4JTE 40, KA4SAA 37, WA4AGH 35, KA4IKH 32, WA4SWF 27, K4MHL 26, K4DZM 25, W4PKX 25, KA4MBF 22, WA4AVV 20, N4EEL 18, WD4CQF 17, KD4IF 16, WD4IYI 16, WB4AUN 12, WA4GAL 11, K4HQE 10, WA4UIV 10, WA4YPQ 10, NN4H 9, KA4NKU 8, WB4UQI 8, K4AVX 7, WD4CJQ 6, N4CAC 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. PFCs: KC8DN K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ K8ZJU.

Net	Freq.	Time/Day	QNI	Tic	Sess.	Mgr.
QMN*	3663	1800 Dy**	1098	396	93	WA8PIM
MITN*	3953	1900 Dy	706	355	31	WD8LRT
GLETN	3932	2100 Dy	1221	171	31	K8DTG
MACS*	3953*	1100 Dy	600	118	31	K8LNE
MNN*	3722	1730 Dy**	330	55	62	KA8DEZ
UPN*	3922	1700 Dy	629	39	36	WA8DHB
WSSBN	3935	1900 Dy	535	38	31	WB8SUR
8R	3930	1730 M/S	414	35	26	W8HIN
SEMTN*	146.64	2045 Dy	159	27	25	WA8RNB
MEN	3930	1730 Su	184	2	5	W8HIN
VHF Nets	11 rpts		704	41	47	WD8NKT

*NTS Nets. Times local. **QMN late net, 2200; MNN late net, 2000. 3932 kHz is MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. UP ARES Thur 3922 kHz, 1800. OO reports: K8JH K8NKB AC8Y W8QG KE8X. OBS reports: K8NKB AF8V. Silent Key, with deep regret: WA8BHQ. Upgrades: to Tech, KA8CDT KA8ECT KA8KDO KA8MRY; to General, WD8IBT WD8OEP; to Advanced, N8BNC WD8DJA W8HFS KA8HJK KA8KYR WD8IXZ WD8IYA WD8OSE WD8RMV WA8ZYB; to Extra, WA8FSN KA8GMJ WA8YWR. Callsign changes: WD8BKD to KC8BC; WB8HNB to KK8G; WD8IXX to KC8AS; WD8NXV to N8CUH; WD8SBJ to N8CRA. New EC for Menominee County is W8ECK. K8XL of Grandville reports that of a class of 28 Novices licensed recently, 23 already have upgraded to Tech or General. KA8MRY's upgrade to Tech came one day following receipt of her Novice ticket! Hearty congrats to all the upward movers. Van Buren EC, KI8Z, reports that ARES and Skywarn now have an Emergency Operating Center at the Bangor Fire Department with direct radio link to the sheriff's department. A reminder about the Great Lakes Division Con-

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Converts mid & super band cable channels for viewing on your TV set! No. 341AE047

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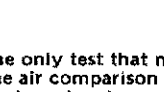

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Impossible to find at any price!

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IN STOCK – THE MURA CORDLESS TELEPHONE SYSTEM!

Answer & originate calls with this wireless phone system. 400 ft. range! Re-dialable! Last number recall! Paging features use your factory touch system! No. 341VA774

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Accuracy of 1 min./year up to 5 years operation on 1 alkaline "C" cell. Imported from West Germany. No. 341VA561

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13.8 volts nominal 12.5 volts full load. Easily handles ham station, marine radio, SSB linears up to 40W P.E.P. Brand new, factory sealed. 110 V.A.C. No. 341VA394

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Model TB5EM/4KWP

By the only test that means anything ... on the air comparison ... this array continues to outperform all competition ... and has for three decades. Here's why ... Telrex uses a unique trap design employing 20 HiQ 7500 V ceramic condensers per antenna. Telrex uses 3 optimum-spaced, optimum-tuned reflectors to provide maximum gain and true F/B Tri-Band performance.

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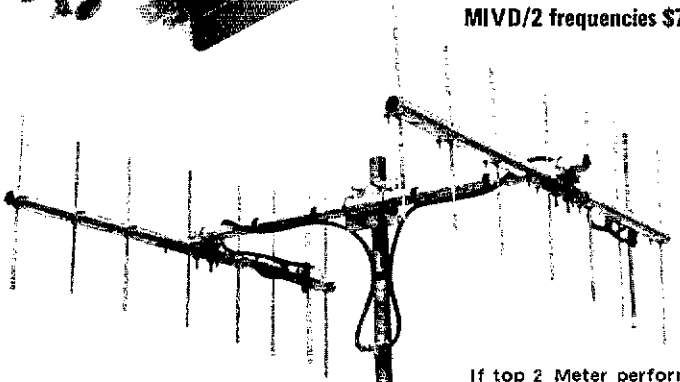

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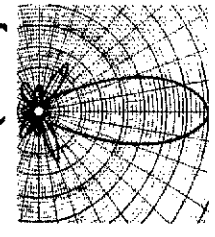

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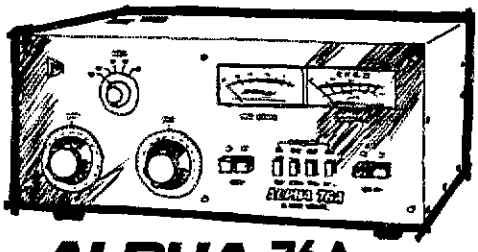

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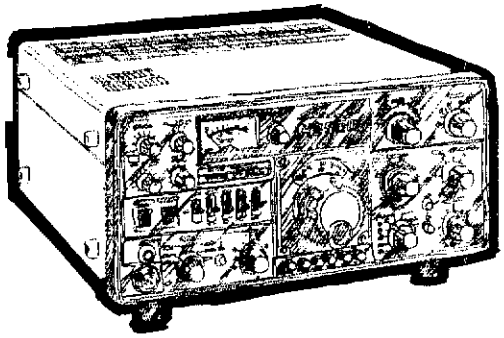

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With new audio peak and notch filter, optional FM.

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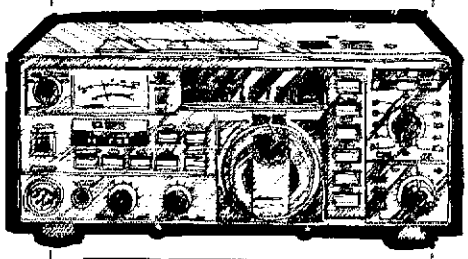
4W power, 4-modes scanning, Keyboard input with 10 memories



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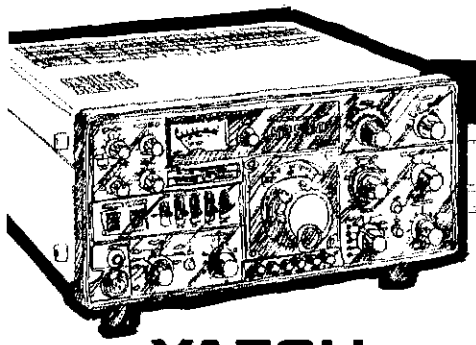

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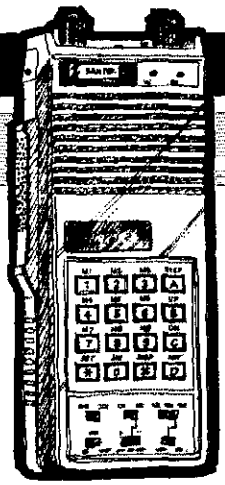

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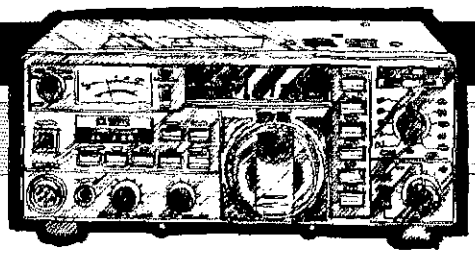
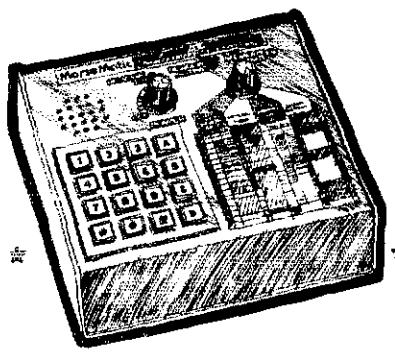


ICOM IC-730

Full feature HF transceiver, 200W PEP input, Dual VFO standard



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TEN-TEC

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546 Omni "C"	$1085.00
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255 Deluxe P.S. with speaker	$ 170.98

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ATV-5	$85.00
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HY-GAIN

TH6DXX	$237.00
TH5DX	$201.00
TH3MK3	$180.00
TH2MK3	$118.84
TH3JR	$137.00
105BA	$ 98.00
155BA	$150.00
205BA	$237.00
204BA	$188.00
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vention in Louisville, KY, September 26/27, in what is described as a fantastic facility. Yes, Michiganians, there is a Kentucky in the G.L. Division! A little closer to home, ARPSC workshops are scheduled for the U.P. Hamfest, Aug. 1, for Lansing on Aug. 22, and for Gaylord on Sept. 12. Everyone interested in public service communications is welcome and urged to attend. Traffic: AF8V 434, WA8PIM 352, WD8LRT 323, WB8MTD 287, KA8CPS 231, KB8MX 170, K8KMO 135, WB8YDZ 135, WB8ITT 105, WD8MJB 105, WA8DHB 101, WD8IBY 101, W8UE 90, N8BJD 78, K8DTG 71, W8IHX 70, WD8NKT 64, K8OCP 60, KA8AID 59, W8YIQ 53, W8CUP 52, KC8DC 42, K8GXV 42, W8RNQ 41, W8VPW 39, K8LNE 38, KA8DEZ 37, W8SCW 37, WD8RHU 34, WD8ROK 34, WD8EIB 32, W8JXJ 32, KE8X 32, WB8SYA 31, KK8G 29, WD8OSE 27, W8HIN 26, WB8YRY 26, W8VIZ 25, K8UPE 22, WB8TTA 20, W8JUP 19, WD8RWR 18, WD8BSE 15, KB8GT 15, WA8YBP 15, WA8TAQ 14, N8BNC 12, KA8IWW 12, KF8M 12, W8PDP 12, W8MOF 11, K8BZ 10, WB8DJS 10, KA8ECT 10, WB8HPZ 10, WB8YWA 10, K8ZJU 10, W8LDS 9, WD8RNQ 9, WA8AXF 8, W8TBP 8, WD8OEP 5, WA8VBF 5, WD8LIP 4, K8RV 3, KM8I 2, KI8Q 1.

OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: K8AAZ KF8J WB8JGW WD8QMP WB8YGW W8EK. Net reports:

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN	No rpt			6:45/10 P.M.	3.577
BNR	130	39	30	6 P.M.	3.605
ONN	81	11	20	6:30 P.M.	3.708
OSN	269	186	31	6:10 P.M.	3.577
OSSBN	1981	1735	93	10:30 A.M.	3.9725
O6MN	400	54	31	9:00 P.M.	50.160

As I sit here at the keyboard looking out at one of Cleveland's most perfect early June days, I'm reminded that by the time you read this Field Day will have come and gone. I hope you had one of the best ever. When this issue arrives, I hope that SET planning is well underway. ECs and Net Managers should have reasonably firm ideas about their planned simulations, and know which agencies will cooperate. Also, each EC should have some useful estimates of the number of amateurs needed. This year I hope we can put more intra-section traffic through the cw and RTTY nets, and use them as a liaison to section nets. This can be most ably accomplished by appointing liaisons to the local 2-meter nets where most SET traffic originates. I hope you've had a chance to work Cleveland's submarine, USS Cod, this summer, courtesy of the Parma Radio Club, K8UZW, and the Cod Memorial Commission. The Cod is a bona fide floating World War II sub; QSLs should be sent to WD8RZG. Upgrades to Extra: KC8EX and KA8COC.

Local Nets	QNI	QTC	Sess.
BRTN	355	252	31
COARES (Apr.)	137	6	3
COARES (May)	87	3	3
CCOMF	74	4	9
Firelands Red Cr.	53	7	4
Huron Co. ARC	59	7	5
LCNWARES	997	158	55
MASER (Apr.)	143	9	5
MASER (May)	97	4	5
RARA	48	3	3
TATN	402	1234	31
TSRAC	846	84	33
VWCEN	39	4	5

Traffic: (May) WB8UBR 809, KA8IUK 610, N8XX 510, K8JE 424, WB8QHU 424, WB8QHV 353, WB8JGW 338, K8OZ 298, WD8KFN 249, WD8KBW 188, N8BQK 188, AB8P 183, WA8GMT 181, K8JDI 169, WB8SRC 167, KF8J 158, W8HVA 155, WA8HGH 154, W8QZK 141, KB8YS 139, WB8WTS 139, WD8RIB 126, K8DL 124, W8MOK 120, W8TP 111, WB8SIQ 105, K8CKY 102, KK8L 97, W8EK 96, KA8DJZ 92, WA8SSI 80, K8GET 75, WB8RSM 74, N8AKS 73, WD9HDZ 71, WD8MIO 68, WD8ODV 67, N8JR 65, W8UJ 64, K8AN 64, W8GGZ 62, WD8PEI 58, WB8YGW 49, N8CGM 48, WD8NEC 45, N8CJS 44, WB8WHF 44, W8ZM 44, W8OQL 43, WB8DMF 42, WD8DYW 40, W8WEG 39, W8JMD 34, WA1QAA 32, WB8YTD 32, WA8LOY 31, WD8OYK 30, WA8BUW 29, K8CMR 29, KA8HGH 29, WD8PMW 29, N8APM 27, N8CW 27, WA8JNO 27, WA8QYJ 27, W8MGA 25, WA8BOV 23, W8RG 23, WB8SJE 23, WD8OYO 21, WD8PIY 21, N8AIB 20, KA8KFW 20, WA8MAZ 20, K8NJQ 20, WB8CJU 18, K8PYT 18, W8IM 17, WB8TTQ 17, W8WAV 15, WA8ZID 15, WB8MRL 14, WD8NEB 14, WD8DOS 12, K8DEV 11, WB8OFR 9, AF8O 8, WB8QXN 8, WD8PXI 7, WB8RHP 7, WB8AWM 6, W8LZE 6, W8UQY 6, WA8HED 5, WD8JAJ 5, AF8O 5, N8AJU 4, WB8VLR 4, WB8NTR 3, WB8NHV 2, WB8YUS 2, (Apr.) W8TP 62, WA8BUW 54, WB8TTO 47, WB8TKU 23, N8CDO 10, WD8JAJ 7, WB8VLR 7, W8EDU 5, N8AUH 4.

HUDSON DIVISION

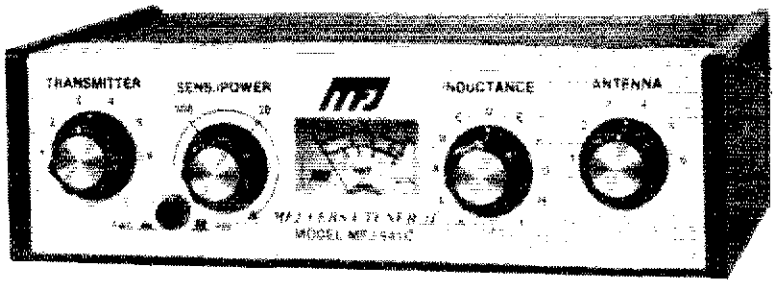
EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2TM. STM: WA2SPL. ASCM: KB2KW W2IT K2AV. NM: W2WSS WB2IXR N2BDW WB2ZCM WA2SPL WB2HDU KA2CTU. Congratulations to new NYS net manager KA2CTU and assistants N2APB and WB2EAG. Welcome aboard! Note the lack of net listings. This is to allow more room for other items occurring in the section. It will be included only every few months. Now let's hear from all the clubs! Ulster RACES provided communications for World Hunger Walkathon (18 miles) in New Paltz with W2s XL ZW WA2s KLV IXJ RUX KPF RUW WB2s AQU OXY KC2L AK2H N2AVN KE2A KA2KVZ all helping. Several Albany ARA members participated in the Crop-10 mile walk. Albany ARA Novice class — new licensees include KA2MJG and KA2MJM. Member upgrades include Extra — KB2UK KB2UL; Adv — WA2YBM N2BFH KA2HUY; Gen — KA2HZN. Schenectady ARA has participated in several public service activities. They also announced the passing of W2AZH K2AXY and K2DLR. All will be missed. Rip Van Winkle ARS reports that Bikeathon for Retarded was assisted with communications by members of Columbia/Greene ARES under WB2LKZ. It seems that many groups participated in Field Day, provided the weather cooperated, hope all had a successful operation. PSHR: N2BDW WB2EAG WB2IXR KB2KW WB2MCO W2VJR WA2CJY 33. Traffic: (May) WA2SPL 301, WB2EAG 135, WB2MCO 97, W2IQK 64, W2VJR 63, N2BDW 53, WB2IXR 38, KB2KW 31, W2EFU 30, AA2Y 28, WB2SON 18, WA2CJY 17, WB2OHR 16, K2MI 12, N2EF 4. (Apr.) WA2CJY 33.

NEW YORK CITY — LONG ISLAND: SCM: John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section, please try and check in: NLI CW 3630 kHz 1900/2200 WB2TQC mgr; NLI Phone 3928 kHz 1815 WA2SEL mgr; Nassau VHF 146.04/64 2100 M,W,Sun 2100 WA2SOE mgr; Big Apple VHF 147.915/315 M-F 2030 N2BMF mgr; Suffolk VHF 144.77/145.37 M-F

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



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Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

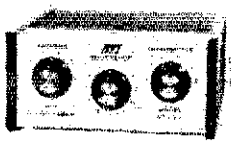
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+$4), like 941C less balun. **MFJ-945, $79.95** (+$4), like 941C less antenna switch. **MFJ-944, $79.95** (+$4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900 **$44.95** (+$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $54.95 (+$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $34.95 (+$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B **$139.95** (+$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962 **$199.95** (+$4)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $179.95 (+$10), similar but less SWR/Wattmeter.

MFJ-984 VERSA TUNER IV

MFJ-984 **$299.95** (+$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

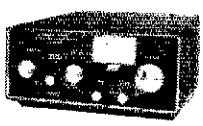
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $209.95 (+$10), like 984 less ant. switch, ammeter. **MFJ-982, $209.95** (+$10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $179.95** (+$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



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New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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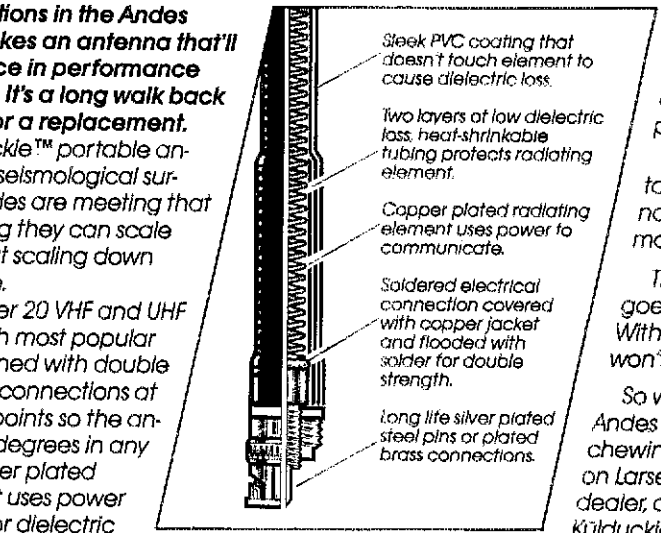

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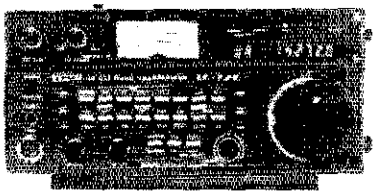

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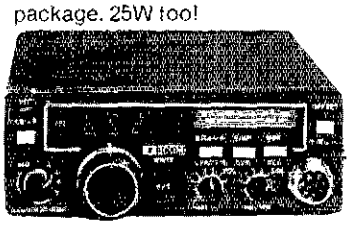

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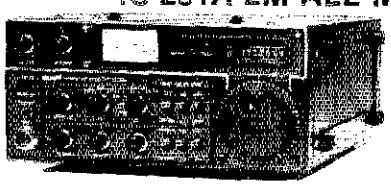

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143.8000 - 148.1999 MHz, 10W,SSB,FM,CW. Dual VFO's with 3 memories. Dual all mode scanning system. AC supply self-contained.

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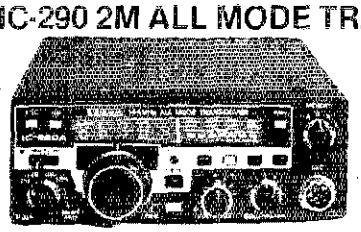

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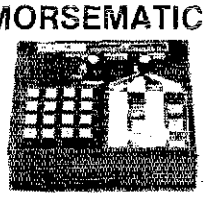

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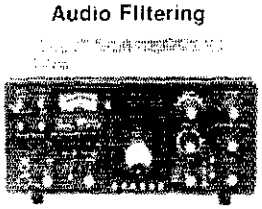

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2030 N2BKK mgr; Limarc 146.25/85 Fri 2045 WA2SOE mgr. Note: All times are local, please try and help out by checking in once in a while. Congratulations to KA2IOV who won the NYC LI Section in the Novice Roundup. Welcome to SMØGLF/2 who is visiting here and says he will probably stay for 2 years, it's nice to be able to look up at someone who is taller than me. Congratulations to WA2UWA who passed his Extra. Grumman ARC has their "WAG" (Worked All Grumman) Net on at 2030 on Thurs. KA2CLQ now has DXCC phone and WA2HWJ now has his DXCC. Many thanks to the following stations who participated in the Guide Dog Walk a Thon: KA2HXB KB2XL WA2UWF KA2CHD KA2BSY N2ACD KA2GOO WA2ARC and his XYL KA2IOV WB2RYU KA2BPO KA1NH Brad Mann. Many thanks to N2RQ and the stations who helped with the Boy Scout campout at Eisenhower Park, not enough room in the column to list all the stations. GT. South Bay ARC covered the town of Babylon mini marathon held on June 6. KA2CLQ will attend the Merchant Marine Academy starting this fall. NLIPN welcomes WA2ARC and N2BMF. High QNJ for May NLIPN: KA2CLQ KA2ELB WA2UWA WA2SEL. LIMARC had their biggest ever flea market, they ran out of tickets and sellers space. WB2ALW K2LJH and the rest of their crew did an outstanding job. N2BKK had his gear lifted from his new QTH. Do you have your S.S.# on your gear or other I.D.? WA2PMW reports an RTTY net nightly on 144.27 FM RTTY "Tread Group." There is a great picture on the front of the June Metroplex Newsletter of the Great Wall of China with a Metroplex bumper sticker on it. The picture was taken by WB2ZPI, who recently toured by land with his XYL. Traffic: (May): W2AHV 195, W2GKZ 130, KA2ELB 67, WB2IDP 42, KA2CLQ 33, WB2JAY 24, WA2PMW 20, K2IZ 18, W2DBQ 14, WA2SEL 9, KA2KGH 3. (Apr.) WA2PMW 40.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — SEC: WB2VUF. STM: W2XD. NMs W2CC N2BOP W2PSU KA2GQQ W2TCA N2XJ WB2IQJ N2BNB.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJPN	W2CC	3950	6 P.M. Dy	36	512	239
NJN/E	N2XJ	3695	7 P.M. Dy	31	393	140
NJN/L	N2XJ	3695	10 P.M. Dy	31	288	139
NJSN	WB2IQJ	3735	6:30 P.M. Dy	31		
NJVN	W2TCA	49/49	10:30 P.M. Dy	31	324	107
OBTTN	N2BOP	72/12	8 P.M. Dy	31	607	167
UCETN	KA2GQQ	085/685	7:30 P.M. Dy	31	233	55
NWNJVN	N2BNB	90/30	Weds	4	37	19
NJRTTY	W2PSU	147.51	Autostart	31	63	10

It is my very sad duty to report W2UEZ, NM for both NJNs, is now a SK. He will be sadly missed by all NJN members. The following are upgrades: to Extra — WA2SGL now KM2G; to Advanced — KA2JMH; to General — WB2LAH KA2ALS. WB2YOK directed comms for United Jewish Appeal Walkathon in Morris County on 5/3. KA2HAE now N2CLL. New Novice, KA2MKK. N2BLM to Advanced. The Tri-County Radio Assn had a very successful hamfest/fleamarket with 56 door prizes. New slate of officers for JSARS: WB2PXD, pres.; WD2AJM, v.p.; KA2HLG, secy.; KA2EKN, treas.; KB2IB, general trustee. Ramapo Mountain ARC advises that VK2BKL visited KB2DN. From the RMARC annual Spring National VHF contest the top station single operator was WB2QOQ with the multi-op being W8DJY. WB2PIR to Advanced, N2CEZ to General. Ft. Monmouth ARC had an excellent dinner meeting at the Officer's Club and invited KB2WI as guest speaker. W2ZEE Advanced to Extra. KA2AXY now KC2AM, N2BOZ now KC2AH and WA2QWR now KC2AK. The New Jersey Masonic ARC met at the Masonic Home in Burlington and elected the following officers: Al Bein, pres., John Novak, v.p.; Steve Ackerman, secy./treas. June 14th they will meet again at the Masonic Home where they will show the League film "The Wonderful World of Amateur Radio" and W2JIO will be guest speaker. The Masons hope to establish a club station at the home for its members. WB2ZPI and his XYL toured China recently and will give a slide presentation in the near future. Recent Metro-upgrades: to Advanced — KB2VR and KA2GHD. In August WA2PLT will speak on "Legal Methods of dealing with Jammers" and September, WA2DHF will speak on the "Evolution of VHF-UHF Amateur Radio in the NY-NJ-CT Metro Area." N2BLM to Advanced, KA2ERG reports total success with the Westfield, NJ Soccer Tournament coverage on May 23-24 via 2 meters. Special thanks go to the following: WA2MIF KA2CHK KA2DAU W2NR KA2AMG W2YJC W2IHA WB2MMO W2IMM WD2ABC KA2JQD KA2HUU K2ONE WB2RMJ N2BOP WB2KTR W2NKD. W2XD gave a talk on NTS to NJ Air Force MARS and also attended the Rochester Hamfest where he was a guest speaker. BARA participated in the Ridgewood Memorial Day Run with 12 operators supplying 2-meter capability. The expert from the Club and Training Dept gave an excellent talk on AMSAT and OSCAR. Traffic: N2BOP 199, K2VX 174, AG2R 167, W2XD 159, W2TCA 109, N2XJ 87, KB2WI 86, KA2JMH 59, WA7DPK 58, N2BNB 49, AF2L 44, N2BC 41, N2BQL 19, W5DTR 19, W2CC 18, WB2KLF 18, KA2GSX 16, W2NKD 10, N2SU 10, WA8ZNH 5.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WBØAVW WAØAUX WDØHND WØYLS. Congrats to editor of DSM "State Sheet" for being awarded OUTSTANDING by the ARNS. WBØCOO reports great County Hunter Convention in DSM. "Operation Twister" in Mt. Pleasant a good cooperative effort by ARES and government officials. The DSM Ham and Computerfest in DSM August 16th. The 75-M Picnic in Des Moines August 23rd, contact WBØUFF for details. See you there. NØAOE now KJØY, KAØBBY now KCØET. New upgrades KAØBBW KAØBZB KAØADN. Be sure to sign guest book at "Old Threshers Reunion" in Mt. Pleasant Sept. 2-7. *KFØH now has DXCC 300. NØAYM now* KFØZ. N4RR/Ø new EIDXA VP. Ten rep by WØSS WØYLS KØGP NØBLA WBØUPF AEØR KAØX. DTRN rep by WAØAUX WBØQAM NØAHP WØNTK. Traffic down this month, originate a radiogram through an Iowa Net. PS events could include traffic handling for the public. Congrats to all the Novices that participated in the Novice Roundup. CVARC working on plans for Convention '82, support them. WØANZ WØYBV KAØCLQ AKØP back from funpedition to SD/ND border.

