

QST

QST is the official magazine of the American Radio Relay League, Inc.



Try a collapsible
2-meter quad

Page 26



tempo...

the first in synthesized portables gives you the broadest choice at the lowest price

...the new S-5

- * The only synthesized hand-held offering 5 watts output. (Switchable for 1 or 5 watt operation)
- * The same dependability as the time proven S-1. Circuitry that has been proven in more than a million hours of operation.
- * Heavy duty battery pack.
- * External microphone capability.
- * The S-5's exciting low price...only \$299.00
- * With touch tone pad \$339.00

SPECIFICATIONS

Frequency Coverage: 144 to 148 MHz
Channel Spacing: Receive every 5 kHz, transmit Simplex or ± 600 kHz

Power Requirements: 9.6 VDC
Current Drain: 17 ma-standby, 900 ma-transmit

Antenna Impedance: 50 ohms
Dimensions: 40 mm x 62 mm x 170 mm (1.6" x 2.5" x 6.7")

Weight: 17 oz.
Sensitivity: Better than .5 microvolts nominal for 20 db

SUPPLIED ACCESSORIES

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

OPTIONAL ACCESSORIES

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 • Rubber flex antenna: \$8 • Leather holster: \$16 • Cigarette lighter plug mobile charging unit: \$6 • Matching 30 watt output 13.8 VDC power amplifier (S30): \$89 • Matching 80 watt output power amplifier (S80): \$149

The Tempo S-2

Tempo is first again. This time with a superior quality synthesized 220 MHz hand held transceiver. 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 exciting features of the S-1. 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-25 (25W output) or S-75 (75W output) Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz rig, the S-2 will add tremendous versatility. Its low price includes an external microphone capability, heavy duty ni-cad battery pack, charger, and telescoping whip antenna.
Price...\$349.00 With touch tone pad...\$399.00

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

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

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

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

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

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

Henry Radio

Prices subject to change without notice.



Shown with optional touch tone pad

The new improved
Tempo S-1

- The first and most thoroughly field tested hand-held synthesized radio available. 800 channels in the palm of your hand.
- Simple to operate. (You don't need a degree in computer programming)
- Heavy duty battery pack allows more operating time between charges.
- External microphone capability
- The lowest price ever...\$259.00
- The S-1T (With touch tone pad installed)...\$289.00

Now available is the expanded line of Tempo commercial hand holds... "big name" quality at affordable prices. The FMH-12 & FMH-15 operate in the 135 to 174 MHz range and the FMH-40 & FMH-44 in the 440 to 480 MHz range. Tempo also offers the FMT-2 & FMT-42. They provide excellent VHF or UHF mobile communications and feature a remote control head for hide-away mounting. Also available is the superb MR-3 pocket receiver... a miniature, 2 channel VHF high band monitor or paging receiver. Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.



SOMETIMES THE BEST COSTS A LITTLE MORE...

**BUT you get a LOT more
for your money.
For instance:**

- Full length 72 character line and 24 line screen
- True "ASR" operation—type into 50 line on-screen buffer *while* receiving
- 150 line receive buffer and power off EAROM storage
- Ten HERE IS messages plus CW ID, WRU, and SEL-CAL
- Original split-screen plus bright/dim display of RX/TX text
- Control Functions *clearly marked* on the keytops
- On screen status indicators and time
- P31 eye-ease green screen phosphor (white also available)
- All three modes—CW, Baudot RTTY, and ASCII Computer code
- Upper/lower case ASCII with all control characters; 110-9600 baud
- ST6000 multiple active filters and detectors for super reception
- Crystal controlled TX tones matched to RX filters for true transceive
- Interface LOOP, RS232, MIL 188 and CMOS with no extra options to buy
- Full RS232 Modem connector and full or half-duplex for computer use
- HAL one year warranty and ten years' experience with RTTY

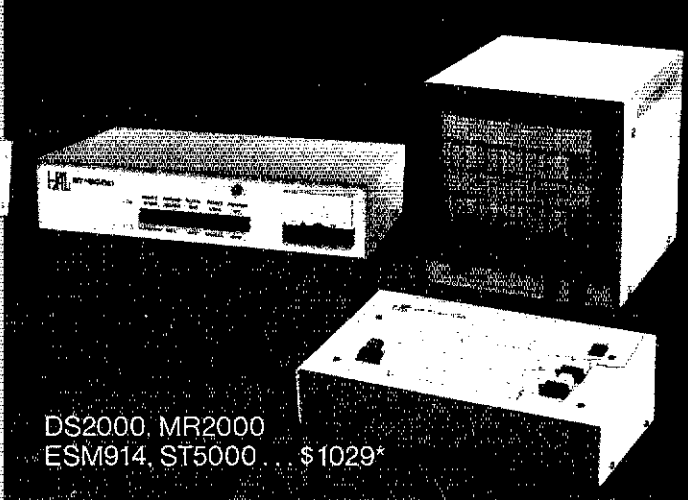
...AND THEN SOMETIMES IT DOESN'T!

**COMPARE with other similarly
priced systems—note these
extra features and better
performance for fewer dollars:**

- Full length 72 character lines and 24 line screen
- "Semi-ASR" operation by typing into 255 character buffer *while* receiving
- Pretype the entire 1728 character screen
- Two programmable HERE IS messages plus CW ID
- Keyboard Operated Switch (KOS) for automatic TX/RX control
- Bright/dim display of RX/TX text
- Labeled controlled keys plus on-screen status line for easy operation
- All three modes—CW, Baudot RTTY, and ASCII Computer code
- 1-175 wpm CW; 60, 66, 75, 100, 133 wpm Baudot; 110, 300 baud ASCII
- Word wrap-around, Unshift On Space, Synchronous Idle
- Edit as you type with Word Mode
- High performance external demodulator rather than built-in compromise
- Internal Loop Supply and Motor control for full TTY machine compatibility
- Solid state RTTY Loop interface; both cathode and grid-block CW outputs
- HAL one year warranty and ten years' experience in RTTY



DS3100 & ST6000 . . . \$2550*



DS2000, MR2000
ESM914, ST5000 . . . \$1029*

LOOK FOR THE BEST or THE MOST ECONOMICAL . . . WE HAVE BOTH!

* Prices for U.S. customers purchasing complete systems as specified in our catalog. Write for our complete catalog for detailed specifications and other system combinations. Prices and specifications subject to change without notice.



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217-367-7373

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*Simply...
the Best*

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QST

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THE COVER

Considering a power increase for portable vhf operation? Try this neat portable quad instead. See page 26.

(photo courtesy
WA9GDZ/6)



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Rack Attack from DenTron

Components are the latest in communication systems adapting to your stations' needs. The DTR-3KA and DTR-1200L are equipped with heavy-duty handles for easy rack mounting and rack brackets that can be easily removed. The DTR-1200L linear amplifier provides 1200 watts SSB and 1000 watts CW input continuous duty. It features large 3 1/2" shadow box, back lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers. The DTR-3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dry dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 OHM impedance. Component racks available at your DenTron Dealer.

DTR-1200L Linear Amplifier

Frequency Ranges:

80 Meter Band	3.45 - 4.6 MHz
40 Meter Band	6.00 - 9.0 MHz
20 Meter Band	10.00 - 18.00 MHz
15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model

Modes:

Power Input: 1200W - SSB, 1000W - CW
 Power Requirements: 234/117 VAC 50/60 Hz
 RF Drive Power: 150 Watts maximum and 65 watts minimum for 1 KW DC input.

DC Plate voltage:

Duty Cycle: Idle + 2300V approximate
 Input Impedance: 50 Ohms nominal
 Input VSWR: 1.5 to 1 average
 Output Impedance: 50 Ohms nominal
 Antenna load VSWR: 2 to 1 maximum
 ALC: negative going, adjustable from front panel

Spurious Emissions:

IMD - greater than 30 db down
 Harmonics - greater than 40 db down

FCC Type Accepted

Size: 5 1/4" H x 17" W x 13" D (19" W with rack brackets)
 Weight: 46 pounds

Switchable 12VDC accessory output voltage

Multimeter:

Plate Voltage 0 - 3000VDC
 Plate Current 0 - 500ma
 Relative Output Adjustable

Front Panel Plate Voltage Switching

DTR-3KA Antenna Tuner

Frequency Coverage: 1.8 - 30 MHz continuous
 Built in 2 KW PEP Dummy Load - Forced Air Cooled
 Input Impedance: 50 ohms (Resistive) to transmitter Antenna Inputs

Coax 1, 2 & 3 - unbalanced—may range from a few ohms to a high impedance

Long wire - low to high impedance

Balanced line - 75-660 ohms

Power Capability: 3000 watts P.E.P.

Wattmeter: 200 watts forward

2000 watts forward

200 watts reflected

Accuracy: ± 5%

Remote sensor box

3 1/2" backlit meters

Dummy Load: with manual or automatic forced air cooling.

Integral 3KW Balun

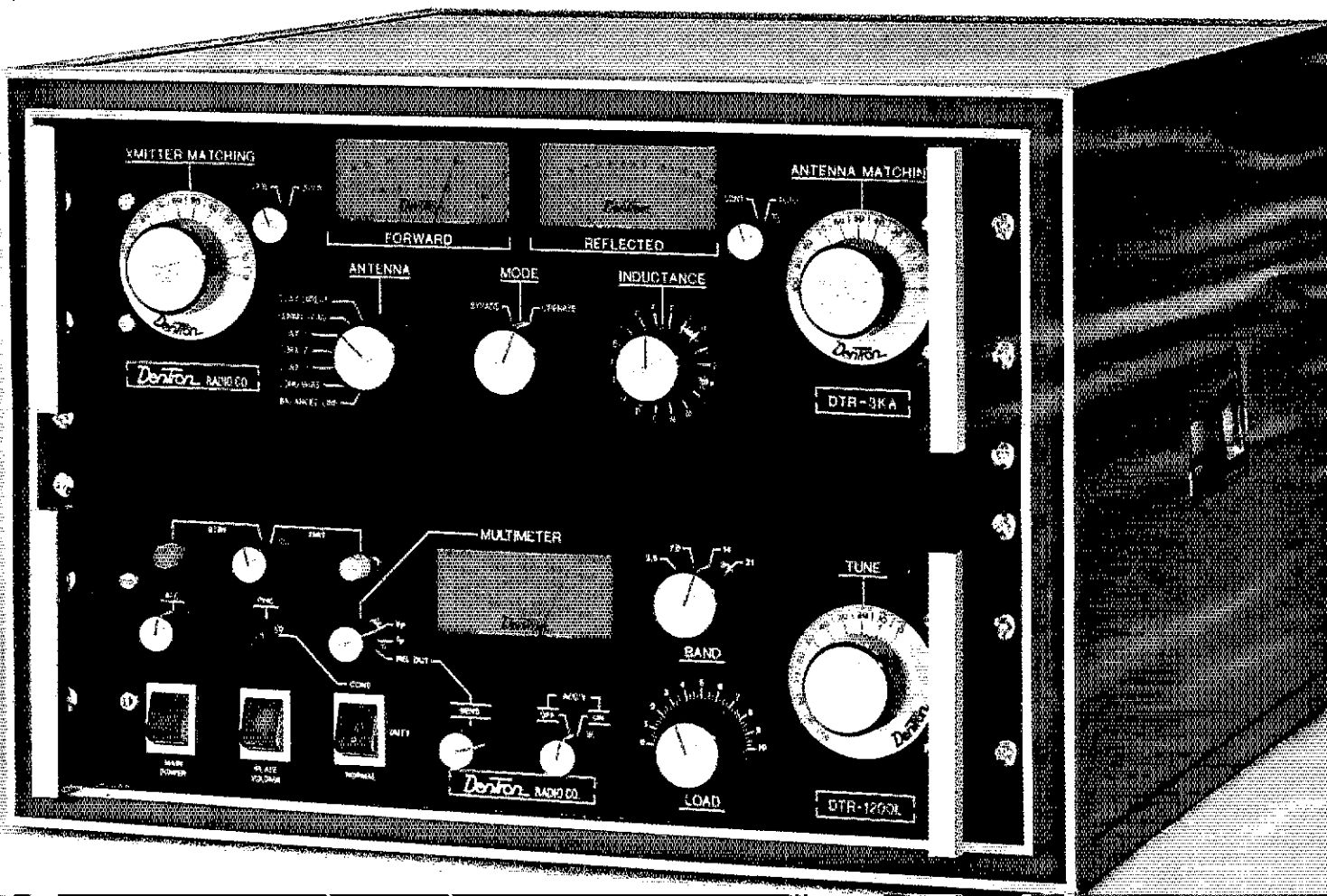
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Radio Co., Inc.

1605 Commerce Drive

Stow, Ohio 44224

(216) 688-4973



Ringo Ranger II: We've made the best better.

The new Cushcraft Ringo Ranger II incorporates Cushcraft's latest design features for increased performance and greater operating pleasure. Ringo Ranger II is the most recent design from Cushcraft's engineering team. The wisdom of Cushcraft's founder, Les Cushman, W1BX (50 years of licensed ham radio and antenna designing) plus the effort of Dave Cleary, K1WHS, world renowned active VHF/UHF amateur (first 2 meter EME WAC) and creator of many recent Cushcraft antennas have led to this superior design.

The new Cushcraft Ringo Ranger II is the longest lasting best performing 2-meter FM base station antenna. Check these features:

Ringo Ranger II incorporates proven features with new insulating materials and 5/8" wavelet antenna decoupling section for increased antenna isolation.

Covers entire band with no need for re-tuning or re-adjustment.

Operation of 5/8" wavelet corrosion resistant aluminum tubing. Does not have joints or welds. No moving gears. Non-ferrous base metal. Not degraded by short circuit. Smooth profile for best appearance and ease of installation.

Strong enough to endure wind and ice storms. Built-in lightning arrester to reduce static noise and lightning hazard. Conveniently mounted and it fits nicely on towers with other antennas.

ANTENNAS

ARX-2B	144-174 MHz
ARX-20B	220-225 MHz
ARX-450B	435-470 MHz

Conversion kit includes decoupling hardware, RG-8/U cable, built-in lightning arrester.

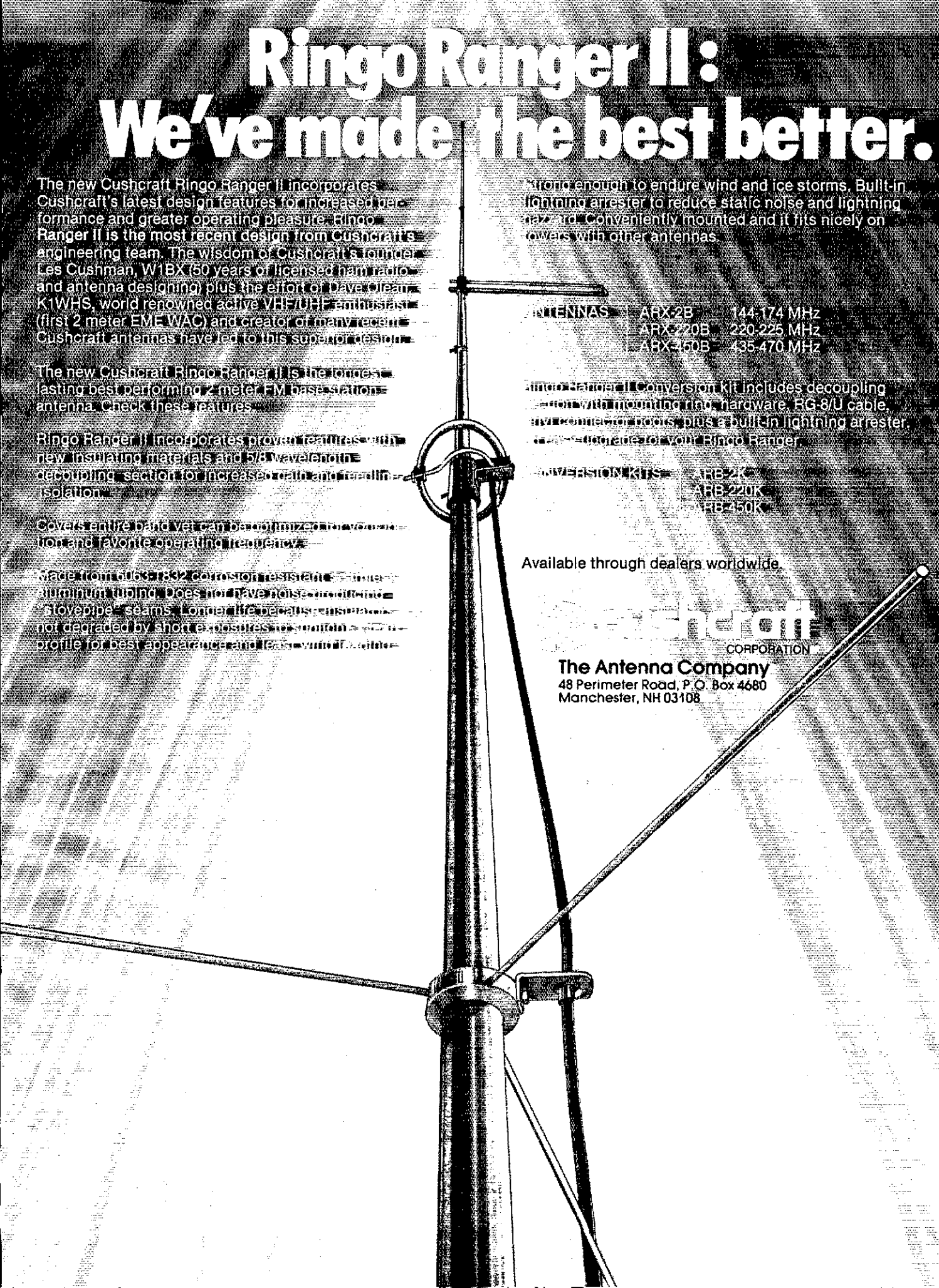
CONVERSION KITS

ARB-20K
ARB-220K
ARB-450K

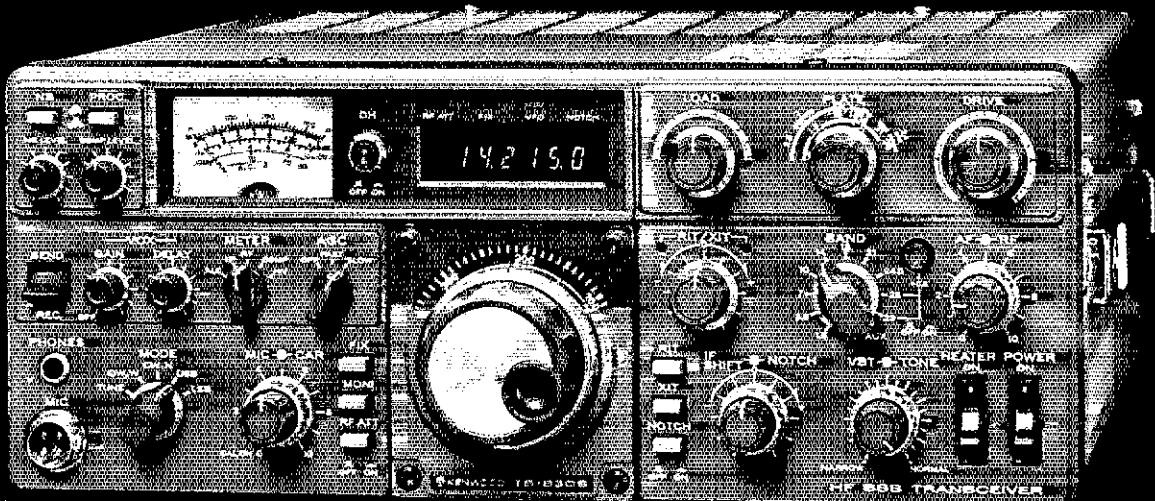
Available through dealers worldwide.

Cushcraft
CORPORATION

The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108



Top-Notch.