Net	Day/Time	Freq.	QNI	QTC	Sess.
75 M Phone	M-S 1730-2300	3970	2148	67	52
TLCN	Dy 2330-0300	3560	343	95	62
ICN	Tues 0100	3713	24	10	4
IANEB PM	M-F 2030	3978	69	5	19

Traffic: WAØAUX 141, WØSS 124, KØGP 94, WØYLS 87, WBØOAM 52, WØBW 44, KØCY 38, KAØX 35, AEØR 25, WA4VWV 20, WBØAVW 18, KØJGI 11, KAØJQG 10, WBØUPF 10, WDØHND 6.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC:

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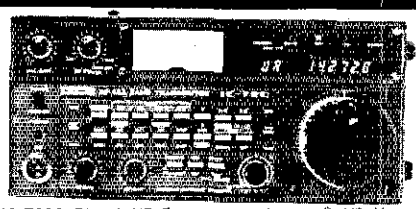

IC-720A Digital HF Transceiver. Covers 9 HF Ham bands, receives .1 to 30 Mhz. Synthesized & all Solid-State. Output variable 10 to 100w continuous, all bands. Six digit LED readout, dual built-in VFO's, AM, CW, SSB & RTTY filters. Passband tuning, RIT, VOX, semi break-in CW, blanker & speech processor. 13.5 VDC @ 20A max. 4½"h × 9⅝"w × 12½"d, 17 lbs ..... **Regular $1349.00**

PS-15 Power supply 149.00
PS-20 Continuous duty power supply 229.00
Adaptor cord for PS-20/IC-720A 25.00
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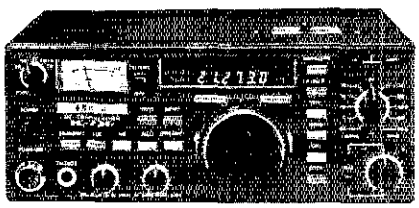
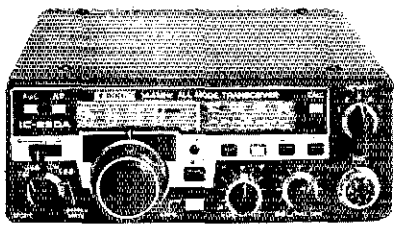
FL-34 5.2 KHz AM filter 49.50
SP-3 External base station speaker 49.50
Phone Patch 139.00
AH1 5-band mobile antenna/tuner 289.00

IC-2KL 500w output, 160-15m (incl. WARC) Solid-State, automatic band switching linear for IC-720A, 720 & 701. With AC supply ..... **Regular $1795.00**



IC-730 80-10m (incl. WARC) HF Transceiver. All solid-state, synthesized, 200 watts PEP input. Dual VFOs, 8 frequency memory storage. IF shift with pass band tuning optional. Up/down tuning with optional mic. 9½"w × 3⅝"h × 10⅝"d, 10 lbs. ..... **Regular $829.00**



IC-290A 2m All Mode mobile for 143.8 to 148.199 MHz. RIT, prog. offsets, 5 memory channels. 2 VFOs, 2 scanning systems, memory & prog. band scan. SSB squelch. Adj. scan rate with auto scan stop & resume after delay, priority ch., memory retention provision, Hi/lo power, sidetone, blanker, T/T mic. Opt. remote tuning mic. 6¼"w × 2⅛"h × 8⅝"d. ... **Regular $549.00**

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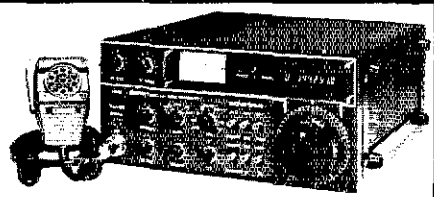

IC-251A Microprocessor controlled 2 meter All-mode Transceiver for 143.8-148.1999 Mhz. 7 digit display. 10 watts, 3 memories, mem. scan & programmable band scan. 600 KHz offsets, variable splits with two built-in VFO's, 13.8vdc or 117vac. w/amplified hand mic. 4½"h × 9¼"w × 10⅛"d, 11 lbs..... **Regular $749.00**

IC-451A UHF All Mode Transceiver for OSCAR mode B or J & simplex. For 430-440 or 440-450 MHz. Features similar to the IC-251A ..... **Regular $899.00**

IC-551 *All mode, microprocessor cont. 6m transceiver* for 50-53.999 MHz. 6 digit display, 10w, 3 mem. ch. w/var. scan, 2 VFO's & blanker. 13.8vdc & 117vac 4½"h × 9¼"w × 10½"d, 14 lb ..... **Regular $479.00**

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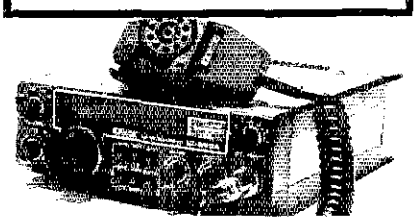

IC-255A Microprocessor cont. 2 meter FM Transceiver for 143.8-148.195 Mhz. 25 or 1w output. 5 memory channels w/scan, adjustable rate & auto stop. 600 Khz offsets, 2 built-in VFO's. 13.8vdc @ 5.5A. 7⅛"w" × 2½"h × 9½"d, 5½ lbs. w/TTP mic ..... **Regular $399.00**

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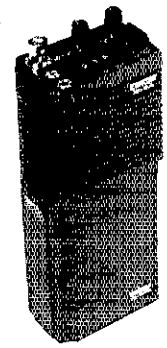
IC-25A Compact full-featured 2 meter rig. 5 memories plus two VFOs, priority channel, 2 scanning systems including auto. scan resume, provision for memory backup, touchtone microphone. 2"h × 5"d..... TBA



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	Regular	SPECIAL!
IC-2A 2m HT w/nicad & wall chgr	$239.50	**$219.50**
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BP-2* 450 ma, 7.2v nicad pk, 1W output 39.50
BP-3 Extra 250 ma nicad pk, 1.5W output 29.50
BP-4 Alkaline battery case 12.50
BP-5* 450 ma, 10.8v nicad pk, 2.3W output .. 49.50
CP-1 Cig lighter plug & cord (BP-3) 9.50
DC-1 DC operation module..... 17.50
HM-9 Speaker/microphone 34.50
LC-2A Leather case for IC-2A 34.95
LC-2AT Leather case for IC-2AT 34.95
2A-TTN TT pad 39.50
**BC-30 required to charge BP-2 & BP-5*

IC-ML1 2m mobile amplifier. 2.3W input, 10W output (with IC-2A-2AT use BP-5 pack) **$89.00**

IC-202S 2 meter portable SSB Transceiver. 3W PEP output. Uses regular "C" cells, optional Nicad pack & charger or IC-3PS AC supply/speaker. With hand mic. whip antenna and strap ..... **Regular $279.00**
IC-20L 2m amplifier, 10w SSB/FM..... 98.00
IC-402 432 Mhz portable SSB Transceiver. Features same as IC-202S above ..... **Regular $389.00**
IC-30L 432 Mhz amp., 10w SSB/FM..... 105.00
IC-502A 3W SSB 6m portable, as above.... **$239.00**

BC-10 Memory back-up for 720/551D ..... TBA
BC-15 Nicads & AC chgr for portables..... 57.50
BC-20 Nicads & DC-DC charger for ports..... 57.50
WC-215 Wall charger for BC-20 ..... 11.95
IC-3PE *3A power supply/speaker* 95.00
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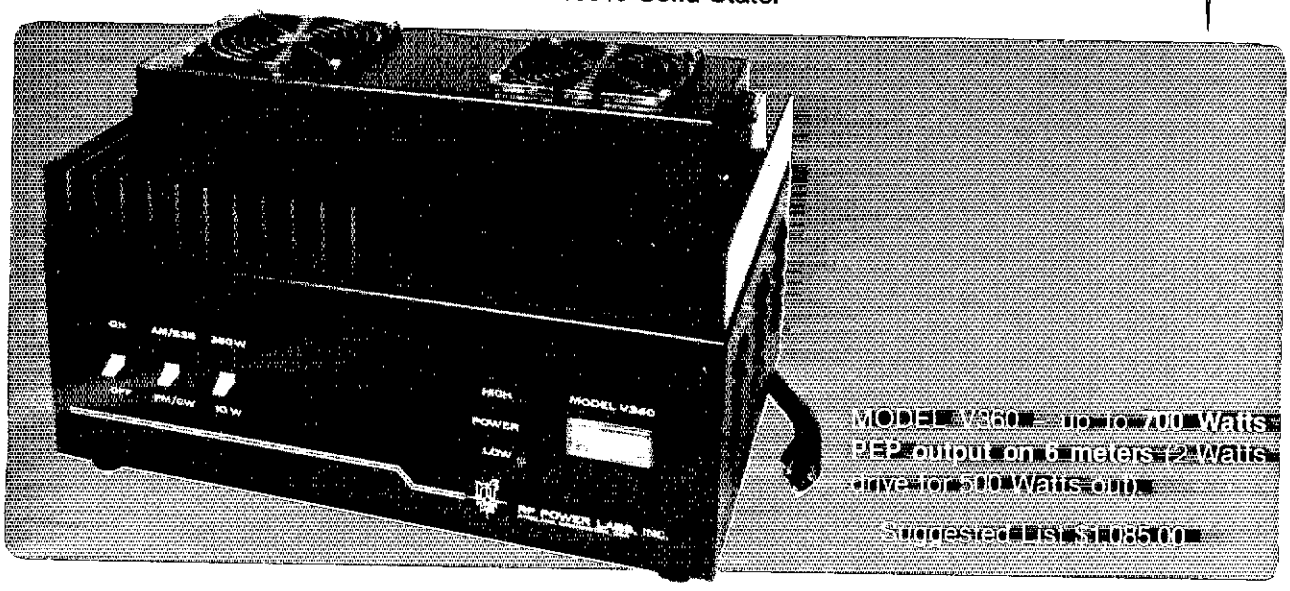

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drive for 500 Watts out
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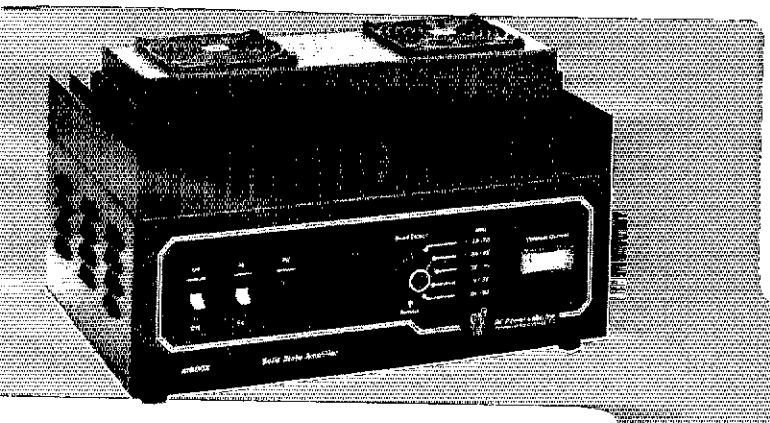

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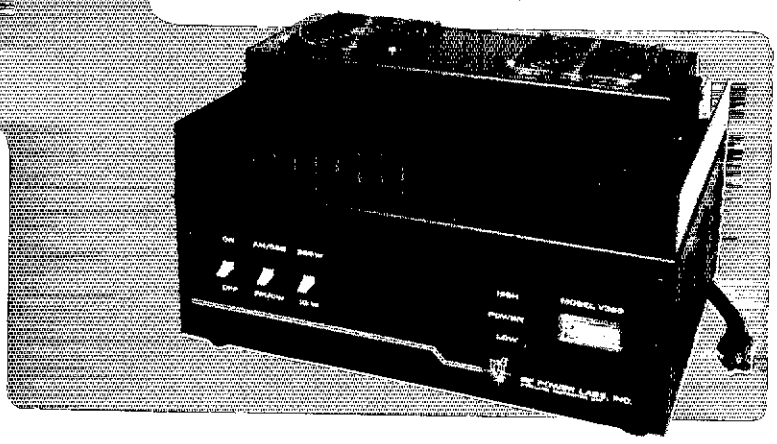

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W0KL. NMs: W0FT cw, W0OYH phone, WA0SZS vhf. Everyone must be real busy this time of year. The reports do seem to come in later and in less quantity than during the winter months. If your gardens are all doing as well as mine, you are excused, I know how much time I am pulling weeds. Received word we have another ham who is chief engineer at an fm radio stn — it is KA0KXJ. W0KL reports 893 total hams registered in the ARES. Still shooting for that 1000 mark. Congratulations to W0AM and his new SUB-HARMONIC — proud grandpa of a new granddaughter. W0HI sportin' a new Alpha 76A amp with Delta 580 Exciter cw with full Bk. As usual doing a FB job on the cw nets. He says that new rig also has ssb when needed. Still never heard him on voice. W0KL gave a ham radio demo this past month to the Ottawa Kiwanis club, with the assistance of W8AVH and WA0UGO using 20 and 2 mtrs. QKS totals, QNI 397, QTC 118. CSTN QNI 1509, QTC 81. KSBN QNI 1043, QTC 67 and KPN QNI 391, QTC 23. KWN QNI 798, QTC 507. Traffic: W0QMT 148, W0OYH 95, W0HI 90, W0FT 73, K0EZ 70, WA0LBR 69, WB0YLP 51, W0KL 49, W0AM 40, WD0ACG 34, K0BXF 34, W0ASY 30, KA0DRC 29, WB0ZEN 25, AC0E 22, W0FOJ 22, W0PB 21, W0RBO 17.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst SCM: Joe Flowers, W0OTF. STM: WB0LFY. SEC: N0AJI. Sporting new calls this month are WA0ZHY now KC0CL, K0ONR now KC0AS and KB0AB now KJ0U. Also KJ0U is now sporting a new 70 ft tower. Congratulations to the following new licensees and upgrades: KA0s KSI KSH KKH — Novices; WB0ZMZ KA0DCO and KA0JMV — Tech; KA0IAS KA0GRP N0CGZ WD0DOT — General; KA0GBK N0CCX WA0SXD — Advanced; K0GUG N0ARH N0CKU WB0LFY — Extras. Our sympathy to the family and friends of K0KPE and KA0AWA who joined the ranks of the Silent Keys.

Net	QNI	QTC	Net	QNI	QTC
MEOW	323	17	CMOEN	134	7
NEMOE	133	7	ACE	38	1
MOSSBN	551	31	HBN	376	27

The Ozark ARS now has 100 ft of new tower for their repeater. Congratulations to W0EZM upon his retirement. Callaway Amateur Radio League is now conducting ham license classes. Remember, all reports including traffic and net are to be directed to WB0LFY prior to the 5th of the month for publication. Those reports not received by that date will not be published! We have a deadline to meet and if it is not here on time, we will not wait for it. Traffic: KC0AS 843, W0BMA 222, W0OUD 127, K0SI 102, W0OTF 70, K0K 52, WB0LFY 26, KA0P 18, KA0E 17, K0PCK 10, WB0VHN 6.

NEBRASKA: SCM, Shirley M. Rice, KA0BCB — SEC: N0AIH. STM: WD0BQG. Our sympathy to family & friends of W0KFY. More new ECs: W0PPT K0FJT WA0HFH W0GEQ K0JFN WA0OOX KA0AFW. Scotts Bluff ARES participated in a mock tornado drill on May 21 with county officials. Congrats to new Novices: KA0KPS KA0KPY KA0KPU. Techs: KA0IAE KA0IZO. Gen: KA0CGF KA0JLH. Adv: N0BUN KA0FHX WD0EDO WD0GMX KA0JLT WB0VIV WB0SXM WB0SXN. Extra: KA0ERR WA0YPY. North Platte has a design for a new club flag! Hats off to the Pine Ridge ARC for a great hamfest. Good food, ragchewing & prizes. Best prize went to K0JBL for being one week late last year. Hi! Traffic: WD0AHV 68, W0HOP 30, KA0BCB 29, WA0BOK 29, W0ZNI 25, K0BRS 18, WB0SGB 13, W0FOB 12, WB0GWR 11, W0NIK 10, WB0GMQ 9, WA0DXY 6, WB0EDU 6, WD0APY 2, K0SFA 6, W0YFR 6, WA0PCC 2, K0YUH 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU. SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

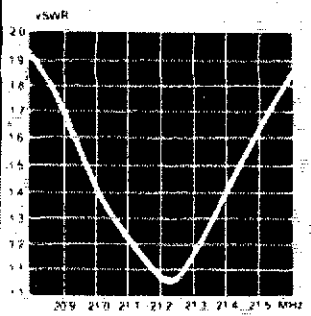
Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3540	1900 + 2200	62	318	418	K1EIR
CPN	915/315	1800/1000 Su	26	42	219	WB2PJU
NENN	*3720*	*1815*				*WB1CPF*
NVTN	28/88	2130	31	52	304	WA1ELA
RTN	13/73	2100 M-Sa	26	71	178	WB1CPF
WCN	78/18	2030	31	88	399	W1DPR

High QNI: CN: W1EFW WB1ESJ K1UQE WB2PJU. CPN: K1EUW KA1KD. For the second month in a row, a BPL for WB1CPF, who handled a lot of traffic with the Tri-City ARC at Expo 81. ORS KA1DZV going to Maine to study Electronic Communications. Meriden ARC provided communications for the Cheshire road race using repeaters N1ADE and W1KKF. Candlewood ARA flea market will be held on September 20 at the Essex House, Route 6 in Newtown (I-84 exits 8 or 9). New Murphy Marauder officers: K1ZZ, pres.; K1CC, v.p.; K1TO, activities mgr.; K1NYK, secy./treas. W1CUH received DXCC. Eastern Connecticut ARA flea market was a big success. New Tri-City ARC officers: KA1BB, pres.; N1AEL, v.p.; N1AMD and WA1WYN, secy.; KA1GQU, treas. Upgrading: KA1FGH to General, N1BFU and KA1BZW to Advanced, KA1JP and K1UQE to Extra. W1QV chasing spring DX. Greater Fairfield ARA's Dogwood Festival QSO Party was successful despite bad solar disturbance effecting all bands. W1ICQ using solar panels to power his station. 146.205/805 are the new frequencies of the Shoreline ARC (Killingsworth) repeater. No New England Division Convention this year! Traffic: WB1CPF 1000, W1EFW 272, K1GF 234, KA1BHT 120, WB1ESJ 112, WB1GXZ 75, W1BDN 62, K1UQE 59, W1XX 45, KA1DZV 42, WB1CRH 41, K1AQE 33, K1EUW 25, W1DPR 20, KA1KD 15, WA1LOU 9, W1KV 8, WA1WQG 7, W1QV 6, W1CUH 4, W1VS 2, W1ICF 1.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW.

Net	*Mgr.*	*Freq.*	*Time/locv/Dy*	ONI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	356	340
EMRIPN	KA1BJY	3.898	1730/Dy	379	252
NENN	WB1GQO	3.720	1815/Dy	239	90
NEEPN	K1BZD	3.945	0830/Sn	60	20
HHTN	K1BSO	04/64	2230/Dy	462	182
EMRISS	N1BHH	3.715	2030/Dy	118	41
EM2MN	N1BNI	90/30	2000/Dy	192	44

Got a call the other night from a fellow on the Cape who was concerned about the accuracy of the new Repeater Directory. It goes without saying that the Directory can only be good as the information sent in by individuals. We agreed that it would be a good idea to try and coordinate the notification of repeater owners when the data is needed at Hq. If there is anyone out there that would like to take this on, please let me know. It should be clear that the responsibility for data being sent in would be that of the repeater owner and the coordinator would only notify him/her that the data was due at Hq and solicit information on new repeaters and/or changes in existing ones so an attempt can be made to contact every repeater in EMass. Any takers? Whitman Club ran a Mothers Day message center at Westgate Mall and sent out 107 messages. Brockton Centennial parade coordinated by 35 hams under direction of WB1EZT.



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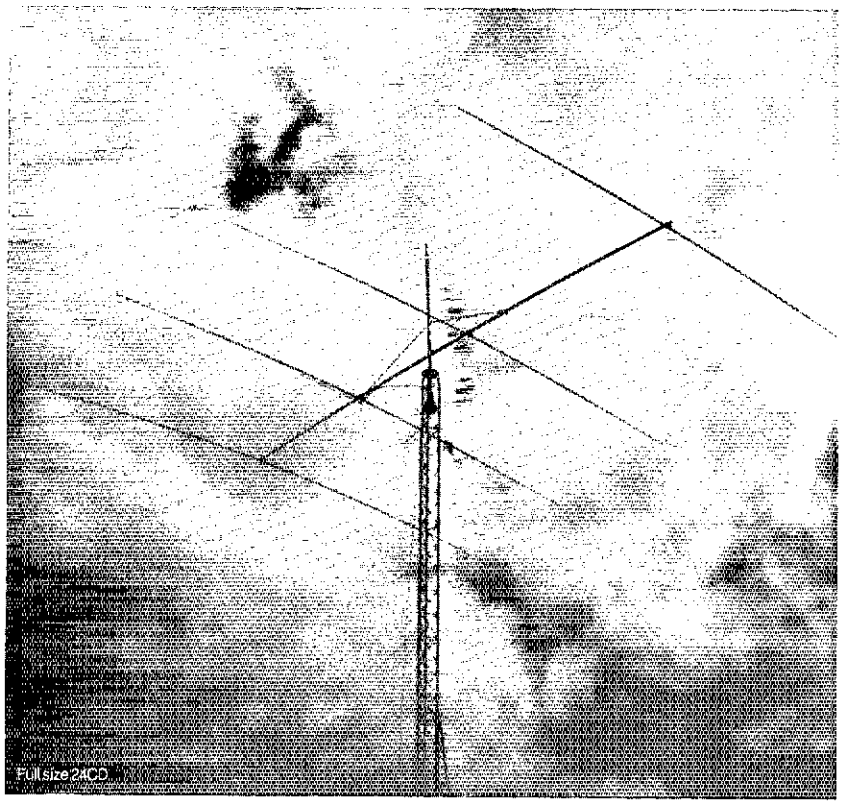
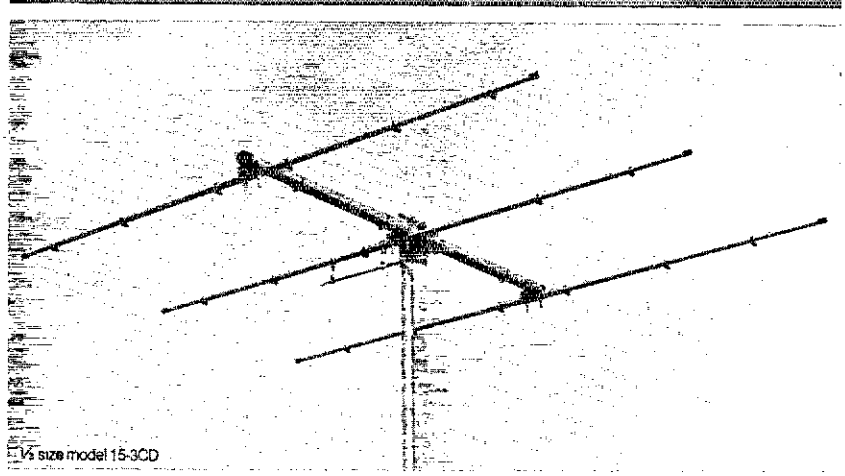
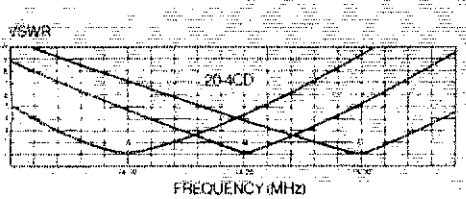
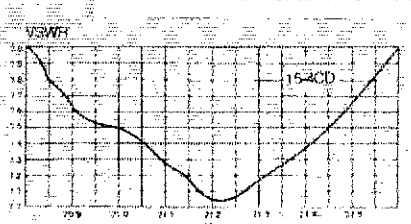

Full size 24CD

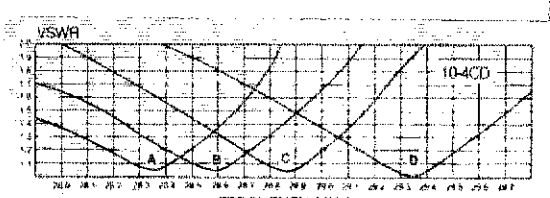

1/5 size model 15-3CD

Specifications

Model number	20-4CD	20-3CD	15-4CD	15-3CD	10-4CD	10-3CD
Frequency range (MHz)	14.0 – 14.35	14.0 – 14.35	21.0 – 21.45	21.0 – 21.45	28.0 – 29.7	28.0 – 29.7
Forward gain (dBd)						
Front to back ratio (dB)						
Boom length (ft) (m)	32 9.75	18 5.49	20 6.10	14 4.27	17 5.18	12 3.66
Boom dia. (in) (cm)	2¼"-1⅝" 5.4-4.8	2¼"-1⅝" 5.4-4.8	2"-1¼" 5.1-4.1	1⅞"-1⅜" 4.8-4.1	1¾"-1¼" 4.4-3.8	1⅝"-1¼" 4.1-3.8
Longest element (ft-in) (m)	35-10 10.92	35-8 10.87	23-4 7.11	23-2 7.06	17-10 5.43	17-8 5.38
Element dia. (in) (cm)	1¼"-⅞" 3.1-1.3	1¼"-⅞" 3.1-1.3	1"-⅝" 2.5-1.6	1"-⅝" 2.5-1.6	⅞"-⅝" 2.2-1.6	⅞"-⅝" 2.2-1.6
E-plane B/width (deg)	60	56	57	56	57	56
Side lobe attenuation (dB)	40	40	40	40	40	40
1.5-1 VSWR Bandwidth	300 KHz	800 KHz	500 KHz	500 KHz	600 KHz	700 KHz
Turning radius (ft-in) (m)	20 6.10	23 7.01	15-4 4.67	13-6 4.11	14 4.27	10 3.05
Weight (lbs) (kg)	55 24.95	30 13.61	25 11.34	20 9.07	18 8.16	11 5.00
Windload (sq. ft) (sq. m)	8.1 0.75	5.5 0.51	4.5 0.42	3.4 0.32	3.1 0.29	2.3 0.21







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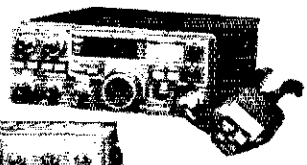

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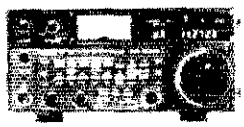

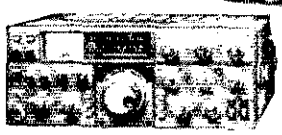

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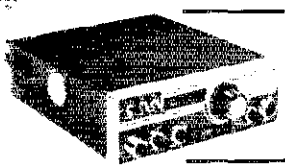

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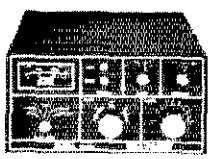

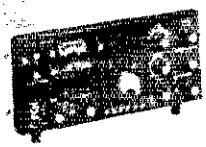

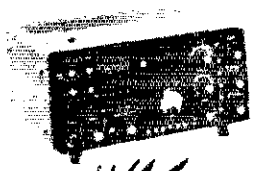

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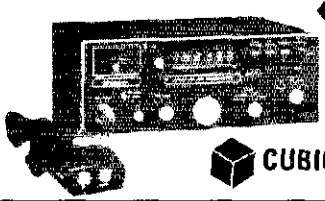

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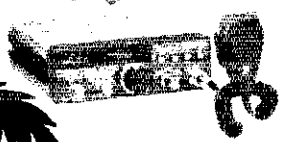

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KA1CGP/NCS N1BHH N1BEK WA1VSY WB1DNZ and KA1OQ worked with Boston Red Cross on March of Dimes Walkathon. New Quannapowitt Club officers are: AA1M, pres.; AE1E, v.p.; KA1MI, secy.; N1AHP, treas. Billerica Club funded ARES emergency equipment with a very successful mini auction. W1ECK been doing a lot of work on the Massasoit Club (78/18) repeater. Wellesley Club had an engineer from Channel 5 TV give a talk. K1YUB graduated 30 Novices from classes in Medford. Mitre Bedford Club making some good catches on 10 meters during lunch hour (YC, VU, 8Q6, A5, VQ9 etc). Framingham Club very busy this spring participating in five different public service events. Acton-Boxboro Club officers: N1ASF, pres.; W1OHD, v.p.; AE1B, secy.; N1AVS, treas. The license plate legislation has gone to the Senate. Bill 997 which would provide for a $2.00 surcharge for ham plates and Bill 4898 which would provide for no additional charge over the regular registration rate have come out of the House favorably and are in the Senate. Traffic: (May) N1BHH 828, WA1TBY 325, K1BZD 305, KA1BJY 178, K1BA 166, KA1ON 158, K1BSO 109, WB1GQO 76, KA1EMQ 44, KA1MI 43, W1ATX 29, N1BNI 27, W1CZB 12, WA1FNM 10, N1AJJ 7, KA1FE 5, K9HI 4, KA1R 2, WB7TPY 2, W1LE 1, K1TKI 1. (Apr.) N1GQ 196, WB1GQO 67, WA1OWZ 4.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ. SEC: KL7IJG, WA1YNZ, Aroostook EC, reports international cooperation on a walkathon for the benefit of various charities. Providing comms were VE1CB VE1BWP VE1BWQ VE1AU VE1BMC WA9TVH KA1JC N1BJX N1BGO WB1DED K1PWG K1CLF. New officers Sandy River RC are: W1KX, pres.; KA1CNG, v.p.; WA1JCN, treas.; WA1LZR, secy. New Mid-Coast Repeater Club officers are: W1FKC, pres.; K1BEA, v.p.; KA1FK5, secy./treas. PSHR: AK1W 102, W1RWG 90. Nets sess/QNS/QTC: CMEN 9/120/15; BN 26/728/1; SGN 26/939/119; PTN 31/257/108; SPSN 13/188/9; AEN 4/52/0; MSN 13/69/19; RACES 5/49/5. Traffic: AK1W 124, W1RWG 104, W1BJ 96, WA1FCM 88, W1KX 85, WB1BYR 74, N5YX 29, W1BMX 26, N1AZA 18, N1BCT 18, N1BCE 10, K1NAN 10, N1BJW 13, WA1YNZ 9, W1AHM 6, W1CTR 6, K1TVT 6, KA1EIW 5, K1WQI 5, KA1EKT 3, KA1ENL 3, KA1GGE 3, WA1JCN 3.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: AK1E. STM: W1TN. NMs: N1NH & K1OSM. Interstate Repeater Society new officers: K1MRK, pres ; KA1FUJ, v.p.; K1YPP, secy.; N1ALT, treas. EC W1FYR has new 2 kW ac power plant. Cushcraft hosted the last Nashua Club meeting. WA1YQQ reports the Great Bay Club's first Fleamarket was a success. W1UPK now QCWA member. W1UN cutting down trees for more antenna space. Congrats to new ECs: W1RCC Hillsboro, KA1DUJ Gratton, WB5MTR/1 Belknap. The Amherst Club provided comm for the Walkathon. Seen on hyways & byways: W1UN W1QNH W1MHX WA1EZE WA3KUT & W1GWU. The new Portsmouth repeater is on the air, tune in 46.805. The GSPN had 303 QNI & 81 QTC. Congrats to the GSPN, now member of NTS. My thanks to all that worked to get this accomplished. WB1CXM now KD1Q. The NHN had 92 QTC & 131 QNI. Traffic: (May) W1TN 121, KA1BBI 118, N1NH 115, KA1CXP 98, K1YMH 79, K1OSM 75, KA1BJ 61, AK1E 54, W1MHX 45, W1ALE 44, W1VTP 40, WB1DKX 37, KB1A 35, KA1CJI 25, W1FYR 21, KA1FWQ 9, WA1PEL 8, W1NH 7, W1BYS 2. (Apr.) K1YMH 56.

RHODE ISLAND: SCM, J. Titterington, W1EOF — STM: KA1FE. RIEM 2-Mtr Tfc Net had 21 sess, QNI 173, Tfc 29. As rpted by WA1OSL, NM. N1RI sends his rpt from Virginia where he is on transcontinental bicycle tour. This is my last report of 48 as your SCM. It has been my pleasure to have served you and I have enjoyed it very much. I hope you will support W1YNE, my successor, in the same way you have helped me. Somewhat immodestly, I feel the section is doing better now than when I started, but I am sure I could have done better. Adios and see you on various nets and bands. Traffic: (May) W1EOF 396, KC1G 228, KA1FE 94, N1RI/4 3. (Apr.) W1YNE 167, KA1FE 119.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. On May 3, 1630, KA1EAN reported thru IBM rptr (25/85) to W1ICW, an auto accident on R-104A, who contacted VT S.P. for the parties. BARC holding FD at Mt. Philo. GMWS, same, at Post Rd Elem. School. GMWS expects to have solid state rptr on 147.045 during summer. W1KQO repeater (34/94) ops sim. emer. net 1100 each Sun. Other rptr groups are invited to tie in with them. We would like to have statewide 2-mtr coverage for any emergency by linking rptrs thru those who can work other rptrs. Firm & reliable coverage is needed. The SEC, STM & SCM would like any input you may have. How abt giving it a go?! GMN 26/432/.44; VSB 31/416/87; VTN 30/125/53; RFD 5/90/20; VPN 5/63/6; Carrier — no rpt rcvd. Traffic: K1BQB 131, N1ARI 114, WB1ABQ 78, W1RNA 39, W1KJG 6.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. STM: W1TM. SEC: W1JP. NMs: WA1ITL W1UD W1UPH, with band-hop support, W1YI WB1HIH W1DOY WA1YYW K1JNT WB1DBN K1JHC. Congrats W1UKR for Certificate of Merit for Club OSL Bu., Emergency, and NTS work of many years. Also noted KA1T on WMN; appointment of AMSAT area reps WA1ZUB for Central MA and W1KK for Western MA. A pat on the back for the following editors/newsletters, as compiled by K1BE: W1SPG/"Ham Chatter," KA1CRG/"Zero Beat," N1AHW/"Intermod," W1HEP/-"Squelch Tale," WA1VCU/"Echoes." Contact K1BE for club speaker info. PSHR: WB1HIH 113, W1TM 63. Traffic: WB1HIH 220, W1TM 153, W1KK 99, W1YI 85, WB1HKN 72, WA1ITL 38, W1JP 20, KA1T 14, W1BVR 7, WA1OPN 5, W1ZPB 4.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred S. Wegmer, KL7HFM — ASCMs: AL7AC KL7IBG. SEC: KL7EWQ. STM: AL7O. Congrats to KL7IF upon becoming the new TCC-AK mgr. YL news headlines this month feature. KL7AP, the Extra class half of the Rhodes-Morgan team, upon her election to the presidency of the Anchorage ARC. A YL first! The ARC is also to be complimented for having originated and delivered 3000 QTCs at their annual Mother's Day event. The 1981 Ham of the Year is KL7GNP. Congrats! KL7IEN has been appointed the Director, Alaska State Army MARS. Who says we don't do things big in AK? Nine ham calls in one family — YES — that's the way KL7AM does it. KL7AM KL7HCQ KL7HCP KL7HCQ KL7HCR KL7HCS KL7HCT WL7AIJ WL7ART. W7KUF KL7IPN KL7CUK helped get ill mountain climber rescued from the 14,000 ft level of Mt. McKinley. W7KUF was on site with another climbing party and used the WR7ACT rpt to direct the rescue efforts. KL7IPN and KL7CUK coordinated and relayed the life saving information.

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160-15* Meters

1.2kW Linear Amplifier

1.2kW PEP, ssb continuous, 1kW cw 50% duty cycle.

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The Drake L75 utilizes an Eimac 3-500 Z triode for rugged use, and lower replacement cost compared to equivalent ceramic types.

Built-in relative power reading for output indication.

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Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

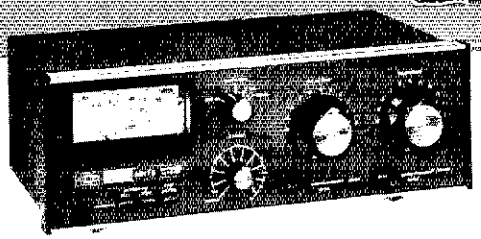
Built-in power supply.

Operates from 120/240 V-ac, 50/60 Hz primary line voltage.

Drake L75 Specifications:

• **Frequency Coverage***: Ham bands 160 through 15 meters*. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit. • **Plate Power Input:** 1200 watts PEP on ssb and a-m, 1000 watts dc on cw. • **Drive Power Requirements:** 60 watts PEP on ssb and 50 watts on cw, a-m, RTTY, and SSTV. • **Input Impedance:** 50 ohms. (Bandpass tuned input) • **Output Impedance:** Adjustable pi-network matches 50 ohm line with SWR not to exceed 2:1. • **Intermodulation Distortion Products:** In excess of −33 dB. • **Power Requirements:** 240 volts 50-60 hertz 10 amperes, or 120 volts 50-60 hertz 20 amperes. • **Tube Complement:** One 3-500Z. • **Dimensions: Amplifier** 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). • **Weight:** Amplifier 42.2 lbs (19.2 kg), Power Supply 42.5 lbs (19.3 kg).

*Export model includes coverage of the 10-meter Ham Band



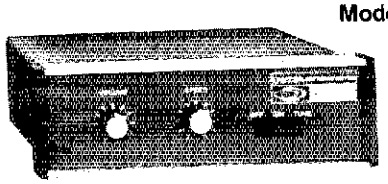
Model 1540

Drake MN75 Matching Network

- **Frequency Coverage:** 1.8 - 30 MHz
- **Antenna Choice:** Matches antennas fed with coax, balanced line, or random wire. (For balanced line use optional B-1000 Balun.)
- **Antenna/By-Pass Switching:** Allows matching unit by-pass regardless of antenna in use, and selects various antennas.
- **Extra Harmonic Reduction:** Employs "pi-network" low pass filter type circuitry for maximum harmonic rejection.
- **Built-in Metering:** Accurate Rf Wattmeter and VSWR Reading, pushbutton controlled from front panel.
- **Input Impedance:** 50 ohms (resistive).
- **Power Capability:** 200 watts average continuous duty (0-300W scale).
- **Dimensions:** 13.1"W x 4.53"H x 8.5"D excluding knobs and connectors (33.26 x 11.5 x 21.6 cm).
- **Weight:** 8 lbs (3.6 kg).

Drake MN75 Specifications:

• **Frequency Coverage:** 1.8 to 30 MHz. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle to 23 MHz. 4:1 at 23 to 26 MHz, 3:1 at 26 to 30 MHz. 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas:** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters) • **Meter:** Reads VSWR or forward power. • **Wattmeter Accuracy:** ± 5% of reading ± 1% of full scale. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, range switching, VSWR calibration, and selection of watts or VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.



Model 1507

CW75 Keyer

• Iambic keying. • Built-in side tone. • Optically coupled keyline for grid block or direct keying. • Speed and volume control. • Self completing dots and dashes. • Operates from external 7-14 volt supply or 9 volt battery (internal optional). • 5-50 WPM. • Squeeze keyer, semi-automatic "bug" or straight key operation • **Size:** 6.25"W x 2.25"H x 7.0"D (15.9 x 5.4 x 17.3 cm). • **Weight:** 1.4 lbs (.63 kg).

Specifications, availability and prices subject to change without notice or obligation.

R.L. DRAKE COMPANY

DRAKE

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

We proudly announce our Amateur Communications Terminal, the ACT-1. It's the best value in the Amateur Radio market for your RTTY/CW requirements. Check the combination of features and proven MICROLOG quality. You'll agree, the ACT-1 is a "Tough ACT to follow." Microlog Corp. 4 Professional Dr. Suite 119, Gaithersburg, MD 20760, Tel. 301-948-5307 Telex 908778.

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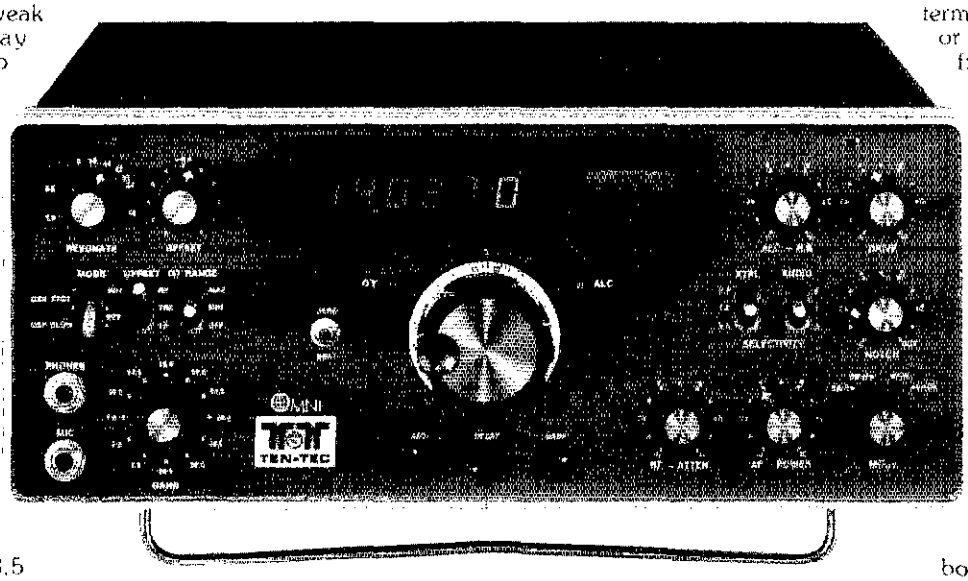
INNOVATORS IN DIGITAL COMMUNICATION

• SIMPLE DIRECT CONNECTION to your Transceiver. • COMPLETE SYSTEM, built-in Demodulator & AFSK Modulator with keyboard programmable tone pairs from 500 to 3000 Hz. • SPLIT-SCREEN operation with keyboard selectable line location • 1400 character text buffer. • TEN, 40 CHAR. programmable message memories, plus ID's WRU & SELCALs. • RANDOM CODE generator & hand key input for practice. • Baudot 60 to 132 WPM. • ASCII 110 & 300 baud. • SYNC-LOCK & NON standard speed ASCII operation from 10 to 200 baud, (slow speed = noise immunity). • RECORDER INTERFACE for "BRAG-TAPE" or recording off-the-air. • CODE CONVERTED Printer output in Baudot or ASCII. • SSTV/GRAPHICS transmit. • FULL 63 KEY Computer grade keyboard.

*9" monitor $199.

The Rig That Filters The Crowd



OMNI-C has what it takes to filter the crowds. To narrow the Amateur Radio world right down to the particular signal you want. The selectivity, sensitivity, dynamic range and operational features you need to cut any crowd down to size.

Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

Standard filters include an excellent 8-pole 2.4 kHz crystal ladder filter and, in addition, a 150 Hz active audio cw filter with three ranges (450, 300, 150 Hz).

Optional filters include 1.8 kHz 8-pole crystal ladder ssb filter, 500 Hz 8-pole cw filter, and 250 Hz 6-pole cw filter.

Front panel switches put any optional filter in series with the standard filter for up to ***16 poles of filtering*** for near ultimate skirt selectivity.

Four i-f response curves for ssb and three for cw. That's response tailoring, *that's crowd control.*

Optimized sensitivity and dynamic range. The OMNI sensitivity range of 0.3 μV typical (slightly less on 160 & 80M) combines with a 90 dB dynamic range to provide an ideal balance that will handle any situation from copying a weak signal half way 'round the world to keeping the next-door kilowatt from muscling in. And a PIN diode switched 18 dB attenuator is included for extra insurance against overload.

More crowd-handling features—and all standard equipment.

Built-in notch filter. To drop out unwanted signals or carriers. Tunable from 200 Hz to 3.5 kHz, with a 50 dB notch depth.

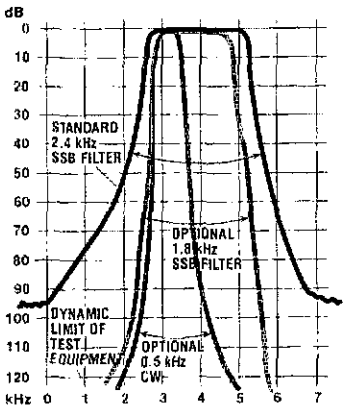
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, ±500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any *crowd.*

All solid-state—from the pioneer, Ten-Tec.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.

"Hang" AGC for smoother action.

WWV reception on the 10 MHz band.

Digital readout in two colors, red for the 5 significant places, green for the 6th digit (100 Hz). Instant recognition.

Separate receiving antenna capability. Switch receiver to a common antenna for transceive or separate receive-only antenna; the system also acts as receiving antenna by-pass with an instant break-in linear amplifier or transverter.

"S"/SWR meter, electronically switched

200 watts input, all bands, with 50-ohm load. 5 year pro-rata warranty.

100% duty cycle on all bands up to 20 minutes. Full RTTY and SSTV power.

Built-in VOX and PTT with front panel controls.

Built-in phone patch jacks for easy interface.

Built-in zero-beat switch for spotting the exact frequency of a DX station.

Built-in adjustable sidetone volume and pitch.

Adjustable threshold ALC, optimum power for driving a linear. Provides means of working into a high SWR.

Front panel control of linear or antenna. The rear panel bandswitch terminals control relays or circuits in step with front panel bandswitch.

Automatic sideband selection plus reverse.

Low distortion audio, less than 2%; a Ten-Tec trademark.

Clean signal, exceeding FCC requirements.

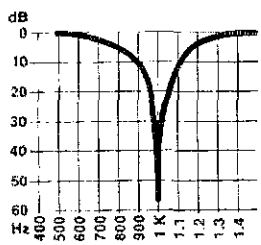
High stability over wide temperature and voltage excursions.

Built-in speaker, compression-loaded; in bottom of cabinet.

Plug-in circuit boards for fast easy service.

12-14V dc power for easy mobile use.

TEN-TEC OMNI-C



NOTCH FILTER PERFORMANCE ADJUSTED TO 1 kHz POINT.

All 9 hf bands—only crystals are needed for 18 and 24.5 MHz bands.

Broadband design for instant band change without tune-up or danger of damage to the final amplifier. Another Ten-Tec *original.*

Full complement of accessories:
Model 280 Dual Primary AC Power Supply, $169. Model 255 Deluxe Power Supply/Speaker Combo, $199. Model 243 Remote VFO, $189. Model 215 PC Microphone, $34.50. Model 214/234 Microphone/Speech processor, $39/$139. Model 645 Dual Paddle Keyer, $85. Model 670 Single Paddle Keyer, $39. Model 227 Antenna Tuner, $79. Filters $55 ea.

Made in the U.S.A.

Model 546 OMNI-C transceiver $1289

Get out of the crowds with OMNI-C. See your TEN-TEC dealer or write for details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

IDAHO: SCM, L. H. Allen, Jr., W7JMH — Elmore County ARC has new emergency plans, 12 new Novices in the past 3 years, 13 have helped with the March of Dimes Walkathon and Bikeathon. They are working on a new repeater for the Mountain Home area, on 146.01/61 fm. KA7COI is now KB7XT, KA7HJF now KB7ZB. KA7HCY has new ICOM 2-M. KA7IHO and KA7EKR putting up 11 el beams on 2-M.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935 ssb	8 P.M. Dy	30	1233	36
CD	3990 ssb	8:10 A.M. M-F	21	593	10
IMN	3635 cw	9 P.M. M-F	21	186	82

N7AYL in Texas June 9-17. W7HZL and XYL in Canada June 6-14. Oly, XYL of W7GHT in Clarkston Hospital for surgery June 1-3 — home now doing nicely. Traffic: W7GHT 218, W7JMH 47.

MONTANA: SCM, Les Belyea, N7AIK — KA7BXT and W7ZQA are SKs. K6PP from Anaconda is new Asst. SCM, welcome. Both the Glacier-Waterton and WIMU hamfests were well attended and successful. Was nice to visit with W2HD (ARRL pres) on his first trip to Montana. Hams from Wolfpoint and Bozeman aided with the Bike-A-Thon. Very heavy wet spring snow took out the 34/94 repeater in Butte for 10 days. Flooding in many areas of the state put ARES members on alert. New Novices in the Sidney, Savage area: KA7KBZ KA7KCA KA7KCB KA7KCC KA7KCD KA7KCE KA7KCF KA7KMG KA0KUF, KB7Q and KD7Q have their hard earned DXCC award. New officers Libby Amateur Radio Klub (LARK): K7JZO, pres.; WB7DBY, v.p.; KA7FVP, secy./treas. KB7Q reports some aurora and single hop ES on 6-M. Also active on 6 is W7RZY KF7T KL7DLC. 31/91 repeater in Livingston is on top of Sheep Mountain and running nicely. KA7ADM WB7WBA W7JMX got new calls for their vacation — G5DWJ G5DWK G5DWL. FB. Net reports QNI (only): IMN 186, BSN 191, MTN lost report, sri. PSHR: W7TGU 67, WB7DZX 113. Traffic: W7TGU 1178, WB7DZX 104, K7SIK 30, N7AIK 17, WB7UTJ 17, WB7BWZ 15.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	0145Z Dy	3908	770	68	K7WPC
OSN	0230/0600 Dy	3587	415	398	KB7JW
OARES	0115Z Dy	3993.5	404	101	W7HLF
OARES	0230Z Dy	3993.5	224	67	W7HLF
WCN	0300Z Dy	3708	342	120	K7ZIG
PTTN	0300Z Dy	146.76	414	61	W7LRB
PdxARES	0330Z Dy	147.32	1218	22	K7WWR
LBLARES	0330Z Dy	146.79	1023	23	WB7OQH
SOARES	0315Z Th/Sa	146.94	198	89	KA7DBS
MPARES	0300Z Tue/Th	147.02	200	2	WA7ZAF
LOCARES	0300Z T,W,F,SU K.	147	4		W7LRB

Upgrades: KA7DHU KA7HID WB7RKW WB7VGG N7CME KA7HOJ KA7DRH KA7IAX, congrats! WB7TKY collected two gold medals in Vocational Industrial Club state contest. New DXCC for WB7VUF. Special demo station at Pdx Hobby Fair, Washington Park Zoo, originated 23 messages and received twelve on May 31. Ops were WA7LGN KB7JW KA7ELI and N7BMY. New repeater on 146.30/90 for Tualatin Valley. New ARES repeater will be on air in Medford in July on 147.90/30 sponsored by ARES. Late BSN report for April, QNI 670, QTC 41. Jackson Co. March of Dimes Walk-a-thon communications handled by ARES with KB7MM walking the route with handheld. Traffic: W7VSE 648, K7NTS 286, WA7LGN 236, W7LNE 147, WB7OEX 92, W7TC 87, WA7IHS 51, KI7Y 41, W7QMU 31, K7QPW 22, K7WWR 20, KA7DBS 14, W7LT 11, K7GWK 1.

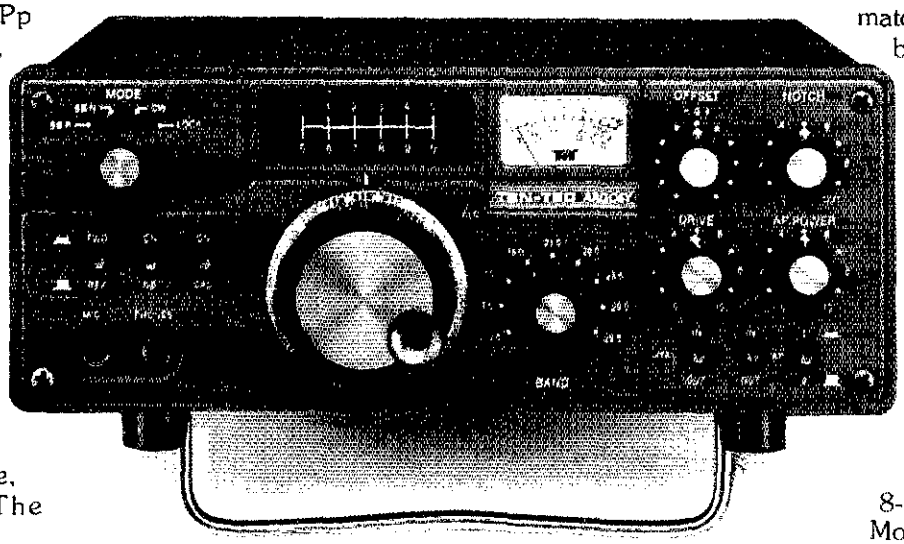
WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. NMs: WA7CBN KA7CSP W7GB W7IEU. Nets reporting are: NTN, QNI 865, QTC 96; WARTS, QNI 3028, QTC 427; NWSSBN, QNI 585, QTC 57; WSN, QNI 655, QTC 219; EWTN, QNI 61, QTC 48; IETN, QNI 132, QTC 48; PSTS, QNI 143, QTC 88, SCARES, QNI 89, QTC 2. Sorry to report W7ETD and KA7HZK have become SKs. Members of Clallam Cty ARC planning to invade Canada on Aug 9 for the International picnic held each year between amateurs of the two countries. Don't forget the Tacoma Hamfair Aug 15 and 16. 26 Spokane area amateurs provided medical communications for Bloomsday '81, the nations 3rd largest footrace. Kitsap Cty ARES members provided communications for the Port Orchard-Bremerton Bike-O-Thon and the NAD Road Run. WB7FGC has upgraded to Extra. Lower Columbia ARA will be at Cowlitz County Fair in August. Evergreen Amateur Radio Service (EARS) provided communications for the Rhododendron Festival and activities. Washington State Amateur Radio Week will be Sept 6-13 with BEARS sponsored Washington State QSO Party beginning Sept 12. New officers for Clark Cty ARC are: WB7WUS, pres.; KA7FLI, vice-pres.; N7BEY, treas.; N7ASX, asst treas.; W7KYX, secy.; WA7YEC, editor. With some good planning by EC WB7SWW and good publicity by Skagit Static editor, W7JGM, the Skagit Cty ARES are plugging up the holes in their communication plan. Traffic: W7DZX 769, WB7TQF 627, N7AFZ 186, W7FJZ 158, K7GXZ 148, N7CSP 141, K7CTP 134, KE7I 124, W7GB 88, W7IEU 88, WA8BDD 71, WA7JEB 64, N7AFY 55, KA7CSP 41, WA7RCR 40, W7BUN 35, WA7EDQ 25, W7LG 15, WB7CFH 14, W7APS 9, W7ERH 3, WA7OJI 1.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF N6DHN VE2AQV/W6. SEC: WB6KQU. N6NE attended Fresno & Santa Maria Hamfests & departs soon for Japan. N6IG & N6AMG have completed their Six-Meter WAS — congrats to both! ATTENTION SECTION CLUB SECRETARIES and/or EDITORS: Please include me on your newsletter mailing list so I can report your club's activities in this column (see page 8 for my address). NCDXC held their May meeting in Oakland honoring their charter membrs. EBARC welcomes new members KA6KZX KA6HND KA6NQJ and new call holders N6EBO (KA6HET) and N6FBQ (KA6HLY). SBARA's "Alpine Group" made it to the top of Mission Peak. Their roster lists 102 members-FB. MDARC mourns the loss of their member, W6JLE. Recent upgrades are WA6LCL to Tech, N6DQL & WA6GFT to Adv. LARK meets second Sat, 0930, Valley Memorial Hospital. Their recently upgraded members are N6DOA to Adv and WA6OHB to Gen. No word on "Klutz-of-the-Month" honors lately! Traffic: W6OA 70, WB6UZX 34, K6APW 28, KA6ERF 5.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. We sadly report the passing of amateurs W7OK and W7HHM. They will be sorely missed. Las Vegas Club had Field Day 81 on beautiful Mount Charleston and a good time was had by all. Congratulations to AD7K on his standing as number 2 in nation. Category cw low power for sweepstakes 80. Look out WA7NIN. KB7MV doing fine job as Northwestern Nevada EC. His net is on 01/61 Thursdays at 7 P.M. local

Here's a Concept You Haven't Seen In Amateur Radio For A Long Time— Low Price.



The right design — for all the right reasons. In setting forth design parameters for ARGOSY, Ten-Tec engineers pursued the goal of giving amateurs a rig with the right features at a price that stops the amateur radio price spiral.

The result is a unique new transceiver with selectable power levels (convertible from 10 watts to 100 watts at the flick of a switch), a rig with the right bands (80 through 10 meters including the new 30 meter band), a rig with the right operational features plus the right options, and the right price for today's economy—just $549.

Low power or high power. ARGOSY has it. Now you can enjoy the sport and challenge of QRPp operating, and, when you need it, the power to stand up to the crowds in QRM and poor band conditions. Just flip a switch to move from true QRPp power with the correct bias voltages to a full 100 watt input.

New analog readout design. Fast, easy, reliable, and efficient. The modern new readout on the ARGOSY is a mechanical design that instantly gives you all significant figures of any frequency. Right down to five figures (± 2 kHz). The band switch indicates the first two figures (MHz), the linear scale with lighted red bar-pointer indicates the third figure (hundreds) and the tuning knob skirt gives you the fourth and fifth figures (tens and units). Easy. And efficient—so battery operation is easily achieved.

The right receiver features. ***Sensitivity*** of 0.3 μV for 10 dB S+N/N. ***Selectivity:*** the standard 4-pole crystal filter has 2.5 kHz bandwidth and a 2.7:1 shape factor at 6/50 dB. Other cw and ssb filters are available as options, see below. I-f frequency is 9 MHz, i-f rejection 60 dB. ***Offset tuning*** is ± 3 kHz with a detent zero position in the center. ***Built-in notch filter*** has a better than 50 dB rejection notch, tunable from 200 Hz to 3.5 kHz. An optional noise blanker of the i-f type has 50 dB blanking range. ***Built-in speaker*** is powered by low-distortion audio (less than 2% THD)

The right transmitter features. ***Frequency coverage*** from 80 through 10 meters, including the new 30 meter band, in nine 500 kHz segments (four segments for 10 meters), with approximately 40 kHz VFO overrun on each band edge. ***Convertible power:*** 100 or 10 watts input with 100% duty cycle for up to 20 minutes on all bands. ***3-function meter*** shows forward peak power on transmit, SWR, and received signal strength. ***PTT*** on ssb, ***full break-in*** on cw. PIN diode antenna switch. ***Built-in cw sidetone*** with variable pitch and volume. ***ALC control*** on "high" power only where needed, with LED indicator. ***Automatic*** normal sideband selection plus reverse. ***Normal 12-14V dc*** operation plus ac operation with optional power supply.

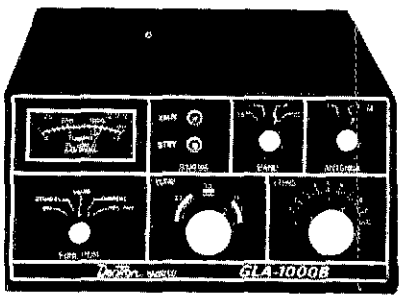
The right styling, the right size. Easy-to-use controls, fast-action push buttons, all located on raised front panel sections. New meter with lighted, easy-to-read scales. Rigid steel chassis, molded front panel with matching aluminum top, bottom and back. Stainless steel tilt-up bail. And it's only 4" high by 9½" wide by 12" deep (bail not extended) to go anywhere, fit anywhere at home, in the field, car, plane or boat.

The right accessories—all front-panel switchable. Model 220 2.4 kHz 8-pole ssb filter $55; Model 218 1.8 kHz 8 pole ssb filter $55; Model 217 500 Hz cw filter $55; Model 219 250 Hz cw filter $55; Model 224 Audio cw filter $34; Model 223 Noise blanker $34; Model 226 internal Calibrator $39; Model 1125 Dc circuit breaker $15; Model 225 117/230V ac power supply $129; Model 222 mobile mount, $25; Model 1126 linear switching kit, $15.

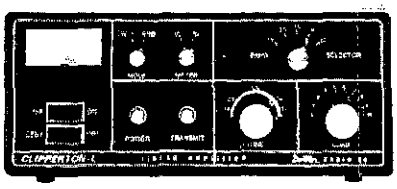
New TEN-TEC Argosy $549

Model 525 ARGOSY —— $549. Make the right choice, ARGOSY—for the right reasons ***and*** low price. See your TEN-TEC dealer or write.

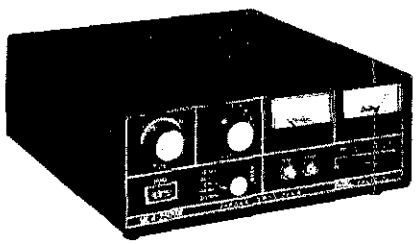
TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862



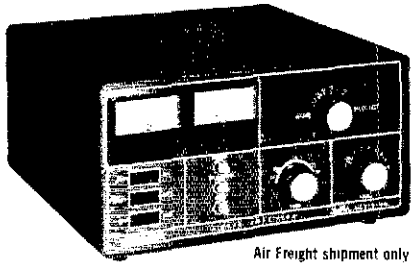
DenTron **GLA-1000B** Linear for 80-15m including some MARS. 1200w PEP SSB, 700w DC CW. (4) D-50A's, **tuned input**, compatible with Solid-State rigs. 125w max. drive. Size: 5⅜"h × 11"w × 11"d, 24 lbs.
Reg. $449.50 - ***Sale Price $349.95★***



DenTron **Clipperton-L** Linear for 160-15m. 2KW PEP SSB, 1KW DC CW, RTTY/SSTV. (4) 572B's, **tuned input**. 65-150w drive. 6"h × 14½"w × 14½"d, 42 lb.
Reg. $799.50 - ***Sale Price $599.95★***

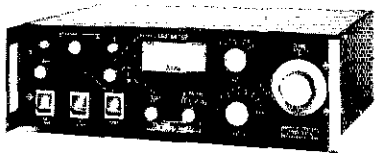


DenTron **MLA-2500B** Linear for 160-15m including some MARS. 2KW PEP SSB, 1KW DC CW, RTTY/SSTV. (2) 8875's, 60-135w drive. 5½" × 14"d × 14"d, 47 lbs.
Reg. $999 - ***Sale Price $799.95★***

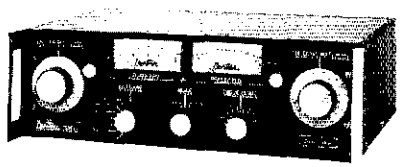


Air Freight shipment only

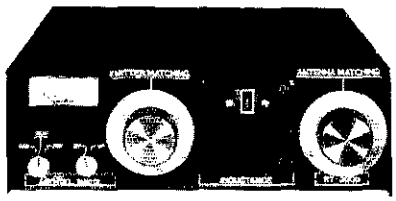
DenTron **DTR-2000L** Linear for 160-15m incl. some MARS. Legal power limit on SSB, CW, RTTY/SSTV (1) 8877, 65-125w drive. 7¼"h × 14½"w × 14½"d, 54 lbs.
Reg. $1300 - ***Sale Price $999.95★***



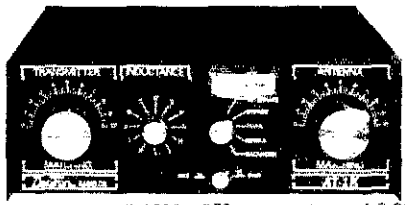
DenTron **DTR-1200L** Linear for 80-15m with some MARS. 1200w PEP SSB, 1000w CW. (2) 572B's, 65-150w drive, tuned input compatible with Solid-State rigs 5¼"h × 17"w (19" w/rack bkts.) × 13"d, 46 lbs.
Regular $665 - ***Sale Price $455.95***



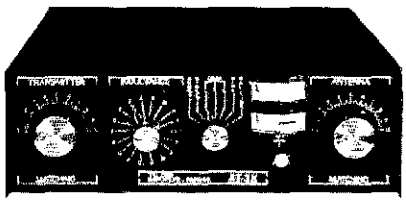
DenTron **DTR-3KA** antenna tuner 3 KW PEP, 1.8-30 MHz. Tunes coax, balanced line or long wires. Size and style match DTR-1200L linear above, 15 lbs.
Regular $499 - ***Sale Price $349.95***



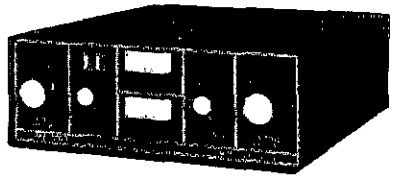
DenTron **RT-3000** Roller inductor tuner. 3 KW PEP. 1.8-30 MHz continuous tunes coax and wire antennas or balanced line using optional BL-1 balun. Vernier dial, wattmeter. Size: 4"h × 12"w × 13"d, 10 lbs
Regular $299 - ***Sale Price $249.95***



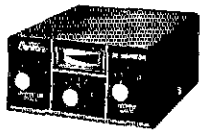
DenTron **AT-1K** 1200w PEP antenna tuner. 1.8-30 MHz - tunes coax, wires and balanced line using optional BL-1 balun. Size: 3½"h × 10"w × 9½"d, 7 lbs.
Regular $154.50 - ***Sale Price $139.95***



DenTron **AT-3K** 3 KW PEP antenna tuner. 1.8-30 Mhz - tunes coax, wires or balanced line with optional BL-1 balun. Size: 4"h×12"w×13½"d, 12 lbs.
Regular $259 - ***Sale Price $219.95***



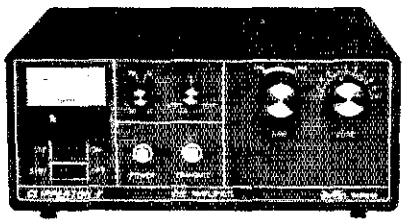
DenTron **MT-3000A** 3 KW PEP tuner. 1.8-30 MHz. Built-in balun & dummy load. Tunes coax, wires and balanced line. Size: 5¼"h × 14"w × 14"d, 18 lbs.
Regular $399 - ***Sale Price $349.95***



DenTron **Jr Monitor** tuner. 1.8-30 Mhz. 200w. Balun built-in, tunes coax, wire & balanced line. Mobile bracket supplied.
Available in August?
Regular $79 - ***Sale Price $69.95***

Accessories:

BL-1 Balun for RT-3000, AT-1K & AT-3K	$49.50
1 Kw 4:1 chassis mount balun	29.50
3 Kw 4:1 chassis mount balun	39.50
All Band Doublet 160-10m antenna	29.50
100' 2 Kw 470 ohm ladder line	12.00
100' 2 Kw 300 ohm transmission line	19.50
SWL flat top antenna kit	19.50
Big Dummy 1 Kw dummy load w/ oil	39.50
SWR-1A SWR/Power meter, dual meters	49.50
W2 1.8-30 MHz wattmeter	Sale 99.00
W2-PEP Pk/av wattmeter, 1.8-30 MHz	Sale 119.00
Multi-PS-10 VOM/wattmeter/SWR bridge	Sale 29.00



DenTron **Clipperton-V** 500w amplifier for 144-148 MHz, FM/SSB/CW/AM. Compatible with 2m Multi-modes. 4CX-250B, 2-25w drive. Typical input/output: 2w/190w, 5w/295w, 10w/365w. Built-in supply and RF antenna relay. 6"h × 15"w × 17"d, 42 lbs.
Regular $599 - ***Sale Price $539.95***

★Sale Prices on these units limited to units purchased at the old price. First Come - First Served!