VBT, notch, IF shift, wide dynamic range

TS-830S

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

TS-830S FEATURES:

• 160-10 meters, including three new bands

Covers all Amateur bands from 1.8 to 29.7 MHz (LSB, USB, and CW), including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.

• Wide receiver dynamic range

Junction FETs (with optimum IMD characteristics and low noise figure) in the balanced mixer, a MOSFET RF amplifier operating at low level for improved dynamic range (high amplification level not needed because of low noise in mixer), dual resonator for each band, and advanced overall receiver design result in excellent dynamic range.

• Variable bandwidth tuning (VBT)

Continuously varies the IF filter passband width to reduce interference. VBT and IF shift can be controlled independently for optimum interference rejection in any condition.

• IF notch filter

Tunable high-Q active circuit in 455-kHz second IF, for sharp, deep notch characteristics.

• IF shift

Shifts IF passband toward higher or lower frequencies (away from interfering signals) while tuned receiver frequency remains unchanged.

• Various IF filter options

Either a 500-Hz (YK-88C) or 270-Hz (YK-88CN) CW filter may be installed in the 8.83-MHz first IF, and a very sharp 500-Hz (YG-455C) or 250-Hz (YG-455CN) CW filter is available for the 455-kHz second IF.

• Built-in digital display

Six-digit large fluorescent tube display, backed up by an analog dial. Reads actual receive and transmit frequency on all modes and all bands. Display Hold (DH) switch.

• Adjustable noise-blanker level

Built-in noise blanker eliminates pulse-type (such as ignition) noise. Front-panel threshold level control.

• 6146B final with RF NFB

Two 6146B's in the final amplifier provide 220 W PEP (SSB)/180 W DC (CW) input on all bands. RF negative feedback provides optimum IMD characteristics for high-quality transmission.

• More flexibility with optional digital VFO

VFO-230 operates in 20-Hz steps and includes five memories. Also allows split-frequency operation. Built-in digital display. Covers about 100 kHz above and below each 500-kHz band.

• Built-in RF speech processor

For added audio punch and increased talk power in DX pileups.

• RIT/XIT

Receiver incremental tuning (RIT) shifts only the receiver frequency, to tune in stations slightly off frequency. Transmitter incremental tuning (XIT) shifts only the transmitter frequency.

• SSB monitor circuit

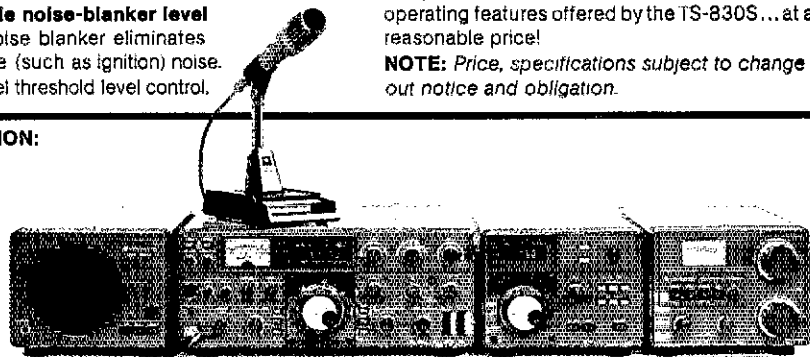
Monitors IF stage while transmitting, to determine audio quality and effect of speech processor.

Ask your Authorized Kenwood Dealer about the many operating features offered by the TS-830S... at a very reasonable price!

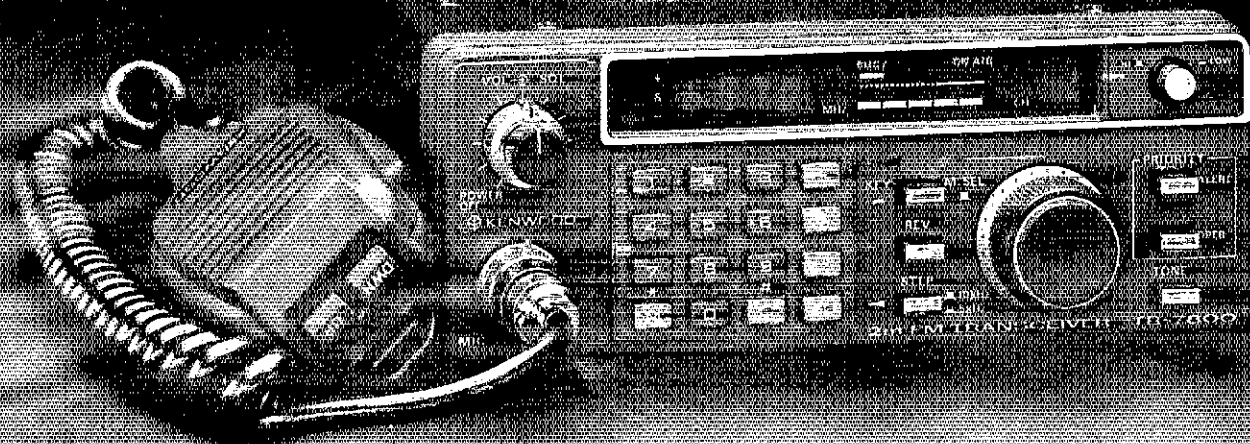
NOTE: Price, specifications subject to change without notice and obligation.

MATCHING ACCESSORIES FOR FIXED-STATION OPERATION:

- SP-230 external speaker with selectable audio filters
 - VFO-230 external digital VFO with 20-Hz steps, five memories, digital display
 - AT-230 antenna tuner/ SWR and power meter
 - MC-50 desk microphone
 - YG-455C (500-Hz) and YG-455CN (250-Hz) CW filters for 455-kHz IF
 - YK-88C (500-Hz) and YK-88CN (270-Hz) CW filters for 8.83-MHz IF
 - HC-10 digital world clock
 - HS-5 and HS-4 headphones
 - MC-30S and MC-35S noise-cancelling hand microphones
- Other accessories not shown:**
- TL-922A linear amplifier
 - SM-220 Station Monitor
 - PC-1 phone patch



Easy selection.



15 memories/offset recall, scan, priority, DTMF

Touch-Tone®

TR-7800

Kenwood's remarkable TR-7800 2-meter FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. 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 DTMF encoder.

TR-7800 FEATURES:

- **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-7800. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **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.

- **Extended frequency coverage**
143,900-148,995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Built-in autopatch DTMF (Touch-Tone®) encoder**
- **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.
- **Selectable power output**
25 watts (HI)/5 watts (LOW).
- **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.

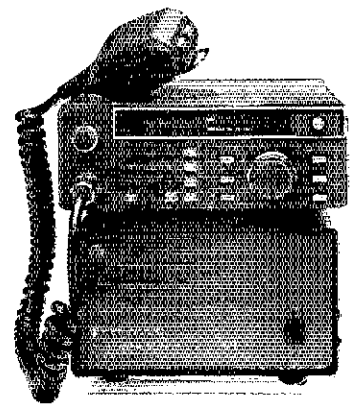
- **TONE switch**
To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
Depth is reduced substantially.
- **Mobile mounting bracket**
With quick-release levers.

See your Authorized Kenwood Dealer now for details on the TR-7800...the remarkable 2-meter FM mobile transceiver!

NOTE: Price, specifications subject to change without notice and obligation.

MATCHING ACCESSORY:

- KPS-7 fixed-station power supply



Directors

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MITCH POWELL, VE3OT, 782 North Mile Rd., London, ON N6H 2X8 (519-471-6853)

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

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

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

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

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The International Amateur Radio Union — A Vital Force in Post-WARC Planning

Did you know that ARRL is the Headquarters society for the International Amateur Radio Union, and has been ever since the founding of IARU in 1925? It's a fact. Did you know that IARU played a key role in the international planning and preparation which preceded WARC-79 and which was so largely responsible for our success at that critical conference? It did. Did you know that the role and need for the IARU continues unabated in this post-WARC world? It sure does.

We are faced with a proliferation of ITU conferences in the years ahead. Indeed, in the next 10 years, ITU will be holding something over a dozen telecommunications conferences of one sort or another, and because of the increased sharing of frequency bands, which was one of the results of WARC-79, Amateur Radio is very likely to be concerned with a number of these conferences. In fact, there is to be a Mobile-WARC in the early part of 1982, and ARRL/IARU are already commencing budgeting and preparation for that conference, to insure that the Amateur Radio Service is adequately represented.

In the years ahead we (the Amateur Radio Service worldwide) will be implementing the results of WARC-79, which will call for a considerable amount of international cooperation and liaison. The IARU is, naturally, a logical vehicle for such liaison.

As the telecommunications world becomes ever more complex, we must be certain that IARU is either adequate to contend with that complexity, or that it is restructured in such a fashion that it does have the necessary organizational strength to cope. To this end, IARU President VE3CJ has formed an international committee consisting essentially of the members of the Executive Committees of the three regional IARU organizations to exchange ideas and viewpoints and to make any suitable recommendations to the membership of IARU for constitutional improvements. The committee is carrying on this work principally by mail, but will also use the opportunity to discuss

the subject in depth at the triennial meetings of each IARU region over the next three or four years.

Here in Region 2 (North, Central and South America) the first such post-WARC IARU regional meeting will take place in Lima, Peru, this fall. Region 2 President W4KFC and Region 2 Secretary OA4AV are responsible for the preparation for this meeting, following details worked out at a Region 2 Executive Committee meeting earlier this year. It is an important meeting for the future of Amateur Radio, and its importance is indicated by the number of people who will be attending as official delegates from ARRL/IARU, including W2HD, VE3CJ, W0BWJ, W4KFC, VE3OT, VE3CDM, K2SJO, W1RU and K1ZZ. The ARRL Board has recognized the importance of this meeting by providing a number of formal instructions to its delegates; as you will note in the minutes of the July ARRL Board meeting, printed elsewhere in this issue.

Other IARU meetings will follow. In the spring of 1981, Region 1 IARU societies, representing Europe and Africa, will meet in Brighton, England, and sometime in 1982 there will be a similar meeting of the Region 3 IARU societies, representing Asia and the Pacific area.

What does all this mean to you, the membership of ARRL? It means that the Board and the staff of ARRL are dedicated to the continuing support of and participation in the activities of the International Amateur Radio Union. It means that we are dedicated to insuring that it remains a strong and vital force in international Amateur Radio. It means that in this post-WARC world, the International Amateur Radio Union has a continuing function and a continuing role which is recognized all over the world. It means that enthusiastic participants in the work of IARU around the world are committed to maintaining the IARU momentum which was built up in preparation for WARC-79 and which will be so necessary if we are to successfully meet the challenges of the future. — *Richard L. Baldwin, W1RU*

League Lines...

After considerable input from contest participants, the Contest Advisory Committee and ARRL Awards Committee, with the concurrence of the Communications Manager, have returned the ARRL International DX Contest to its previous format with overseas stations working USA and Canadian amateurs only. Single-band categories and the expanded awards program will continue. An upcoming issue of QST will contain full details.

A survey of membership comments received at Hq. supported the reinstatement of the happy birthday message, ARL FORTY SIX. Effective immediately, ARRL FORTY SIX is reactivated with the traditional text unchanged as follows: "Greetings on your birthday and best wishes for many more to come." Please insert ARRL FORTY SIX under the Group Two heading of the current list of numbered radiograms, form CD-3.

The Hq. Technical Department is accepting applications for career positions as Assistant Technical Editor and Laboratory Technician. Interested persons with experience and an Associate Degree or higher in electronics should contact KITD or WIFB at Hq.

League comments on upcoming Mobile-WARC. ARRL has filed comments in response to FCC's inquiry on changes to the International Radio Regulations dealing with the Mobile Services which might be considered at a World Administrative Radio Conference. The League outlined its objective as helping to "ensure that regulatory provisions to be proposed by the U.S., if any, do not have the effect of impeding the experimental, technical and public-service communications work being conducted worldwide by radio amateurs." The Mobile-WARC is expected to be convened in two sessions, the first in March 1982. The Mobile Service is a sharing partner in some vhf/uhf amateur bands.

Amateurs in radio broadcasting: You can obtain a 13-week series of five-minute programs on Amateur Radio for unsponsored free use. Communication World, Volume III, is the newest radio series available from Stephen Brown, WD8QJB. Almost half of the shows were taped on location at the Dayton Hamvention '80. All you need to do is send two 1400-foot reels of audio tape or one 90-minute tape cassette for each set of 13 programs to Stephen E. Brown, WD8QJB, Producer, Communication World, Parkland College, Champaign, IL 61820. Please include the call letters and locations for the radio stations airing the series.

Big catch! FCC's Norfolk, Virginia, District Office investigation of Groner Sales Company of Lucia, North Carolina, has resulted in criminal prosecution of the owner, Charles Groner, and forfeiture of over \$20,000 of illegal CB equipment. J. J. Freeman, engineer in charge of the District Office, said that the forfeited equipment, if sold, would have caused widespread interference to television reception and various other electronic home equipment.

Reciprocal licensing is now in effect between Canada and Haiti. Also, reciprocal licensing between Canada and Chile is in effect.

The IARU amateur societies in North and South America agreed in 1976 that 20-meter third-party traffic should be transmitted on the high end of the U.S. portion -- say, above 14,300 kHz. The voluntary cooperation of all amateurs is sought in support of this agreement.

Attention repeater enthusiasts! Work has begun on the next edition of the ARRL Repeater Directory. The deadline for registering your repeater is November 1, 1980. Please register your repeater on form CD-240 (available for an s.a.s.e.) to ensure the accuracy of the new edition. All information should be sent to the Communications Department at Hq.

Where does the Board of Directors stand on the new 10-MHz band? On 20-meter phone expansion? On the 40-meter DX window? On digital data transmissions? On malicious interference? On the future of the Phase III satellite program? The full story appears on pages 50 through 53 of this issue.

Information on the Great Lakes VHF Conference was received too late for inclusion elsewhere. It will be held September 27 and 28 at the Holiday Inn, Battle Creek, Michigan. Contact Lou Ryason, WB8WXS, 23 South 27th St., Battle Creek, MI 49015, 616-962-8442, for more details.

The ARRL Foundation will inaugurate a fund-raising program to support amateur radio space activities. More about this in a later issue.

ASCII, Baudot and the Radio Amateur

Use of the ASCII computer code by U.S. amateurs has been permitted since March 17, 1980. ASCII has some similarities to the RTTYer's Baudot code . . . and some differences, too.

By George W. Henry, Jr.,* K9GWT

The 1970s brought a revolution to Amateur Radio RTTY equipment and techniques, the latest being the addition of the ASCII computer code. For the past few months, radio amateurs in the United States have been authorized by the FCC to use the American Standard Code for Information Interchange (ASCII), as well as the older Baudot code for RTTY communications. This paper discusses the differences between the two codes, provides some definitions for RTTY terms and examines the various interfacing standards used with ASCII and Baudot terminals.

RTTY Codes

Newcomers to Amateur Radio RTTY soon discover a whole new set of terms unique to RTTY equipment. Chief among these are the words *mark* and *space*. To be fair, these terms really are not unique to RTTY since they originated with land-line telegraph service before 1900. Nevertheless, current usage associates mark and space with something RTTYers do to or with machines.

The terms *mark* and *space* date from early pen and moving-paper strip recording of telegraph signals. The pen was solenoid operated so that the pen was lowered when the sending key was down, marking the moving strip; key-up time was represented by the blank space between marks. Of course, an operator familiar with the Morse code would then have to read the tape. One tale has it that the strip recording came first in telegraph operations and was used until the operators discovered that they could mentally decipher the code by listening to the rhythm of the mechanical sounder. Some strip-pen telegraph recorders are still to be found in use to this day.

Teletypewriter machines also use solenoids (called selector magnets) that open and close in response to a signal current (loop current). Following the convention of telegraph recording, the current-on condi-

tion of the signal circuit, or loop, is called the *mark* state of the TTY signal; the current-off condition is called *space*. However, the TTY codes differ from telegraph codes in that variable-length mark or space conditions (dit, dah and spaces between them in telegraph codes) are not used to form the characters. Rather, the TTY codes use equal time-length pulses which can be set to either mark or space. Letters, numbers and symbols are encoded by different combinations of mark or space pulses.

In a teletypewriter machine, the normal "rest" condition of the selector-magnet solenoids is with loop current on. Interruption of the loop current releases the selector magnet, allowing rotation of a cam in the machine. Transmission of a TTY character begins with a space pulse (current off), called the *start* pulse. The start pulse signals to the machine that reception of a character has begun. Immediately after the start pulse, a series of *data* pulses are transmitted with mark or space condition as indicated by the encoding for the desired character. The number of data pulses used to represent the letters, numbers and symbols varies with the TTY code being used; Baudot code uses five data pulses, ASCII uses eight. Immediately after the last data pulse, a *stop* pulse is included which is always a mark pulse. The stop pulse, therefore, always occurs in a fixed time after the start pulse (after five data pulses in Baudot and eight in ASCII). The stop pulse gives the machine a "rest time" to prepare for the beginning of the next character, maintaining receive machine synchronization with the transmitted signal. The time length of the start and each data pulse are the same and are often called the unit-pulse or select-pulse time. The stop-pulse length varies from code to code and even with speeds within a code, as will be explained later. In general, the minimum stop-pulse length can be one or two times as long as the unit-pulse time; stop pulses may be as long as desired since

the machine is "at rest" until the next start pulse is received. This type of TTY code that uses start, data and stop pulses in the construction of each character is called an asynchronous or start-stop serial code. Other codes also in commercial use include synchronous serial codes, in which start and stop pulses are not attached to the data pulses for each character, and parallel data codes, in which each data pulse is assigned a separate wire to and from the terminal device. Such codes are found in common use with computer and line-printer devices. FCC regulations currently authorize amateurs to use either the Baudot or the ASCII serial asynchronous TTY codes.

The Baudot TTY Code

One of the first data codes used with mechanical printing machines uses a total of five data pulses to represent the alphabet, numerals and symbols. This code is commonly called the Baudot or Murray telegraph code, after the work done by these two pioneers. Although commonly called the Baudot code in the United States, a similar code is usually called the Murray code in other parts of the world and is formally defined as the International Telegraphic Alphabet No. 2 Baudot Code in part 97.69 of the FCC Rules and Regulations. This standard defines the codes for letters, numerals and the slant or fraction bar but allows variations in the choice of code combinations for punctuation. U.S. amateurs have generally adopted a version of the so-called "Military Standard" code arrangement for punctuation, largely because of the ready availability of military surplus machines in the post-1945 years. Amateurs in other countries (particularly in Europe) have standardized on the International Consultative Committee for Telephone and Telegraph (CCITT) No. 2 code arrangement, which is similar to the U.S. standard but has minor symbol and code-arrangement differences.

Since each of the five data pulses can be

*HAL Communications Corp., Box 365, Urbana, IL 61801

in either a mark or space condition (two possible states per pulse), a total of $2 \times 2 \times 2 \times 2 \times 2 = 2^5 = 32$ different code combinations are possible. Since it is necessary to provide transmission of all 26 letters, 10 numerals and punctuation, the 32 code combinations are not sufficient. This problem is solved by using the codes twice; once in the *letters* (LTRS) case and again in the *figures* (FIGS) case. Two special characters, LTRS and FIGS, are used to indicate to the printer whether the following characters will be of the letters or figures case. The printer has a latching mechanism that "remembers" or stores the last received LTRS or FIGS character so that it remains in the last received case until changed. Control operations such as LTRS, FIGS, carriage return (CR), line feed (LF), space bar (SP) and blank (BLNK = no print or carriage movement) are assigned to both the LTRS and FIGS case so that they can be sent in either case. The remaining 26 code combinations have different letter or numeral/symbol meanings, depending upon whether preceded by a LTRS or FIGS character.