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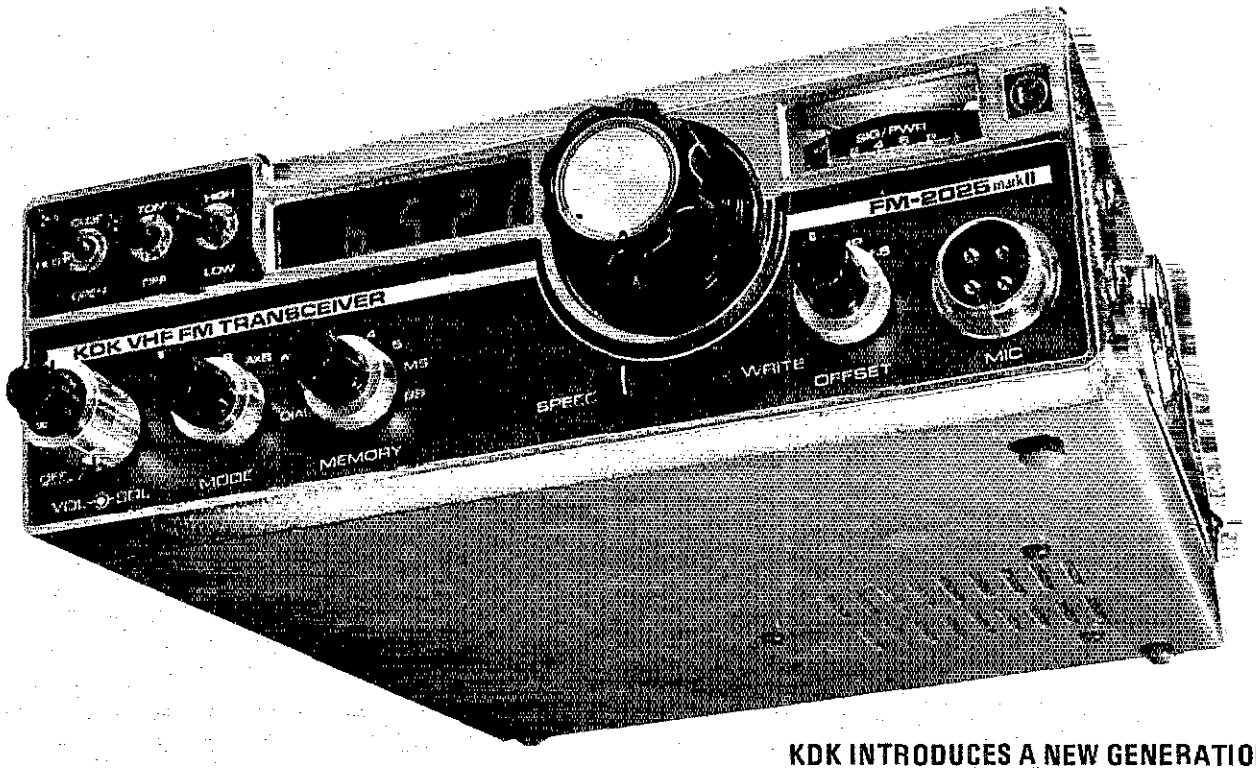
KDK



KDK INTRODUCES A NEW GENERATION OF 2 METER FM RADIOS. THE SPARKLING 2025A MKII IS LOADED WITH FEATURES. EASE OF OPERATION IS THE DESIGN CONCEPT AT KDK AND THIS RIG HAS BEEN ENGINEERED WITH THE HAM IN MIND.

- Features such as ten channel memory in two banks of five each, a solid 25 watts of power, full MARS and CAP coverage from 143.000 Mhz to 148.995 Mhz, plus built in memory retention for up to one year . . . and much, much more makes this the radio of the year.
- If you have been waiting to move up to a new model, or have wished for a radio with "everything" . . . KDK has it!
- The ten channel memory is easily addressable and you have two banks of five channels each. You can even use both banks at once for odd splits.
- Standard 600 hz shift up or down — plus factory available boards for foreign shifts. Your 2025A is never obsolete!
- Band scan or memory scan. Memory scan is easy. There is also band scan with upper and lower limits you can choose yourself!
- Built in nicads for the memory retention which has drain in nano-amps, not milli-amps. The internal battery will hold the memory for up to one year! No other radio offers you this feature.
- Fast and easy dialing. Full solid state dialing and you can choose from the front panel either a fast or slow dial rate.
- No relays are used, only solid state switching. This eliminates a trouble spot many radios encounter.
- KDK has also eliminated another trouble spot by completely hand wiring each radio. No internal plugs to become intermittant and no wire wraps either, just good solid wiring.
- KDK gives you one of the hottest receivers you can find. By using UHF (not VHF) dual gate MOS-FETs with electronic auto tuning for the RF amplifier and the first mixer, you have a combination of ultra sensitivity and maximum quietness.
- The squelch on the 2025A MkII is highly sensitive and front panel adjustable, use it for ultra-DX or super local.
- The audio output stage in the 2025A MkII uses an integrated circuit which has internal protection against over-voltage and shorted output conditions. Plus it is a high audio output chip — just what you need in a noisy mobile situation.
- The transmitter uses direct VCO varicap modulation for true FM. Your transmitted audio sounds as it should; crisp, clear and natural.
- The power output stage of the 2025A MkII will not break down even with an infinite VSWR load, and uses heavy duty solid state antenna switching with a four stage low pass filter. All this gives you an exceptionally clean, spur free output.
- KDK has included an adjustable sub audible tone circuit which can also be used for CTCSS or tone burst on transmit. Again, more features!
- Size is 2 7/10" high, 7 1/8" wide, and 9 1/2" deep.
- You can switch from 25 watts to 3 watts low power.
- And, of course, the DC cable is included along with the matching microphone and mobile mounting bracket. A tone encoder microphone is also available to match and is, naturally, pre-wired.

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time. Use of 01/61 machine courtesy of SNARS. Don't forget the Sierra hamfest in Reno August 22nd. Contact W7BS via CB address, Beehive Net or Nevada Sagebrush Net, for details. Nevada Sagebrush Net M-F 7:30 P.M. Pacific time on 3906 kHz. And we extend our hearty congratulations to W7PBV on his election as Utah SCM. Traffic: N7AKX 438, W7BS 106, W7SK 7.

PACIFIC: SCM, Pat Corrigan, KH6DD — SEC KH6CKJ has resigned due to compelling personal committments and I reluctantly must accept. He has done well in getting more interest in emergency preparedness in the section and selecting good ECs. Now we must replace him. The new EC for Kauai County is KH6S. KH6HIJ doggedly keeping Pac Tfc Net alive despite nagging early sked problems and others. NH6K helps out. He is getting Hawaii-West ARS going. KH6HIJ visits sons in Wash/Balt. during July. Maui ARES did comms for March of Dimes Superwalk America in Apr. KH6ITL, EC for Guam, has hams doing plenty of public service. Saw AH2A at Pac Div Convention in Fresno. He still is active on Guam. WA7SBF now Extra, congrats. YJ8JH visited KH6DD in June. Ex-KH6HGG is now KB2YC in NY. Traffic: KH6HIJ 63, KH6H 1.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. New officers for the Yuba/Sutter ARC are: N6DDP, pres.; N6CCS, v.p.; KA6CQH, secy.; KA6LWR, treas.; KB6MD WD6BFR WD6CEM KA6LIJ KA6LIK, dir. Congrats to K6LYT N6AUB KA6CQH and KA6ETM on getting their Advanced license and KA6LWR on Tech. Dedicated public service operator, ORS and former EC, W6DEF is a Silent Key. A class act will be missed. The Yuba/Sutter ARC reports that member W6TSJ is also a Silent Key and a memorial trophy in his name will be awarded the winner of their competition with the Oroville RC for Field Day operations. The North Hills RC's annual Ham Swap was a great success. W6TOW won an Azden PCS 3000 and KA6AUF won a S2-T. New Emergency Coordinator for Trinity Co. is WA6ZUD New Emergency Coordinator for Placer Co. is K6DMF. Asst EC is KA6ESF. K6DYT is the new EC for Glenn and Butte Co. replacing WB6CQF. Thanks for your years of work as EC. Traffic: N6AUB 9, W6SX 3.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Marin ARC active in Pacific Sun Marathon and Dipsea race, with Amateur Communications Society (K6GWE/R) also active in PSM. Fuddy Duddy Telephoneers (WB6FDT/WR6ACI) entered a repeater in the reclaimed materials category of hobby show at Ladd Chapter Assembly and won second prize! San Francisco RC presentation of Wouff Hong ceremony at Pacific Division Convention was huge success. Members of Sonoma County RA are presumably saving ferrite rods after hearing W6BIP speak about RFI. WB6MKD is now KD6VJ. New Technician is N6ECT. Remember NCN on 3630 kHz at 0300Z and 0430Z and 145.41 MHz at 0330Z. PSHR: W6RNL. Traffic: (May) W6IPL 254, W6RNL 163, K6TP 36, K6TWJ 35, W6GGR 17. (Apr.) W6GGR 18, KB6LO 10.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst SCMs: WA6YAK W6TRP WA6HIN. Officers of the Kern County ARC are: N6DIB, pres.; WB6WPC, v.p.; WA6CDB, secy.; WB6KLL, treas. The club meets the 1st and 3rd Fri in Bakersfield. W6ZXR KA6BTV K6PAZ are Silent Keys. K6RGZ WB6TQH KB6MQ are Extras. N6AUY WB6WWJ N6DYJ are Advanced. KA6NWG N6DIV KA6IZY KA6LGN N6DBH WB6WVE are Generals. WB6YHI KA6FSR KA6OEZ KA6IXC KA6OUC KA6OUA are Tech. KA6LGD is N6EMW, KA6LGF is KD6YQ, KA6NSJ is KD6WL, KA6JJO is N6EOG. WB6ZCJ has an IC 251. K6CZO and W6TO have TS 130Ss. WB6YHI a TR 7800. WA6JDB a TS 830S. W6QOS a PCS 3000. WB6HEQ a FT 902DM. WB6OIV a TS 530S. WB6YAR and WA6ZCL have TR 7850s. Thanks to all who attended the ARRL Pacific Division Convention in Fresno. 600 were registered. Traffic: (May) N6AWH 71, KB6CC 18, W6DPD 17, WA6YAB 10, WA6JDB 8, K9YBM 5, KV6W 3. (Apr.) WB6WYA 8.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. A stay in the hospital most of the month curtailed K6AYB's OO activities. W6ASH and SPECS group of 15 participated in the Earthquake Demo Exercise at El Camino Hospital. Also 30 SPECS were at the Palo Alto Tennis Tournament, with WA6NIL in charge. W6ZRJ attended Pac Div Convention and bought a Tempo 1, so he can hit more repeaters. WB6GFJ working on Skywarn roster and busy learning computers. The SBARA group attacked Mission Peak and once again conquered it. Memorex ARC hopes to get a 2-mtr rig for the club station. West Valley ARA meets twice a month at Los Gatos Red Cross on 1st and 3rd Wednesday, recent talks were on RC Models and on Sunspots. Palo Alto ARA meets 1st Friday of month at Menlo Park Rec. Center and W6IIF, a recent speaker, talked on "Amateurs and Radio Towers." A new member of PAARA is K6JJU. W6NVO was hospitalized with a massive heart attack. Get well soon! A rep of the Red Cross spoke to San Lorenzo Valley ARC on their blood donor program. Recent upgrade was WB6DXQ to Advanced class. W6OIG presented a video taped DXpedition to Navassa Island to the Naval Postgraduate School ARC. The NPSARC provided communications for the Monterey March of Dimes Walkathon. San Mateo RC enjoyed two Pacific Telephone movies; "Any Day Without Warning" and "Light Waves." FARS Flea Market at Foothill College Sept 12, 1981. The Santa Clara Valley Repeater Society is very active in giving communication support for public service affairs. Traffic: W6YBV 260, W6KZJ 105, W6ZRJ 39, W6ASH 24, W6RFF 24, W6PRI 13.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S. ASCM: N4UE. STM: NJ4L. SEC: WA4BFT. NMs: CN AB4V, CMN NJ4L, THEN WD4CNR, JFK WB4WII, NCSSB WB4CES, Cape Fear ARS, WB4YZF, set up demo on Memorial Day at VA Hospital in Fayetteville. Present were WA2HON/4 N4DTB N3EUV KA4SOM N4EWG N4ESX N4ESF and KU4W. Keep the news items coming. NB4L temporarily off the air due to rig problem. KF4R lost antenna to tornado — no one hurt. WA4YSK working with 75m Net Managers and Directors to polish our traffic operations. Thanks for the work. Carolinas Novice Net Managership now in SC as per prior agreement. Much thanks to WD4JJK for a job well done. By now, Field Day '81 is history. Are you satisfied with your group's effort? Start planning for next year OR A REAL EMERGENCY! ARRL affiliated clubs with no annual reporting for last two years going to inactive list. Is your club one of those? Start planning now for your fall Novice and/or upgrade

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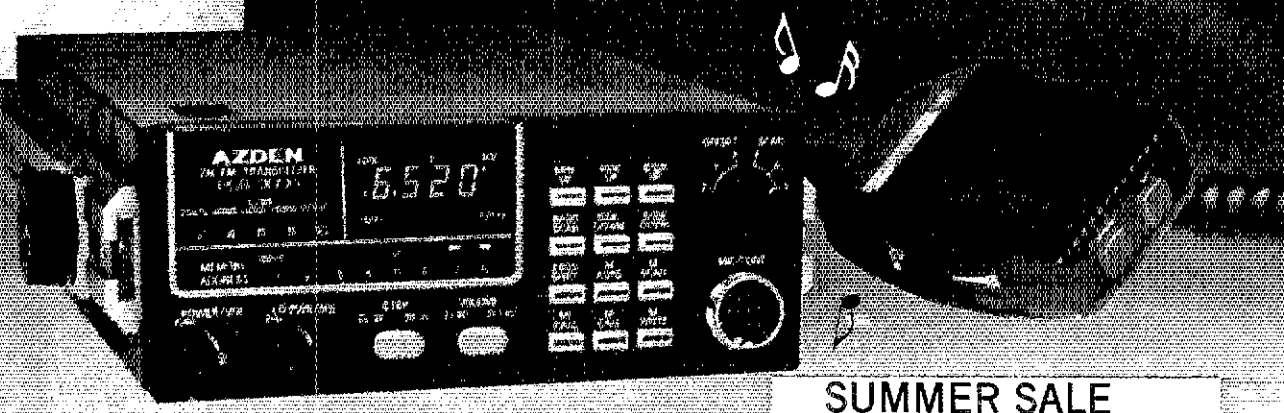

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- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
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classes. Traffic Information Pool (TIP) now ready to give presentations to interested clubs — or other groups — on traffic. All your club has to do is request a program. Contact W4EAT, Carl E. Starnes, Box 188, Stanfield, NC 28163. Traffic: (May) NJ4L 329, WD4CNQ 246, WD4CNR 221, W4EAT 215, AB4S 195, WB4WII 175, WA4SRD 140, WA4UTC 117, K4DHX 114, AB4V 101, WD4JJK 95, NB4L 90, W8PJS 72, WB4UJH 72, KU4W 68, W4FMN 85, AB4J 62, KA4ODX 55, K4MC 52, KC4AM 51, K4FTB 42, K4VHT 42, N4CJJ 40, K4IWW 34, KZ4A 33, WA4OBR 31, NE4J 26, KA4AJI 25, WB6OTS 19, WA4PID 18, WB4CYN 12, WD8NRC 12, WD4EIQ 10, WB4TOP 10, W4WXZ 10, WA4IHG 8, N4UE 8, W4EHF 7, WA4CUD 4, WB4YGF 2. (Apr.) K4VHT 58.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK, SEC: WD4HLZ, STM: W4ANK, NMs: K4PFC W4ODE KA4AUR. Sorry to hear W4NQL back in hospital. Congrats to K4SUG for earning the A-1 Operators certificate. Thanks to all for their reports, both club and individual. All nets welcome you, the NTS nets as well as the local nets. Check-ins/traffic: SC SSBN 1224/170; Blue Ridge 2-Meter Net 1842/66; SC Noontime Net 281/43; Lancaster County 2-Meter Net 149/8; Western SC Emergency Net 375/26; Newberry County ARES Net 90/2; CNN 137/42; Trident ARC 116/2; Dixie 6-Meter SSBN 7/0; Spartanburg ARC 2-Meter Net 319/22. Traffic: K4ZN 348, W4NTO 122, W4ANK 113, K4ZB 85, KA4AUR 65, K4FRX 39, K4KEP 28, W4MTK 28, WA4MIY 22, AF4E 15, KA4LRM 12, WD4NNF 11, NC4F 10, WA4JWS 10, WA4MCG 10, W4FMZ 7, W4DRF 4, N4EE 1, WB4KNB 1, WB4QHF 1.

VIRGINIA: SCM, Luck Hurder, WA4STO — STM: KY4K, SEC: KZ4K, Chief OBS: K3RZR. Chief OVS: N4CD. Chief OO: W4HU.

Net	Freq.	Time	QNI	QTC	Sess.	NM
VSBN	3947	6:00	570	472	31	W4NWM
VSN	3705	6:30	344	247	31	WB4KSG
VN	3680	7/10	566	477	62	W4SUS
VLN	3947	10:15	487	246	31	WD4ALY
VNTN	7260	NOON	274	182	31	WD4FTK
WARC	3748	8:30/Sn	33	9	5	K4JST

Congrats again to the many folks at W4PAY who helped to make the American Red Cross Centennial effort such a smashing success. A great example of many people working together toward a mutual goal. STM KY4K busy with moving chores and increasing demands at work. K4DHB participated in simulated Metro crash while W4PVA continued work on EC procedures for Prince William County. W4KFC attended LPM, QCWA board meeting in Texas, and LRPC meeting in Conn. N3RC flew plane all over Florida. Lots of strange new calls hiding behind familiar fists and faces — N4EVV KD4FP and NM4R to name a few. Congrats to recent upgrader, NN4I — a nice call on cw too. Chief OO, W4HU, reporting steady activity among his people, but would like to see more OO volunteers. OVS WD4CXY assembling group for June vhf contest at Bald Knob near Covington. DEC N4BFI participated in planning efforts for the Virginia Beach Neptune Festival as well as the Norfolk Harborfest. Chief OVS, N4CD, reporting good results on six meters. WB4BAT from Luray preparing his green machine for hf and vhf activity, while KB4KL and WA4STO slathering the ether with RTTY and ASCII signals. K4KXE W4SUS N4EVV WB4DAK KZ4K and a host of others preparing for communications support of a combined 100 mile horseback and foot race in the mountains of Page, Warren, and Shenandoah Counties. Traffic: (May) W4PAY 2040, WB4PNV 471, W4ATO 453, WA4STO 434, KZ4K 358, WA4CCK 336, W3BBN 290, N4YE 274, K4KDJ 235, K4JST 215, WB4FLT 198, WA4LJI 197, W3SDQ 183, W4SUS 176, WD4FTK 173, W4NWM 159, KY4K 147, K4DHB 141, WD4ALY 135, WB4MAE 122, KA3DTE 110, WB4KSG 102, K4JM 97, KB4WT 81, WD4KQJ 75, K3RZR 70, KA4IUM 64, WB4KIT 64, K3EJ 62, WD4DUU 60, WA4YIU 60, N4EVV 56, WB4FDT 53, K4MTX 43, KB4PW 42, W4UQ 41, N4DYY 35, KA4ERP 35, WA4QWC 34, K4BAV 27, N4BJX 27, KL7JEO 27, W3BBQ 26, WA1VRL 23, WB4ODZ 22, W4ENU 21, W4OKN 21, WB4UHC 20, W4PVA 19, W4LXB 17, WB4ZTJ 16, KC4HN 15, WB4ZNB 15, W4NLC 14, WB4RWY 12, NN4I 11, W4KFC 8, WA4PBG 8, WA4RTS 8, WB4ODZ 7, W4KXE 5, WA4TVS 5, KD4FP 4, WB4LAB 4, N4LE 4, WA4EQW/M 3, N4NK 3, KI4W 3, WD4EUV 2, K4VWK 2. (Apr.) W4TZC 3.

WEST VIRGINIA: SCM, Karl S. Thompson, KB8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR W8FZP WD8LDY. I regret to report the passing of W8JM, long time Amateur Radio leader in WV. WV QSO party winner was K8LG. New officers for KFC: WD8SCZ, pres.; WA8CML, v.p.; KC8AM, secy/treas. WB8SAW and KA8IBO are Extras. W8HZA active in military to amateur event on Armed Forces Day. First prize at Hunt. HF was won by WD8ODE.

Net	Freq.	Time(Z)	QNI	QTC	Sess.
Hillbilly	14290	1600 Su	148	42	5
WV PHONE	3990	2200 Dy	530	110	31
Phone-MD	7235	1600 Dy	477	61	30
NOVICE	3730	1615 Dy	85	14	28
KFC 2M	87/47	0130 Tu	108	6	4

Traffic: KD8G 146, WD8AXY 80, K8QEW 47, K8MHR 38, W8HZA 32, W8FZP 31, AI8I 30, KC8CR 29, WD8POG 25, W8YP 22, N8AJC 21, W8CKX 17, KC9CS 15, KD8X 11, N8CFY 10, N8II 9, WB8TDA 9, KB8M 9, K8JQ 6, W8CNF 5, WD8DHC 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, W0ACD — SEC: K3PUR. STM: WB0MCL. NMs: W0EJD N0AXQ W0AIT KB0Z. WHY TRAIN FOR EMERGENCIES? One EC has a very definite reason. WB0DUV, EC of Adams Cty., was gald that she had been through a severe weather training course, as on June 4, she observed a rotating wall cloud over the Denver metro area. There was a severe Weather Net in progress on 146.34/94 due to weather conditions in the area. WB0DUV noted that one of the cells seemed to be headed towards Thorton, in Adams County. Upon further observation it produced three distinct funnels, one of which was directly over her car. Without regard for her own safety she proceeded to follow the path of the funnel, reporting to the weather *bureau and all listening personnel, among them a* teacher in the public school who took action for the safety of the students. After the tornado rained destruction on a portion of Thorton, WB0DUV, who is a Red Cross worker, immediately took over as Red Cross Coordinator leaving the communications to the Assistant ECs. The Red Cross kept her and the ARES people busy for four days helping to provide comfort to the victims. Our hats off to WB0DUV for a job well done! Nets: HNN, 28 sess, QNI 1604, QTC 128, Inf 205, QNF 1136; COLUMBINE, 28 sess, QNI 887, QTC 54, Inf 171, QNF 805; CWN, 26 sess, QNI 194, QTC 186, QNF 751. Traffic: (May)

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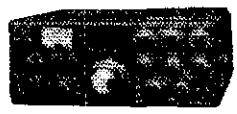
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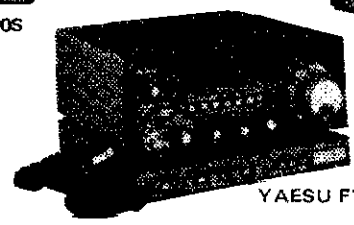
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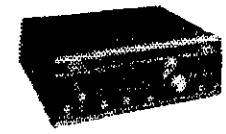
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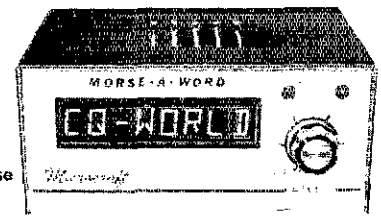

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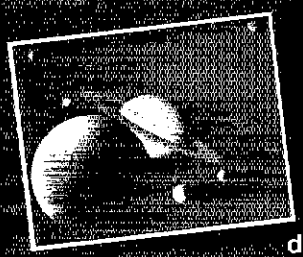

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or 28680 kHz. (±5 kHz)

Dates: Aug. 15-Aug. 30, 1981
Times: Daily
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2330 to 0330 GMT

Additional activity is planned for weekends. Listen to announcements on above frequencies for additional times and frequencies.

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N0BOP 1966, W0WYX 1823, WA0HJZ 1099, W0EJD 238, WD0AIT 200, W5HRS 60, W0NFW 43, W0RE 42, W0GO 26. (Apr.) KB0Z 104, W0GO 30.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR, NMs: WB5NNG KG5L & W5VFQ. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 159 msgs with 266 stations in. New Mexico Roadrunner Net (NWRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 161 msgs with 871 stations in. New Mexico Breakfast Club meets daily on 3.940 kHz at 0700 local and handled 70 msgs with 747 checkins. Yucca 2-Mtr Net, 146.01/61, handled 26 msgs with 706 checkins. Vy sorry to report the passing of W5FPB. He was a friend to all hams and will be greatly missed! Sorry the April report was fouled by the Postal Service. Everyone reported a great time at the "Bean Feed." Approx. 400 attended. Traffic: N5NG 175, W5JOV 133, W5ENI 93, KG5L 87, KA5DDW 49, WA5MIY 24, KB5LI 10.

UTAH: SCM, Royce Henningson, K7QEQ — WA7MEL reports that WA7DLH and KA7DLH rescued and returned home to Ogden 2 stranded motorists whose car had broken down 28 miles south of Nephi. W7OCX reports that on the 16th of May an accident on I-15, north of Beaver, was reported to the Highway Patrol through the Beehive Utah Net. Stations involved were W0IJA W7OCX K7EYE and WA7MEL. W7PBV has earned the Beehive Utah Net certificate. This is the last report from K7QEQ. Remember to send your report to Norman, W7PBV, your new SCM. Traffic: K7HLR 126, WA7KHE 124, WA7TEH 90, WA7MEL 50, W7OCX 18, WA7JHC 14.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. WB7OFK is back home and recouperating from surgery. Two very nice hamfests coming up in Sept. High Plains Round-Up, 9-12-81, west of Cheyenne and High Plains Amateur Radio Rendezvous, 9-13-81 at Fort Laramie. A very enjoyable weekend in the Southeast part of our section. New Novices: KA7JYZ KA7KEW KA7KEZ & KA7KBM. Recent upgrades include KA7CUJ to Advanced. WB7HNR reports the Wyo. Cowboy Net held 21 sess with 559 QNI & 14 QTC. WA0PFJ reports the Wyo. Jackalope Net held 25 sess with 538 QNI. Hope eveyone is enjoying the summer, & remembers to check into the nets. Traffic: W7SQT 646, WB7NHR 171, W0OGH 167, K7SLM 6.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The Birminghamfest '81 is now history, everyone had a good time. Speaking of hamfests, don't forget the Huntsville Hamfest on Aug. 15-16th at the Van Braun Civic Center. It will be real cool inside, HI. BARC new members are KU4J KA4RUK WD4DJL K5KM WA4HMK and K4NEH who got his Novice ticket at age 70. It's good to see the clubs attracting new members. Enterprise ARC reports WD4HBG upgraded to Advanced. They also have a net on Thur. at 7 P.M. local. WD4ROJ repeater, listen in. AENB manager reports QNI 236 in 31 sess, 88 messages. AENM manager reports QNI 2814 in 36 sess, 135 messages. AEND manager reports QNI 254 in 31 sess, 92 messages. AENJ manager reports QNI 544 in 31 sess, 23 messages. CAND net manager reported 100% from Ala. by W4IBU and W4CKS. DRN5 manager reported Ala. 96.7% by W4CKS KA4GIA W4IBU WA4JDH and WA4PIZ. AENX 2-Mtr Net reported QNI 176; they had weather alert on 18th and 26th. Muscle Schoals ARC held a drill on May 9th at the Browns Ferry Nuclear Plant. Hams participating were WB4ZVH WA4JPK WB4NQH WA4LBX WA4HRV KC4IK K4JXS and WA4KBD. NE4L beat all who tried with 45 wpm at Birminghamfest '81 to take championship. HAYLARC, Huntsville, new officers are: WA4AXA, pres.; WB4TJE, v.p.; WA4MLK, secy.; WA4DJW, treas. The "Ham of the Year" award for HAYLARC was won by WA4AXA. The Citizenship Award was presented to WA4QIN at B'Hamfest '81. K4DSO was presented a special award for many years of unselfish dedication to ham radio, congrats to both. Traffic: (May) WA4JDH 1082, W4CKS 132, WA4ZPZ 51, K4AOZ 40, W4IBU 38, W4LXP 32, K4UMD 25, WA4JPK 24, WD4DHI 16, K4HJX 16, AA4J 8, WB4TVY 8, WA4RMP 8. (Apr.) WA4ZPZ 69, K4HJX 34, WA4JPK 26, WB4EKJ 5.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC/NVOAD: WA4PUP. STM: W4WXA. Chief OBS: W4BIA.

Net	Freq.	Time (all EDT)	Mgr.
GCN	3995	0700 Dy 0800 Sun	W4HON
GSN	3595	1900 & 2200 Dy	K4EV
GTN	7118	1815 MWF	Vacant
GSSBN	3975	1930 Dy	WB4ZVX
ARES	3975	1830 Sun	N4BGH
GA TFC	7243	1200 Dy	W4GH
GERN (RTTY)	3620	2030 Fri	WA4ZHC

NM4P (Ex WH6AEO) tnx all Atlanta area hams for the courtesies shown him while he was stateside. He will be on 15 & 20 from Honolulu to keep in touch. K4NYK now NM4T. Thru the efforts of a lot of dedicated people the Savannah area is well covered with FB repeaters & nets & is ready for any emergency. I look forward to receiving the many club bulletins each month & I must say that I enjoy every one. Much effort is given in their preparation. Congrats to K4AZM KA4ATM WB4NTW WD4ADV & W4GH on receiving Region Net certificates. WB4WQL back on again with new Omni. W4CZN went thru receiver problems & now the xmtr is acting up. Will AA4FT become a grandfather one day? The section's sympathies go to W4DGN on the loss of his son, KA4SYP. W4FCW K4YGI WB4DEB WA4GVJ & K4AQA back on the road to recovery after illnesses. Club members please check with your leaders to see that your ARRL club affiliation is current. Many have failed to send in the forms sent by the Leage. Conyers ARG continue with FB activities. Just about all club members have enrolled in the ARES program. Clubs planning an ARRL Hamfest should contact our S.E. Director, W4RH, for the forms at least 3 or 4 months prior to the activity. In fact the ARRL would like it a year in advance. After all of this hot humid weather & vacations, we should all get back to normal. 73 & have a gud summer. Traffic: WA3NAZ/4 232, W4WXA 215, K4EV 114, W4GH 89, W4PIM 48, WB4LBM 36, N4UZ 26, W4FIZ 24, K4JNL 18, W4HON 16, W4BIA 15, K4BAI 6, KA4ATM 5.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. N4EC is the new NM of QFN, the All-Fla. CW Net. Gainesville ARES members getting involved with Skywarn. GARS has a membership drive underway. Contact WA4PWF or WD4ASW for info on the club. Greater Jax Hamfest is August 1st & 2nd at the Orange Park Kennel Club. In FWB area, W4ODW is ready to go on 1296 MHz with a homebrew tripler and K4KJP is working QRP on 432 MHz and has LA & TX. WD4HDT and WD4CFO active on 6 mtrs. The Orlando ARC assisted with March of Dimes Walkathon & Stand

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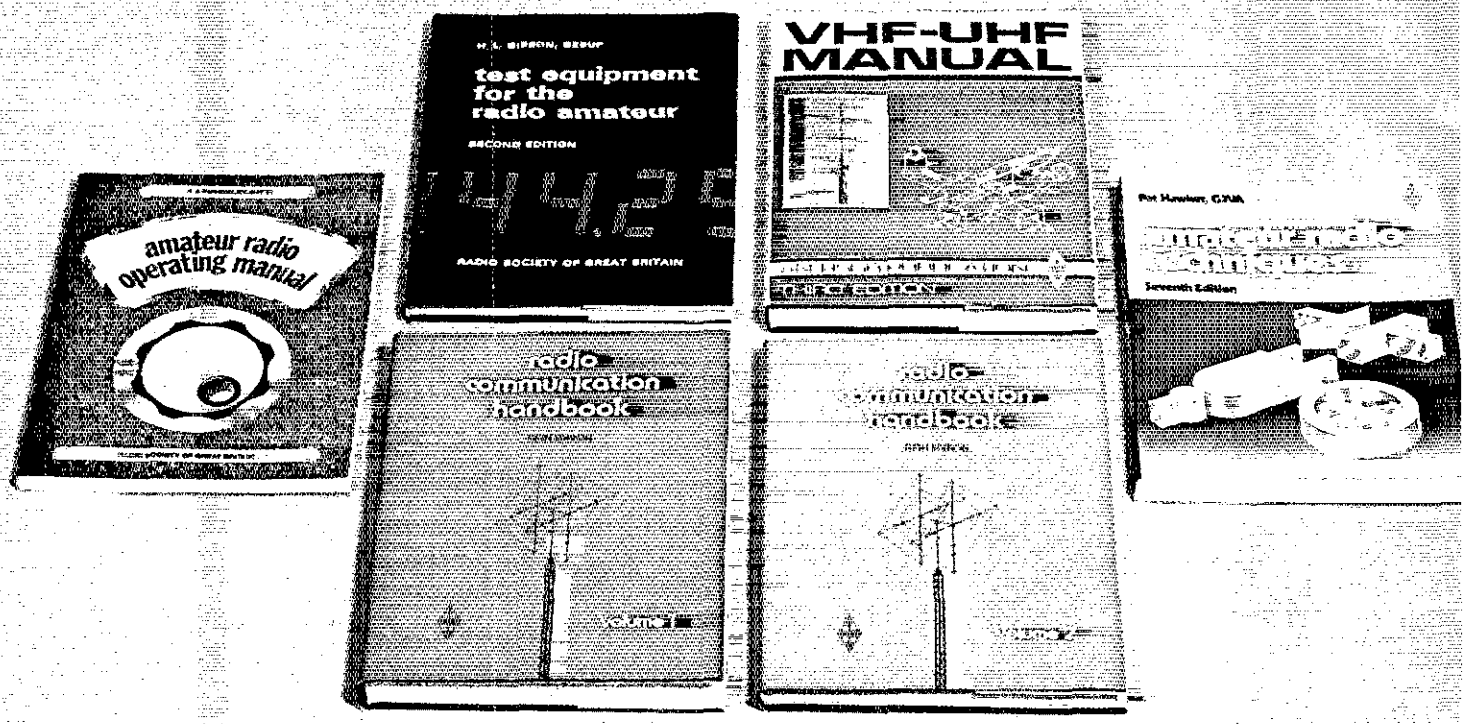

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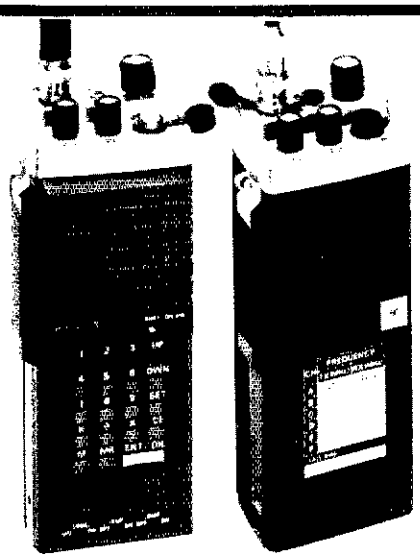

YAESU FT-207R (left) 2m FM Hand-held Transceiver. Microprocessor controlled, 800 channels - keyboard entry 144 to 148 MHz. LED display, up/down manual or autoscan for busy/clear channel, priority channel with search back, keyboard lock, memory back-up & display on/off switch. ± 600 kHz offsets or any odd splits. 2½ w (hi), 200 mw (lo) output. With Nicad pack, wall charger, flex ant., earphone & strap. 7¼"h × 2⅝"w × 2¼"d, 1¼ lbs.

Regular Price $339 - ***Sale $269.95***

YAESU FT-404R (right) 450 MHz Hand-held FM Transceiver. Six crystal controlled channels within a 3 MHz (tx) or 5 MHz (rx) spread, 430 to 450 MHz. Output: 2½ w (hi), 200 mw (lo). With NiCad battery pack, wall charger, flexible antenna, case, strap, earphone & crystals for one channel, 446.0 mHz simplex. 7¼"h × 2⅝"w × 2¼"d, 1 lb

Regular $299 - ***Closeout $239.95***

FT-404R/TTP same features as FT-404R above, plus a factory installed 16-button Touchtone pad.

Regular $325 - ***Closeout $269.95***

Accessories for FT-207R & FT-404R:

NC-1A	15-hr drop-in charger	Sale $44.95
NC-3A	15/4 hr drop-in chgr/AC adaptor	Sale 79.95
FBA-1	Battery sleeve for NC-1A/3A	8.00
FNB-1	Extra NiCad battery pack	23.00
NC-9B	Extra 15-hr wall charger	10.00
PA-2	Mobile DC-DC adaptor & charger	39.00
YM-24A	Speaker/microphone	32.00
FTS-32E	32 tone CTCSS encoder	40.00
FTS-32ED	32 tone CTCSS enc/dec	75.00
Leather carrying case		35.00
TA-2	19" telescoping whip antenna for 207R	9.40
MMB-10	Mobile bracket	15.00
Crystal Certificates	for 404R (2/ch. req.)	ea. 10.00

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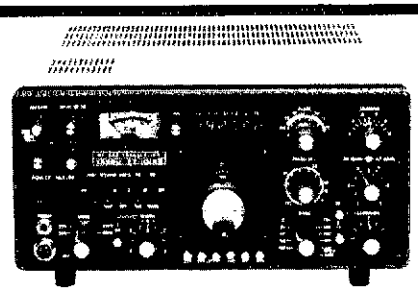
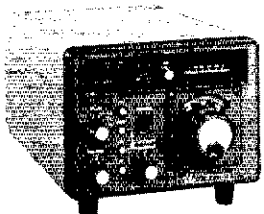


Older YAESU FT-101ZD (Mk II) 9-band, 180w, HF Transceiver with AM. A mid-priced unit loaded with features. Both digital and analog readout, variable IF bandwidth, noise blanker, RF speech processor, built-in 117 VAC & 13.5 VDC (with optional DC-DC converter). Uses FT-902DM accessories. 13½"w × 7"h × 13"d, 33 lbs

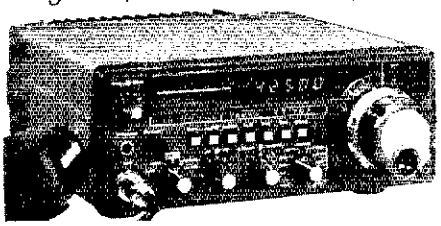
Regular $889 - ***Closeout $749.95***



YAESU FV-101Z External VFO for the FT-101Z/ZD, FT-901/902 - series transceivers. Enjoy the convenience and versatility of operating " separates".

Precision tuning mechanism with analog dials that read to 1 kHz. Clarifiers with ± 2.5 kHz offset for TX, RX, or Transceive frequencies, VFO Shift feature allows ± 8 kHz shift from main dial frequency to check for activity. Six fixed frequency positions - crystals (optional) can be varied with ± 200 Hz fine tuning control. VFO status is continually shown by LED indicators. Supplied with interconnecting cable. 6"h × 8½"w × 13"d, 10 lbs.

Regular $175 - ***Closeout $129.95***

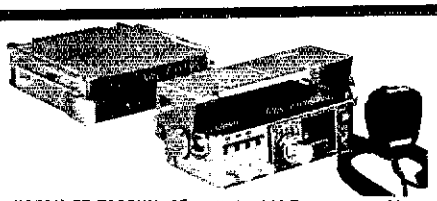


YAESU FT-707 8-band HF Transceiver for 80 to 10m, including WARC bands. Rated 240w DC SSB/CW, 80w AM. LED digital or analog readout & Led level meter. Scan mic., VOX, semi-break-in, calibrator, sel. AGC, noise blanker, clarifier, variable I.F. bandwidth, crystal control provision. 13.5 VDC/15A. 3¾"h × 9½"w × 9¾"d, 15 lbs.

Regular Price $810 - ***Sale $699.95***

Accessories for FT-707

FP-707	Power Supply	Sale $145.95
FV-707M	Digital VFO w/ 12 memories	Sale 249.95
FC-707	8-band antenna tuner	Sale 119.95
FRB-707	Relay box	39.00
MMB-2	Mobile mounting bracket	20.00
MR-7	Mounting rack	20.00
XF8.9HC	600 Hz Cw filter	45.00
XF8.9HCN	350 Hz CW filter	50.00



YAESU FT-720RVH 25 watt 2m FM Transceiver. Microprocessor controlled, 144 to 147.99 MHz. Priority channel, ± 600 KHz offsets, four memory channels plus a "receive memory" for odd splits. Up/down scanning of dial & memory channels controlled from microphone. 1750/1800 Hz tones, LED display and indicators. Combination control head and 144 MHz/25w RF deck which detaches for remoting or to use optional 720RU 440 MHz/10w RF deck. Optional switching box (S-72) for using both decks for two band operation. With microphone, wire stand, mobile mount, DC cord w/cig plug. 13.8 VDC/6½ A. 6"w × 2"h × 10"d, 5½ lbs

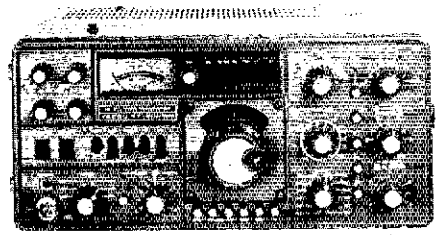
Regular $429 - ***Closeout $349.95***

FT-720RU 10 watt 440 MHz FM Transceiver. As 720RVH above, but for 440 to 449.975 Mhz. Combination control head with 720RU RF deck. Optional 720 RVH deck for 144 MHz/25w and optional S-72 for two bands. 13.5 VDC/4A.

Regular $449 - ***Closeout $359.95***

Accessories for FT-720R:

720RVH	144 MHz/25 watt RF deck	Sale $205.95
720RU	440 MHz/10 watt RF deck	Sale 225.95
S-72	RVH/RU switching box	Sale 79.95
E-72S	6½' cable for remoting RF deck	35.00
E-72L	13' cable for remoting RF deck	40.00



FT-902DM 9-band digital Transceiver

Regular Price $1535 - ***Sale $1299***

Accessories for FT-902DM

SP-901	Speaker	$35.00
SP-901P	Speaker/patch	Sale 69.95
YO-901P	Monitor scope w/bandscope	Sale 462.95
FV-901DM	Remote VFO w/memory	Sale 372.95
FC-902	9-band ant. tuner, 500w PEP	Sale 179.95
FTV-901R	Transverter w/2m	Sale 349.95
	6 meter adaptor	Sale 99.95
	440 MHz adaptor	Sale 229.95
YR-901	CW/RTTY decoder	Sale 649.95
YK-901	ASCII Keyboard	Sale 157.95
XF8.9HC	600 Hz CW filter	45.00
XF8.9HCN	350 Hz CW filter	50.00

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class. The "Worked All Sinkholes" certificate is offered by KA4RUL whose business QTH is just on the edge of the Winter Park sinkhole. Anyone contacting RUL is eligible. Just send him a card. WB4NEQ & KB4LU heading the ELT project for the Panama City ARC. In the panhandle, the Swap Net is active on 144.25 MHz at 8 P.M. CDT Sun. W4MLE is putting up 70 foot tower. The TARS emergency station is being readied by K4AQO & W4MLE. HCARA club net weekly, 2030 local, Thur, 146.115/.715. CD Net for Brooksville area is 2000 local, Wed, 145.5 MHz simplex. WB4TZR headed up the NPR Bike-a-Thon communications for GCARC. DBARA has weekly get-together at Quincy's on N. Nova Rd. KF4U back from a trip west. Upgrades include: KA4OFG & KA4HGH to Tech.; KD4KZ to Advanced and KC4UF to Extra. WA4AXJ & KA4NNS are new Advanced and KA4TSB is Tech. Traffic: WD4HIF 425, N4PL 420, WD4IIO 382, W4SIZ 313, N4EDH 225, WA4EYU 120, N4BZH 92, W4JL 92, W4MGO 81, AA4FG 62, W4KIX 61, WB4ADL 59, W4BSP 48, WB4EXA 41, WB4TZR 38, KF4U 37, N4AXN 35, W3IDO 23, WA4STZ 23, N4UF 23, WB4DTS 22, WB4FJY 21, N4BOY 4.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. New appointments: WA4PFK STM, effective July 1, KA4LNA NM (QFNS), effective July 1, WB4WYG OES, K5IHH has new TR-7800 2-meter xcvr and TS-530S hf xcvr, both fine rigs. W4JM vacationing entire month of June, Houston, TX and Atlanta, GA. W4IYT reports FCC meeting with Dade and Broward County repeater trustees to work out plans to combat willful repeater QRM. A "Regional Hurricane Evacuation Plan" has been developed by Tampa Bay Regional Planning Council and U.S. Army Corps of Engineers, Jacksonville District. This plan was developed with cooperation, and has been endorsed by, local governments and Emergency Coordinators in Counties of Hillsborough, Manatee, Pasco and Pinellas. Many details of the plan of use to the general public have been published in St. Petersburg Times, June 8th and Clearwater Sun, June 4th. While Tampa Bay area is said to be one of the most vulnerable spots for hurricane damage, we hope this plan will minimize loss of life in the event a big storm comes. With other station activity data scarce, we think it appropriate to publish a list of Emergency Coordinators: Brevard County, North-WB4WYG, Brevard, South-KB4OW, Broward-WB4KKG, Charlotte-WB4ITH, Collier-KA4ASZ, Dade-W4IYT, Desoto-none, Glades-none, Hardee-none, Highlands-W4KMN, Hillsborough-KR4X, Indian River-none, Lee-WD4CHP, Manatee-K4DYB, Martin-K4ZK, Monroe-K4URX, Okeechobee-WA4AYY, Osceola-WD4PGG, Palm Beach East-WB4RLU, Palm Beach West-K4SJA, Pinellas-W4GPL, Polk-WB4FVV, Sarasota-K4CGX, St. Lucie-WB4NOZ. If you are an active amateur and not yet a member of ARES, you should contact your EC and register for possible emergency operations. If you are in one of the counties which has no EC, please contact your SEC, AA4WJ, and volunteer to be EC for your county. It can be a very rewarding experience. Traffic: W3CUL 3097, W3VR 647, K4TH 457, WB4FVV 405, K4SCL 401, WA4PFK 374, WD4AWN 303, WD4COL 286, NC4H 267, W4NFK 251, W4GPL 182, WA4EIC 174, WB4AID 145, WB4WYG 117, KE4O 98, KA4ASZ 91, W4DVO 86, KA4LNA 86, W4IRA 71, WB4PIB 56, W3TLV 52, KE4UK 50, W4BK 48, W4ESH 42, WB4GCK 40, K5IHH 32, W4IYT 26, WD4CHO 22, WB4SNX 14, W4SMK 12, W4WYR 11, WB4GSV 7, W4JM 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — New traffic net, DWINS, operates on Saturdays and Sundays on 7.11 MHz at 1700 UTC. W1AW Bulletins are retransmitted Sats and Sundays by WP4BCV on 7110 kHz at 1800 UTC. KP4DJ retransmits bulletins every day on 3710 kHz at 2200Z. Both retransmissions at 15 wpm. New appointments: WP4BCV OBS, WP4AOH ORS/OTS, KP4MO OO, KP4EMX NM-WINC, NP4F NM-WINO, PSHR: WP4BDS 249, NP4F 126, NP4D 82, WP4AOH 77, KP4DJ 62. BPL: WB4BDS NP4F WP4AOH. Traffic: WP4BDS 1004, WP4AOH 642, NP4F 569, NP4D 209, KP4DJ 106, KP4U 102, WP4BBM 37, KP4FBT 15, KP4FAF 11, WP4AOK 5.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE W7UQQ. More club newsletters arrived this month and I greatly appreciate receiving them. Please continue to send them. The White Mountain Hamfest is now history. I'm sure all attendees enjoyed themselves. Sorry I couldn't attend. I am planning to attend the Ft. Tuthill Hamfest. W7YS reports that even though it took 40 yrs., he finally got a confirmed VU. Newly licensed Novices in Flagstaff are KA7KIP KA7KBA and KA7KBB. The CCARC is planning club participation in the June VHF QSO Party. W7KIH is reported as being involved in arrangements with Samaritan Hospitals in Phoenix for power outages/emergencies. The AAA5 club holds a Wednesday evening net on 147.87/.27 MHz. WA7WEB reports that he will be off the air for several years, since he is moving and going to school. Good luck and hope to hear you on when you get a chance. There is a lot of vhf activity within the section. That means there are many qualified to become and Official VHF Station. Are there any takers? Let me hear from you if you are. I encourage all to originate at least one piece of formal traffic and utilize the section's traffic nets. (May) ATEN: QNI 990, QTC 163. SWN: QNI 266, QTC 159. (Apr.) Cactus Net: QNI 979, QTC 240. PSHR: W7EP. Traffic: (May) W7EP 191, K7MC 75, KB7HA 73, K7NTG 60, WA7KQE 53, K7UXB 38, K7JKM 19, WA7NXL 13, N7EH 7, K7GLA 5, WA7YUL 5, W7LBW 4, KE7W 4, WA7WEB 3. (Apr.) K7UXB 10.

LOS ANGELES: SCM, Stan Broki — N2YQ — ASCM: N6UK. STM: W6INH. SEC: WB6FAK. NM: K5DY. Congratulations to W6VIF on getting his Extra. Also the new president of the SGVRC is WD6CHR. WB6YID had an exciting time at his station when he relayed messages to the State Dept. and the U.S. Coast Guard when two boats were being held by the Nicaragua military. AK6Y was successful in getting 9 Red Cross Chapters to send messages to Washington during the anniversary celebration of the Red Cross. WA6LVO sent test emergency traffic to KB6CC for the TV show PM Magazine. It should be telecast soon on local stations. K6INK is now an Army MARS stn, AA7QNL. N6VI reports getting an X-Band Gunnplexer working. All of the radio clubs reporting this month are busy getting ready for Field Day. Good luck to them all. OOs reporting this month: K6CL 2, WB6YID 5, K4WGW 9 and K6KA 80 reports sent out. Traffic: W6INH 170, WB6YID 150, WA6OCM 113, K6OWA 89, K6INK 81, WA6LVO 44, KT6D 30, W6NKE 30, N6BCY 29, N6PZ 25, W6BWG 23, K6CL 15, W6RO 15, KA6ALH 14, N6HE 5.

ORANGE: SCM, Fred Heyn, WA6WZO — Asst SCM: WA6WZN. SEC: W6UBQ. STM: KA6A. WB6JBI has been appointed DEC of Orange County with Asst STM, WD6CSL, replacing him as EC for North Orange County.

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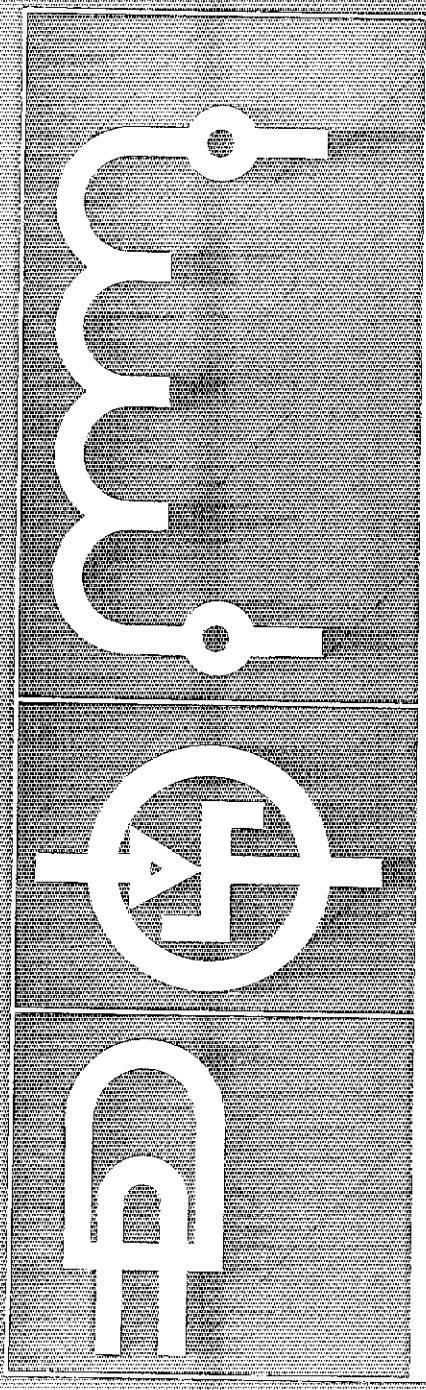

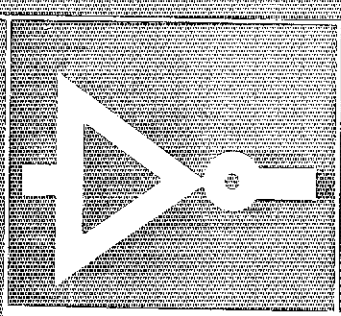

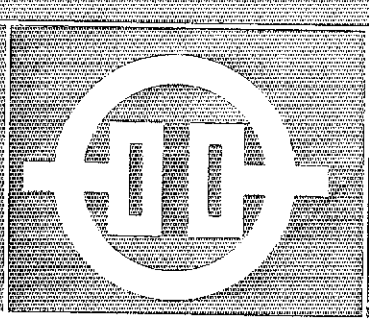

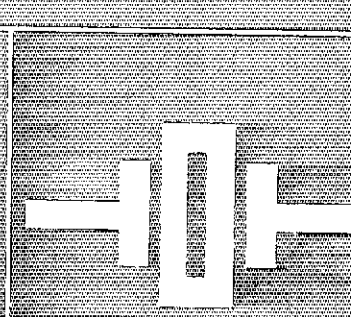

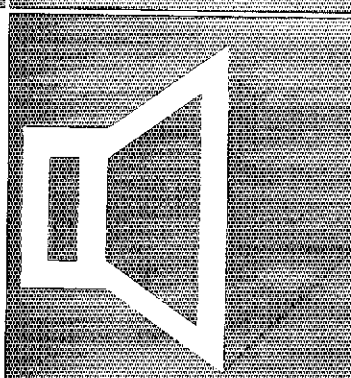

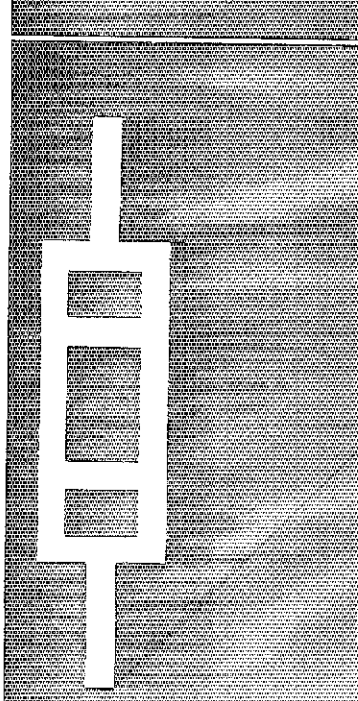

If you're a relative newcomer to Amateur Radio, then this book is just what you need. Some of the topics of interest to the beginner are:

- HOW TO SOLDER
- HOW TO USE A VOM
- THEORY NEEDED FOR THE TECHNICIAN/GENERAL FCC EXAM
- HOW TO USE A TRANSMATCH
- HOW TRANSMITTERS AND RECEIVERS WORK

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- HOW TO TROUBLESHOOT YOUR EQUIPMENT
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This book has 217 pages of text. It is available at your dealer or directly from ARRL. (Use the handy order form elsewhere in this issue.) Price is $5.00 in the U.S. and $5.50 elsewhere in U.S. funds.

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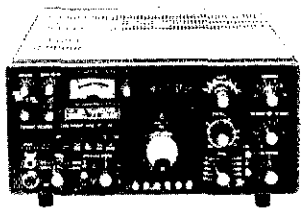

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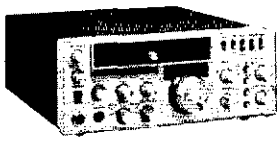
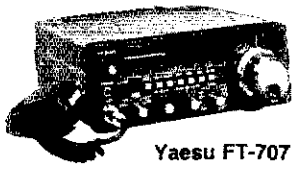


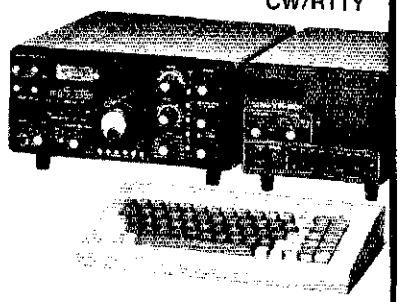
Yaesu FT-107M



Yaesu FT-707

Yaesu FT-902DM

Yaesu YR-901
CW/RTTY



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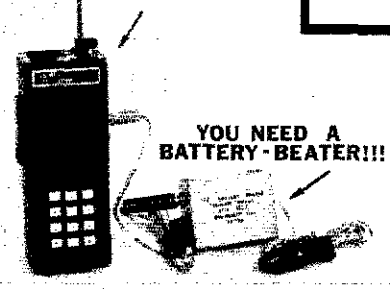

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Although WA6TLE resigned as DEC for Orange County, he will continue as EC for South Orange County; we are grateful for his fine service in holding both positions for so long. Clairmont Repeater Association (maintaining WB6YNQ/Rpt on 144.62/145.22 at Santiago Peak) current officers: WD6EBT, pres.; KA6JIT, vice pres/secy.; WB6YNQ, treas. Radio Communications Monitoring Association current officers: KA6JCX, pres.; N6CRO, 1st v.p.; N6CRI, 2nd v.p.; KA6IJA, secy. EC AI6I reported FB 17th annual Fire Preparedness Exercise with the following VIP members providing main support: W6CDB AI6I WA6MGU W6NBJ WB6NSX N6AXR WA6KER N6BAE WA6NUW WA6QMW K6SNO WA6UVF W9TTG, OBS W6BAM maintains bulletin sked on Mon, Wed, Fri & Sun at 8:30 P.M. on 7075 kHz. AEC N6EDS (formally KA4FDX) reports FB SET "Operation 81" that included Barstow Hospital, Red Cross, PD, and Fire Department. EC KS6T reports considerable public service activity including medical drill, parade support, display and demonstrations with the help of the following: KS6T WA6MBK K4WRM KA6EMS K6MFE WA6MRA KA6DSD N6DQU WD6FKD W6CXB W6CTS WA6PTU WA6QZA. Those interested in DX try AD6P/R 144.88/145.48 maintained by the So Ca DX Club; including a Thursday night 7:30 P.M. DX net with N6TK net control. Also 145.62 simplex is used by the Orange County DX Century Club. NM WA6QCA report for SCN/V showed 423 check-ins with the following having at least 17: KA6ALH KN6C W6CKT WD6CSL KB6FC K6INK W6NTN WA6OCM KB6OT WB6QBZ WA6QCA. Traffic: N6ANL 518, KS6T 490, KN6C 217, WB6QBZ 129, W6NTN 101, WD6CSL 100, N6EDS 83, K6ZCE 47, W6CPB 40, WA6QCA 39, W6RE 37, AI6E 28, N6DNH 23, WA6WZO 9, N6ADV 7, W6TKV 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW (222-5575), SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). Annual ARES picnic was held June 7 at Convair's Missile Park, co-chaired by WA6BCC and KM6S. Convair Club Pres. KD6QK, bestowed honorary membership upon SCM, W6INI, with presentation of a gold key to club's station. WA6EYX is EC of newly formed Escondido District. W6DEY is getting into computers via the kit route. KA6MLY has her sights on medical school. Good luck! Upgraded: WB6TBA to Extra, N6DCX to Advanced. N6BWM demonstrated the magic of ham radio to hundreds of Boy Scouts at camp he manages. ARC of El Cajon meets at 1930 on second Thursday at Parkway Jr Hi La Mesa. W6PKA made WAZ with confirmation from Zone 17. S.D. Amateur Radio Council officers are W6SLF, chmn.; KD6BW, v.c.; KS6L, secy.; W6RHI, treas. Palomar ARC's 444.425/449.425 rptr is in operation on Palomar Mtn. S.D. Repeater Assn's 146.04/64 rptr is back on Mt. Otay in SANDRA-owned facilities. Traffic: (May) KT6A 530, W6HUJ 343, N6GW 171, KM6I 101, KB6AI 80, K6HAP 75, N6AT 46, KU6D 27, W6DEY 25, K6QCW 17. (Apr.) K6QCW 25, W6UQF 8.

SANTA BARBARA: SCM: Robert N. Dyrutt, W6POU — ARRL Net Dir. data submitted Rptr. listings sought. Ventura Co. DEC, W6RIC, organized SCTN responses to Red Cross 100th Anniv. SMRA nets on 28/88: Swap-Mon/Fri, Bulletin-T/Th, ARES-T, DX-T, Tech.-W, Info-Th; N6AHI/R links 147.375/975 across state; N6WP/ K6TOD lauded for tech. work for SBAR Co. quake drill, recordings by N6DZH replayed at critique. Annual SBARC swapfest/BBQ Sun. Aug. 23, active T-hunts again via W86RDV efforts. Terminals copy ttc/bulletins on ASCII autostart 146.58 MHz. SBAR linked to Oxnard via digital data for demo at Cal. Emerg. Svcs. Assn, meet by N6WP W1UUQ/6. Silent Key: W6YP. SBAR No. County gets new EC, KA6Q; S.L.O. County's K6DZT announced ARES agreement with Cal. Div. of Forestry-Red Flag Patrol. Map coord. and CDF trng. pgm. scheduled Sctn Rptr. Coord. W6KPS scheduled rptr bldg pgm with K6KZT and WB6FMC/R mbrs. County ARES VHF Net resumed Tuesdays 1930 PT on WB6FMC/R 22/82. Traffic: K6YD 178, W6ZRR 118, N6YH 30, W6IGS 6, N6TR 6.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, N5PC — Asst SCM: WA5QFD, SEC: W5GPO. STM: W5VMP. NMs: AA5J AE5I KA5IWF. Lots of ARES activity in the section during May. Most ARES Skywarn nets have been in session several times. N. Central and East Texas real busy. Addresses and phone numbers of all DECs and ECs have been supplied by DPS. They do plan to use ARES. Most DPS offices have scanners and should be informed of your local repeater freqs used for Skywarn. K5PC and W5GPO will work with DPS to develop operations notebook. Thanks to all ECs and DECs who responded to SEC request for address info. Section now has 16 DECs, 65 ECs and 1230 ARES members. Tnx to all who have supported ARES. Still need 70 plus ECs to have all counties covered. DECs are responsible for all counties not covered by EC. Our job as ARES is to communicate. To do our job properly we must be able to communicate with each other. DECs and ECs are urged to contact their SEC at any time for assistance. SEC has been receiving several excellent club newsletters each month. These are great. Also have received many copies of ARES emergency plans from ECs. Glad to find that so many counties do have a good workable plan. We need ECs in many counties. Contact the SEC and volunteer your services. Please help us out on this. ECs should make max use of Asst ECs. During an emergency the EC should not find himself tied down and not be able to do his job properly. WA5UTA, EC Wichita County, has a good outline for use of Asst ECs. WB5WKG, EC Throckmorton Co, is only XYL EC in section. She is daughter of AE5I, EC of Taylor Co. Congrats. Remember that all communications systems can work together. As an amateur operator you can wear several hats: RACES, MARS, ARES and Skywarn. Meetings with DECs and ECs will be scheduled for Texhoma Hamarama and Amarillo Hamfest. Plan to attend to give the SCM and SEC your input on how to improve ARES in our section. Traffic: W5CTZ 267, N5BT 206, W5TI 195, KC5FX 89, KA5AZK 82, WB5SDD 78, WD5JYI 65, W5HMR 49, KA5CFP 48, KC5NN 40, WA5INJ 37, K5QKM 35, W5ERT 31, WB5VTZ 31, KA5IWF 27, KK5B 25, K5HGX 23, KB5UL 22, WB5UZS 21, AE5I 20, KA5AVQ 18, K5PC 18, W5VMP 16, AJ5F 12, W5PBN 9.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst SCM: W5REC. NMs: WD5IRB K5CAY WA5OUV W5UYH. They are always looking for help with their nets. Is your area represented on a regular basis? Vacation time is here. Hope all have enjoyable and safe ones. W5FKL is recovering from another bout in the hospital. W5JJ becoming quite a gad-about. Summer noise levels causing problems all over the bands from area nets to DXing. Reports of some fine times at Dayton and Dallas Hamcom. The main source for information for this column

A fresh idea!