Keyboards on Baudot machines such as the Teletype Corp. models 15 and 28 differ from standard typewriter keyboards, having only three rows of keys with the related letter and number/symbol on each keytop (Q and I, K and L, and so on). The typist soon discovers this difference! Newer electronic terminals such as the HAI, DS2000 and DS3100 have standard keyboard arrangements and automatically insert LTRS or FIGS characters as they are needed. The Baudot code itself is restricted to upper-case letters only since insufficient codes are available to represent lower-case letters.

The Baudot code has seen extensive commercial use throughout the world and is still actively utilized for international wire, press and weather communications. Because of the ready availability of Baudot mechanical equipment, this code will continue to be quite popular among radio amateurs. Nevertheless, the lack of code space for control, extended punctuation or lower-case letters is a severe limitation of the five-unit Baudot code. These limitations are particularly inconvenient in computer-terminal applications, even though various serial and parallel data-coding schemes have been used with computers. Fig. 1 shows a time diagram of typical Baudot characters, and Table 1 shows the Baudot data code for both the U.S. and CCITT No. 2 alphabet. Notice that the waveform drawing of Fig. 1 shows the *current* waveform, with mark represented by the upper deflection: If the same data were observed on an RS-232 data line, mark would be represented by a downward or *negative* deflection, but more about RS-232 later. Also, the bits in Fig. 1 are arranged in a left-to-right order, as would be observed on an oscilloscope. The bits in Table 1, however, are arranged

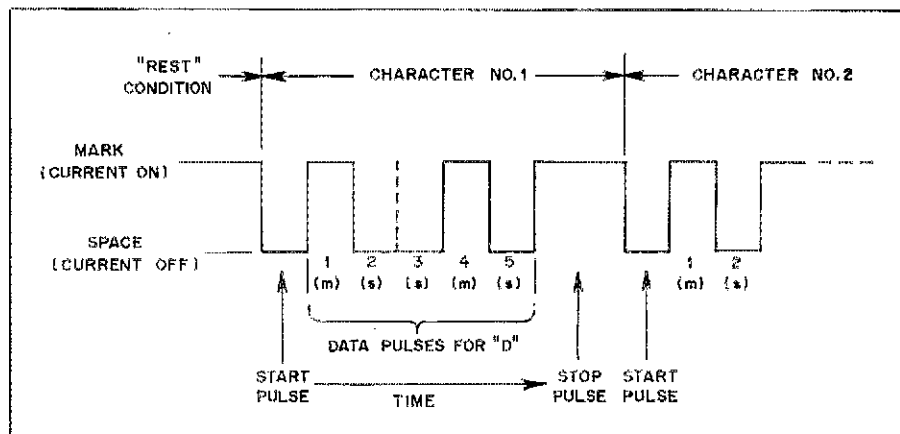


Fig. 1 — Time sequence of a typical Baudot character, the letter D.

in *descending* order (b5 to b1), conforming to the standard binary representation. Thus the letter D shown in Fig. 1 would be written as the binary character 01001.

ASCII

In 1968, the American National Standards Institute (ANSI) adopted the American National Standard Code for Information Interchange (ASCII), ANSI Standard X3.4-1968. This code uses seven data pulses to specify the letter, number, symbol or control operation desired. An eighth data pulse, called the *parity* bit, is provided for optional error checking. As

with the Baudot code, the ASCII standard as approved for U.S. amateur use is asynchronous and serial with both start and stop pulses.

Whereas the five-unit Baudot code was arranged by Murray so that the most frequently used letters are represented by the least number of mark holes punched in paper tape, ASCII has been arranged to optimize computer applications. The code has been particularly designed for rapid collation of alphanumeric lists, one data bit difference between upper- and lower-case letters, and isolation of all control operations from printing operations. A time diagram of a typical ASCII character is shown in Fig. 2. Table 2 shows the ASCII data code. As noted for the Baudot-waveform drawing, Fig. 2 shows the loop current with mark represented by the upward deflection; an oscilloscope trace of an RS-232 data circuit would be inverted, with mark as the more negative deflection. Also the bits in Table 2 are arranged in binary number order (b7 to b1). Thus, the letter S in Fig. 2 would be written as the binary number 0101 0011, with the eighth (parity) bit set to space (0), as indicated.

As can be seen from the code table, many more punctuation symbols are included in ASCII than in Baudot. ASCII also includes a large number of control characters designed for print control of the terminal itself, formatting of data to the computer, and control of other hardware devices by the terminal. Although these control functions are defined by the ANSI definition, variations in the use of the control characters abound in the differing commercial applications.

The keyboards of both mechanical and electronic ASCII terminals are arranged similar to the "standard" typewriter keyboard, thus minimizing any retraining required when an operator moves from a typewriter to a terminal. The "extra" ASCII keys are arranged around the periphery of the standard keyset if they are provided at the terminal keyboard.

A common abbreviation of the full 128-character ASCII code restricts the

Table 1
The Baudot Data Code

Bit Number	Letters	U.S. Figures	CCITT No. 2 Figures
54321			
00000	BLANK	BLANK	BLANK
00001	E	3	3
00010	LF	LF	LF
00011	A	—	—
00100	SPACE	SPACE	SPACE
00101	S	BELL	'
00110	I	8	8
00111	J	7	7
01000	CR	CR	CR
01001	D	5	WRU
01010	R	4	4
01011	J	'	BELL
01100	N	'	'
01101	F	'	'
01110	C	'	'
01111	K	'	'
10000	T	5	5
10001	Z	"	+
10010	L))
10011	W	2	2
10100	H	#	2
10101	Y	6	6
10110	P	0	0
10111	Q	1	1
11000	O	9	9
11001	B	?	?
11010	G	&	&
11011	FIGS	FIGS	FIGS
11100	M	'	'
11101	X	/	/
11110	V	'	'
11111	LTRS	LTRS	LTRS

Note: FIGS-H (10100) may also be used for MOTOR STOP function. "1" = mark = hole in punched tape

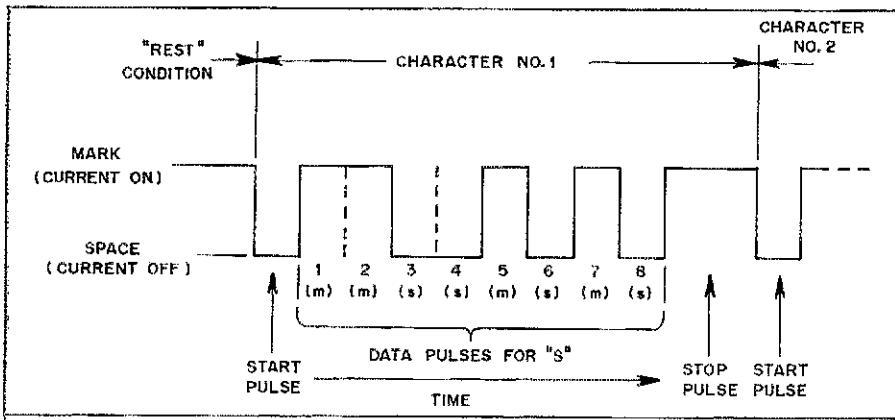


Fig. 2 — Time sequence of a typical ASCII character, the letter s. The eighth or parity bit may be set for any of four conditions: (1) always mark, (2) always space, (3) odd parity or (4) even parity. All four choices are in common usage.

Table 2
The ASCII Data Code

7	0	0	0	0	1	1	1	1
6	0	0	1	1	0	0	1	1
5	0	1	0	1	0	1	0	1
4321								
0000	NUL	DLE	SPC	@	P			P
0001	SOH	DC1	!	1	A	Q	a	q
0010	STX	DC2	"	2	B	R	b	r
00011	ETX	DC3	#	3	C	S	c	s
0 1 0 0	EOT	DC4	\$	4	D	T	d	t
0 1 0 1	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	ACK	SYN	&	6	F	V	f	v
0 1 1 1	BEL	ETB	'	7	G	W	g	w
1000	BS	CAN	{	8	H	X	h	x
1001	HT	EM		9	I	Y	i	y
1010	LF	SUB	~	:	J	Z	j	z
1011	VT	ESC	+	;	K	[k	{
1100	FF	FS	,	<	L	\	l	
1101	CR	GS	-	=	M]	m	}
1110	SO	RS	.	>	N	^	n	~
1111	SI	US	/	?	O	_	o	DEL

- | | |
|------------------------|-------------------------|
| ACK = acknowledge | FF = form feed (home) |
| BEL = signal bell | FS = file separator |
| BS = backspace (←) | GS = group separator |
| CAN = cancel | HT = horizontal tab (→) |
| CR = carriage return | LF = line feed (↓) |
| DC1 = device control 1 | NAK = not acknowledge |
| DC2 = device control 2 | NUL = null |
| DC3 = device control 3 | RS = record separator |
| DC4 = device control 4 | SI = shift in |
| DEL = (delete) | SO = shift out |
| DLE = data link escape | SOH = start of heading |
| ENQ = enquiry (WRU) | SPC = space |
| EM = end of medium | STX = start of text |
| EOT = end of trans. | SUB = substitute |
| ESC = escape | SYN = synchronous idle |
| ETB = end of block | US = unit separator |
| ETX = end of text | VT = vertical tab (↑) |

Note: "1" = mark = hole in punched tape

alphabetic letters to upper-case only, often called CAPS-LOCK or CAPLK. In general, these terminals transmit the upper-case ASCII code for a letter whether the SHIFT key is used or not; they may or may not be capable of transmitting all of the control codes. These terminals usually print (or display) the upper-case letter when either the upper- or lower-case letter ASCII code is received. The Teletype model 33 is an example of a popular upper-case-only ASCII terminal. Other terminals, such as the Teletype model 43 or the HAL DS3100 ASR, have

user-selectable upper/lower case or upper-case-only (CAPSLK) transmit/receive features.

W1AW ASCII Bulletins

W1AW now runs ASCII bulletins 26 times each week. Following each regular RTTY transmission, the bulletins are repeated on ASCII. The W1AW schedule is in "Operating News," in April and October QST, and a copy is available from Hq. for an s.a.s.e. The ASCII transmissions are at 110 baud with 170-Hz shift. The eighth bit, parity, is always sent as a space and is followed by two stop bits.

The optional eighth data bit may be set to four conditions: (1) always mark, (2) always space, (3) odd parity, or (4) even parity. All four choices are in common usage. Simple non error-detecting terminals usually set the eighth bit to be always a mark or space (usually space). Parity is sometimes used with computer and data interconnections where error-detection is desired. When used, the parity bit is controlled so as to set the total number of mark data bits in the ASCII character to be always even or odd (even or odd parity). For example, if odd parity is used with the ASCII character c (first seven bits = 100 0011), the eighth parity bit will be set to space to give an odd number (3) of data bits (0100 0011). Conversely, the odd-parity eight-bit code for the letter B would be 1100 0010. (Logic convention has it that lowest order bits are placed to the right; thus the bit order in the binary representation is 8765 4321.) Upon reception, the receiving terminal simply counts the number of mark pulses in each ASCII 8-bit character. If an odd number is counted, it is *assumed* that no errors occurred. Notice, however, that even if a bit error is detected, there is insufficient data to determine which bit was wrong, and therefore no error *correction* is provided by the parity check itself. Also, if there are two bit errors in the same ASCII character, the parity count will still be odd, and no error indication is given even though two errors occurred. Thus, parity checking will not give complete error detection and does not provide for error correction. Some applications require more sophisticated error detection and correction schemes. Even parity works in a similar manner, except that the eighth bit is chosen to make the total number of mark pulses even rather than odd. The U.S. amateur regulations do not specify a requirement for use of the eighth data bit; it may be set to mark, space, odd or even parity, depending upon the preference of the operator and the capability of his equipment. Relatively simple terminals do not provide parity options; more sophisticated equipment such as the DS3100 ASR do.

Speeds and Baud Rates

The transmission rate of Baudot TTY signals is usually specified in words per minute, much like that used for telegraph codes. Actually, the speed is given in the *approximate* number of five-letter-plus-space combinations transmitted in a *continuous sequence* of start-stop characters in a one-minute interval. Convenient choices of gear ratios and motor-shaft speeds have resulted in the use of noninteger wpm rates. Common usage, however has rounded the exact speeds to easily remembered numbers. Thus, "60 speed" Baudot is actually sent at 61.33 wpm and "75 speed" is really 76.67 wpm. A major problem occurs with the use of

words per minute as a TTY speed specification because of the varying length of stop pulses in use. For example, "60 speed" Baudot TTY has 22-ms-long start and data pulses and a 31-ms stop pulse; the Western Union "65 speed" also has 22-ms start and data pulses, but the stop pulse is also 22-ms long; electronic terminals commonly use 22-ms start and data pulses and 33-ms stop pulses (1.5 times the data-pulse width). All of these three codes are compatible and may be received on the same printer or terminal since the stop-pulse length is a *minimum* time. The common factor between these codes is the 22-ms length of the data, or unit pulse. Therefore, a new data-rate specification has been adopted, the *baud* rate, which is the reciprocal of the data- or unit- or select-pulse width:

Baud rate = $1/t$, where t = length of unit pulse.

Using this definition, all three of the above codes have a data rate of 45.45 baud, commonly abbreviated to "45 baud."

As noted above, the length of the stop pulse varies between codes, being from 1.0 to 2.0 times as long as the unit (or data) pulse; multipliers of 1.0, 1.42, and 1.5 are commonly used with the Baudot codes. Standard Baudot data rates and speeds are shown in Table 3.

U.S. amateurs are authorized to use all of the Baudot data rates shown in Table 3, with the exception of 100 baud. This rate has seen limited commercial use in Europe. The 45-baud data rate is by far the most popular worldwide amateur data rate. A limited amount of amateur use of 74 baud ("100 speed") has been noted on the high-frequency bands. Most commercial RTTY transmissions on high frequencies use 50, 57 and 74 baud, with little 45-baud activity.

ASCII data rates are commonly specified as a baud rate, although a character-per-second (cps) or words-per-

minute (wpm) rate may also be given. The lowest standard ASCII data rate in common usage is 110 baud. ASCII characters sent at 110 baud are usually sent with a 2-unit-wide stop pulse, although the 1-unit stop pulse may also be found in some applications. Above 110 baud, it is common to make the stop pulse one unit pulse in length. The standard ASCII data rates commonly used with asynchronous serial transmission are shown in Table 4.

The ASCII data rates up to 300 baud are authorized for U.S. amateur use on frequencies between 3,500 and 21,250 MHz. Data rates up to 1200 baud are permitted between 28 and 225 MHz; up to 19,600 baud may be used above 420 MHz. The 110-baud rate is by far the most practical for 3.5 to 21.5 MHz use, again because of the ready availability of equipment as well as the increased susceptibility of the higher data rates to noise, static, interference and so forth. Vhf fm amateur activity finds 110 and 300 baud useful for terminal-to-terminal communications, and 300 and 1200 baud for computer-related activities such as exchanging programs and the like. The very high data rates (1800, 2400, 4800 and 9600 baud) really find their best application in high-speed computer-terminal data links. The 150 and 600 baud rates are recognized ANSI and Electronic Industries Association (EIA) standards, but have seen limited use to date. Some home-computer systems are also using 250, 500 and 1100 baud for cassette interfaces, not necessarily with ASCII encoding of the data. The FCC regulations (Part 97.69) specify *maximum* baud rates for each frequency range, but do not require use of the standard rates. Therefore, nonstandard baud rates may be used with ASCII encoding, but this may not be practical for lack of compatibility with existing terminal equipment.

Loop Circuits

The first commercial applications of

teleprinter machines used direct-wire telegraph connections between machines. A simple series circuit was used to connect the two machines and a dc power supply. This simple loop circuit is shown in Fig. 3. This connection is also called a neutral-loop circuit.

As discussed earlier, the printing mechanisms use solenoids or selector magnets to sense the presence (mark) or absence (space) of the loop current. The letters typed on the sending keyboard are encoded with proper mark and space pulses by mechanically driven keyboard contacts. Since the keyboards and selector magnets of both machines are series connected, text typed on one keyboard is reproduced on both printers. Connection of the keyboard directly to its associated printer is called a local loop and results in what is called half duplex (HDX), giving local copy of transmitted text, termed local echo. The two machines could be connected with two separate circuits so that keyboard no. 1 is connected through a loop supply and wire to the selector magnets of printer no. 2; keyboard no. 2 is then connected to printer no. 1 with a second loop circuit. This type of connection is called full duplex (FDX). Note that the full-duplex connection uses two signal, or loop, circuits and does not provide local reproduction or echo of transmitted text. Most Amateur Radio connection of teleprinters is in the half-duplex configuration. The full-duplex connection is commonly used with computer terminals. The computer itself may then supply a reproduction of the transmitted text to the printer, but in this case the remote or computer-generated echo provides confirmation that typed text has been properly processed in the computer.

The battery or dc loop supply in Fig. 3 is used to maintain the current in the selector magnets during mark pulses. The actual current in the loop is adjusted with the series loop resistor. Selector magnets

Table 3
Baudot Data Rates and Speeds

Baud Rate	Data Pulse (ms)	Stop Pulse (ms)	WPM	Common Name
45.45	22.0	22.0	65.00	Western Union
	22.0	31.0	61.33	"60 speed"
	22.0	33.0	60.61	45 baud
50.00	20.0	30.0	66.67	European; 50 baud
56.92	17.57	25.00	76.68	"75 speed"
	17.57	26.36	75.89	57 baud
74.20	13.47	19.18	100.00	"100 speed"
	13.47	20.21	98.98	74 baud
100.0	10.00	15.00	133.33	100 baud

Table 4
ASCII Data Rates

Baud Rate	Data Pulse (ms)	Stop Pulse (ms)	CPS	WPM
110	9.091	9.091	11.0	110
		18.182	10.0	100
150	6.667	6.667	15.0	150
300	3.333	3.333	30.0	300
600	1.667	1.667	60.0	600
1200	0.8333	0.8333	120	1200
1800	0.5556	0.5556	180	1800
2400	0.4167	0.4167	240	2400
4800	0.2083	0.2083	480	4800
9600	0.1041	0.1041	960	9600
19200	0.0520	0.0520	1920	19200

$$\text{CPS} = \text{characters per second} = \frac{1}{\text{START} + 8(\text{DATA}) + \text{STOP}}$$

$$\text{WPM} = \text{words per minute} = \frac{\text{CPS}}{6} \times 60$$

= number of 5-letter-plus-space groups per minute.

have been designed for mark loop currents of 60 or 20 mA dc, with 60 mA being by far the most common for older machines such as the Teletype Corp. model 15 or 28. Newer Baudot machines and most ASCII machines and terminals use electronic interface circuits that accept a wide range of loop currents (10 to 120 mA for the HAL DS3100, for example); a 20-mA loop current is quite commonly used with ASCII terminals.

Since the dc resistance of the machine selector magnets is rather low (100 to 300 ohms, typically), it would at first seem that a low-voltage loop supply could be used. However, the inductance of the magnet is usually quite high (on the order of 4 henrys for a model 15), causing a delay in the current rise time. This, in turn, delays the selector magnet response to a mark pulse, distorting the signal. This distortion can be severe enough to cause misprinting of received text, particularly if other forms of distortion are present (such as caused by variations in the radio signal). The effect of this inductive distortion is reduced considerably if the L/R ratio (L is solenoid inductance and R is total loop resistance) is reduced by increasing R . Increasing R requires that the dc voltage be increased to maintain the required 60-mA loop current. In general, the higher the loop voltage and loop resistance used, the lower the distortion. In practice, loop power-supply voltages between 100 and 300 Vdc are common; 130- and 260-volt supplies were often used with model 15, 19 and 28 Teletype machines. Modern TTY systems use a 150- to 200-volt loop power supply and a 2000- to 3000-ohm loop resistance to set the 60-mA loop current. Because of the related keying circuitry, the demodulator unit of a good RTTY system usually includes the loop power supply and current-limiting resistor.