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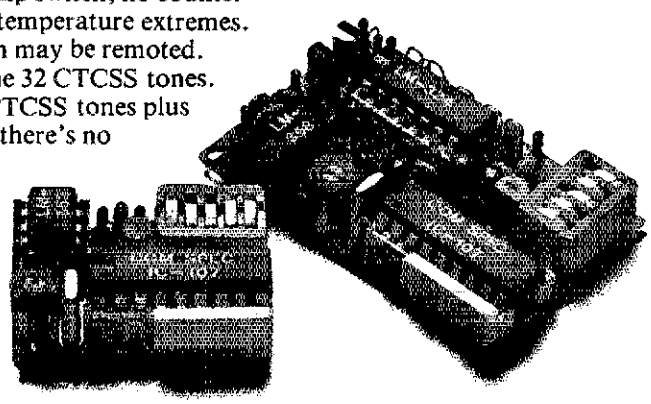

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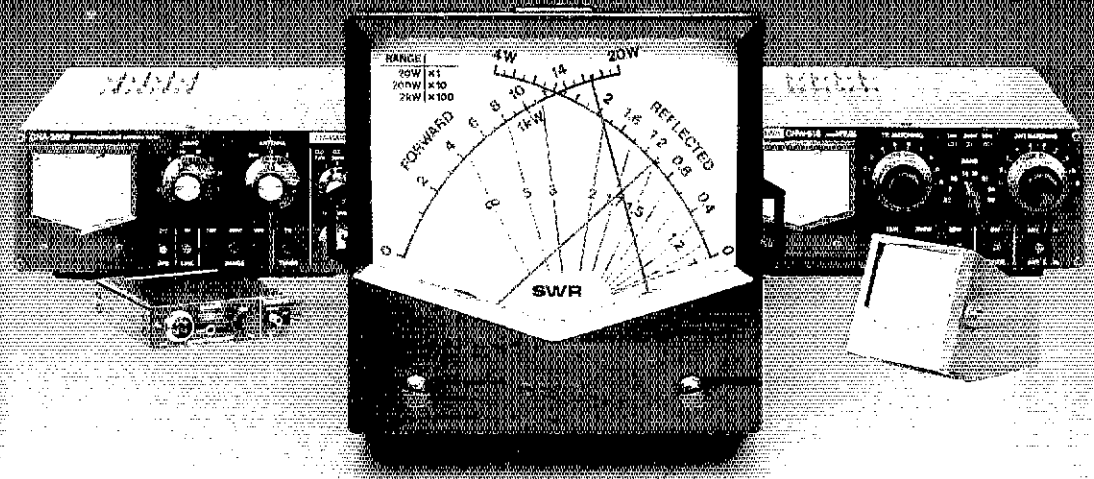

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DAIWA cross-needle precision is now available in a compact case. Get forward power, reflected power and SWR readings at a single glance—from a meter that fits anywhere!

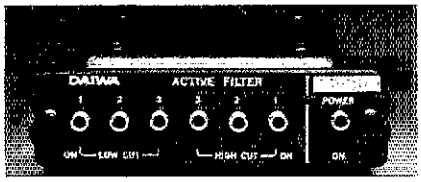
CN520 - Frequency: 1.8-60MHz • **Power range:** Forward 200-2kw, Reflect 40-400 watts • **Detection Sensitivity:** 40 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** 72W x 72H x 90D m/m

CN540 - Frequency Range: 50-150MHz • **Power Range:** Forward 20-200 watts, Reflected 4-40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

CN550 - Frequency Range: 144-250MHz • **Power Range:** Forward 20-200 watts, Reflected 4-40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

Active Audio Filter AF-306

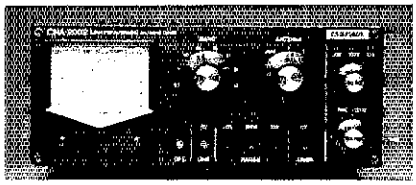
By electronically filtering unwanted signals, the AF-306 gives you clean, distinguishable copy. Featuring its own internal speaker, the AF-306 Active Audio Filter is easy to install, easy to operate.



Input: 2.8v (4v max.) • **Output power:** 1 watt @ 8 ohms • **Distortion:** less than 2% • **S/N ratio:** better than 50dB • **Low Cut Filters:** 400Hz, 800Hz, 1100Hz • **High Cut Filters:** 1100Hz, 1600Hz, 2500Hz

Automatic Antenna Tuner CNA-2002

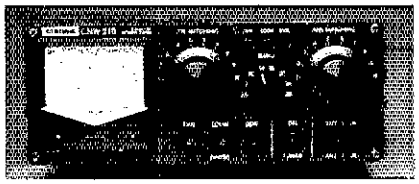
Leading the way in convenience is the Daiwa CNA-2002 2.5 kW (PEP) Automatic Antenna Tuner. Cross-Needle Metering and optimum matching in under 45 seconds make it the perfect compliment to any state-of-the-art amateur station.



Frequency range: 3.5-30MHz including WARC bands • **Tuning Time:** less than 45 seconds • **Power rating:** SSB - 2.5kW PEP, CW - 1kW (50% duty), AM - 500 watts, RTTY, SSTV - 500 watts • **Output Impedance:** 15-250 ohms (unbalanced) • **Dummy Load:** 100 watts 1 minute (installed) • **Metering Ranges:** Forward power - 20/200/2000 watts, Reflected power - 4/40/200 watts, SWR - 1:1 - infinity • **Power requirements:** 11-16vdc @ 200ma

Manual Antenna Tuners CNW-518 / CNW-418

The serious amateur wants to achieve the best antenna match possible. That's why DAIWA offers two manual antenna tuners that maximize power transfer—and offer cross-needle metering as well.



CNW-518 - Frequency range: 3.5-30MHz including WARC bands • **Power rating:** 1kw CW (50% duty) • **Output Impedance:** 10-250 ohms (unbalanced) • **Insertion loss:** less than .5 dB

CNW-418 - Same as above except - **Power rating:** 200 watts CW

Infrared Cordless Microphon RM-940

DAIWA ingenuity is also evident in the RM-940, an Infrared cordless mobile microphone system. Audio and transmit/receive switching are carried on a safe infrared beam. Experience the freedom of cordless mobile operation. Ask your Daiwa dealer t a demo today!

Microphone: Electret Condenser type • **Conti ous Operating Time:** 5 hours minimum • **Charg Time:** 8 hours max • **Usable Distance:** 3.5 fe microphone to sensor • **Power Requiremer** Controller—13.8 vdc @ 80 ma, Microphone— vdc @ 30 ma

Speech Processor RF-67

DAIWA innovative thinking led to the deve opment of the RF-670 Photocoupler Spee Processor. Its unique design gives your si nal the boost it needs to cut through bothersome QRM. Get RF-type processin performance with the RF-670's economic photocoupler design.

Clipping Level: 20dB max • **Frequency respon** 300-3000Hz (-10dB) • **Clipping Threshold:** l than 2mV at 1kHz • **Bandwidth:** 2400Hz at 6 down • **Distortion:** less than 3% at 1kHz, 20dB cl **Output level:** 40mV max • **Mike imp.:** 600-50k ohm **Power requirement:** 13.5v @ 60ma • **Dimensio** 90 x 25 x 93 m/m

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Premium quality, high-gain design. Special *tilt-over* feature for added convenience.

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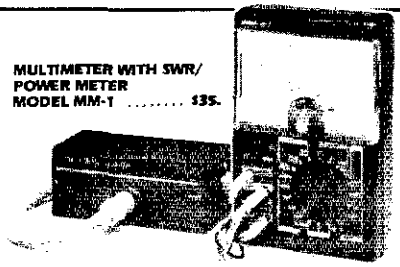
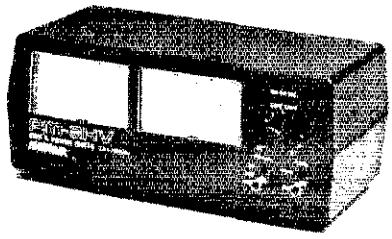


MULTIMETER WITH SWR/ POWER METER MODEL MM-1 ..... $35.

The MM-1 is a high quality 20K-ohm/VDC Multimeter usable as a SWR/Power Meter by connecting the directional coupler unit included.

Specifications:

DC Volt	0 — 0.3, 1.2, 6, 30, 120, 600V (20K-ohm/V) ± 3%
AC Volt	0 — 6, 30, 120, 600V (8K-ohm/V) ± 4%
DC mA	0 — 60uA, 3, 300mA ± 3%
OHM	Rx1, Rx10, Rx1K
dB	−20 — +18 0 — +32dBm
C	200pF — 0.5uF
LI	0 — 0.1, 10, 100mA
Frequency Coverage	3.5 — 150MHz
VSWR	1:1 — 3:1
RF Power Range	0 — 20, 200, 1000W ± 10%
Accessory Included	Directional coupler unit with relevant connector cable, test leads and battery
Dimensions	4⅛"(W) x 6¼"(H) x 2"(D) Multimeter 4¼"(W) x 2¼"(H) x 2"(D) Coupler
Net Weight	1.06 lbs. (480 grams) Multimeter 0.75 lbs. (340 grams) Coupler



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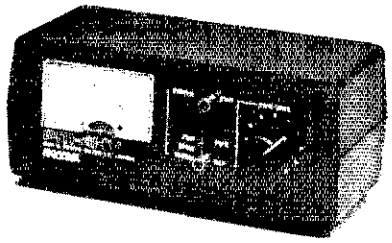
Specifications:

Frequency Coverage	3 — 150MHz
RF Power Range	0 — 20, 200, 1,000W, 3 ranges ± 10% accuracy
Power Source	12V AC/DC (for meter illumination only)
Accessory Included	7ft. long connector cable with fuse for meter illumination purpose
Dimensions	7"(W) x 3"(H) x 3⅝"(D)
Net Weight	1.8 lbs (0.8 kgs)



SWR & POWER METER FOR HF/VHF BAND MODEL PM-4HV ..... $30.

Compact and light weight SWR/Watt meter designed for mobile operation as well as base station use.

Specifications:

Frequency Coverage	3 — 150MHz
RF Power Range	0 — 20, 200, 1,000W, 3 ranges ± 10% accuracy
Accessory Included	Velcro double back adhesive mounting for mobile installation
Dimensions	6"(W) x 2¾"(H) x 2½"(D)
Net Weight	1 lb. (0.44 kgs)

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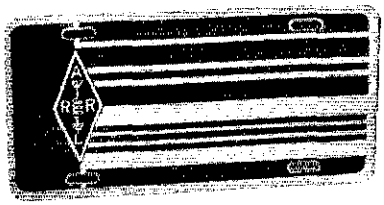

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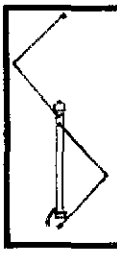

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has been the various club publications that I receive. Many thanks. So far this spring we have had several Weather Alerts with quite a lot of activity in spotting, tracking and reporting conditions to the NWS. There is no way that I can recognize all who have worked long and hard in this activity. Many of our operators have gone right from storm watching to working with the Red Cross. Truly living up to the public service concept. Traffic: W5REC 250, WB5NKC 208, W5RB 143, WD5IRB 97, WA5RKU 85, KB5EK 84, W5AS 71, K7KVV 69, W5UYH 61, WA5OUV 60, WB5ELG 44, WB5NKD 39, WA5FSN 37, K5CAY 35, W5VXU 35, WD5IFB 33, WB5EAY 28, W5VLW 22, W5VOR 22, KF5A 18, WA5JGU 18, K5MGD 12, NØIN 8, W5FKL 8, W5JJ 2.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N, W5SG, OO reports that he has gotten on RTTY after a 20 year absence and is sure enjoying it. W5CTZ has been appointed Assistant NM for TEX Traffic Net. WB5TAY is now N5DKM. A group from the Tidelands ARC operated a booth handling Mother's Day QTC from League City. Those involved were WB5OUU AG5P K5BY KN5K W5VXV WD5CXB W5MGG W5TCI WB5YDD N5CYY WA5FTI WA5LOO WB5ZOB WB5TNH WB5NTF WD5IGY WD5EEU WD5EEV WN5EAT K5YYD and WD5KBK. WB5EFJ has been appointed ORS. WD5AAH coordinated installation of antennas at Red Cross Hdqts. in Angleton. K5RVF reports that Golden Triangle area hams supplied communications for the Bum Phillips Celebrity Golf Tourney in Beaumont. One million dollars was raised for the Hughen School for Crippled Children. WB5UYV reports that the Del Rio area hams received Skywarn training. The autopatch on the Del Rio 22/82 machine has been used to report several accidents. KA5LEI is a new Tech in Brenham. KA5HPY is now KC5LZ. W5AIR reports he is active with the Houston Red Cross communication group. K5DG has been named DEC for the Rio Grande Valley area. KA5GYJ has been named EC. K5GU traveled to Cape Kennedy for the Shuttle launch, and had the opportunity to operate the club station at Kennedy Space Center. KSC had 4000 QSO's and Dryden Space center station had 2300 QSO's from launch to landing. West Texas Repeater Association assisted the Civil Air Patrol in their simulated emergency test. WTRA 28/8 solar powered on North Mt. Franklin will stay in place — contrary to rumors. Traffic: WB5YDD 631, W5SHN 471, W5KLV 319, W5SBE 211, KC5JL 198, KB5TC 179, W5TFB 156, K5HZR 136, WD5KBK 133, AG5P 133, N5TC 108, KB5NX 104, WA5RVT 98, N5DKM 63, N5CRR 57, WB5MMI 44, WD5AAH 42, N5DAA 34, AK5M 34, W5BGE 27, N5FN 27, WD5GKH 26, KA5GYJ 26, WB5EFJ 22, K5RG 16, WB5UYV 8, WD5DQR 6, KA5KRI 6, KB5KZ 3, W5AIR 1.

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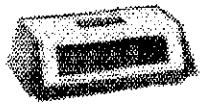

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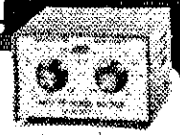

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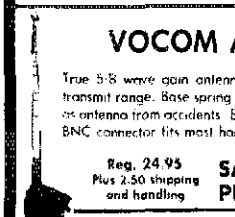

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True 5/8 wave gain antenna. Boosts reception as well as transmit range. Base spring tuned coil protects radio as well as antenna from accidents. Extends to 47" telescopes to 8" BNC connector fits most handhelds.

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for Kenwood TR-2400 stops and locks on busy, or stops and resumes when carrier drops. Controlled by keyboard, no switches to add. Installs easily inside rig, six simple connections, no modifications. Assembled-$24.95. Kit-$14.95

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Memory Scanner

for Kenwood TR-9000 scans 5 memory channels. Stops on busy and resumes when carrier drops. Uses existing controls. No switches to add. Installs easily inside rig. Assembled-$39.95

IC-280

Band Scanner

for Icom IC-280 scans band in 47 seconds. Stops and locks on busy. Uses existing controls, no switches to add. Installs easily inside control head. Assembled-$29.95

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for Icom IC-280 adds a fourth memory channel and scans all four plus the dial frequency. Stops on busy and resumes when carrier drops, or busy channel can be locked in. Operates thru addition of submini switch (Off, Scan, Lock). Installs inside head. Assembled-$39.95

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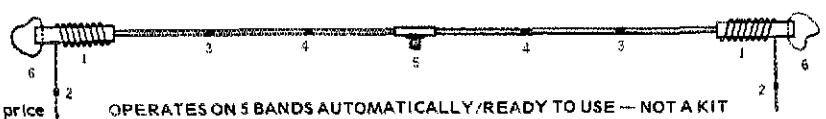

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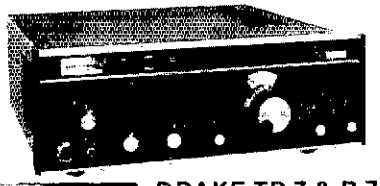

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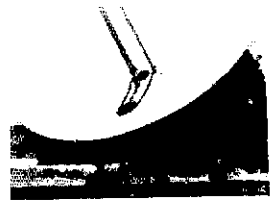

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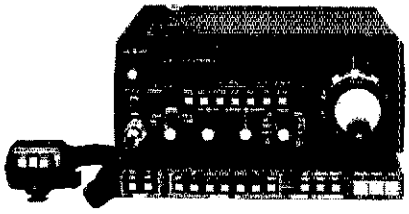

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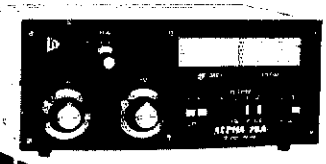

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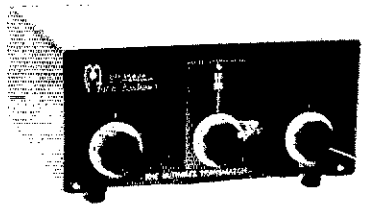
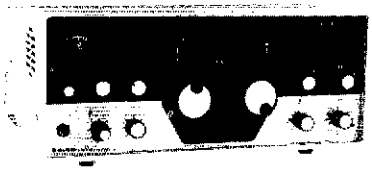
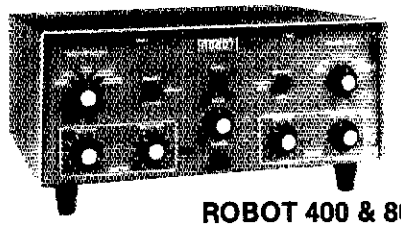


Murch Model UT2000B

ICOM Model-720A Model-IC-730



ASTRO 103 150A & 100 MXA



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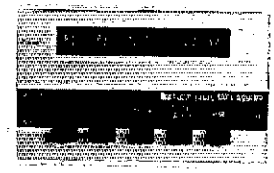

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(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash 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 August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc, is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CQ and QST 1950-1978 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues all other 30 cents each including USA shipping. Send s.a.s.e., chronological order and payment to W6LS, 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

YAESU OWNERS — join the ten-year old International Fox-Tango Club. Receive valuable newsletter monthly, catalogue of modifications, free advertisements, technical consultation, FT Net, more. Annual dues now $8 per year US, $9 Canada, $12 overseas airmail. Send to N4ML, Box 15944, West Palm Beach, FL 33406.

WARRENARA 24th Annual Hamfest, Sunday, August 16, 1981, KSU-Trumbull campus, Outerbelt/Rt. 45. Huge flea market on lawn; equipment displays/sales inside; meals, snacks sold all day. $4,200 awards TenTec Omni' two TenTec Deltas; three IC-218s; plus hourly awards. Details: QSL WARA, Box 809, Warren, OH 44482.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, Box 192, Garrison, NY 10524.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

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.

FREE FLEA market! Elmira, New York International Hamfest at the Chemung County Fairgrounds, September 26. Dealers, Tech talks, great food (cheap), and even more awards than last year. Tickets and info from John Breese, WA3FJM, 340 West Avenue, Horseheads, NY 14845.

SOUTHERN ILLINOIS — Shawnee Amateur Radio Association's 25th anniversary Silver Jubilee Hamfest will be August 30 at John A. Logan College in Carterville, Illinois. Offerings include air conditioned flea market — awards, forums, computers, food, refreshments, contests. For details QSL Bill May KB9QY, 800 Hilldale, Herrin, ILL 62948 or 618-942-2511 days.

HAMBURG, New York — Ham-O-Rama '81 — Friday, September 18th 6:00-9:00 PM and Saturday, September 19th 7:00 AM-5:00PM at the Erie County Fairgrounds near Buffalo, New York. New equipment displays, computers, technical programs, ladies programs, awards and more. Tickets $3 advance or $4. at gate. Children under 12 free. Outside flea $2. per space. Inside flea $7. per space. Talk-in 146.31/91. Advance ticket deadline September 4th. S.a.s.e. to David Baco, WA2TVT, 130 Vegola Avenue, Cheektowaga, NY 14225.

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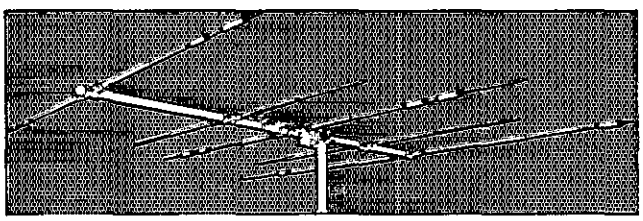
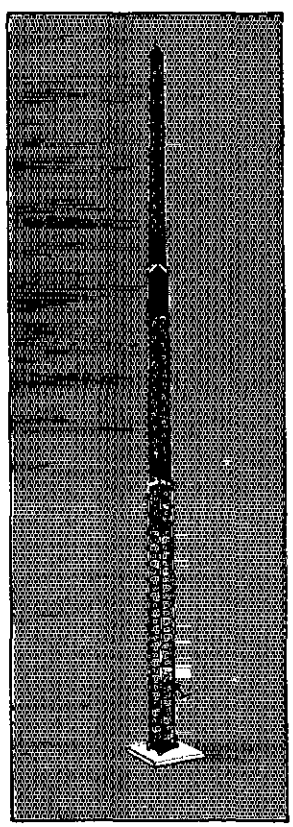


The installation of a ham's first directional antenna system is a memorable event because of the substantial improvement in the capability of the station. You really have to experience using a directional array at your station to appreciate the thrill of improved performance.

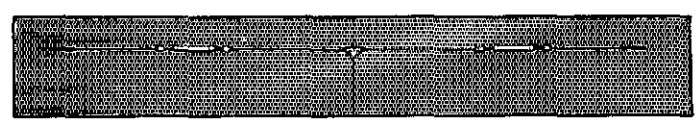
A Hy-Gain TH5DX can do more for operating pleasure than an expensive new state-of-the-art receiver and maximum power amplifier combined. The TH5DX is the result of 25 years of experience in designing and building multi-band beams, and represents a focused effort to optimize performance and reduce size. Hy-Gain Beta Match provides dc ground, optimizing energy transfer to the antenna. Air dielectric Hy-Q traps have also been used. The elements are taper swaged to reduce tubing diameter and weight which greatly reduces wind load.



HG52SS

Self-Supporting Crank-Up Tower

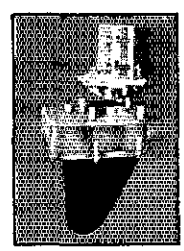
This all steel crank-up tower has an improved guide system which provides a rigid close-tolerance structural support. The ends of the tubes are left open to allow complete hot dipped galvanizing of both inside and outside surfaces after welding as well as unrestricted moisture drainage. It comes complete with base mount and rotator mounting plate and requires no guying. It stands 52' (15.8 m) extended and retracts to 21' (6.4 m).



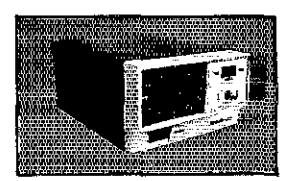
2DBQ Trap Doublet for 40 and 80 meters

This Hy-Q trap doublet provides true half-wave length performance on both frequencies featuring individually pretuned matched traps for each band. Traps are large diameter for exceptionally favorable L/C ratio and power handling ability.

HDR300 Heavy Duty Rotator



This is a commercial /industrial grade rotator with enough reserve strength to easily rotate the TH5DX and more. The good-looking control console features a digital azimuth readout accurate to ±1°.



PLUS!

One HG10 Heavy duty 10 foot mast
(enough mast to stack a vhf with the TH5DX)
Three HGCOA Coax extension arms
Two BN86 Broad band Ferrite Baluns

Here's what you get!

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BN86	Baluns (2)	31.90

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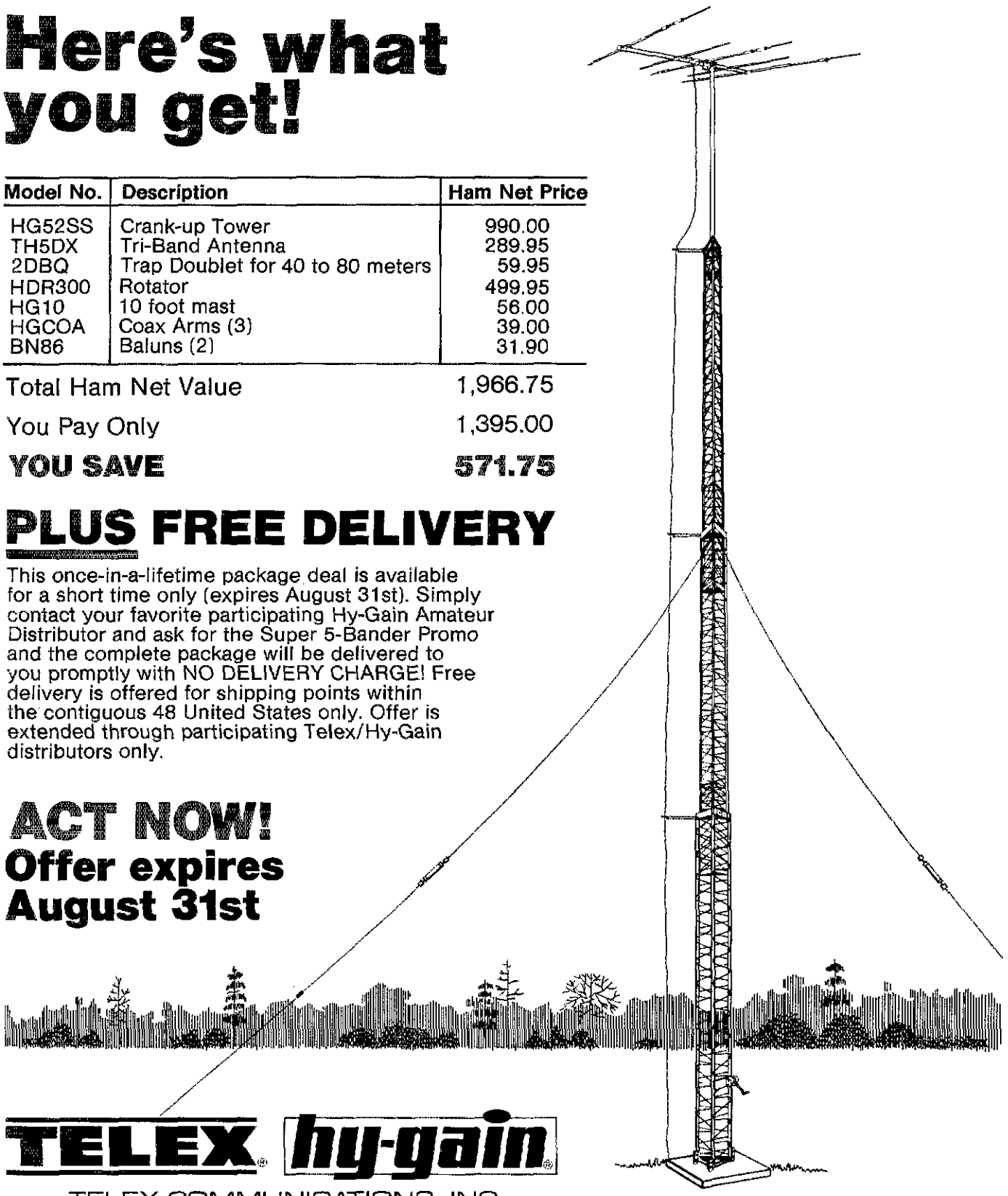

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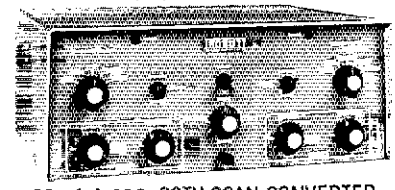
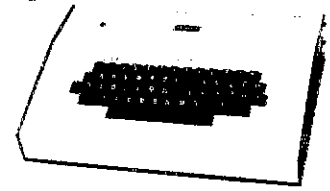


Model 400 SSTV SCAN CONVERTER
Regular $795 - ***Sale $699.95***



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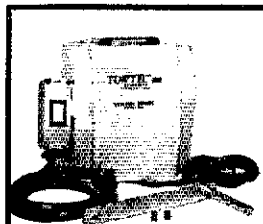

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THE NORTHWEST Ohio Amateur Radio Club will hold its annual hamfest on Sunday October 11, 1981 at the Allen County Fairgrounds in Lima, Ohio. Doors open 6:00 A.M. Tickets $2, advance, $2.50 at the door. Camping available at the fairgrounds. Talk in on 52/52, 07/67, and 34/94. To reserve table space or for more information write N.O.A.R.C. P. O. Box 211, Lima, Ohio 45802 or call 419-645-5381.

CINCINNATI — The Original Forty-Fourth Annual Hamfest — Sunday September 20, 1981 at Stricker's Grove on State Rte. 128, one mile west of Venice (Ross) Ohio. Exhibits, awards, food and refreshments available. Flea market (radio related products only). Music, talks hidden transmitter hunt and sensational air show. Admission and Registration $4. For information: Lillian Abbott, K8CKI, 317 Greenwell Rd., Cincinnati, OH.

ARRL Roanoke Division Convention September 26 and 27 in the Virginia Beach, Virginia, Pavillion. Free transportation to the oceanfront where the Neptune Festival is also taking place. FCC Amateur exams given to those sending Form 610 request in advance. Admission $3.50. Major award will be an fm transceiver. Flea market tables $5 per day, $7 both days. TRC, P.O. Box 7101, Portsmouth, VA 23707. 804-587-1695.

KENTUCKY — the Bluegrass Amateur Radio Society will host its annual Central Kentucky ARRL Bluegrass Hamfest Sunday August 9, 1981 starting at 8:00 A.M. at Tates Creek Junior High School, Centre Parkway, Lexington, Kentucky. Talk in 146.16/76 Mhz. Forums, indoor exhibits, awards, protected paved flea marked area. Admission $3.50 advance; $4 at door. Outdoor flea market space free, with admission. For more information contact Ernie Cohen K4DHN, 3379 Sutherland Drive, Lexington, KY 40502.

SEPT. 19 & 20, The Peoria Area Amateur Radio Club will hold Peoria Superfest '81 at Exposition Gardens, W. Northmoor Rd., Peoria, IL. Admission $2. advance or $3. gate. Same low price! Gate opens 6:00 AM, commercial building 9:00 AM. Talk-in 146.16/76 call W9UVI. Forums, latest amateur and computer product displays, huge free flea market, ladies programs, and childrens activities. Full camping facilities. Sat. night informal get together at Heritage House Smorgasbord, 8209 N. Mt. Hawley Rd. For tickets and info write Superfest '81, 5808 N. Andover Ct., Peoria, IL 61615.

ILLINOIS: Fox River Radio League will host the 1981 Illinois State ARRL Convention in conjunction with its annual Hamfest to be held on Sunday, August 23rd at the Kane County Fairgrounds in St. Charles, Illinois. The Convention program features forums on antennas, DX, and ARRL operations. There will also be several contests, and demonstrations of Amateur Radio communications modes. Advance tickets, send sase to Jerry Frieders, W9ZGP, 1501 Molitor Rd., Aurora, Illinois 60505. Commercial exhibitors contact Mike Pittard, KA9EVT, at 312-896-7383. Talk-in frequency will be 146.940 MHz.

FIFTH WELI Hamden Radio Club flea market Sunday August 16 9:00-5:00, Radio Towers Park, Benham Street, Hamden CT for information call 203-288-3765.

SEPT 27, LIMARC sponsors ARRL Hamfair 81 at Islip Speedway, Islip Ave., (Rte. 111) Exit 43 Southern State Pkwy. Over 375 exhibitors at the last show in May. No reservations needed, electricity available. Call nites Sid Wolin, K2LJH, 516-379-2861, Hank Wener, WB2ALW 516-484-4322. Heavy Rain date Oct. 4th.