The simple circuit of Fig. 3 has proved impractical for long-distance wire use because of the inclusion of ground resistance in the loop circuit; variations in ground resistance from rain, terrain and so forth, cause variations in loop current and therefore in machine performance. Two telegraph wires could be used to provide a totally wire circuit, but at the expense of twice as many telegraph wires per signal circuit. Another approach commonly used in telegraph circuits involves reversing the current flow in the loop between mark and space pulses. Thus, in an east-west circuit, current flowing to the west might represent mark and current flow to the east would represent space. Current polarity-sensing devices, called polar relays, are then used to sense the direction of current flow. The polar relays then key local loops to operate the machines at each end. This considerably complicates the connections at both ends and requires local-loop supplies at each station as well as supplies to generate the

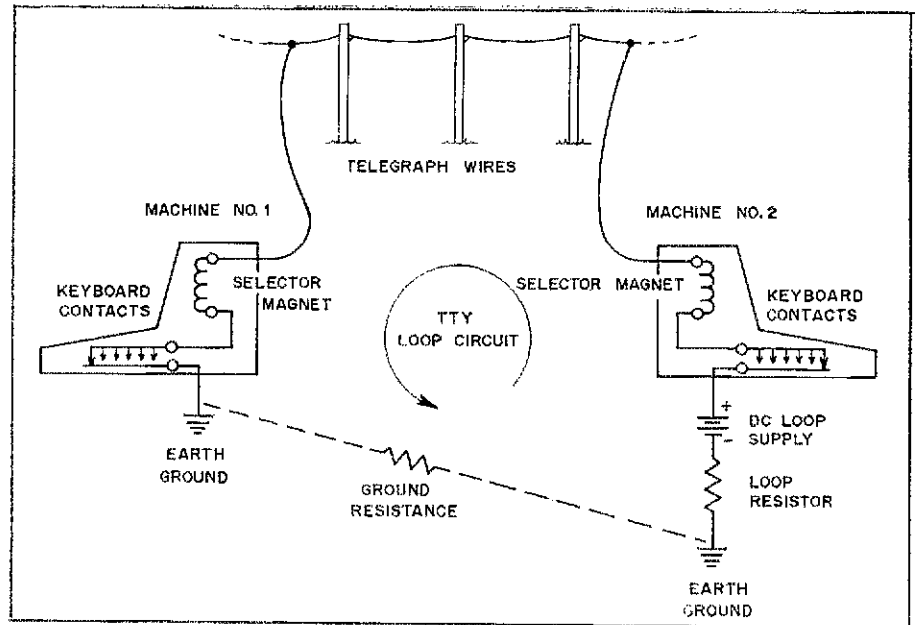


Fig. 3 — A simple teleprinter loop circuit. Current flow represents the mark condition. Open keyboard contacts at either machine result in no current, representing the space condition. Current, when it flows, travels in one direction only. A connection such as this is called a neutral-loop circuit (as opposed to a polar-loop circuit in which current flows continually, reversing direction for mark and space conditions).

two polarities of signal current. Properly adjusted polar relays are very sensitive and can give excellent low-distortion operation. Fortunately, amateur RTTY operations do not need the polar relay, and such devices are best removed from surplus printers when they are encountered; the rf hash generated in a polar relay can be considerable!

Virtually all of the commonly available Baudot machines can be used with 60 to 20 mA high-voltage loop circuits. Therefore, to maintain compatibility with this existing equipment, use of the high-voltage current-loop interface is strongly recommended, even if electronic terminals are also used. Well-designed Baudot electronic terminals will include a high-voltage loop interface circuit.

On the other hand, the newer ASCII machines (such as the Teletype Corp. models 33, 35 and 43) are available with a wide variety of input/output (I/O) interfaces. These devices usually include a high-current, low-voltage selector-magnet assembly (500 mA, 10 to 30 volts is typical), an internal magnet-driver transistor and power supply, and an electronic interface to the data connections. These machines may be supplied with a 20-mA loop-interface circuit (or RS-232, TTL or other interface standards).

RS-232 Data Interface

The EIA has defined a new standard for interconnection of terminals, modems and computers in *EIA Standard RS-232-C* (August 1969). This interface standard specifies voltage levels for mark and space, rather than the current levels used in a loop circuit. The basic RS-232-C voltage ranges are shown in Fig. 4.

Note that mark, normally considered to be a logic 1, is represented by a negative voltage and the logic 0 by a positive voltage. Thus, the RS-232 interface standard can be thought of as a polar voltage standard. Also, note that RS-232 voltage levels really are *not* transistor-transistor logic (TTL) compatible (in spite of some claims you may read to the contrary)! Users should carefully examine "pseudo RS-232-compatible" equipment to make sure no damage will be caused to their RS-232-interfaced equipment. The RS-232-C standard also includes definition of con-

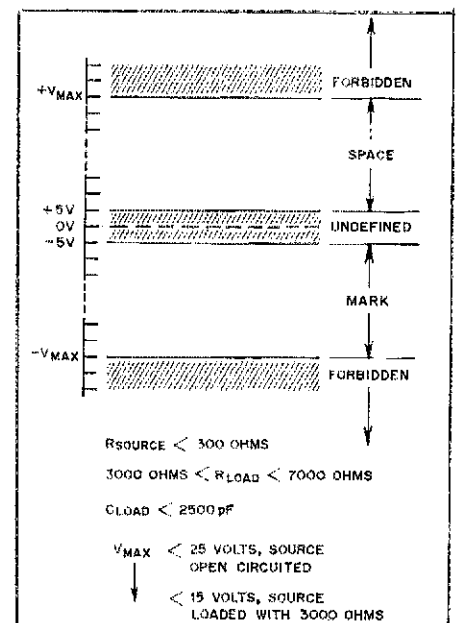


Fig. 4 — RS-232-C voltage standards. Note that these voltages are *not* compatible with TTL integrated circuits.

Table 5

RS-232-C Interface Connector

Pin Number	Circuit	Description	Abbreviation
1	AA	Protective Ground	PG
2	BA	Transmitted Data	TXD
3	BB	Received Data	RXD
4	CA	Request to Send	RTS
5	CB	Clear to Send	CTS
6	CC	Data Set Ready	DSR
7	AB	Signal Ground (Common Return)	SG
8	CF	Received Line Signal Detector	CD
9	--	Reserved for data set testing	
10	--	Reserved for data set testing	
11	--	Unassigned	
12	SCF	Secondary Received Line Sig. Detc.	
13	SCB	Secondary Clear to Send	
14	SBA	Secondary Transmit Data	
15	DB	Transmit Signal Clock	TXC
16	SBB	Secondary Received Data	
17	DD	Receive Signal Clock	RXC
18	--	Unassigned	
19	SCA	Secondary Request to Send	
20	CD	Data Terminal Ready	DTR
21	CG	Signal Quality Indicator	
22	CE	Ring Indicator	RI
23	CH/CI	Data Rate Selector (DTE/DCE Source)	
24	DA	Transmit Signal Clock to Modem	
25	--	Unassigned	

Use of a 25-pin connector is assumed but not defined in the RS-232-C standard. Commercial usage has seen the adoption of the TRW-Cinch D-Subminiature connector series (DB25P and DB25S), also manufactured by many other firms (Amphenol 17-10250 and 17-20250, for example). In general, the male pin connector (DB25P or 17-20250) is installed on the data terminal, but other arrangements may be found on some equipment.

control signals to pass between originating and receiving devices, and even defines the connector-pin assignment. The RS-232 connector signal and pin assignments are shown in Table 5.

The control signals such as DATA TERMINAL READY (DTR), REQUEST TO SEND (RTS), and so forth, are often called *handshaking* signals; they provide status indicators between data devices (terminal to and from a modulator/demodulator or modem, for example). All control-signal voltage and impedance levels also conform to the RS-232-C standard shown in Fig. 4. Control signals are considered to be active or on when the voltage is positive; a negative-voltage control signal is off or inactive. The terms "mark" and "space" are usually not used when describing RS-232 control signals. Thus a positive voltage on pin 5 (CB = CLEAR TO SEND) is the terminal's signal to the data

circuit that the terminal is ready to receive data. Also, an open-circuit or no-voltage condition on an RS-232 signal is interpreted as a "mark" or "active" condition.

Other Data-Connection Standards

A number of other data-connection standards may be found in use in commercial equipment. Chief among these is an interface that is compatible with the popular TTL integrated circuits, a TTL-compatible interface. TTL interconnections are particularly useful when directly interfacing computers or other digital devices. Although TTL and RS-232 interface standards are not directly compatible, a number of line-receiver and line-driver integrated circuits are available.

A common data standard used in U.S. military applications is the MIL-188 Data Standard. MIL-188 is very similar to the

RS-232 standard, with the exception that logic voltages are inverted — mark is represented by positive voltages and space by negative voltages.

Other data interfaces are to be found for CMOS logic integrated-circuit connections. Interfaces for both +5-volt and +12-volt CMOS operation are in use.

Bibliography

The discussions of this paper have been necessarily brief and the reader is referred to the bibliography below for additional information on these topics.

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ANSI X3.16-1976 American National Standard Character Structure and Character Parity Sense for Serial-By-Data Communication in the American National Standard Code for Information Interchange

ANSI X3.28-1976 American National Standard Procedures for the Use of Control Characters of American National Standard Code for Information Interchange in Specified Data Communications Links

Electronic Industries Association, EIA Engineering Department, Standards Orders, 2001 Eye St., Washington, DC 20006

EIA Standard RS-232-C Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange

EIA Standard RS-269-B Synchronous Signaling Rates for Data Transmission

EIA Standard RS-363 Standard for Specifying Signal Quality for Transmitting and Receiving Data Processing Terminal Equipments Using Serial Data Transmission at the Interface with Non-Synchronous Data Communication Equipment

EIA Standard RS-404 Standard for Start-Stop Signal Quality Between Data Terminal Equipment and Non-Synchronous Data Communication Equipment

EIA Industrial Electronics Bulletin No. 9: Application Notes for EIA Standard RS-232-C

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KA2DKD, Mahwah, New Jersey, chairman of the Solar Division of AAVSO. — *Ed Tilton, WIHDQ*

HAMS HELP "TALL SHIPS"

□ Virginia Beach, Virginia, area hams recently helped pass position reports for ships during a sailing-ship race. The "tall ships" departed Cartagena, Colombia in early May, with intermediate stops in Norfolk and Boston, and arrived in Kristiansand, Norway, in late June. U.S. amateurs in New England, Florida and Texas also participated in the project. — *Gay E. Milius, Jr., WAUG, Virginia Beach, Virginia*

Strays

QST congratulates . . .

□ David H. Houghton, who reached his 80th birthday on August 31. Dave worked longer at League headquarters (54 years!) than any other person. He came to Hq. in 1922 and for 43 years was QST's Circulation Manager. From 1941 to 1976, Dave was the Treasurer of the ARRL.

□ Chip Margelli, K7JA, who has been named assistant vice president and sales manager for Amateur Radio at Yaesu Electronics.

SUNSPOT NUMBER INFORMATION

□ Sunspot number information has been compiled and disseminated by the Swiss for many years. The program is expected to end this year. If this happens, similar information will be made available by the American Association of Variable Star Observers (AAVSO).

The AAVSO has been a major contributor to the Zurich program since 1974, operating with encouragement, technical advice and financial assistance from the National Oceanic and Atmospheric Administration (NOAA), Boulder, Colorado. The American effort is under the direction of Casper H. Hosfield,

A High-Performance Synthesized 2-Meter Transmitter

Give spurs the boot! An on-frequency VCO is featured in this well-heeled 12-watt transmitter.

By Albert Helfrick,* K2BLA

This 2-meter transmitter is the culmination of a two-year study to produce a synthesized fm transmitter that does not suffer from any of the ills that plague much of the synthesized 2-meter equipment currently being used. Two requirements were stipulated: First, the entire 2-meter band should be capable of being covered with 5-kHz channel spacing throughout; second, there should be no audible reference whine or microphonics.

In the design of vhf phase-locked synthesizers, it is not difficult to achieve any one of these requirements. In some designs, however, it is very difficult, if not impossible, to achieve *all* of the requirements *simultaneously*, while observing other, almost obvious, requirements such as reasonable cost, size and parts availability. Several synthesizer types were built for the transmitter: two mixing and multiplying types using LSI synthesizer chips, one employing direct synthesis using a 5-kHz reference and, finally, a direct or on-frequency synthesizer using a 10-kHz reference.

Circuit Description

Several features of this transmitter are unique. First, the VCO in the synthesizer operates at the same frequency as the transmitter output stage. That implies that there are no mixers or multipliers to produce spurious outputs, which greatly simplifies the tuning of the power amplifiers. The entire 2-meter band can be covered without any significant spurious outputs.



An ON-OFF switch and the frequency-selector switches are the only controls mounted on the front panel of the synthesized 2-meter transmitter. A microphone connector and accessory plug are located on the rear panel.

A dual-modulus (or "pulse-swallowing") divider is a type of programmable divider which allows very high frequencies to be divided by any integer with the use of only one high-frequency integrated circuit. The heart of the circuit, shown in Fig. 1, is U6, a dual-modulus, divide-by-10/11 ECL integrated circuit. The output of this chip drives two presettable TTL down-counters, called the main counter and the swallow counter. Both

counters are preset at the same time, and each is clocked down simultaneously with the output of the prescaler. The swallow counter necessarily has a smaller number preset than the main counter, and thus reaches zero before the main counter does. Upon reaching zero, the swallow counter switches the mode of the ECL prescaler from divide-by-11 to divide-by-10 operation, and the main counter continues toward zero. When the main

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counter reaches zero, both counters are preset to their respective numbers and the process begins again.

If M is the number preset into the main counter and N is the number preset into the swallow counter, the total number of input cycles to the ECL prescaler is

$$P = 11N + (M - N)10 \\ = 10M + N$$

The output frequency of a properly locked phase-locked loop is the reference frequency times the programmable divider ratio, or in this case

$$F_{out} = (10 \text{ kHz}) (10M + N)$$

The values of both M and N are selectable; that is, N goes from zero to nine and is selected by the tens-of-kHz switch, while M goes from 1440 to 1479 and is selected from the MHz and hundreds-of-kHz switches. The two most significant digits of the number M (i.e., 14) are

permanently wired into the counter and are not selectable.

The Loop Reference Frequency

A second unique feature is the use of a 10-kHz loop reference frequency even though the channel spacing is 5 kHz. There are several ways of keeping all traces of the reference frequency out of the transmitter output, one of these being the use of a carefully designed and implemented loop filter. A filter of this sort must not degrade the lockup time, capture range, lock range or loop stability. If the high-frequency capability of the loop is reduced too much, excessive noise and microphonics can become a problem. The use of a higher loop-reference frequency allows a wider loop bandwidth with the same level of reference sidebands. Quite simply, the higher the reference frequency, the better.

Normally, if a 10-kHz reference frequency were used with a phase-locked loop, only frequencies that were exact

multiples of 10 kHz could be generated, which would not be acceptable for 2-meter fm operation. The method of obtaining 5-kHz resolution while using a 10-kHz reference is called "reference pulling." See Fig. 2. This "pulling" involves shifting the 10-kHz reference frequency very slightly so that the 144-MHz output frequency moves up by about 5 kHz. This technique does not produce an exact 5-kHz shift on all channels, with the greatest error being at the band edges. If the frequency shift were set at exactly 5 kHz at the center of the band, however, the error at the band edges would be 40 Hz, hardly enough to cause problems with even the fussiest repeaters.

The VCO

The last and most important feature of this transmitter is the low-microphonic VCO, Fig. 3. Designing a phase-locked loop that is to be modulated for fm use is a very difficult task. Changing the

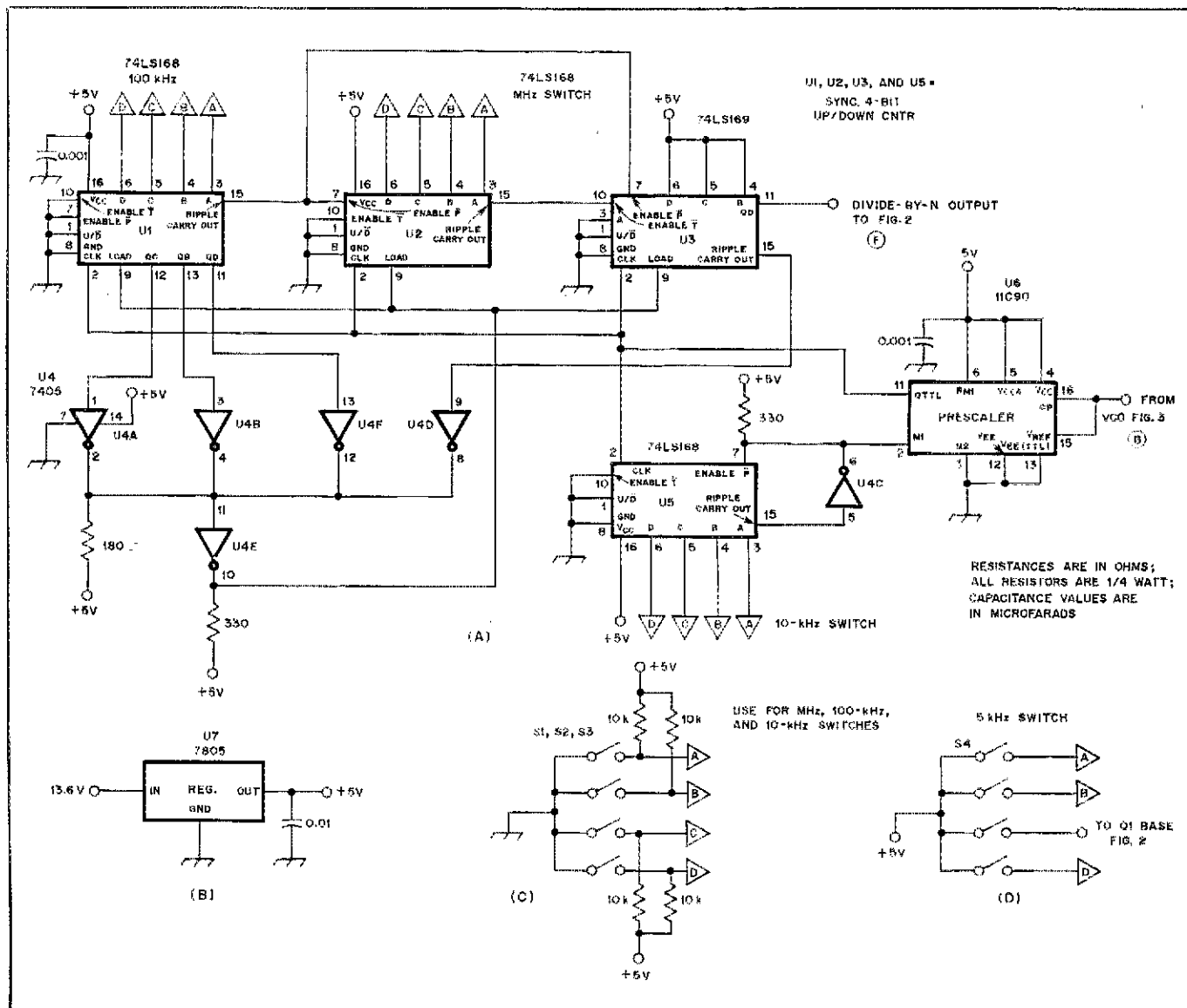
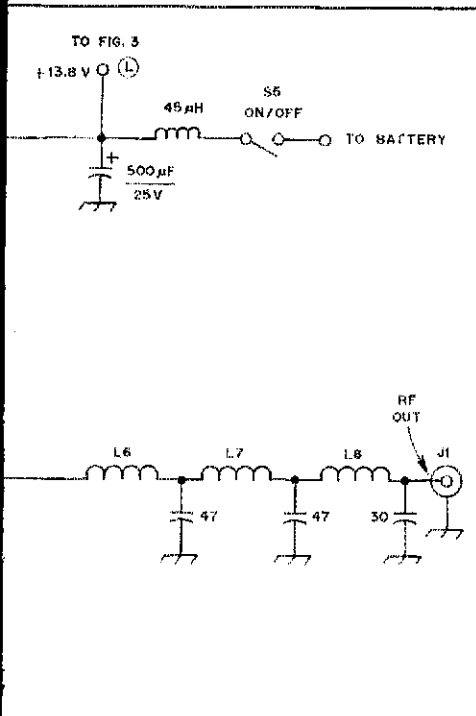


Fig. 1 — The programmable divider chain. S1 through S4, inclusive, are BCD-encoded switches. A toggle switch may be used at S4 if desired.



available types.

modulation limiting. The MOSFET output of the amplifier provides a predictable clipping level for the speech amplifier. The unwanted harmonics of the clipped waveform are removed with an R-C low-pass filter. A similar op amp is used for the loop amplifier/filter.