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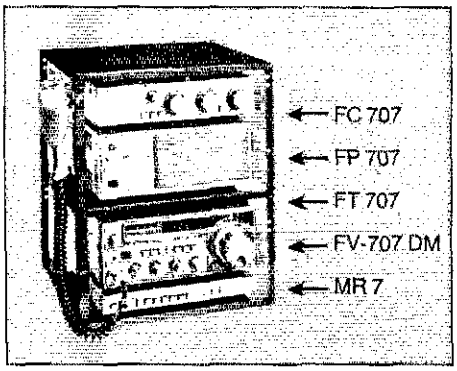

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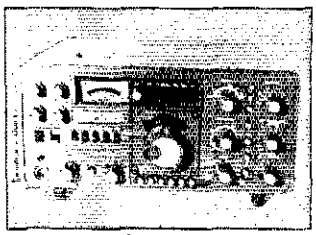

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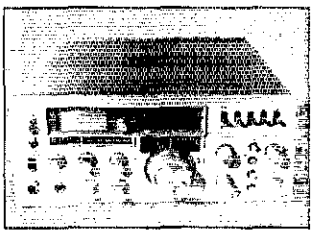

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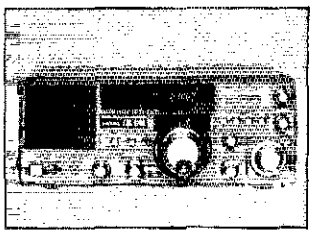

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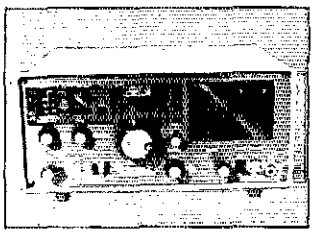

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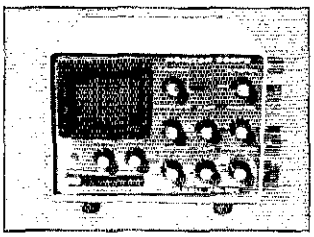

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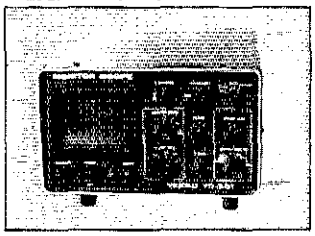

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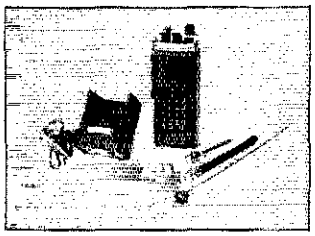

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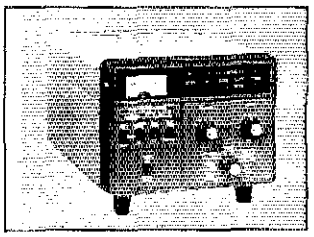

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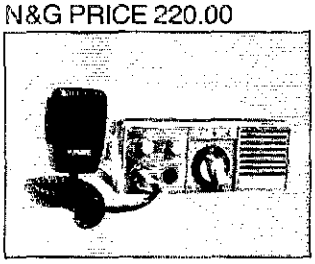

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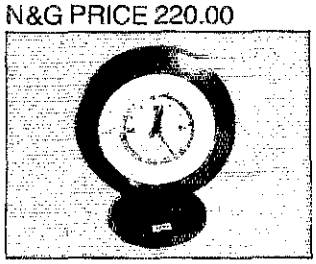

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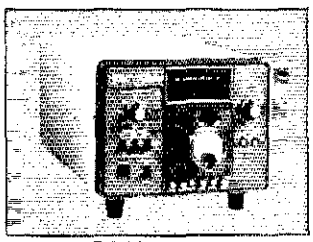

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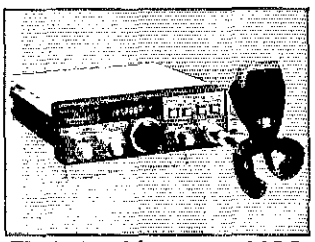

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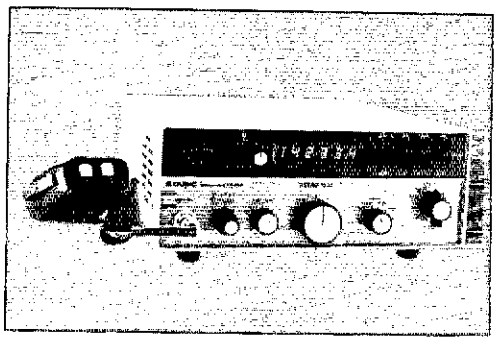

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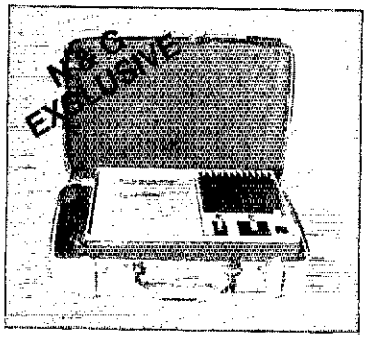

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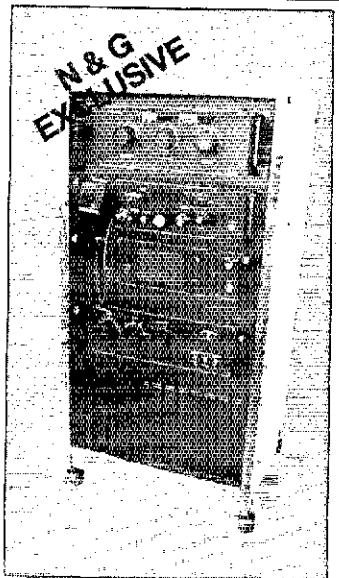

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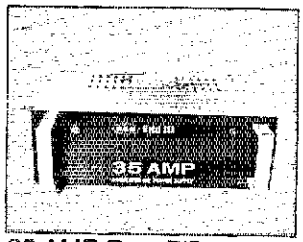

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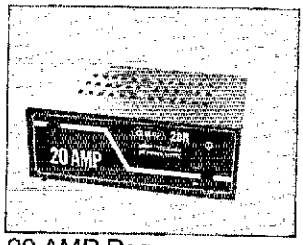

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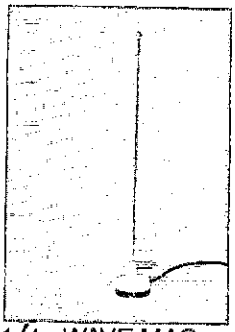

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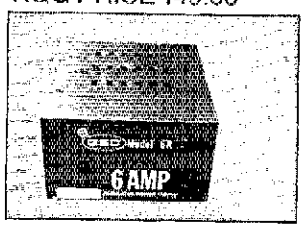

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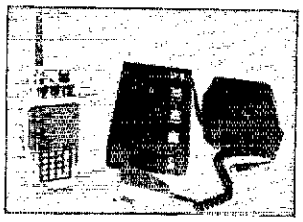

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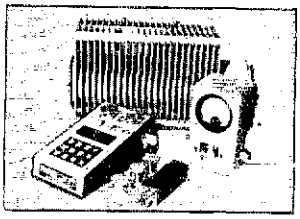

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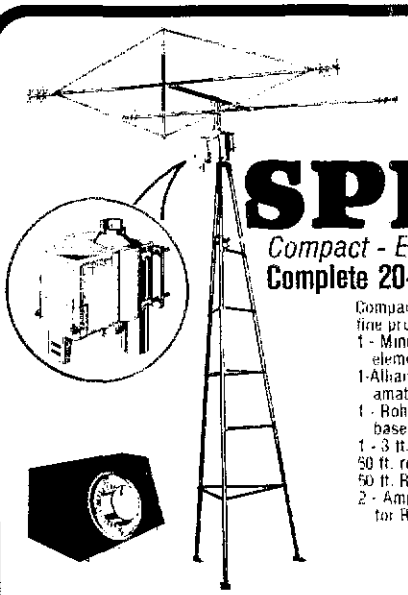

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RG-213/U	50	60	.90	2.3	5.2
RG-59/U	75	1.10	1.70	4.1	8.2
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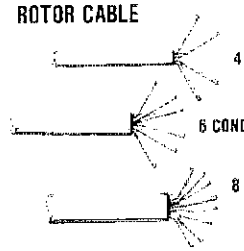

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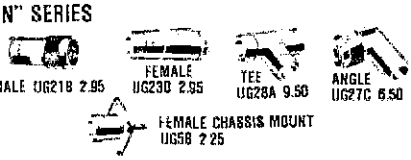

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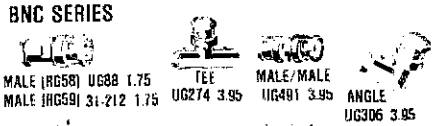

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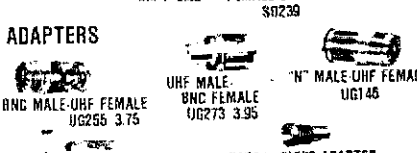

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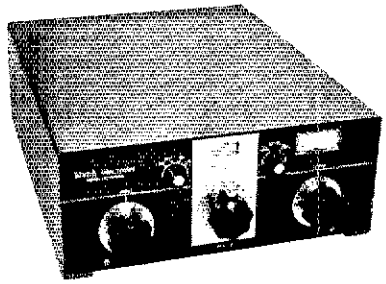

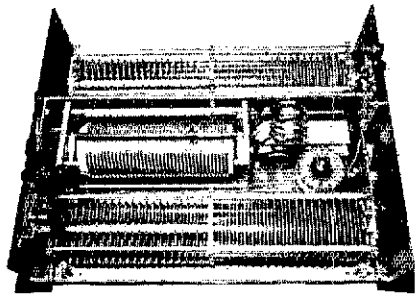

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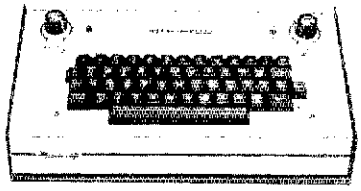

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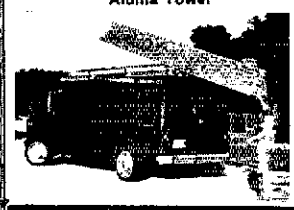

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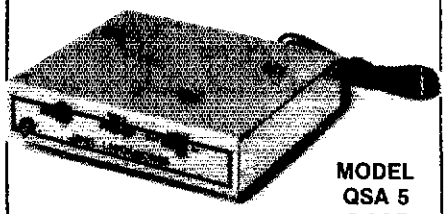

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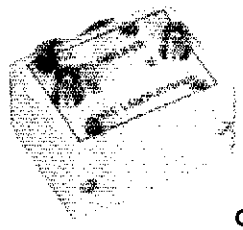

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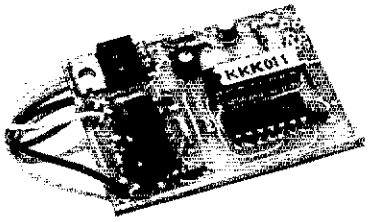

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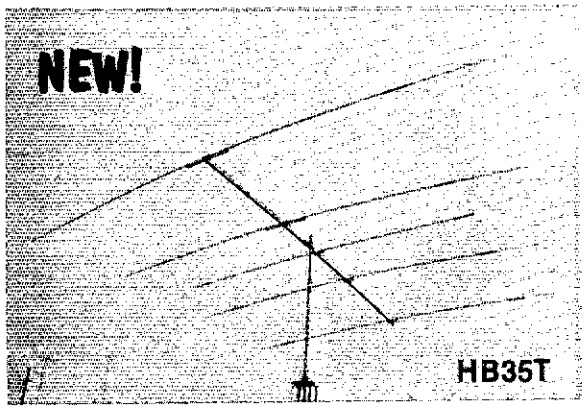

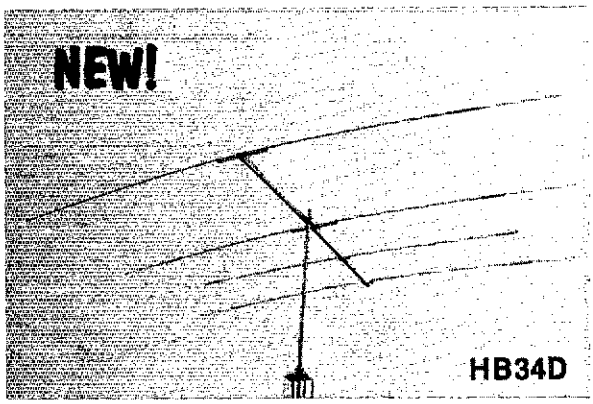

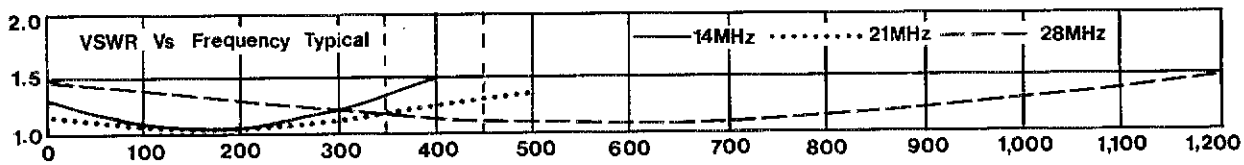

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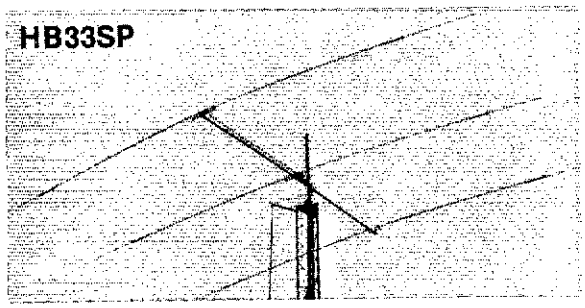

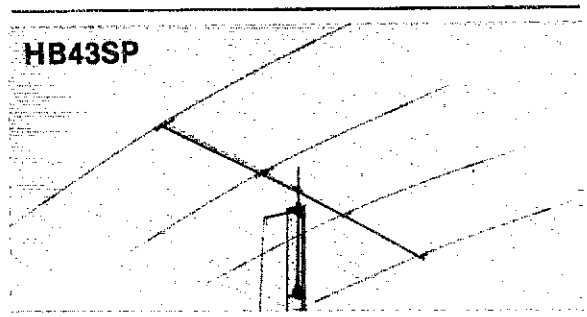

	HB35T	HB43sp	HB34D	HB33sp
Bands	10/15/20	10/15/20	10/15/20	10/15/20
Elements/Band	5 5 4	4 4 4	4 4 3	3 3 3
Max Pwr PEP	3KW	3KW	3KW	3KW
VSWR	1.5	1.5	1.5	1.5
Impedance Ohms	50	50	50	50
Max El Length	27'	27'	27'	27'
Boom Length	24'7"	19'8"	16'5"	13'2"
Turn Radius	18'10"	16'9"	15'10"	15'
Wind Area Ft²	7.93	6.62	6.04	4.73
Wind Load (lbs.) @ 80mph	160	132	121	102
Boom Diameter	2"	2"	2"	2"
Mast Size	1½-2"	1½-2"	1½-2"	1½-2"
Weight Lbs	50	38	34	27
Max Wind MPH	100	100	100	100
Balun Furnished	Yes	Yes	Yes	Yes
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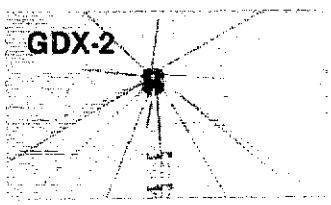

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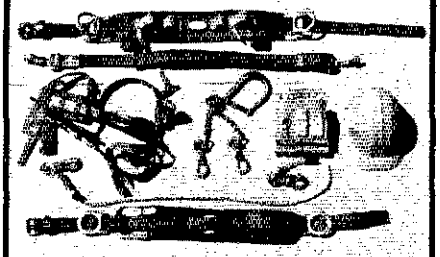

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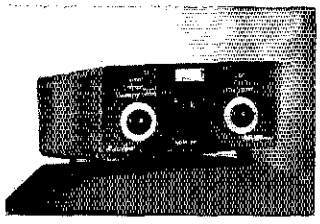

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RTTY: Complete HAL setup — DS-2000/ST-5000, cw board, monitor, all cables and manuals. Perfect condition. Make offer. Bob Jackson AG5X 713-488-0065.

FOR SALE: HyGain 3750 hf transceiver, 3854 speaker, 3855 VFO, service manual, covers, MC-50 mike. Absolutely mint condition. $1500. Shipped collect. Don Schneider N4CJU. 493 Lakeside Pl., Largo, FL 33541 813-531-1016 eves.

MICROPHONE Stand wanted! I need a Model C-4 stand for the Turner Model 80 mic. Anybody have one?? Also want a E.F. Johnson SSB converter, cat. no. 240-305-2. Could probably use a Heath SB-10 just as well. Must be in exc. shape, pse. Also need a matching speaker for a 75A-4. No response to last request, so let's try again. A nice one pse. Want a peak-reading wattmeter, Swan WM-3000 or similar A.N. Gerli, AC1Y, 35 Brookmoor Road, Avon, CT 06001.

COLLINS WARC conversions, $125. S-Line dual VFO, $150. KWM-2/75S twin transceive, $250. 75A-4/KWS-1 transceive, $350. K1MAN, 207-495-2215.

ROSS'S Used equipment specials for August: Kenwood TS-820S $650, R599A, T599A, and S599 $549, TS-120S $520, TS 520 $499, R-300 $200, TS700A $390. TS7625 $269. Swan PSU1 and SS200A $449, 500C $259, 102BX $738, 260 $279. Tempo AC fan $329. Ten-Tec 240 160 conv. $80, 244 Digi, readout $140. Yaesu FT-101E cw $500, FT 221R $378, FT 625RD $579. Icom 245 $209.90, IC-245SSB $319.90, IC-21A and DV21 $289, IC-211 $429, IC-211 $399.90. Drake TR3 $269, R4B and T4XB $600. All prices cash plus shipping. Closed at 2:00 on Monday. Ross Distributing Company, Preston, ID 83263. 208-852-0830.

SWAN 350C 500W ssb/cw transceiver w/117XC p.s., absolutely band new condition w/no scratches, etc. $375. Want UTC CVM-5 modulation transformer or equivalent 600W multi-match type. Bruce Berman WA2OGS, 44 Center Grove Road, Apt. B-45, Randolph, NJ 07869. 201-366-0227 eves.

SWAP or sell FT-7B with cw filter. Looking for 2m all-mode. W7LHO, 505-753-9379.

WAØWSS estate, Heath SB-220 $445. SB-610 scope $90. HM-102 wattmeter $25. Cantenna $9. Drake TR-4, RV-3 (remote VFO, speaker, power supply) $385. TR-22 FM transceiver, mike, Regency P-107 power supply $89. Mastercrafter digital clock $7. Midland 23-112 VOM Meter $15. Cashier's check you ship. Tristao MM35 crank up, told over 35 foot tower, HAM-M, TA-33Sr., Diplomat FMD12 $250. GE Pre-Progress two meter transceiver $20. Pick up only. WØKC, 10 Taylor Ests., Kirkwood, MO 63122.

WANTED Dentron 160XV WA1YCN.

KENWOOD TS-520 $450 mint, Drake SL300, SL500 SL1800 $35 each, Autek QF1 $35 W1ABJ 617-964-7323.

WANT: Signal/One CX11A transceiver and Alpha 77 amplifier. WA6BUS 714-962-5940.

HEATH SB-634 Station Console, mint, $125. KA9EIC, 715-398-3408.

SELL/TRADE: Tektronix 545B oscilloscope, excellent condition $395. Telonic SM-2000 sweep generator w/L-5M plug-in $175, Tektronix oscilloscope probes new and used, Eimac SK-300 tube socket $85, Transco 1460-822 high performance DPDT remote coaxial switch, new $65. WA6BUS 714-962-5940.

ROSS'S NEW factory sealed carton specials for August: Icom 251A $589.90, 701 $950, IC-211 $545, 255A $308, 2AT/NiCD $239.80, 502A $199.25. Kantronics' Field Day $379, Varifilter $115, Signal Enforcer $150. Kenwood TS-830S $869.80, TS-130S $669.80, TS-530S $750, R-1000 $399.90, TL-922A $1025, TR-9000 $441.60, TR-7650 $399.90. Mirage B108 $150, B-23 $69.90. Robot 400 $669.80, 800 $747.82. Signal/One CX11A write. RF Power Labs A1000 $1100. Cubic 100MXA $495, Astro-102-BXA $980. Slinky antenna $37.95. Ten-Tec 444 $1300, 515 $399, 546 $1055, 580 $755, 525 $479. All prices cash plus shipping. Closed Monday at 2:00. Ross Distributing Company, Preston, ID 83263. 208-852-0134.

FOR SALE: Two meter 40 element Cushcraft colinear antenna with 50 feet of coax cable. Price $165. Two meter Cushcraft Ringo with 35 feet of coax cable. Price $25. Buyer must pick up items. K1YOA Roy Sassi, 34 Rawlinson Drive, Coventry, RI 02816. 401-828-0580.

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WANTED: SW broadcast rcvr, such as Heath SB 313, Drake SPR4 or similar. David Potter 406 E32 Austin, TX 78705.

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HEATH KIT SB-102, SB-600, HP-23B, all manuals, excellent condition $350. WD5AIN 806-274-2008, 801 Skyline Dr., Borger, TX 79007.

FOR SALE: Kenwood TS 520S, cw filter and DG-5 display. Used less than 10 hr $650 phone 305-878-3671. K2KXK.

SELL: Drake station T4XB R4B MS4 AC4 All manuals etc. Excellent condition $800. Also SB610 scope $85. Will ship UPS 312-969-3883 WB9BQV, Don.

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KENWOOD TS-120S, PS-30, VFO-120, SP-120 MFJ-752 audio processor, Diawa RF-440 speech processor. All equipment is absolutely mint and on air. New price $1200 will sell for $800. W1FYI, 203-272-2482.

EXCITING DX show for hamfests, conventions, banquets, club meetings. See June Ham-Ad, page 157. WA4WME.

FOR SALE: Instructor Graph $100. RF Signal Generator Heath EF3 $35. 2 meter HW2036A transceiver, Micorder $250., 2 meter HW202 transceiver $100. Heath A1 cond. Power supply $25. WA2TTV H. Richardson Phone 1-716-372-1549.

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Don's law - If you're working on the inside of a radio, the smallest piece you touch will fall to the most inaccessible region inside the radio, connecting an active component to ground. Call our service department.

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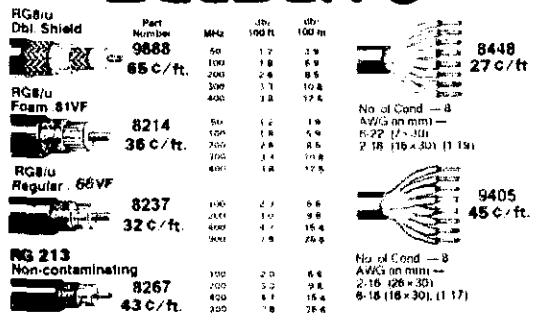

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KENWOOD R599 receiver mint $175, HAL Communications DS-2000 keyboard $375, W7IS, Rt 1 Box 142AAA, Elma, WA 98541 1-206-426-7192.

SELL: Wilson SY-1 $170, CDE TX2 — $175. N9AFE, 1-217-546-7479.

TI-59 PROGRAMMABLE — Card Reader/Printer and PC-100C Thermal Printer for sale: manuals, carrycase, AC & DC chargers, aviation and HP RPN simulator software. Electronic Engineering Packet and Programming Sourcebook, extra 3-roll thermal paper, program forms (2), and 40 magnetic cards included. Total value: $635. Price: $450. Gene Pfeiffer 212-792-4064 or 201-731-9090.

HAMMARLUND HQ129-X mint with original manual and speaker $129. Cash and carry W2KU, 516-627-3909.

HAM — PILOTS Heath OC-1401 R-NAV/Scientific RPN Preprogrammed Computer for sale: Manuals, ac, dc plus carrycase with internal power supplies included. Expert assembly by R/TV Engineer. Price: $250. Gene Pfeiffer — 212-792-4064 or 201-731-9090.

COMMERCIAL 150 MHz fm transceivers, GE Prog Line tube-type, most with accessories. $50 each or 3 for $100. FOB Electrocom, 2109 N. Claiborne, New Orleans, LA 70116. 504-949-3852.

YAESU FRG-7 185$, Bearcat 250 200$, Drake SW-4 50$, SL-56 audio filter 45$, Kenwood YG-3395C cw filter 30$. All excellent. KA7FPD 307-634-5711.

WANTED: Hallicrafters, SR 2000 in good condition. WA8OYU, Peter Pritko, 7596 Boneta Rd., Wadsworth, OH, 44281. 216-334-5220.

ICOM-710 with RM-2 remote controller $850; Collins R-390A $350. Bob Dildine, W6SFH 707-542-7619.

WILSON MARK II handheld — TTpad, two NiCad packs, wall charger, leather case, speaker-mike, eight frequency pairs. $225. N2ZZ Jim Boehner, 1003 Walnut Ave., Syracuse, NY 13210. 315-472-6447.

SELL TRADE Yaesu FT480R all mode 2 meter or IC2AT with sp/mic mint. Wanted Kenwood TS700SP or Icom IC251A KB5MR 918-299-9645.

FOR SALE: Howard 435 ham receiver. Purchased about 1938. Can be fixed. McNichol, W3QJM. 2818 Oak Ave., Altoona, PA 16601.

DRAKE C-line T4XC R4C Heath HP-23A ps, all filters nb manuals cables excellent condition first $775 or best offer. Will ship UPS. Kurt Eisenach 604 12th Avenue, International Falls MN 56649.

SELL: Mint Drake C-line, R4C (w/0.25, 0.50, 1.5 kHz filters), 4NB, T4XC, MS4, AC-4, xmit & rev xtals for 10m to 160m, cables, manuls, orig cartons. $900 or best offer, Larry, WA8RXU, 614-446-4831 after 6 P.M.

FT-101B. Factory original with 160m xtal; 600 Hz cw filter, mike, fan, 12V cables, manual plus Daiwa SWR/pwr meter CN-710 and A-Tronix keyboard with 256 character erasable memory. All items absolutely factory mint condition, in original cartons. Operating time: 12 hrs. Send certified check/postal money order $600, or write: K6IOQ, 7338 Oso, Canoga Park, CA, 91306. 213-703-7243.

OLD-TIMER moving to smaller quarters. Needs to dispose of 40 yr. collection of ham gear preferably as a lot for best reasonable offer. Transmitters, receivers, power supplies, amplifiers, speakers, radar unit, radio tubes, etc. 207-635-2846. J. Sass RR1 Box 522, N. Anson, ME 04958.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 421, 230 Woods Lane, Somerdale, NJ 08083.

TS820S WITH Sherwood Engineering 350Hz filter. Absolutely perfect condition. N2MF 315-446-9157.

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DRAKE Line "loaded" R4C/T4XC/AC4/MS4, . noise blanker, 4 filters, crystals. Late serial number, "mint" $985. Alan Bloom, N1AL, 2425 Corby #7, Santa Rosa, CA 95401.

CLEANING OUT ham shack, s.a.e. for four page list. W9VZR, 4627 North Bartlett Avenue, Milwaukee, WI 53211.

WANTED: HAL ST-6 demodulator. W1EIM 207-646-3567 Box 387, Ogunquit, ME 03907.

DIGITAL Frequency meter, Beckman 6121, laboratory meter, preamp, prescaler, good to 300 MHz, manuals, FB cond. $300 plus shipping. Jack, W2JS/5, 11308 Picktair, Austin, TX 78750.

DRAKE TR7/DR7, surplus 12V supply, all filters, noise blanker, receives VLF/BC bands. Early serial number but looks and works great. $1250 Alan Bloom, N1AL, 2425 Corby #7, Santa Rosa, CA 95401.

SEARS-Yaesu FRG-7 general coverage communications receiver. Mint $180. W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

WANTED: Drake MN2000 N6DEN.

FOR SALE: Tower, AB105, 150 feet — call 301-672-3872. Wanted: Collins 1.5 kHz filter F455FA-15, also need 500 Hz filter, both for use in 75-S-3 receiver — want mint Kenwood TS 700-SP — call 301-672-3872. Thomas L. Nickle.

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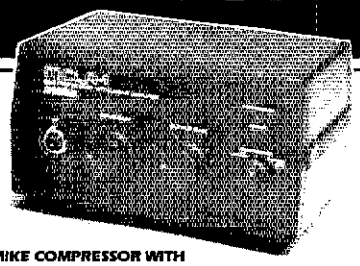


MIKE COMPRESSOR WITH LINEAR AMPLIFIER MODEL MCLA-1 ..... $65.

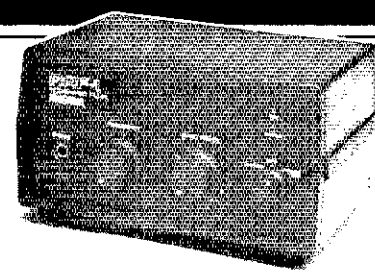
The MCLA-1 incorporates both a Mike Compressor and Linear Amplifier. By connecting the MCLA-1 between your microphone and transmitter either linear amplifier or compression action is possible. When the Function Switch is in the Compressor position, low voice levels are amplified and high voice levels are compressed. In the Linear position, microphone sensitivity is improved.

Specifications:
COMPRESSOR:

Current Drain	Less than 4mA
Input Impedance	600 ohms
Frequency Characteristics	100 — 10,000Hz, ± 0.2 dB
Distortion	Within 0.4% at 300 — 3,000Hz
Dynamic Range	More than 46 dB

LINEAR AMPLIFIER

Input/Output Impedance	600 ohm (High Imp. Mike avail.)
Frequency Characteristics	300 — 10,000Hz, ± 0.5 dB
Gain	25 dB (12V)
Power Source	DC9V (006P or ext.)
Accessories Inlcuded	* 4-pin mike plug, * 3ft. long power cable
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	2.6 lbs. (1.2 kgs)

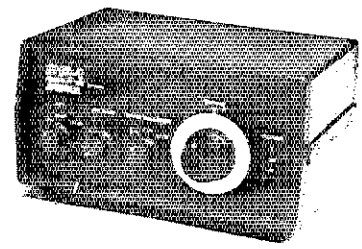


ACTIVE AUDIO FILTER MODEL AAF-1 ..... $65.

By connecting the AAF-1 between a receiver and an external speaker (or earphones), you can reduce unnecessary or undesired audio signals from your receiver; reduce noise and reduce beat frequency interference. The AAF-1 circuitry consists primarily of IC's and incorporates two separate filtering functions, band-pass and notch, both of which have variable frequency ranges.

Specifications:

Filters	1) Band pass filter 2) Notch filter
Center Frequency Shift Width	Between 200 and 2,500Hz
Variable Bandwidth Range	B.P.F. 100 — 10,000Hz (-12 db) NOTCH: 70 — 1,500Hz (-12 dB)
Input Impedance	8 — 600 ohms
Output Impedance & Power	8 ohms 1W max.
Semi-Conductor Used	5 ICs, 1 Tr., 7 Diodes, 1 LED
Power Source	DC 9V (006P or ext.) 150mA max.
Accessories Included	* 3ft. long connector cable with plugs * Plug adaptor * 3ft. long power cable
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	2.6 lbs. (1.2 kgs)



PRE-SELECTOR MODEL PR-1 ..... $80.

The PR-1 Preselector, when connected between an antenna and transceiver or receiver, will improve the selectivity of weak signals and will assist in reducing image interference.

The PR-1 is usable with any transceiver equipped with an antenna change-over relay.

Specifications:

Frequency Range	3-30MHz in 3 bands: 3-7MHz, 7-14MHz, 14-30MHz
Gain	20 db at 7MHz, variable through control of RF Gain
Semi-Conductor Used	3 FET's, 5 Trs, 11 Diodes, 1 LED
RF Attenuation	20dB & —10dB
Input/Output Impedance	50-75 ohms
Relay Rated	200W, CW continuous
Power Source	117V AC, 60Hz
Dimensions	8"(W) x 4"(H) x 5½"(D)
Net Weight	3.1 lbs. (1.4 kgs)

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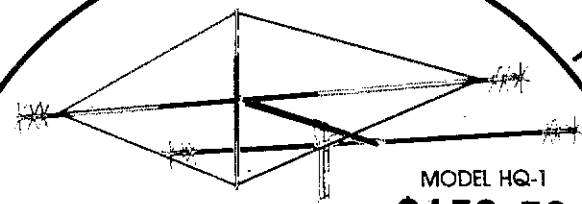

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DRAKE R4A, MS4, mint, rarely used, $225 plus shipping. Dick Lindzen, 301 Lake Ave., Newton, MA 02161, 617-332-4342.

WANTED: Heath HP-14 power supply. WB7UEU, Lee Chambers, 1023 South Adams #143, Olympia, WA, 98501, 206-753-0744.

FOR SALE: Antenna farm & modern brick home in the Ozarks. Located on all-weather highway Ark. 59. Lots of extras for the Ham. Send s.a.s.e. for complete details 32 acres. W. O. Anderson, W5UBU, Rte. 1, Box 52, Canehill AR 72717 501-848-3232.

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FOR SALE or trade 16K Level II TRS-80 year old M-80 interface, green screen prefer trade for hf amplifier but will consider other trades KA8IJR.

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WANTED: Back issues of Popular Electronics and Electronics World. John Clements WA6RXW, 7310 Ensign, Sun Valley, CA 91352 213-765-7651.