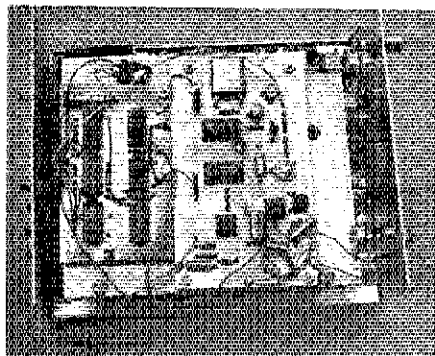
An 11-volt regulator is included for use with the speech amplifier and the loop amplifier. It was desired to use the regulator to reduce the susceptibility of the transmitter to be modulated by input voltage noise, producing so-called "alternator whine." It is important to note that a 3-terminal regulator is not suitable at this point because of an input-output voltage differential of only 1 volt at worst. Most 3-pin regulators have a drop-out voltage of 2 volts or more.

The Crystal Oscillator and Divider

The 2.56-MHz crystal oscillator drives a CMOS ripple counter that divides the crystal frequency down to 10 kHz (see Fig. 2). A variable capacitor is switched across the crystal with a transistor (Q1). The output frequency is raised about 5 kHz by switching this capacitor out of the circuit with the 5-kHz switch. The transistor switch is connected to the "4" bit of the switch which raises the output frequency 5 kHz for numbers of 4 or greater. The switch may be mechanically prevented from going beyond the digit 5 if desired.

The Power Amplifier

A three-stage, broadly tuned power amplifier provides about 12 watts of output. The first stage operates Class A and boosts the 50-mW signal from the VCO to



The programmable divider and the reference oscillator are visible on the top shelf. The VCO and the power amplifiers are mounted on the bottom of the enclosure.

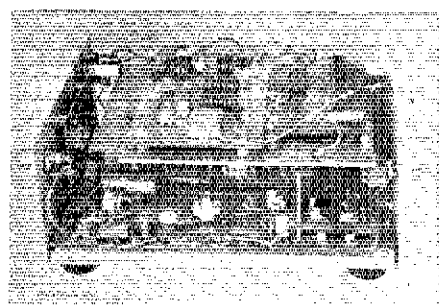
about 500 mW. The second stage, operating Class C, develops 3 watts of drive for the Class C final amplifier. A low-pass filter is used to remove any harmonic energy appearing at the output. All bypassing and tuning components throughout the power amplifier are specially selected for low inductance. Failure to use these special components will result in instabilities and possible component destruction. No pc-board pattern was produced. Instead, small islands were cut into double-sided pc-board material with a sharp knife and the copper peeled away.

Switching Circuitry

A solid-state switching circuit is used for switching the PIN diode and supplying the Vcc to the power amplifier stage. In addition, a terminal is provided at the back of the transmitter cabinet for use with an external changeover relay and receiver muting.

Check Out and Tune-Up

After the unit has been wired and checked to ensure correct assembly, power may be applied. Before depressing the PTT switch, check for overheating components or other unwanted symptoms. Once it has been determined that no catastrophic errors exist, adjust capacitor C1 while watching the VCO control voltage at point H (see Fig. 3). If the loop is locked, the voltage at H should change with the capacitor setting. With the frequency-selector switches set to 146 MHz, set C1 for a VCO control voltage of 5.5 volts. Check to see if the synthesizer is on the proper frequency by means of a frequency counter or by listening for the synthesizer signal with a 2-meter receiver. The frequency counter should be coupled to the VCO by removing the coaxial lead to the power amplifier and keying the mike PTT switch. While monitoring the synthesizer frequency and the VCO control voltage at point H, set the frequency-selector switches to 144 MHz and 147.99 MHz, and determine that the loop remains locked. Set the switches to 146.005



The power amplifier is clearly visible in this side view. The transistors are mounted on the aluminum box for heat sinking.

MHz and adjust C26 for a counter reading of exactly 146.005 MHz. Move the switches to the 146.000 MHz position and adjust C25 for that frequency-counter reading.

Disconnect the counter and reconnect the power amplifier. With the frequency selector at 146.000 MHz, adjust C20 through C24, inclusive, for maximum power output. A wattmeter may be used as an indicator of power output. In the early stages of tuning up, the power output will be quite low, so careful attention must be paid to the wattmeter readings. The final power output should be on the order of 12 watts with an input current of approximately 2.5 A.

Microphone Gain and Modulation Levels

Set the mike gain and modulation levels with the aid of a deviation meter if possible. Without the aid of such a device, a cut-and-try approach may be used by asking for reports on the air or by using a receiver and comparing the modulation level of the transmitter to that of other stations heard. The microphone-gain potentiometer may be set so that clipping occurs only on loud voice peaks and so that normal speech produces peaks of about 10 volts peak-to-peak. The actual deviation is set by the value of R_A which can be anywhere between 0 and 15 k Ω .

Future Considerations

The pulse-swallowing synthesizer is especially suited to receiver applications because of its ability to program the required frequency offset for i-f shift. I am considering a matching receiver which will use a similar synthesizer and a VCO in the 133.3- to 137.3-MHz range for low-side injection. This receiver will be a simple, single-conversion affair with a 10.7-MHz i-f and a monolithic crystal filter.

Other dual-modulus schemes can be used such as 20/21, 40/41 and 63/64. The major advantage of the higher divisors is that higher frequencies (even into the uhf region) can be brought down to the frequency range of standard TTL devices. It is entirely possible to build a synthesized 1-GHz fm transceiver with only a few more components than are used in this 2-meter synthesized unit.

Constructing a Simple 5/8-Wavelength Vertical Antenna for 2 Meters

No loading coils — inexpensive — easy to build. Does that sound like the 5/8- λ antenna you've been wanting to build? You've got it now!

By E. J. Bauer,* W9WQ

A diligent search of the amateur journals will reveal a plentiful supply of articles concerning the use of the deservedly popular 5/8- λ antenna on the vhf bands. Being a recent convert to 2-meter fm operation, I took a closer look at this type of antenna. In the process of constructing several versions, I formulated some new ideas which may be of interest to those who derive satisfaction from making their own antennas.

Electrical Theory

Refer to Fig. 1A. The feed-point impedance of a 5/8- λ vertical antenna ex-

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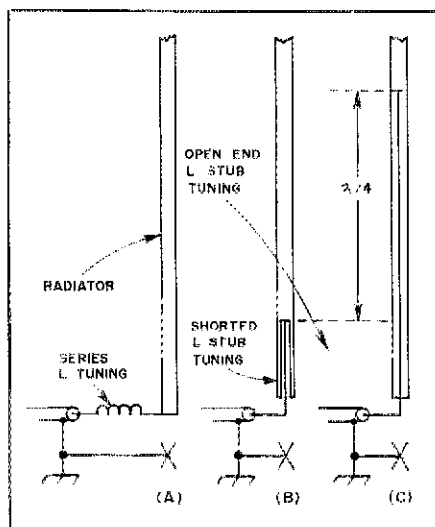


Fig. 1 — The three basic configurations of the 5/8- λ antenna mentioned in the text. The stub tuning method shown at C may be easily arranged mechanically.

hibits a resistive component in the vicinity of 50 ohms. It requires a suitably chosen series inductor, however, to cancel the capacitive reactance which also exists at that point. Only then will a reasonable impedance match be presented to a 50-ohm coaxial-cable feed line. One constructor, K4LPQ, obtained the required inductance by means of a short-circuited stub of coaxial line of proper length.¹ (If the required reactance is known, the length of the stub can be calculated). He improved the mechanical construction of the antenna by placing the stub inside the radiating element. See Fig. 1B. This approach requires an electrical connection to be made between the braid of the stub and the lower end of the radiator. Soldering such a connection would be difficult unless a material such as brass or copper is used for the radiator. If the center conductor of the stub is extended one-quarter wavelength beyond the inductive shorting point (as in Fig. 1C), a signal-frequency short will occur at that point. Furthermore, there is now no need for the stub to be made of coaxial cable. An insulated wire of suitable length (somewhat longer than an electrical quarter wavelength) is all that is needed to develop the required series inductance at the feed point of the antenna.

Construction

I selected a surplus whip antenna to be used as the radiating element for the 5/8- λ vertical.² Cutting the fully extended whip

¹Notes appear on page 23.

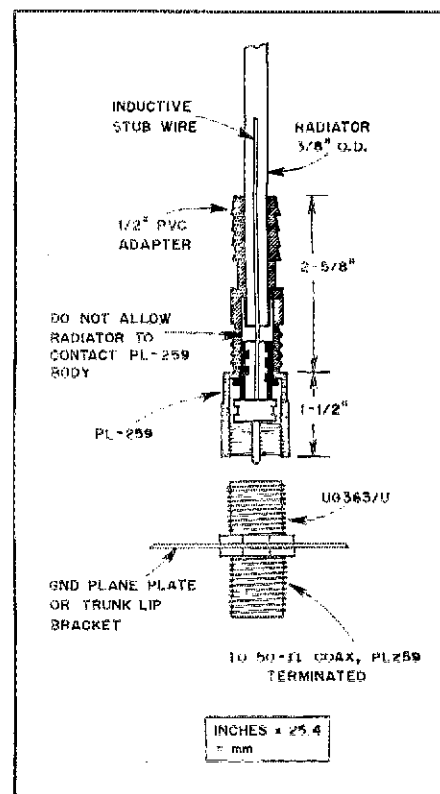


Fig. 2 — This drawing shows a cutaway view of the antenna assembly. A PVC pipe adapter allows simple and inexpensive construction.

at a distance of four feet (1.22 m) from the tip leaves the larger (base) end with a 3/8-in. (10-mm) OD section. This size tubing fits closely into the hole at the barbed end of a PVC pipe adapter. See Fig. 2. The hole in the threaded end of this same adapter mates snugly with the body of a PL-259 coaxial connector. Cement

the radiator to the adapter using a good adhesive. If epoxy is used, it would be advisable to roughen the inner surfaces of the plastic adapter to provide some "bite." It has been my experience that the bond between epoxy and PVC is marginal. Insert the radiator no more than 2 in. (51 mm) into the adapter and allow the adhesive to cure.

Solder approximately 28 in. (700 mm) of no. 18 solid, insulated wire to the pin of the PL-259. Larger wire may be used here, but the optimum length required for matching will be found to be somewhat longer. The inner diameter of this particular whip is 3/16 in. (4.8 mm) at this

point and will easily accommodate no. 12 insulated wire.

Fig. 2 shows a UG-363/U connector being used as the junction for the radiator, ground plane and transmission line. This connector is expensive, so one might prefer to use the less expensive SO-239 connector.

Testing

Temporarily assemble the radiator/insulator assembly to the plug/wire portion, attach a ground plane and check the VSWR at two well-separated frequencies. The results will show whether the stub is too long or too short. It should be possi-

ble to get the VSWR below 1.5:1 across the repeater portion at the upper end of the 2-meter band. Shortening the stub to move the maximum VSWR point higher in frequency is easy. Should you overshoot, it is simple to start over again with a new piece of wire. Once you are satisfied with the results, the PL-259 can be cemented to the insulator. That's all there is to it. See you on 2 fm!

105F

Notes

¹Pentecost, "5/8-Wavelength Vertical Antenna for Mobile Work," *Ham Radio*, May 1976.

²Fair Radio Sales, P. O. Box 1105, 1016 F. Faucka St., Lima OH 45802, G01-51048 telescoping whip antenna.

The Shooter — A 3-Band Portable Antenna

Want a vertical you can put up or take down in a jiffy? Try this penny-pincher's Field Day special!

By E. W. "Twisty" Ljongquist,* W4DWK/W1CQS

When Wayne Stump, WB4ARZ, brought his little marvel over for me to see, I was admittedly more than a bit skeptical. His previous accounts of the lightweight antenna had aroused my curiosity. Could an antenna made from the miscellany found around the house or in the neighborhood live up to what I'd been told?

The day came when Wayne arrived with his compact bundle of hardware. I looked at the collection and then him, gesturing as I laughingly remarked, "you gotta be kidding!" His only answer was a smile as he set about assembling the various pieces of metal that were transformed in a matter of minutes into a vertical antenna. "Too flimsy to be practical," I told myself as he put on the final touches.

When I moved closer to the antenna, however, I realized I'd judged the book by the cover — for I found the construction to be quite sturdy. "Well, what do you think of it now?" he remarked.

My reply, "Not too bad an idea for the



Fig. 1 — Wayne Stump, WB4ARZ, seated at this outdoor radio location in sunny Florida. His version of the vertical Shooter antenna is visible at the left.

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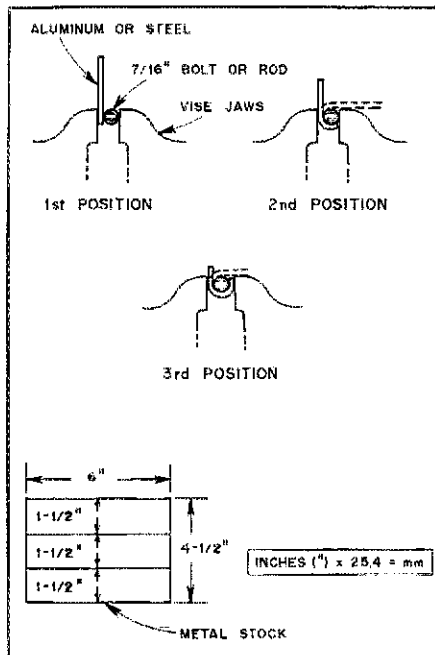


Fig. 2 — Dowels for the Shooter are made by placing the metal stock (shown at the bottom) in a vise along with a 7/16-inch (11-mm) dia bolt or rod. The metal is bent into a cylindrical shape as indicated by the three drawings. The dowels can be made from either aluminum or steel.

chap who enjoys jaunts to the 'boonies' or DXpeditions. As a matter of fact, I'd say it's nearly tailor made for someone like you who has a travel trailer!"

Wayne could sense that my doubts were rapidly disappearing. As I grasped the antenna and gave it a little tug, I declared with a tone of approval, "What a nifty vertical for Field Day. Even condominium of apartment dwellers can use it!"

A Simple Evening Project

Once the material has been gathered, the work of making this antenna should take little more than an hour. You might say it makes a good project for a rainy evening.

Look at Fig. 1, which shows Wayne at the key of a portable installation. You will see one of these vertical antennas positioned just to the left of the operating bench. The scene is rather typical of a basic Field Day station. Figs. 2, 3 and 4 provide details of the Shooter.

In knocked-down form, the entire package is very compact. The maximum length of the antenna segments is such that there should be no problem carrying the bundle or even shipping it by airplane. I estimate the weight to be about six pounds. All parts, except the conduit, can be fitted into a 6-inch cube and still leave enough spare room to accommodate a small I. network. In my opinion, a portable antenna like this is nearly ideal, especially if you consider the fact that the total cost should be no more than \$7.

Moments after Wayne left, I began a scavenger hunt around my QTH. That

adventure netted most of the components needed to construct a copy of his vertical. Naturally, the odds and ends I found were not all identical to the parts he'd acquired. But the resulting variations I made in building the Shooter in no way impaired the performance.

The main ingredients of the antenna are two 10-foot (3.05-m) lengths of 5/8-inch (15.9-mm) OD thin-wall electrical conduit. These may be purchased at an electric supply store or a place that handles building materials. Two couplers, suitable for that diameter conduit, are also required along with a washer that has a 5/8-inch opening. At the time of this writing a 10-foot length of this conduit sells for about \$2.

To cut the conduit into the prescribed lengths, I recommend the use of a pipe cutter. Tools of this type are available at many hardware stores. Although a hacksaw will serve the purpose, a pipe cutter will provide a more even cut.

Preparing and Fastening the Sections

As you begin the construction of the antenna, cut one of the 10-foot lengths in half. Cut the other length at 6 feet (1.83 m), then provide a length of 27 inches (686 mm) and another of 6 inches (152 mm). File off the burrs and lay this material aside.

Three metal dowels are to be made. These aid in holding together the sections of the antenna, besides serving as a means for electrical continuity. I formed my dowels from a fairly stiff piece of aluminum chassis material that was 6 inches (152 mm) wide and long enough so that guidelines may be drawn on the metal as explained below.

Dowel dimensions are presented in Fig. 2. With the help of a square, draw the three guidelines across the piece of aluminum so that the lines are 1-1/2 inches (38 mm) apart.

Now obtain a bolt or rod, 7/16 inch (11 mm) in diameter, for shaping the dowel. The length of the bolt or rod should equal the length of the dowel. Clamp the

*Notes appear on page 25.

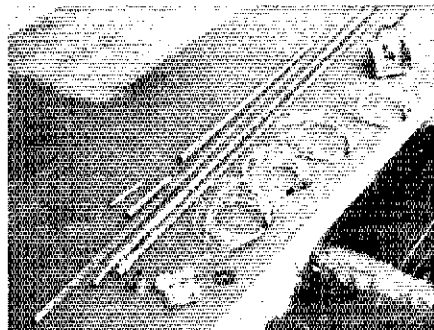


Fig. 3 — This is all there is to the Shooter except the pegs. When the antenna is being stored or transported, a good idea is to keep the guys and radials coiled and tied with plastic ties.

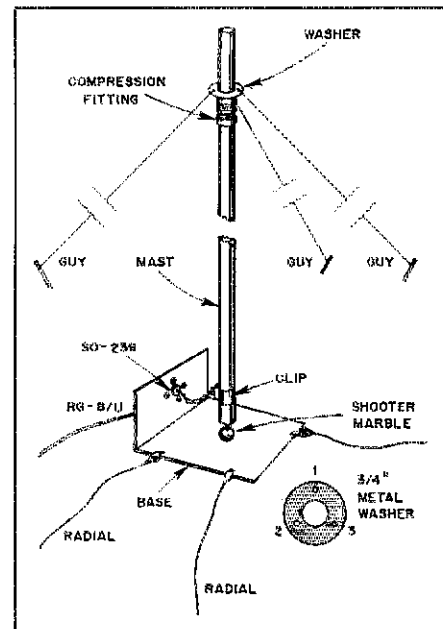


Fig. 4 — The Shooter is mounted and guyed as indicated by this illustration. A metal washer is drilled at points 1, 2 and 3 (equidistant from each other), and a guy is connected to each hole. The washer slips over a section of the conduit coming to rest atop one of the compression fittings. Ground radials are clipped to the metal base.

aluminum stock and the bolt in a vise with the bolt just catching the edge of the aluminum. Fig. 2 shows how this is done. Bend the stock around the bolt. Release the vise and reposition the aluminum so that it can again be bent further around the bolt once the pair has been reclamped in the vise. After this step, you should have a U-shaped end on the aluminum stock. Now cut off the straight section of the aluminum with snips or a hacksaw. Reclamp the U-section and the bolt in the vise and finish bending the dowel into a cylindrical shape with the help of a hammer and block of wood. With a little judicious work using pliers, you should then have a dowel that fits properly in the conduit. Fashion the remaining dowels in the same manner.

To begin putting the antenna sections together, insert one of the dowels into a 5-foot (1.52-m) section and another in a 6-foot (1.83-m) section. What you do with the third dowel is explained in Table 1.

Secure each dowel with a self tapping screw. This screw should be placed 1-1/2 inches (38 mm) from the end of the conduit. Two thin-wall compression couplers are to be installed as shown in Fig. 4. These reinforce the joints and aid the dowels in keeping the antenna straight.

As you may have gathered from Fig. 1, this vertical antenna is not self-supporting. Guys are clearly visible in the picture. Wayne and I guy our respective antennas in a slightly different manner. Because he has welding equipment, he brazed three wire loops on one of the compression nuts. Each loop serves as a

terminal for a guy. On the other hand, I simply drilled three holes in a 3/4-inch (19-mm) flat washer which slides over the conduit. You can see how this is done by referring to Fig. 4. A guy is attached to each of the three holes.

Wayne chose plastic clothesline, but I wanted something lighter for guys. To save weight and storage space, I preferred a strong grade of nylon fish line that has a thickness about equal to that of a mason's or carpenter's chalk line. Where the antenna is to be installed at ground level, tent pegs are practical for anchoring the bottom ends of the guy lines.

The Shooter Base

Now, you may wonder why I dubbed my version of the vertical antenna the Shooter. Well, actually this "moniker" is related directly to what I use for the base insulator. Ever play "mibs" as a youngster? Remember the "glassies" or "shooters" that a flick of the thumb sent dashing toward your opponent's marbles? Well, that is exactly what serves as the base for my antenna. (I found one tucked away in a bureau drawer.) Of course you could use a cone-shaped stand-off insulator instead, but I liked the idea of the glassie. Mine is epoxied to the base to prevent it from getting lost.

Whereas Wayne fabricated a base plate from flat washers and a steel peg, one made in the following manner may be easier to fabricate. Aluminum stock that is left over from making the dowels could be cut to provide a 4 x 7 inch (100 x 175 mm) plate that can be bent at right angles 3 inches (75 mm) from one end. A 3/8-inch (9.5-mm) hole may be drilled in the center of the bottom of the base and a 3/4-inch (19-mm) hole placed in the upright part to accommodate the coaxial fitting. The base you see in Fig. 3 actually is a bracket from an old amplifier. Originally it held an amplifier tube in place at the socket.

Mount an SO-239 coaxial connector on the base. Solder a short length of flexible wire to the center conductor of the connector. The length should be such that you can make contact with the bottom of the antenna by means of a clip. Such a clip may be salvaged from an old fuse block that was a part of a main distribution box removed from house wiring. Solder the wire to the clip and then slide the clip onto the antenna. An alternative might be to bend a piece of spring-brass material to an equivalent shape.

A Vertical Needs Radials

A quarter-wave vertical antenna will not function properly without radials. In general, the more radials you provide, the better the signal will be. Ground rods introduce considerable ground loss, and for that reason are not considered effective rf grounds. I use only four radials, mainly for the sake of portability. Because of my

Table 1

Radiator Lengths

Band	Length
10 meters	A 6-foot section plus the 27-inch piece.
15 meters	A 6-foot section plus one 5-foot length. The third (loose) dowel can be used to change length if necessary.
20 meters	A 6-foot section, two 5-foot lengths plus a 6-inch piece. Use the loose dowel for connecting the top section.

location over the dry Florida sands, however, I should increase the number.

While touching on the subject of radials, I do recommend a review of the excellent articles concerning ground systems and SWR written by both Jerry Sevick, W2FMI² and M. Walter Maxwell, W2DU.³ A good resume of Maxwell's series is contained in the book, *Amateur Radio Techniques*, published by the RSGB.

I find much truth in the statement that SWR isn't everything. For instance, when I adjust my antenna, I frequently find that minimum SWR and maximum field strength do not coincide. In my opinion, a simple field-strength meter will tell you and me more about antenna performance than any SWR indicator.

A valid reason for having an SWR indicator, though, is that it will let you know if your rig will "like" what it sees as it looks into the transmission line. Some of the new transceivers have a nasty habit of popping out when the SWR goes over 2:1. Who needs that to happen? To compensate for mismatch and any reactance presented by the antenna system, an antenna tuner (more properly called an impedance-matching network) is desirable. The popular Transmatch circuit or even a simple L network should handle any matching requirements concerned with this portable vertical antenna. What the tuner does is to provide an adjusted load that is appropriate for a 50-ohm transmitter output. The tuner does not change a mismatch that may be present at the antenna feed point. For the portable vertical to have the best feed-point match in relation to the transmission line, a good radial system and adjustment of the antenna height are required.

Radiator Lengths for Each Band

To select the correct radiator elements for each of the three bands, choose the lengths from Table 1. Those dimensions are taken from *73 Vertical, Beam and Triangle Antennas*, an excellent antenna book written by Edward Noll, W3FQJ.⁴ Those dimensions are for the cw portions of the respective bands. They can be found in Chart 2 on page 11 of Noll's book. You may disregard the transmission-line lengths suggested by Noll in connection with this antenna. As George

Grammer, W1DF, says, "A line is just to carry the rf to the antenna." Very seldom, and only in special cases, is the line anything but that.

Although the antenna dimensions I've listed are mainly for the cw portions of each of the three bands, I find that with these same measurements operation in the phone segments is quite satisfactory. Only at the highest end of the bands did the SWR get up to 3:1. The signal reports I received while operating my FT-10/B with the Shooter assured me that the signals are getting out.

Putting this antenna up is easy once you get used to the procedure. Lay the proper assembly (the elements for the particular band you've chosen) on the ground with the lower end approximately at the point of the erection. Install the compression couplings and tighten them snugly with pliers. Fasten two of the guys, allowing some slack. Incidentally, my guys are 16 feet (4.9 m) long. With the third guy in your hand and the third peg within reach, raise the antenna for a visual check. If the antenna is nearly vertical, set the third peg and fasten the bottom of the third guy. Should the antenna be too far out of plumb, you'd do better to lower it and rearrange it.

Once the radiator is up, lift the antenna enough so that the base can be slipped beneath, allowing the antenna to come to rest atop the marble. Then shift the base as needed to make the antenna plumb.

With the antenna in proper position, connect the coaxial transmission line to the SO-239 connector on the base. Lay out the radials in a random manner, clipping each one to the base as shown in Fig. 4. You are now ready to fire up the rig and make the tuning adjustments.

Tuning consists of setting the antenna tuner for minimum SWR, adjusting the conduit length if necessary (I did not have to make a length change) and observing the field-strength meter for maximum signal output. If you find that maximum signal strength does not occur at the same point as minimum SWR, do not be overly concerned. In that case a compromise will provide you with the best results.

Both Wayne and I hope that those amateurs who have pleaded for information about simple portable antennas will try the Shooter. We feel the small amount of effort required to make one will be well spent. It is not a real DX chaser, as compared to a quad mounted 60 feet above ground, but you can have fun with it. □

Notes

¹Electricians call this "half-inch conduit."
²Sevick, "The W2FMI Ground-Mounted Short Vertical," *QST*, March 1973, and "Short Ground-Radial Systems for Short Verticals," *QST*, April 1978.

³Maxwell, "Another Look at Reflections," Parts 1 through 7, *QST*, April, June, August and October 1973, April and December 1974, and August 1976.

[No additional parts for this series are planned for *QST* appearance. — Ed.]

⁴Published by Editors and Engineers (Howard Sams).

A Portable Quad for 2 Meters†

Backpacking, boating or mountaintopping? Invest an afternoon's work and pack this novel directional gain antenna on your next expedition.

By R. J. Decesari,* WA9GDZ/6

Last year, while I was "hilltopping" in the San Diego area with my 2-meter fm transceiver, a band opening occurred in which stations from Los Angeles, Santa Barbara and further points north were copied on simplex frequencies. Establishing solid communications with the built-in quarter-wave whip antenna and 1-watt power of the transceiver (with weakening batteries) was rather difficult, even with the opening. Because of my intense desire to communicate with these DX stations, a need for either a directional gain antenna or a power amplifier was established. Since I didn't particularly desire toting and charging additional batteries for an amplifier, I set this concept aside. I then took a closer look at improving the antenna. This novel portable antenna configuration evolved from many hours of thinking and tinkering in my workshop.

Initial efforts to design a collapsible antenna centered on a conventional four-element Yagi configuration. Several models of the Yagi, whose elements all opened simultaneously, proved to be a nightmare in bell cranks and lever arms. From this attempt, I decided that all the elements should still be attached to a main boom, but the operator would open the elements individually during antenna set-up, thus eliminating the push rods and cranks. The Yagi design, with the elements folding on top of each other to minimize space, was still rather large considering element spacing and other required mechanical appendages and dimensions. At about this time, I happened to spot a big 20-meter quad while driving to work and immediately started to ponder the possibilities of using a quad for the intended portable antenna.

With only two elements, the quad

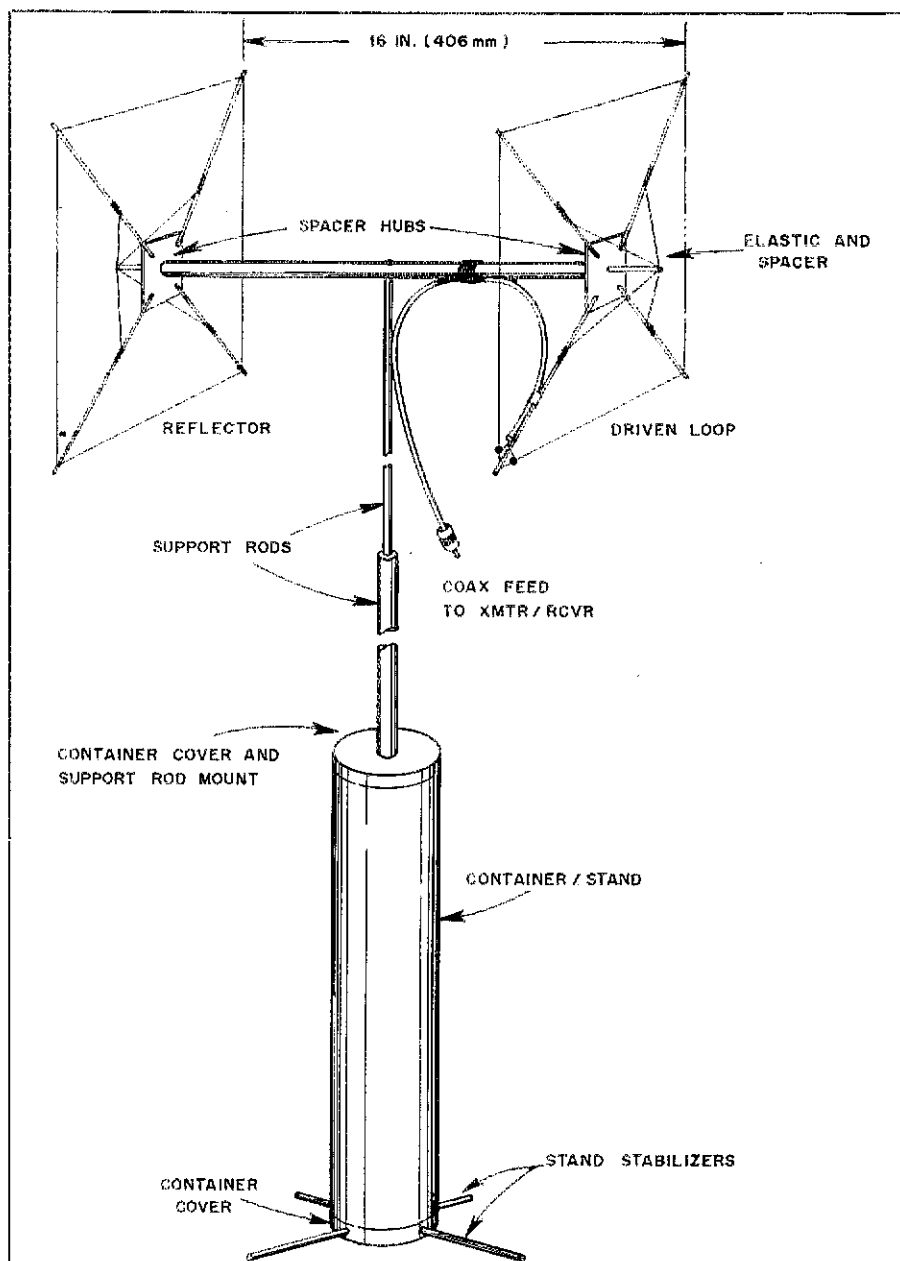


Fig. 1 — The basic portable quad assembly. The author used an element spacing of 16 in. (406 mm) so that the quad spacers would fold neatly between the hubs.

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†A patent is pending on the antenna system described in this article; commercial application of this construction technique is prohibited.

provides an excellent front-to-back ratio, as well as about 6 dB of forward gain. With a two-element quad, the element spacing for optimum reflector performance is between 0.15λ and 0.2λ . That works out to about 12 and 16 inches (305 and 406 mm) at 2 meters. Not a bad overall size for a 2-meter antenna! Now the problem was how to support the square loops. A quick lesson in geometry revealed that if an "X" configuration of spacers were used to support 144-MHz loops, then each leg of the "X" would also be about 16 inches! All that was left to do was design a center hub that would allow the spacers to fold to the longitudinal axis of the boom and the basic problem would be solved. Consequently, the garage workshop was put in to overtime service and the preliminary model of the brainchild was fabricated.

A Quad is Born

Figs. 1 and 2 show the basic portable quad. Both driven and reflector elements fold back on top of each other, resulting in a structure about 17 inches (432 mm) long: The wire loop elements may be held in place around the boom with an elastic band. To support the antenna once it has been erected, the container is used as a stand. To provide more stability, four small removable struts slip into holes in the base of the container. Both the support rods and struts fit inside the container when the antenna is disassembled.

I have used two different methods of keeping the quad spacers erect. Both methods are successful. Fig. 3 shows the quad spacers held open by spring-steel clips. Each clip is fabricated from an ordinary paper binder with a hole drilled in it to allow it to be attached to the quad spacer. The clip is compressed and slid down the quad spacer until it engages the hub. This provides a rigid mechanical support to hold the spacer open when in use as well as allowing it to pivot back for storage in the container. Fig. 4 shows a slightly different method: A mechanical stop is machined into the hub, and elastic bands are used to hold the spacers erect. The bands are attached to an additional strut to hold the spacers open. When not in use, the strut pulls out and sits across the hub, and the spacers can be folded back. Details of each method are shown in Fig. 5.

The clip and hub assembly is possibly easier for the home builder to fabricate, with the exception of drilling the hole in the spring steel. A high-speed-steel or carbide-tipped drill set is required, since the spring steel is an extremely tough and brittle material. Care must be taken when drilling the holes since the clip material will tend to crack. It is recommended that the builder start with a small-diameter drill and proceed to sequentially larger drill diameters until the final diameter is reached. The clip should be expanded and

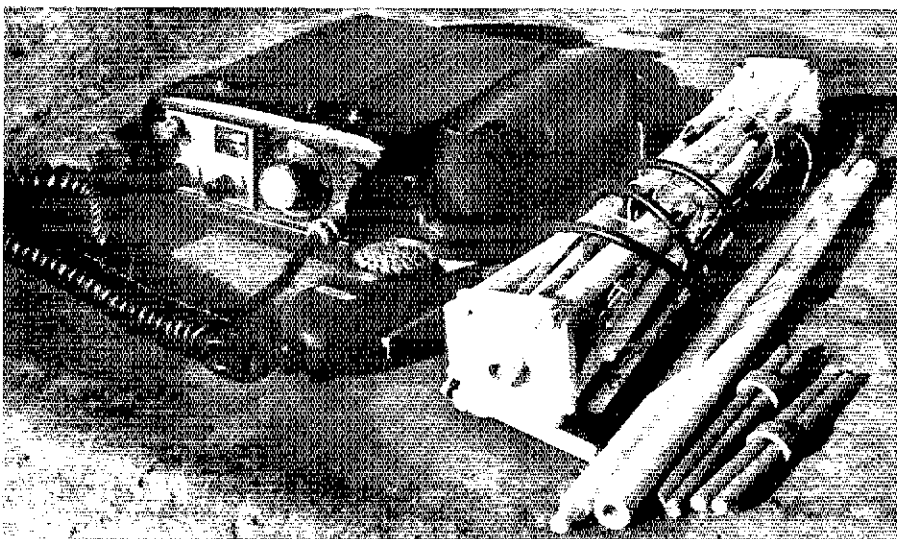


Fig. 2 — The portable quad in stow configuration. Two long dowels are used as support rods. Four smaller dowels are used to stabilize the container.

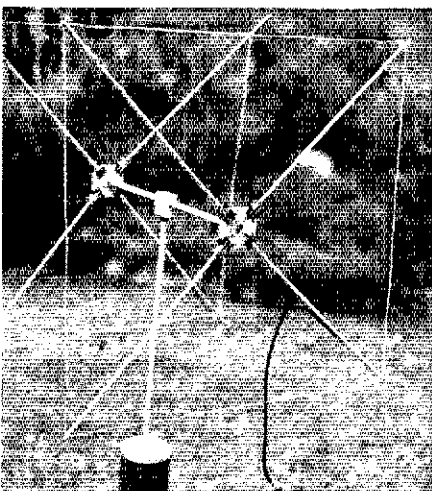


Fig. 3 — Paper-binder spring clips are used in this version of the quad to hold the spacers erect.

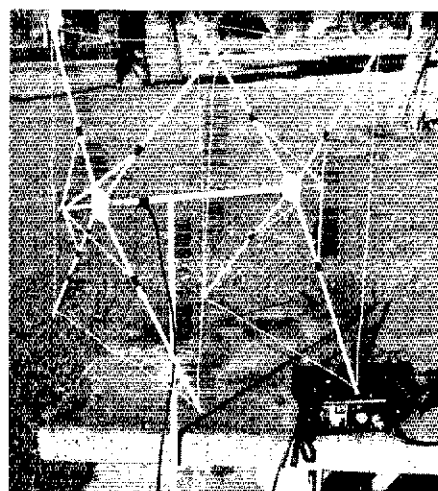


Fig. 4 — This version of the portable quad uses mechanical stops machined into the hub; elastic bands hold the spacers open.

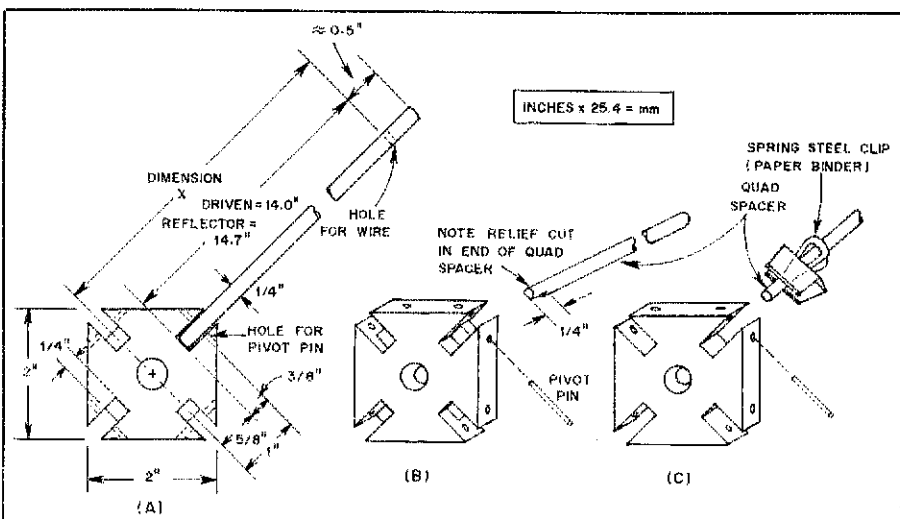


Fig. 5 — A detail of the spacer hub with spacer lengths for the director and reflector is shown at A. The hub is made from 1/4-inch (6.4-mm) plastic or hardwood material. The center-hole diameter can be whatever is necessary to match the diameter of your boom. The version of the hub with mechanical stops and elastic bands is shown at B. At C is the spacer hub version using spring clips.