TEKTRONIX 661 scope, 4S1 d.t. sampling plug-in, 5T1 time base. dc-1 GHz. No probes, $250. C-12 scope camera, $195. S.a.s.e. for list. A.P. Towbin 436 Orange, New Haven, CT 06511.

813 OPERATING curves needed: manufacturers' blurbs; text references; copied excerpts; your recollections; anything. My 813 is a single-section tetrode. Will reimburse. N1ATB.

HEATH HW-101, HP-23C P/S, SB-301-2 filter, HS-1661 speaker, BW clipper, Torrestronics digital readout, HDP-21 microphone, all pertinent manuals. $465. HD-1410 keyer, $40. KB5NY. 512-341-8389.

HEATH HR-20 receiver with p/s-Standard SR-146A 2 mtr. handie talkie with T/T pad, charger and external mike — Yaesu FT-401B transceiver with speaker/phone patch, Shure 444 mike, FL2100B 80-10 linear with new 572 tubes. Dentron Super Tuner Swan WM-3000 wattmeter. All equipment with manuals Augie WB4EBI 404-972-7631.

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NEW CODE cassettes — new beginners code course with two 90-minute cassettes. Order #F1 at $10.95. Many new practice cassettes. Write for new catalog. Order popular QSO tapes similar to FCC exam, #C7 — 25 QSOs at 15 wpm or #C8 — 25 QSOs at 22.5 wpm. All practice cassettes $5.95 each ppd. Computer generated code, 90-minute, high-quality cassettes. MC and Visa welcome. Fast service! K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037. 408-683-0287.

COMPLETE Station: Kenwood TS-520 transceiver, Turner microphone 454X, Hallicrafter HA-1 keyer, Vibroplex deluxe key, Heathkit SB-610 scope, Heathkit VOM-IM-104, Johnson antenna meter, B&W antenna switch, Hy-Gain Dipole 40-80, Hy-Gain Vertical 10-15-20, Heathkit dummy antenna and junk box. $750, plus shipping wt. appx. 100. All equipment excellent condition. s.a.s.e. WB4GRL, H. J. Boyd, 5 So. Live Oak Rd., Hilton Head Island, SC 29928. 803-671-2365.

SALE: new BS-5 adapt for Kenwood SM-220 $60. K1KON 203-838-1335.

HAMMARLUND HQ-170A VHF, HX-50A, D104, dipole $375 WB2YRL.

FT-901 D(M), mint, cw/am filters, latest factory modifications, with SP-901P speaker/patch, $900 Tom Neill, K4XG 615-790-2610.

SELL: TS520, cw filter, VFO-520, $450. K3AV, 301-474-2970.

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TR4C, AC4, MS4, uhf mod, $425. TC-6, SC-6, TC-2, SC-2, CC-1, CPS-1, SCC-1 crystal calibrator, $575. Tempo 6n2 kW for 6 & 2 meters $850. Willard Tucker, 513-875-2992.

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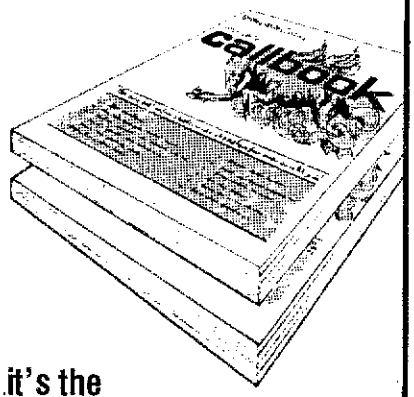

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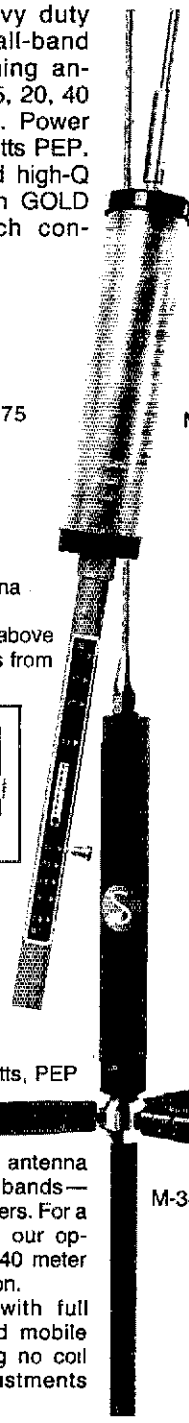

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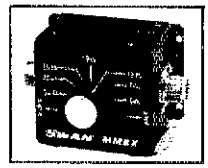

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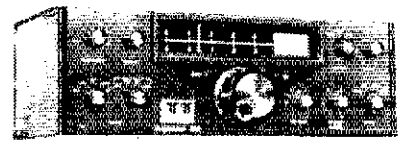
289	Noise Blanker	39
1140	D.C. Circuit Breaker	10



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CENTURY 21 Digital, mint, 1979, new finals, David Ashenfelter (KA8DDT), 23612 Coach House Ct., Southfield, MI 48075. Best Offer.

SSTV: SELL Venus SSTV monitor, Venus SSTV camera, tripod, all manuals. Excellent condition, $350, or best offer takes all. Would trade for 2-meter ssb linear amp. W2ZNN, 1115 W. 2nd. Ave., Corsicana, TX 75110.

TOWER 54 ft. self supporting, crank-up, tilt over, hot dip galvanized, one man installation. Tristao, tower-TWS-70-354G, base — BCS-7054, 10 ft. steel mast. $1800 or best offer. Norm Atlas, 11416 Harrisburg, Rd., Los Alamitos, CA 90720, 213-430-8379.

COLLINS 30L-1, mint, $499 pp; Dentron GLA1000B, new, $285 pp. WA5OXK, 504-392-9101.

DRAKE T4X, R4A, MS4, AC-3 13 extra xtals, manuals, excellent $560. KB8FP, 616-452-4893.

MOR-GAIN Antenna 75/40 HD/SP /A. never used, factory carton. Cost $90. Sell $65. or trade for good wattmeter. Yaesu FTV 250 two meter transverter, factory carton, like new $140. KD8L 1-513-738-4711, Hamilton, OH.

SB614 monitor $135 pp, SB634 station console $125 pp, SB644A VFO $100 pp. WA5OXK, 504-392-9101.

SONY ICF-2001 receiver. As new, in box, all papers. $200., a.c. adapter $10., plus shipping. Gene Cox, Route 3, Gatlinburg, TN 37738. 615-436-7559.

LO AIR time FT101E with Fan, Desk and hand mikes, ac/dc cables, mint condition $525. W6SYA, 2958 Cloudcrest Rd. LaCrescenta, CA 91214, weekdays 213-359-5914.

MOTOROLA HT220, 2-meter, 5W, TTP, 6ch, 2 rapid charge batteries, test connector, 12Vdc vehicle rapid charger, 120Vac charger, and leather case all for $800. Cushcraft AFM-4D 2-meter 4-pole, $55. L. Low 209-464-9760.

BUY-SELL-TRADE. Send $1. for catalog. Give name address and call letters. Complete stock of major brands new and reconditioned Amateur Radio equipment. Call for best deals. We buy Collins, Drake, Swan, etc. Associated Radio Communications 8012 Conser, Overland Park, KS 66204 913-381-5900.

SELL NEW antenna tuner MFJ941B 300 watt Versatuner never used with original box, instructions. Best reasonable offer. W2HBV, Box 634, Newark, NJ 07101.

COAXIAL CABLE sale — free catalog, RG-8X foam 95% shield 19c/ft, RG-8/U 95% shield poly 31c/ft, RG-58C/U noncontaminating mil-spec 12c/ft., RG-59/U 75 ohm 100% foil 10c/ft, RG-8A/U mil spec 96% shield 35c/ft, SO-239 PL-259 10/$5.89, UG-175, UG-176 10/$1.99, Barrel 98c, F-59A 10/$2.15, shipping: cable $2.50/100', connectors 10% $1.50 min, Nemal 5685 S.W. 80th St., Miami, FL 33143 305-661-5534.

FACTORY reconditioned Collins KWM-2 and power supply $550. Frank Curtis Box 13 Virgil SD 57379.

FOR SALE: Kenwood TS-520, cw filter, SP-520 speaker, Shure 444 mic, extra finals and driver. All for $400. Icom 211, RM-2 remote control. Both for $550. All items guaranteed mint condition in factory cartons. Certified check or money order. I ship. Rob Yaw WA7IAL, Box 1904 Havre, MT 59501.

DRAKE R-4A, T4-X, MS-4, AC-4 reflectometer, Astatic Fone 10-DA Vibroflex Key, Brass key, new spare tubes for both sets, crystals for 10 and 160 bands, cables, manuals, many extras. All good condition. Losing sight, one package deal $650. WB2BQA, 914-723-1105.

BUILD antenna tuner from brand-new ARC-5 transmitters. Conversion data included $18.95. Send for Gov't. surplus catalogue 50c. G&G Radio 45-57 Warren Street, New York, NY 10007, 212-267-4605.

WHOLESALE to ham dealers free catalog coax and connectors RG-213/U $287/1,000', Belden RG-8/U foam 80% shield $145/1,000', RG-58/U 80% shield $39/1,000', PL-259 American $41/100, Nemal 5685 S.W. 80th Street, Miami, FL 33143 305-661-5534.

SELLING station, Yaesu FT101E with fan, cw filter, YC-601 digital and matching speaker. D-104 microphone, Ten-Tec KR-50 keyer. All top condition. Firm $660 FOB. Loren Carlberg, WB5WDG, 2423 Canterbury, Muskogee, OK 74401.

HENRY 2K desktop linear, $550 Johnson kW Matchbox w/SWR $135, both excellent WB7BKU, Bob Ensminger 710 Grandview, College Place, WA 99324, 509-529-4350, 525-0297.

HEATH SB-303 all filters $225, SB401, mic., all xtals $210. Manuals. Vry gd cond. Both $425. KB4NH 956 E. Seminole Dr., Venice FL 813-493-6303.

TRADE HEATH 2-meter hand-held for ???????? Has tone pad, remote hand microphone and holster (modified Motorola). Crystals for 146.94, 146.52, 146.79, 146.88, 147.00, 147.09, 146.97, 146.55, 146.67 and 147.36. Sase for response. Peter O'Dell, KB1N, 7 Brian Rd., South Windsor, CT 06074.

YAESU FT-707 with 350 Hz cw filter, FP-707 power supply. $685 FC-707 antenna tuner. $75. All perfect. WB7VOO, 602-298-4820.

HEATH SB-610 monitor scope $95, HD-15 patch $25, Tatar, 1625 North Park, Cleveland Heights, OH 44106.

THE VHF shop August special — Lunar 2M10-80P 2 meter 80 watt linear amplifier with preamp, call or write for a super deal! Linear amplifiers, preamps, GaAsFet preamps, converters, Transverters, filters, antennas etc., by: Lunar, Spectrum International, KLM, Tama, Microwave Modules. K3MKZ Box 349 RD#4 Mountaintop, Pennsylvania 18707 717-868-6565 MC/VISA accepted.

MINT: Drake 2C, $175; Globe Chief, $45. N5MG/2 607-273-4772.

SWAN 270 xcvr, 80-10, 120V ac, 12V dc. Xlnt cond. Cables, mic, manual. $265 plus $5 shipping. (Just got TS-830). Drake 2A rcvr. Mint. $160. Bob, WØEUL, 303-366-3980 after 1800 MDST.

WANTED Schematic and/or manual for Hallicrafters Hf-40 xmtr and SX-140 rcvr. W2OWH 14 West Holly Drive, Sayville, NY 11782.

FOR SALE 75A1, Pacemaker, Thunderbolt (or trade all three for good transceiver) QSTs 1930s to 1980s (cheap) 212D antique xmtg tube. Ken W9TJG 12830 Cardinal Crest Drive, Brookfield, WI 53005 414-786-6718.

WANTED: MINT Collins 75S3 for pickup within 200 miles of Chicago. Dan 312-394-9418 AF9R.

DRAKE SPR-4 rcvr. Mint w/dc cord, cal., blanker, manual *and all crystals for .150 kHz to 30.0 MHz. No collect* calls. J. Rowland 201-573-9776 after 2300Z.

KENWOOD TS-120S mint, MC-30S, MB-100 — $550. KA1CAS 203-693-8603.

OSCILLOSCOPE, NLS model MS-215, 15 MHz dual trace triggered miniscope. Line knew with probes, charger and manual. $300. Charlie Thrower 813-626-2412.

HAMMARLUND SP-600-JX receiver, continuous .54 to 54 MHz, deluxe model with additional fixed-frequency control unit, I.F. gain control, internal-external BFO, fast-slow AVC and I.F. output, excellent operating condition with manual. $275. Brand new Drake SL-500 filter for TR-7, $40. Charlie Thrower, W4UKV, 813-626-2412 weekdays before 0800 E.D.T.

HEATH TS4A TV align generator $15 Drake TR4CW w/AC4/spkr $595 Atlas 210X $375 Drake T4XB $375 AC4 $95 Regency *K100 dig scanner $125. Drake C4 console* mint $375. Drake T4 recter w/AC3 $195. Drake R4A receiver $195. Yaesu FL101 transmitter $345. Collins 75A4 w/3 filt. $375. W2FNT, 18 Hillcrest Ter. Linden NJ 07036 201-486-6917.

HEATH SB610 signal monitor scope in operating condition wanted. R. Lutz 3217 Madison Rd., Pinckney, MI 48169.

SELL: Drake T4XB, factory aligned, retubed, with manual, Heath HD-1410 meter, Dentron 160-10 tuner, *Astatic D-104 mike. All in excellent condition. Complete* package: $375. WA2DGU 212-925-3426.

GE 2m rig 3W w/control head, microphone, ac supply. $30. Comco lowband fm rig 12 volts w/control head, microphone. 100 watts output on 29.6 MHz. $50. 80-10m linear 2kW PEP 4-400's in rack. truck only $200. Collins ART 13 200W am/cw transmitte w/ac supply, book, microphone. 2-18 MHz. $40. Yaesu mobile microphone lo-Z $8. Heath HD10 keyer $35. Brian Carling, AF4K, 5131, Raywood Lane, Nashville, TN 37211.

Hy-Gain TH6DXX like new, with stainless hardware and balun. $140. Art — K1VKO. 203-853-0587.

YAESU FT-101Z hf xcvr. One year old, mint, with YD-148 desk mic and cooling fan $600 postpaid and insured. Also FC-107 antenna tuner $100. Steve Mottola, WB3GUS, 662 7th Ave., Swarthmore, PA 19081.

DRAKE R4B, T4XB, AC-4, MS-4, crystals, "excellent" $580. MN-2000, "new" $185. W-4, "mint" $48. Turner 252 mike $20. IC-211, SM-2, IC-SP3 speaker "new" $495. New Azden PCS-2000, $225. N4ECD — 502-465-8763.

JOHNSON'S Amateur Radio Supply 700 N. Clark Blvd., Clarksville, IN. 47130. Easy access from I-65 north or south. The only full line amateur dealer in the Greater Louisville area. We're new and ready to deal. In addition to most major lines, we have a full service department. Call or write for good prices and good service. 812-283-3876.

YAESU FT101ZD, with WARC frequencies, mike and fan, mint condition, $675. John W3MA, Box 270 RD 2, Malvern PA 19355, 215-644-0806.

JANEL 50 CA 6M converter never used 28-30 MHz output $40 includes postage J. Rowland 201-573-9776 after 2300Z.

FOR SALE: Ten-Tec 509 Argonaut, 206A xtal cal. 208 cw fltr, 210 pwr sply, KR5-A keyer. $300. firm. ERC SL-56 (converted SL-55) active fltr $25. All mint condx. Certified check or MO only. R.S. Crowell KA4UPQ, 640 Stonehenge Drive, Mary Esther, FL 32569. 904-244-0307.

DRAKE T4X with AC3 mint. $299 plus shipping. KI2Q (KA2EEQ) 201-938-7355.

YAESU FT101ZD, FV101Z VFO, cw filter, fan, mint $749. Includes shipping. K1BW/1. 203-222-0866.

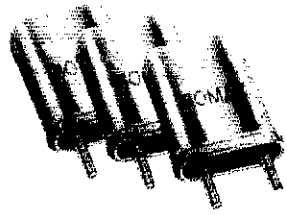
ARMY MARS is *looking for additional members in MA,* RI and CT. For more information, send your name and address to Peter O'Dell, 7 Brian Rd., South Windsor, CT 06074.

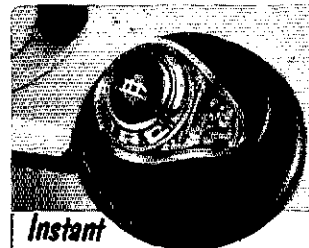
AZDEN PCS-3000. Leap into the future now! We'll beat any price in this issue! And coming soon, the PCS-300 2 meter HT! Call or write for details. LCC Engineering, 116 Country Farms Road, Box 140, Marlton NJ 08053. 609-983-8844 daily 6 P.M. till midnight.

KENWOOD TS520S, DG-5 display, SP-820 speaker. Mint condition. $600 Firm. Alan WB9 RAD 312-278-7278.

YAESU FT101E transceiver, FL2100B amplifier w/10 meters, YC601 digital display, Y0101 scope, SP101B speaker, zero hours, brand new w/manuals and original cartons, $1,450. Alpha 77S amplifier 1.8-30 MHz, 2 8877's absolutely mint w/manuals $4,150. Nease, Post Office Box 9132, Montgomery, AL 205-272-2256.

HY-GAIN 3750 ssb/cw transceiver with speaker in mint condition $1,000 or best offer. Ex-K1DMP Dale H. Atkins, 259 Sabin St. Belchertown, MA 01007.





MAIL ORDER business for sale. Contact W4OLI at Gotham Antennas 813-584-8489.

KENWOOD TS-820S, filter $620. TS-180S, DFC, cw/ssb filters, PS-30 $650. Dentron Clipperton 2kW $425. Hy-Gain TH-6, Balun $150. All guaranteed excellent with manuals, cartons. Tye, KB8FJ 304-745-5275.

SWAN 500CX, 117XC, VX1 fan $460. Drake R4B $295.; 18HT vertical $190. All mint condx. you ship. Ed, KA1DPM, Hudson Road, Temple N.H., 03084 603-878-3530.

QTH 4000' altitude. Mountain views. HG52-SS tower, tri-bander, rotor, 2 BR, 2-1/2 baths, den, livingroom fireplace, country kitchen, double garage. 2041 s f. total 1-1/2 years old. .84 acre $76,000. W4FC 505-522-0340. 4256 Winchester Las Cruces, NM 88001.

CENTURY 21 with xtal cal, exc condx, $225. KA2EAO, 201-256-7832, after six.

VELOUR Cases for IC-2A/AT. Quality hand-made, $8.50. N3ASQ Cases, 1215 Betfield Ave., Drexel Hill, PA 19026.

WANTED: VFO-520S and AT200. George, WA1GTQ, 617-263-0885.

FOR SALE: TR2200A 2 mtr fully crystalled, all accessories $90.; TR8300 450 MHz crystalled 6 channels $170; KLM PA2-25 2M amplifier $60. Phil Marquis, K6HSV, 415-591-8411 days.

WANTED: Antique, heavy brass telegraph key — will pay top dollar. KQ5K, 1400 Howard, Tyler TX 75701.

YAESU FT-101B, fan (low hours) $475. YD-148 desk mic $22. KR-20A keyer $30. All, $500 FOB WB8YZP, 3510 Arnold Canton, OH 44709 216-492-0624 4-10 PM EDT.

HW16/HG10B, mint, $135. 1-214-475-1341 WD5GNL.

YAESU FT-301 transceiver, FP-301 P.S., mic., manual, all mint condition. Shipped UPS in original factory cartons. $500. K5EFW 505-877-2731.

WANTED: VFO-520S and AT200. George, WA1GTQ, 617-263-0885.

DC-AC for TR3, TR4 series. $50. WD5GNL, 214-475-1341.

COLLINS 75S-3B, 32S-1, 516-F2, cables. Johnson Ranger, Matchbox. Hammarlund 129X with matching speaker. $1050 or best offer. George Snow W6OTN 221 Coronado Dr., Aptos, CA 95003. 408-688-0809.

HEATHKIT, absolutely mint condition with manuals and cables, SB-303, $300; SB-401, $300; SB-600, $25; HM-102, $35, plus shipping. Prefer package deal. Certified check or money order only. Joe Novak, KB8VF, P. O. Box 1284, Jackson, MI 49204, evenings, 517-787-3916.

SELL Heathkit HW-101, PS-23, HS-1661 $400. HR-1680. $160. HW-2036A with Micoder II $200. Century 21 with calibrator $235. Brian WA3NGU 204 Hill St., Trucksville, PA 18708 717-696-2490.

CLEGG VHF wanted: Venus transceiver, Apollo linear, Interceptor B receiver w/Allbander, Zeus transmitter. contact George Hawrysko, K2AWA, P. O. Box 568 Boro Hall, Jamaica, NY 11424. Phone (ac) 212-224-2448.

WANTED: Blue Racer Vibroplex. K6VRS. 1794 Yorba Dr., Pomona, CA 91768 714-623-9551.

WANTED: Collins 75A-4 touch-up paint. Also, service bulletins for 75A-3, 75A-4, KWS-1 to Xerox and return. John, WB8IPG; 26316 Falmouth; Warren, MI 48089.

MINT Collins gear: KWS-1, $695. 75A-4, 3 filters, $395. Matching 75A-4 speaker, $35, or trade for Heath SB-604. All unmodified, with manuals, original crates. John Werner; 26316 Falmouth; Warren, MI 48089, 313-759-4539.

FOR SALE: two HB hv power supplies. Details on request L. L. Turner, 2213 Sunland Ave., Las Vegas, NV 89106.

FOR SALE: KWM380, factory-updated, warranty $2795. 75S3B, cwf, 32S3, 516F2 $995. new: 32S3 $995; IC720A, accps $1250; IC255A $279; IC260A $379. James Craig, 29 Sherburne Avenue, Portsmouth, NH 03801 603-436-2884.

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Webster radio, inc.

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HOURS: 8:30 a.m. to 5:30 p.m. – Mon. thru Fri. / 10 a.m. to 3 p.m. – Sat.

Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES

Add an Autek.

QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $65 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

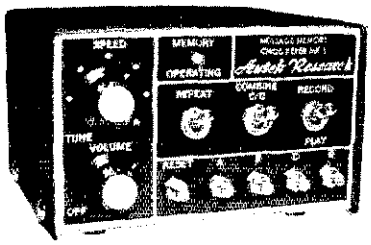
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** *will do to* **QRM**! *Reject whistles* with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST.**) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** *features. We recommend you buy the best rig you* can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** *should make you* wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 *characters. "Memory-saver" feature* standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No tiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post *1963) ham rig directly without a* battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle, 6x3½x-5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** *ever made.* Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place *wasn't even* close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS.

- ☐ QF-1A Filter at $65.00
- ☐ MK-1 Keyer at $99.50
- ☐ ME-1 Expander for MK-1 at $40 (factory installed)
- ☐ ME-1 Owner installed at $30 (save $10)

Add 4% tax in Fla. Add $3 each to Canada, Hawaii and Alaska, $2 for UPS air. Add $15 each elsewhere (shipped air).

Enclosed is $_____.

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Send to Autek Research, Box 302E, ODESSA FL 33556

PRICING: Autek is an innovator, so we're heavily copied. Yet, the "copies" cost you much more. We also give you a free AC supply and pay US shipping. How do we do it? Volume. And because WE SELL ONLY FACTORY DIRECT. No 25% to 50% middlemen markups.

DELIVERY: For 9 years we've shipped over 95% of orders from stock. Some companies have regular long delays. Not us. Order with confidence.

REPUTATION: Don't take our word. Ask on the air for a personal recommendation.

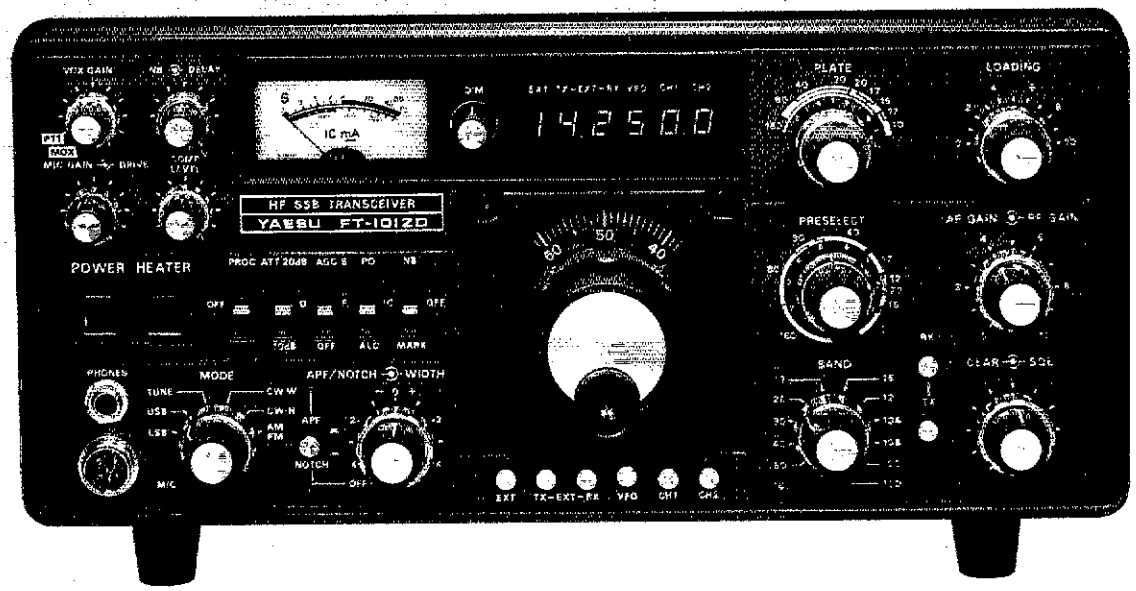
DIRECT MAIL: Your order or request for information will be processed just as fast and with fewer chances for error if you write. PLEASE ORDER BY MAIL. We're best set up for mail. However, if you need to call, our number is (813) 920-4349.

Autek Research

Box 302E
ODESSA, FL
33556

THE EVOLUTION OF A CHAMPION!

FT-101ZD Mk III



The FT-101ZD Mk III is the latest chapter in the success story of the FT-101 line. Armed with new audio filtering for even better selectivity, the FT-101ZD now includes provision for an optional FM or AM unit. Compare features and you'll see why active operators everywhere are upgrading to Yaesu!

Variable IF Bandwidth
Using two 8-pole filters in the IF, Yaesu's pioneering variable bandwidth system provides continuous control over the width of the IF passband — from 2.4 kHz down to 300 Hz — without the shortcomings of single-filter IF shift schemes. No need to buy separate filters for 1.8 kHz, 1.5 kHz, etc.

Improved Receiver Selectivity
New on the FT-101ZD Mk III is a high-performance audio peak/notch filter. Use the peak filter for single-signal CW reception, or choose the notch filter for nulling out annoying carriers or interfering CW signals. In the CW mode, you can choose between the 2.4 kHz SSB filter and an optional CW filter (600 or 350 Hz) from the mode switch.

Diode Ring Front End
The FT-101ZD now sports a high-level diode ring mixer in the front end. This type of mixer, well known for its strong signal performance, is your assurance of maximum protection from intermod problems on today's crowded bands.

WARC Bands Factory Installed
The FT-101ZD Mk III comes equipped with factory installation of the new 10, 18, and 24 MHz bands recently assigned to the Amateur Service at WARC. In the meantime, use the 10 MHz band for monitoring of WWV!

RF Speech Processor
Not an additional-cost option, the FT-101ZD RF speech processor provides a significant increase in average SSB power output, for added punch in those heavy DX pile-ups. The optimum processor level is easily set via a front panel control.

Worldwide Power Capability
Every FT-101ZD comes equipped with a multi-tap power transformer, which can be easily modified from the stock 117 VAC to 100/110/200/220/234 VAC in minutes. A DC-DC converter is available as an option for mobile or battery operation.

Convenience Features
Designed fundamentally as a high-performance SSB and CW transceiver, the FT-101ZD includes built-in VOX, CW sidetone, semi-break-in T/R control on CW, slow-fast-off AGC selection, level controls for the noise blanker and speech processor, and offset tuning for both transmit and receive. The Mk III optional FM unit may be used for 10 meter FM operation, or choose the optional AM unit for WWV reception or VHF AM work through a transverter (AM and FM units may not both be installed in a single transceiver).

Full Line of Accessories
See your Yaesu dealer for a demonstration of the top performance accessories for the FT-101ZD, such as the FV-101Z External VFO, SP-901P Speaker/Patch, YR-901 CW/RTTY Reader, FC-902 Antenna Tuner, and the FTV-901R VHF/UHF Transverter. Watch for the upcoming FV-101DM Digital Memory VFO, with keyboard frequency entry and scanning in 10 Hz steps!

Nationwide Service Network
During the warranty period, the Authorized Yaesu Dealer from whom you purchased your equipment provides prompt attention to your warranty needs. For long-term servicing after the warranty period, Yaesu is proud to maintain two fully-equipped service centers, one in Cincinnati for our Eastern customers and one in the Los Angeles area for those on the West Coast.

Note: A limited quantity of the earlier FT-101ZD (with AM as standard feature) is still available. See your Yaesu dealer. FT-101ZD Mk III designates transceivers bearing serial #240001 and up, with APF/Notch filter built in and AM/FM units optional.

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Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 ● (513) 874-3100

"Cents-ational."

IF shift, digital display, narrow-wide filter switch

TS-530S

The TS-530S SSB/CW transceiver is designed with Kenwood's latest, most advanced circuit technology, providing wide dynamic range, high sensitivity, very sharp selectivity with selectable filters and IF shift, built-in digital display, speech processor, and other features for optimum, yet economical, operation on 160 through 10 meters.

TS-530S FEATURES:

- **160-10 meter coverage, including three new bands**
  Transmits and receives (LSB, USB, and CW) on all Amateur frequencies between 1.8 and 29.7 MHz, including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- **Built-in digital display**
  Large, six-digit, fluorescent-tube display shows actual receive and transmit frequencies on all modes. Backed up by analog subdial.
- **IF shift**
  Moves IF passband around received signal and away from interfering signals and sideband splatter.
- **Narrow/wide filter combinations**
  Any one or two of three optional filters . . . YK-88SN (1.8 kHz) SSB, YK-88C (500 Hz) CW, YK-88CN (270 Hz) CW . . . may be installed for selecting (with "N-W" switch) wide and narrow bandwidths on CW and/or SSB.
- **Wide receiver dynamic range**
  Greater immunity to strong-signal overload, with MOSFET RF amplifier operating at low level for improved IMD characteristics, junction FETs in balanced mixer with low noise figure, and dual resonator for each band.
- **Built-in speech processor**
  Combines an audio compression amplifier with change of ALC time constant for extra audio punch and increased average SSB output power, with suppressed sideband splatter.
- **Two 6146B's in final**
  Runs 220 W PEP/180 W DC input on all bands.
- **Advanced single-conversion PLL system**
  Improved overall stability and improved transmit and receive spurious characteristics.
- **Adjustable noise-blanker level**
  Pulse-type (such as ignition) noise is eliminated by built-in noise blanker, with front-panel threshold level control.
- **RF attenuator**
  The 20-dB RF attenuator may be switched in for rejecting IMD from extremely strong signals.
- **Optional VFOs for flexibility**
  VFO-240 allows split-frequency operation and other applications. VFO-230 digital VFO operates in 20-Hz steps and includes five memories and a digital display.
- **RIT/XIT**
  Front-panel RIT (receiver incremental tuning) shifts only the receiver frequency, for tuning in stations slightly off frequency. XIT (transmitter incremental tuning) shifts only the transmitter frequency, for calling a DX station listening off frequency.

More information on the TS-530S is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-240 remote VFO
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- VFO-230 remote digital VFO with 20-Hz steps, five memories, digital display
- TL-922A linear amplifier
- SM-220 Station Monitor
- KB-1 deluxe VFO knob
- PC-1 phone patch
- HS-5 and HS-4 headphones
- HC-10 digital world clock
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters and YK-88SN (1.8 kHz) SSB narrow filter
- MC-30S and MC-35S noise-canceling hand microphones

KENWOOD
. . . pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.