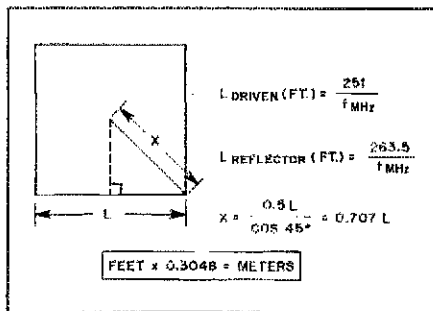


Fig. 6 — Quad loop dimensions. Dimension X is the distance from the center of the hub to the hole drilled in each spacer for the loop wire. At 146 MHz, dimension X for the driven element is 1.216 feet (14.6 inches), and dimension X for the reflector is 1.276 feet (15.3 inches).

fitted over a 1/4-inch (6.4-mm) piece of wood to be used as a drilling back. Use of a light oil is recommended to keep the drill tip cool.

Building Materials

The portable quad antenna may be fabricated from any one of several plastic or wood materials. The most inexpensive method is to use wood doweling, available at most hardware stores. Wood is inexpensive and easily worked with hand tools; 1/4-inch (6.4-mm) doweling may be used for the quad spacers, and 3/8- or 1/2-inch (9.5- or 12.7-mm) doweling may be used for the boom and support elements. A hardwood is recommended for the hub assembly, since a softwood may tend to crack along its grain if the hub is impacted or dropped. Plastics will also work well, but the cost will rise sharply if the material is purchased from a supplier. Plexiglas is an excellent candidate for the hub. Using a router and hand tools, I manufactured a set of Plexiglas hubs with no difficulty. Fiberglass or phenolic rods are also excellent for the quad elements and support.

The loops were made with no. 18 AWG insulated stranded copper wire, although enameled wire may also be used. If no insulation is used on the wire and wood doweling is used for the spacers, a coat of spar varnish in and around the spacer hole through which the wire runs is recommended. The loop wire terminates at one element by attaching to heavy-gauge copper-wire posts inserted into tightly fitting holes in the element. For the driven element, two posts are used to allow the RG-58/U feed-line braid and center conductor to be attached. A single post is used on the reflector to complete the loop circuitry.

The first model of this antenna had a tuning stub attached to the reflector loop. This allowed a certain degree of reflector tuning to maximize its performance. However, I discovered a computer maximization of quad loop and spacing dimen-

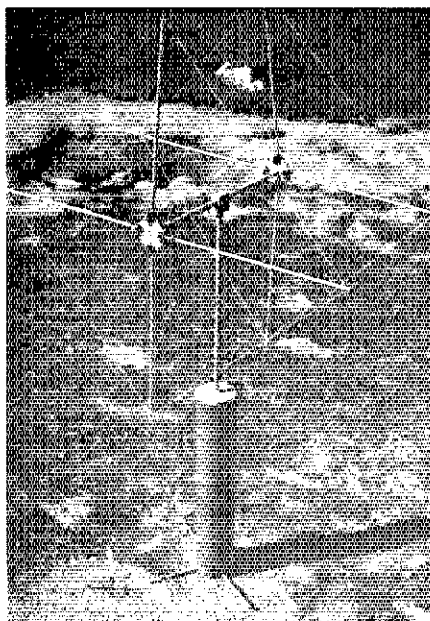


Fig. 7 — A vertically polarized portable quad. The feed point is at the extreme left of the photograph.

sions.¹ This data was used in my subsequent 2-meter quad designs, and has simplified the antenna by eliminating the need for a reflector tuning stub. Fig. 6 shows quad dimensions derived from this data. The quads described in this article have been designed for 146 MHz, but the basic loop size equations will allow the builder to construct a model to any desired frequency in the 2-meter band to maximize results.

The storage container was made from a heavy cardboard tube originally used to store roll paper. Any rigid cylindrical housing of the proper dimensions may be used. Two wood end pieces were fabricated to cap the cardboard cylinder. The bottom end piece is cemented in place and has four holes drilled at 90° angles around the circumference. These holes hold 4-inch (102-mm) struts, which provide additional support when the antenna is erected. The top end piece is snug fitting and removable. It is of sufficient thickness (about 5/8 inch or 16 mm) to provide sufficient support for the antenna-supporting elements. A mounting hole for the supporting elements is drilled in the center of the top end piece. This hole is drilled only about three-quarters of the way through the end piece and should provide a snug fit for the antenna support. One or more antenna support elements may be used, depending on the height the builder wishes to have. Keep in mind, however, that the structure will be more prone to blow over,

¹"Optimum gain element spacing found for the quad antenna," *World Radio News*, March 1978.



The author with the fully erected portable quad antenna. The bottom stand is also used as a storage container.

the higher above the ground it gets! Doweling and snug-fitting holes are used to mate the support elements and the antenna boom.

Polarization and Performance

The antennas shown in Figs. 1 through 4 all have 45° diagonal polarization. This is a compromise between vertical and horizontal polarization that allows both fm and ssb/cw (which is usually horizontally polarized) to be worked on 2 meters. Fig. 7 shows another version of the antenna, built for vertical polarization. Although analytical antenna-pattern and gain tests have not been conducted, the portable quad displays an excellent front-to-back ratio as well as gain. The antenna has been used in the field with very satisfying results. The best example of the performance of the antenna was demonstrated by comparison to a 5/8-wave whip antenna. In this demonstration, the 5/8-wave whip was placed on a table top inside the ham shack and excited with 15 watts. From a location in San Diego, the 5/8-wave whip was unable to trigger any of the Los Angeles repeaters about 150 miles to the north. With the portable quad sitting on the same table, full-quieting access was gained to the Los Angeles repeaters.

This antenna design provides a compact package for a directional-gain antenna ideally suited for portable operation. Furthermore, it can be built from readily available and inexpensive materials. I would like to thank my father-in-law for his encouragement and my wife Sue for her patience and indulgence.

What Is A Filter?

If the psychiatrist says "Butterworth," do you respond "Pancake syrup"? Are you passive when you should be active? Feel trapped by filters? This one is for you.

By Peter O'Dell,* AE8Q

What exactly is a filter? The average citizen will probably tell you about the piece of paper that goes in the basket of his automatic drip coffee pot. After the pot of coffee is brewed, he pulls out the filter and throws it in the trash — unless he is involved with gardening, in which case he probably meticulously scrapes the coffee grounds from the filter paper. Regardless, the once-white paper is now soiled brown. It has served its function by trapping small pieces of coffee grounds and oils within the paper. The larger chunks simply settle in against the filter paper and easily fall off if given a chance.

Some of you are probably mumbling that you could have watched Julia Child on Public TV to find out something as simple as this. Many of us have at one time or another jumped to the erroneous conclusion that the functioning of the filters normally found in electronic devices is similar to that of the coffee filter. It really isn't. How do these filters work?

With a few rather rare exceptions, an electronic filter does *not* trap or absorb unwanted energy; it merely refuses to accept it and refuses to pass it along. The operating principle involved is that the filter rejects unwanted energy. If a coffee filter functioned in a similar manner, coffee grounds would bounce off it (that could be messy). Brewed coffee would pass through, but the filter would remain white. Nothing would be trapped inside the filter. Although the distinction may seem to be trivial, it has far-reaching consequences when using filters in electronic circuits.

The electrical property associated with this rejection process is *impedance*. To be more precise, it is impedance matching that is involved. The source will have an impedance, the load will have an impedance, and the filter will have an impedance. The input impedance of the filter will vary with the frequency of the energy applied. (The impedance of the

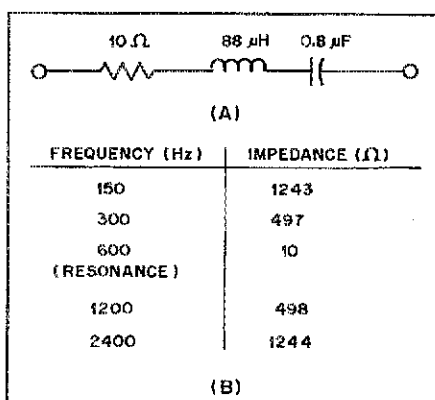


Fig. 1 — Schematic diagram of simple series-resonant filter at A. At B, listed in tabular form, is the impedance vs. frequency for the circuit for one and two octaves above and below resonance.

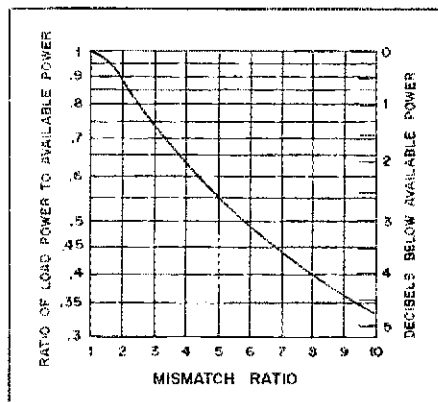


Fig. 2 — This graph depicts the relationship between power loss and mismatch.

source and of the load may also vary with frequency, but that doesn't concern us here.) This impedance variation is the underlying principle of filter operation. To go into any detail on the theory of operation of filters is far beyond the scope of this article. A bibliography is included at the end.

Illustration

Suppose that we look at a very simple

series-resonant circuit, Fig. 1A. A 10-ohm resistor is in series with an 88-mH inductor which is in series with a 0.8-μF capacitor. This circuit is resonant at 600 Hz. At resonance the impedance will be equal to the resistance of the circuit, 10 Ω. As we move away from resonance though, the impedance will change; the numerical value of the impedance is given in Fig. 1B for frequencies one and two octaves above and below the resonant frequency. (An octave is defined as a frequency ratio of 2 to 1.) Notice that the impedance is much higher as we move away from the resonant frequency.

One empirically observable relationship of impedance is $Z = E/I$ for any given frequency. Using the figures from the table (Fig. 1B), it becomes obvious that it takes progressively more voltage to force the same amount of current to flow in this circuit as we move further from the resonant frequency. This is the manner in which filters *attenuate* (reduce) signals. It simply takes a much bigger signal at the input to get the same amount from the output as we move away from resonance. The resistance has stayed the same (10 ohms in this case); the impedance increases because of the changing reactances with changes in frequency. Therefore, additional power is not consumed in the filter; the filter simply refuses to accept the power and pass it on for the unwanted frequencies.

The effect of a mismatch is depicted graphically in Fig. 2. Maximum power will be transferred from the source to the load when the source resistance equals the load resistance (assuming no reactances or situations where the reactances have been canceled out). The mismatch ratio is not a simple function of impedance ratios — unless there is a no-reactance situation. In this special case, the mismatch ratio is the ratio either of load resistance to source resistance or source resistance to load resistance, whichever results in a number larger than 1. When reactance is present, the mismatch ratio is *always* higher than the simple impedance ratio. How much

*Basic Radio Editor

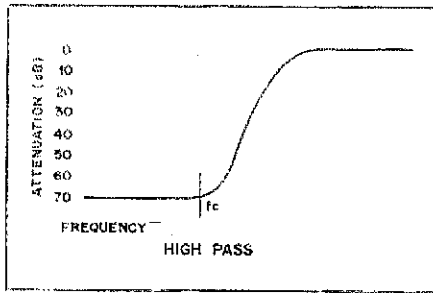


Fig. 3 — Response curve for hypothetical high-pass filter. Frequency increases from left to right.

higher is determined by how much reactance is present. In the extreme case, a load impedance might be a pure reactance equal in value to the source resistance. The impedance/resistance ratio in this case is 1, but because a pure reactance can absorb no power, the mismatch ratio is infinity.

If the mismatch is not very great, most of the available power will be delivered to the load. About half the available power is realized when the mismatch is as great as 6 to 1. This is intended only to provide an idea of what is going on inside a filter.

Because filters are rejecting energy (not absorbing it), it is usually desirable to place them in a low-level portion of any given circuit. (This is true for most filters; however, there are some, such as low-pass filters for transmitters, which are placed at the output of circuits.) For instance, a crystal filter that is overdriven may become unstable and change frequency — in extreme cases the crystal may fracture. If a filter using toroids is overdriven, the core of the toroid may saturate, causing the inductance to change value and thus distorting the response of the filter.

Polytypic Group

Filters come in all shapes and sizes. They can be made from a wide range of components. They can be designed to do many different things. In a typical ssb transceiver we generally find either a crystal filter or a mechanical filter. In fm transceivers, we may find either a crystal or a ceramic filter. Regardless of the construction, filters pass (attenuate very little)

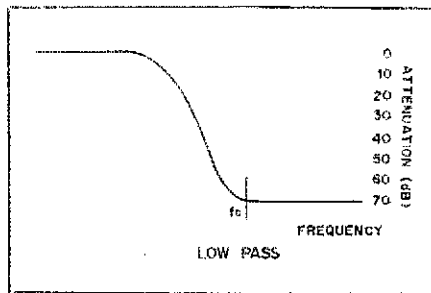


Fig. 4 — Response curve for hypothetical low-pass filter.

some frequencies and reject (attenuate quite heavily) others.

Some specifications are usually provided with the filter to give the user an idea of the *shape* of the response. All that is meant by this is the relationship of output power to available input power over some range of frequencies. Usually this is expressed in terms of decibels or dB. Fig. 3 shows a diagram of a typical high-pass filter (vertical axis represents power level expressed in dB; horizontal axis represents frequency — low to high is from left to right). Signals below f_c are uniformly attenuated 70 dB, while signals only slightly above f_c show little attenuation. A high-pass filter could be useful between the antenna and a TV set to keep the fundamental signal from an amateur hf transmitter from overloading the front end of the TV set.

Fig. 4 depicts the response curve of a low-pass filter. The response of the low-pass filter is a mirror image of that of the high-pass filter. Most amateurs have low-pass filters on the output of their hf transmitters and amplifiers. I recently had a phone call from an amateur who had a severe case of TVI. Asked if he had installed a low-pass filter, he replied that he had two of them — both between the exciter and the amplifier! I suggested that he move one of them to the output of the amplifier. Be sure to buy or build a low-pass filter that will handle the power level that you are running; then put it immediately after the last amplifying device. Low-pass filters are designed to operate into a specific load impedance. In simple

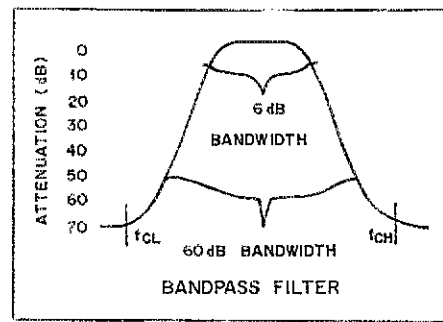


Fig. 5 — Response curve for hypothetical band-pass filter. Those points on the curve representing 6- and 60-dB down are indicated because they are commonly used to calculate the shape factor.

terms, if you are using 50- Ω coax feeding a 50- Ω aerial or a Transmatch, then use a 50- Ω low-pass filter; otherwise it may not act as a low-pass filter. Also, if a high SWR is present on the line, this may degrade the performance of the low-pass filter, as the filter may not be operating into its correct load impedance. (Perhaps this is how the old wife's tale about high SWR causing TVI got started.) Place the low-pass filter between the transmitter or amplifier and the matching network, if employed.

Fig. 5 shows a representative band-pass filter response curve. There is a low cutoff frequency and a high cutoff frequency. The frequencies between the two cutoff frequencies are passed with little attenuation. *Shape factor* or *skirt selectivity* is often mentioned in connection with band-pass filters. For instance, we can measure both points on the curve where the response is down 6 dB. Suppose at these points the bandwidth (difference between the high and low frequencies) is 2 kHz. Now suppose that we mark the points on the curve that are 60 dB down and find that we have a bandwidth of 4 kHz at this point. The 60/6 dB shape factor (slope) is calculated by simply dividing 4 kHz by 2 kHz, which equals 2. To make an intelligent interpretation of the slope factor, it is necessary to know at what points on the curve the bandwidths are measured for the calculation. Obviously, if a filter has a shape factor of 2 to 1 for 30/6 dB,

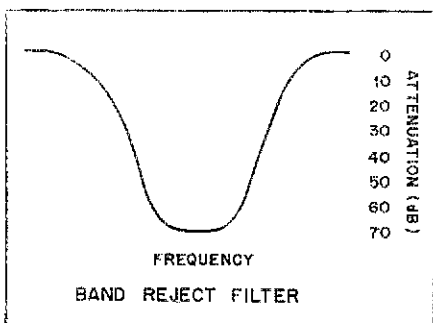


Fig. 6 — Response curve for hypothetical band-reject filter.

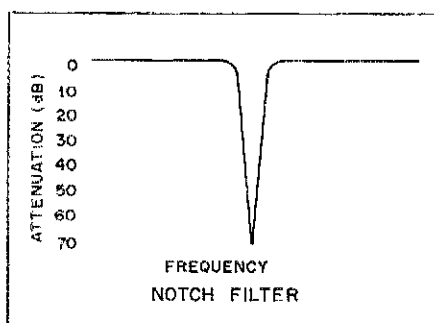


Fig. 7 — Response curve for hypothetical notch filter.

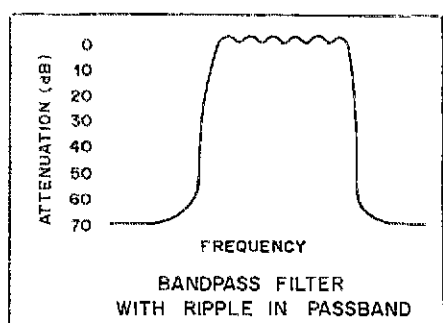


Fig. 8 — The wiggly lines in the band-pass response indicate ripple in the passband.

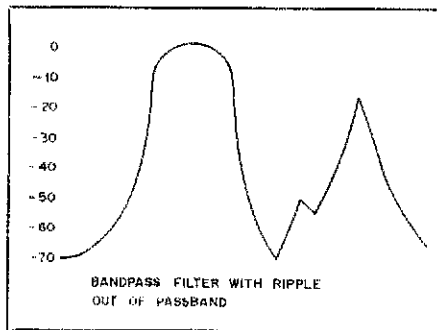


Fig. 9 — Ripple can also occur out of the passband.

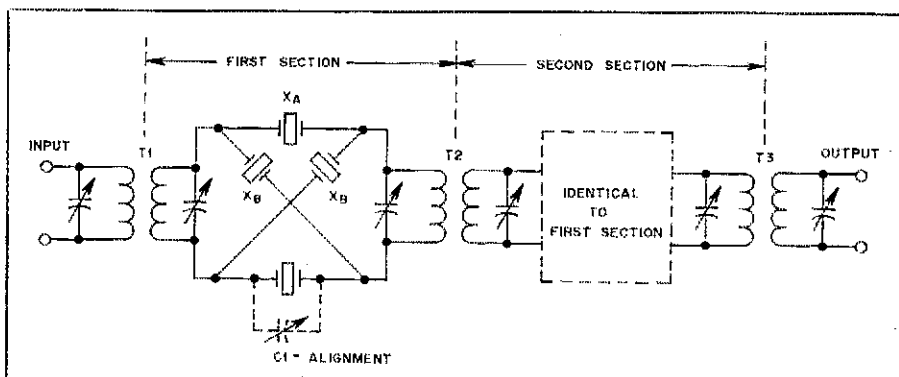


Fig. 12 — Schematic diagram of a two-section crystal lattice filter.

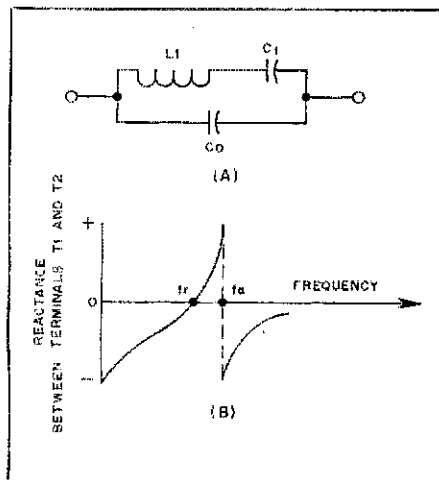


Fig. 10 — The equivalent electrical circuit of a piezoelectric crystal is shown at A. The reactance varies with frequency as in B.

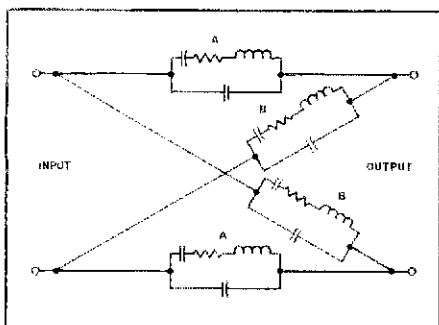


Fig. 11 — Equivalent circuit of a full-lattice crystal filter. Note that the lattice could be redrawn as a bridge circuit.

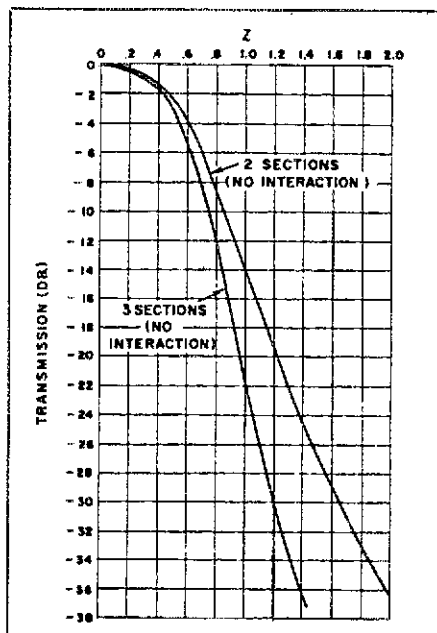


Fig. 13 — Theoretical selectivity characteristics of two and three cascaded identical filter sections when interaction because of mismatch is ignored. Z is proportional to the frequency difference from the center of the passband.

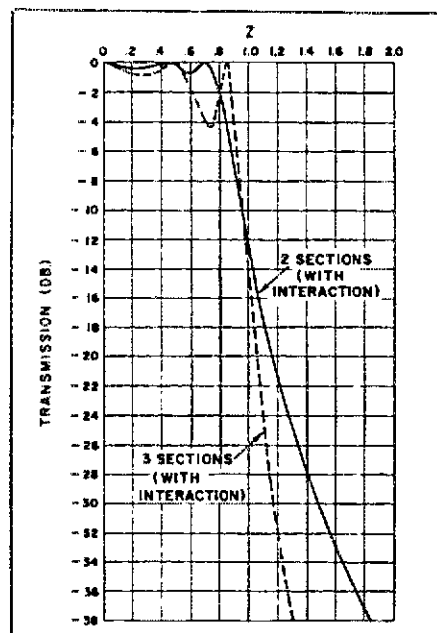


Fig. 14 — Theoretical selectivity characteristics of two and three identical cascaded filter sections when interaction is taken into account. These curves are steeper than those of Fig. 13, but there is considerable ripple in the passband.

its response curve is going to be dramatically different from the above example. Given modern-day crowding on the hf band, a rule of thumb for filters is the steeper (the closer the ratio is to 1:1), the better.

The complement of the band-pass filter is the band-reject filter or band-stop (Fig. 6). Frequencies above and below a specified band are passed with little attenuation, while the frequencies within the band are heavily attenuated. Such a filter could be useful to an amateur living near a powerful shortwave broadcast station that operates between two of the

amateur bands, such as 40 and 20 meters. A band-pass filter would serve to keep the high signal level of the broadcast station from overloading the front end of the amateur's receiver, but it would not degrade the amateur's ability to copy weak signals on 20 and 40 meters. Fig. 7 depicts the response curve of a special type of band-reject filter called a *notch filter*. Notch filters provide a very high level of attenuation for a narrow band of frequencies. Notch filters can be constructed for audio frequencies and intermediate frequencies (usually under 500 kHz). These filters are useful for "notching" out unwanted signals in the passband of a receiver, such as a carrier just slightly off frequency.

When a filter is mismatched, several things may occur. Fig. 8 graphically depicts one of these possibilities. Within the passband of the filter, there may be

some variation in the amount of attenuation. You can expect to find variation on the order of 3 or 4 dB in some filters, depending on their design. This variation is called *ripple* (because of the ups and downs of the passband). Fig. 9 gives another example of what can happen if a filter is improperly designed or terminated. Here the ripple is not in the passband, but is outside the passband. Notice that in the example, at some frequency well removed from the passband, the rejection is only on the order of 25 dB. Depending on the application, ripple, in or out of the passband, may or may not be critical. How's that for leaving things wide open?

High-Q — Crystals Are a Filter's Best Friend

A quartz crystal acts as an extremely high-Q circuit. The equivalent electrical

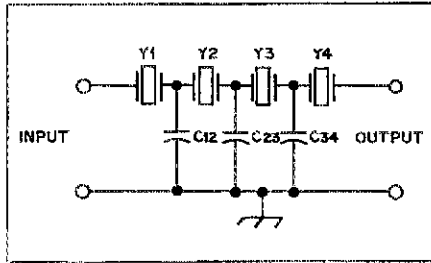


Fig. 15 — Details of a four-pole ladder filter.

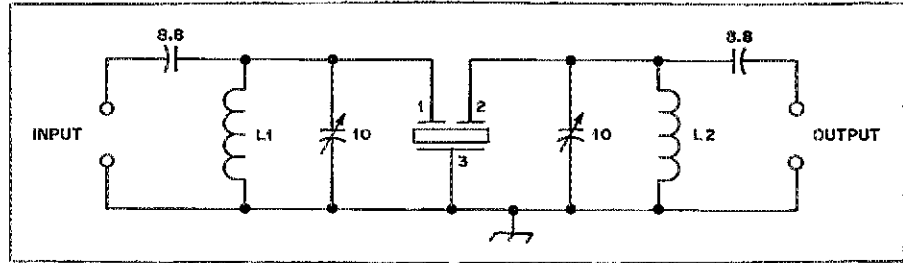


Fig. 16 — Typical circuit employing a monolithic crystal filter.

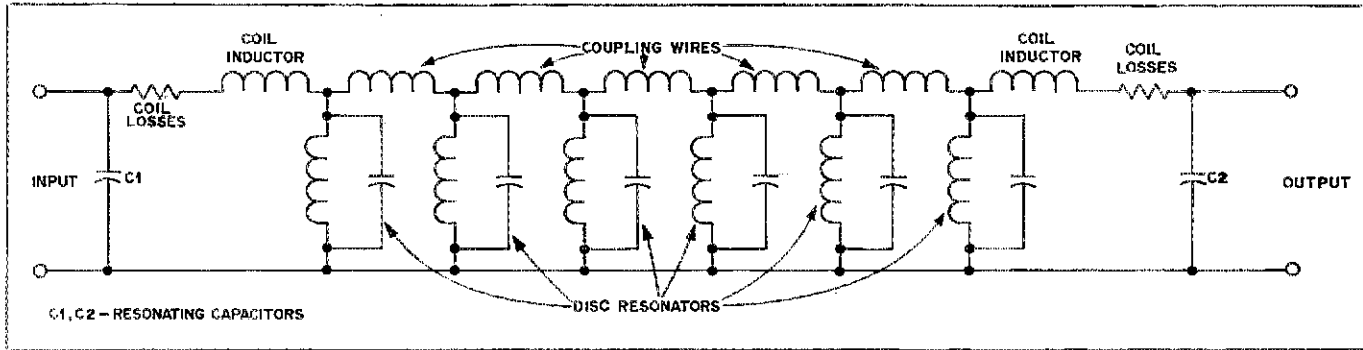


Fig. 17 — Analogous representation of a mechanical filter.

circuit is depicted in Fig. 10A. Fig. 10B shows a graph of the reactance vs. frequency for the crystal. Even though crystals can be used singly as filtering devices, the normal practice is to wire two or more together in various configurations to provide a desired response curve. Fig. 11 details a configuration known as the full-lattice filter (equivalent electrical circuits are shown instead of the crystals). Fig. 12 shows two full-lattice crystal filters cascaded to enhance the characteristics of the filter.

Theoretical selectivity curves for two- and three-section crystal filters are shown in Figs. 13 and 14. Fig. 13 assumes that there is no mismatch or interaction between sections. Fig. 14 provides data on what happens when there is interaction between the sections. Notice that the skirt selectivity has improved at the expense of introducing ripple into the passband. Filters, like most other things in life, often involve trade-offs. Another configuration of crystal filter, popular with European amateurs, is the ladder filter shown in Fig. 15. Fig. 16 shows a circuit employing a monolithic crystal filter. In this configuration a single piece of quartz is made to function as if it were two separate crystals. Crystal filters are high-Q devices that do a very good job of providing selectivity in rf circuits.

Another device that can provide a high degree of selectivity at frequencies up to 500 kHz is the mechanical filter. An electrical equivalent circuit of a typical mechanical filter is shown in Fig. 17. A mechanical device is designed so that it will vibrate at some very precise radio frequency.

Above certain frequencies it becomes

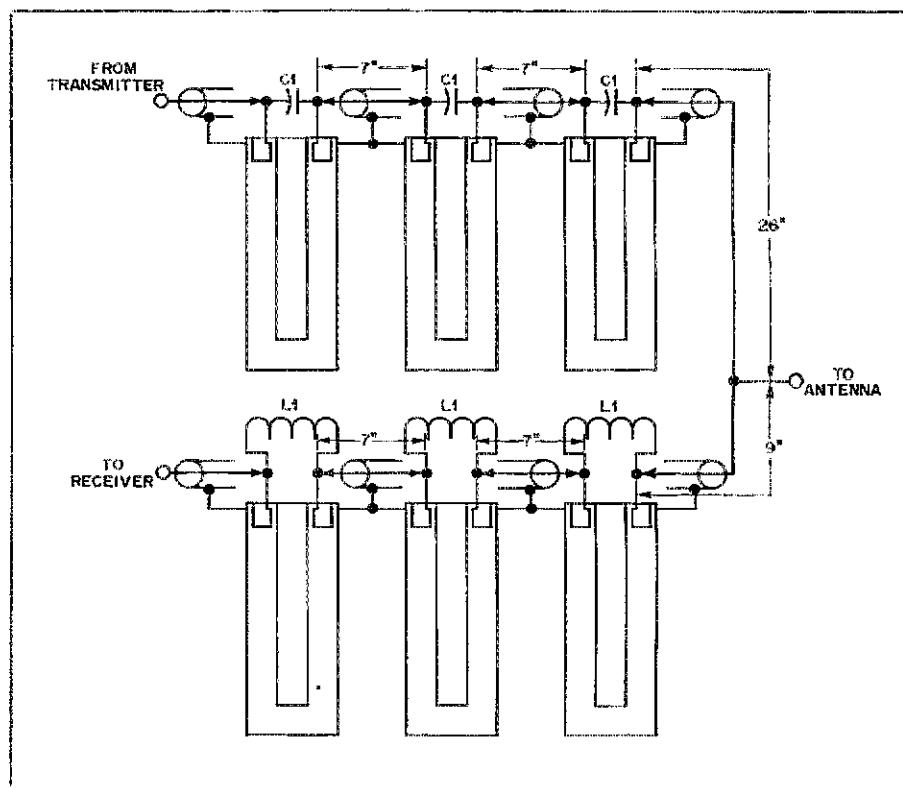


Fig. 18 — Diagram of a six-cavity duplexer.

very impractical to manufacture crystal filters; unfortunately, the need for selectivity does not decrease as the frequency goes up. Fig. 18 shows a duplexer for 2-meter operation — a highly selective filter that allows a repeater to operate both the transmitter and receiver simultaneously on the same antenna. Each leg of the duplexer is made up of three tuned cavities. Each tuned cavity

acts as a series-resonant circuit; however, the cavities in and of themselves would not provide the isolation needed between the transmitter and receiver (100 dB or more). When a cavity is shunted with either a capacitor or inductor, a null is formed on one side of the passband. When the cavity is shunted with a capacitor, the null falls below the passband; an inductor causes it to fall above

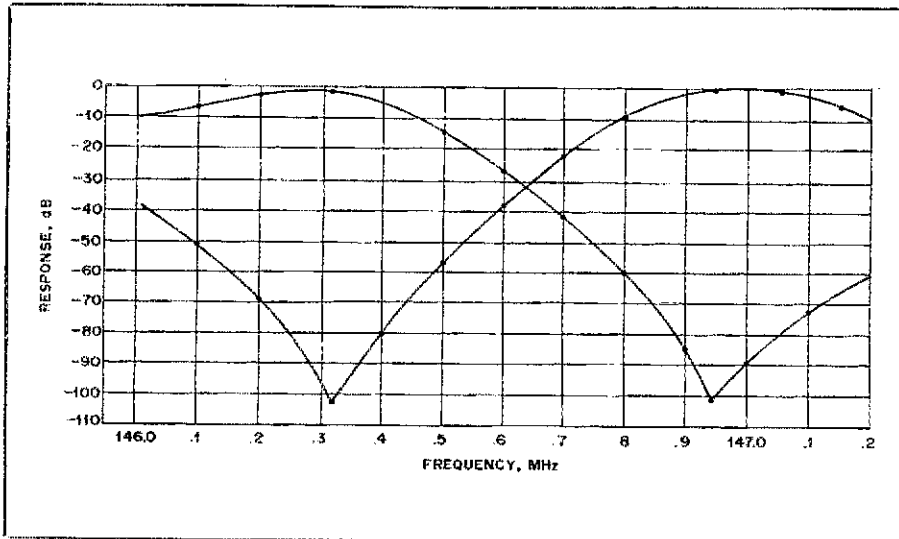


Fig. 19 — Frequency response of a six-cavity duplexer tuned for 146.34 MHz reception and 146.94 MHz transmission.

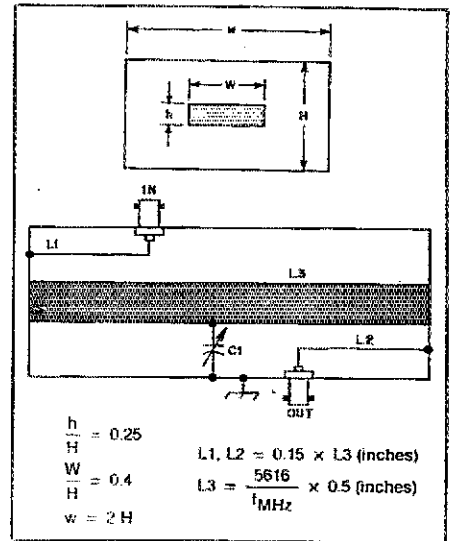


Fig. 21 — Configuration and design data for half-wavelength transmission-line filter.

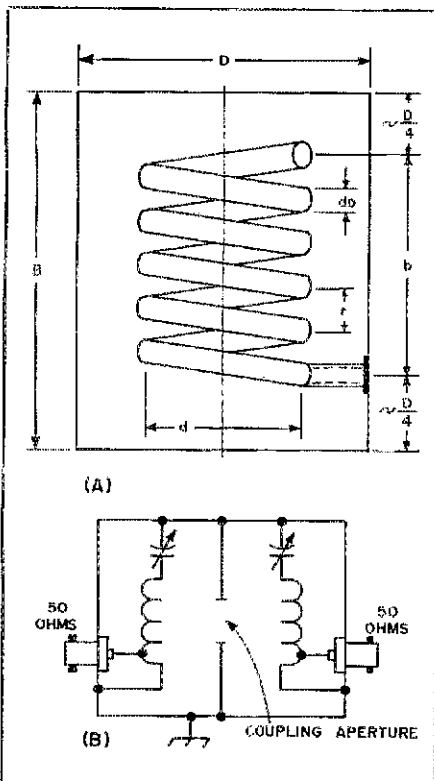


Fig. 20 — Details of helical-resonator design.

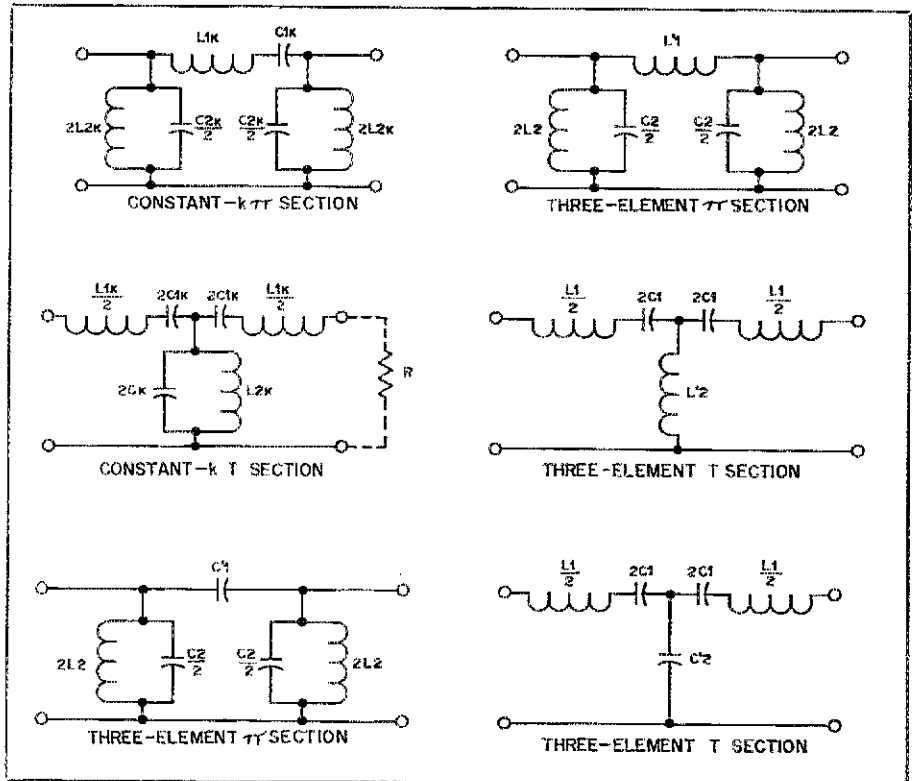


Fig. 22 — Several examples of band-pass filter configurations. Relative values of capacitance and inductance refer to formulas for calculating image-parameter design values.

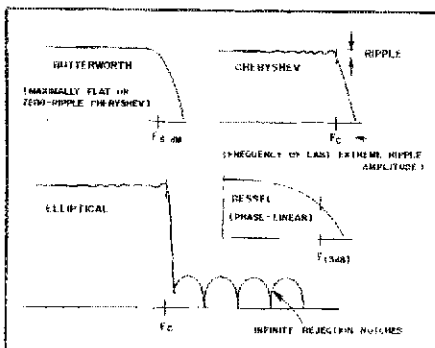


Fig. 23 — Band-pass response characteristics of "modern filters."

the passband. This pattern is shown in Fig. 19. These passbands combined with the nulls give us the isolation needed to allow the repeater to function without desense (receiver overloading from its own transmitter).

Another filter that is useful at vhf is the helical resonator. Fig. 20 provides a detailed view of a typical helical resonator. Many of the better high-band commercial fm transceivers have helical resonators in the front end. Helical resonators can be built for hf (of course, they are somewhat larger physically than their vhf cousins). Such filters are widely

used by groups on Field Day or some of the larger multi-operator contest stations. Another filter often used at vhf and uhf is the stripline filter. A circuit board is etched in such a way that the foil is either a resonant quarter- or half-wavelength transmission line at the desired frequency. Fig. 21 shows a typical half-wavelength stripline filter.

If the Curve Fits . . .

The main problem with filter design is that what is often required in terms of response is a rather complex curve when plotted. Before the widespread availability

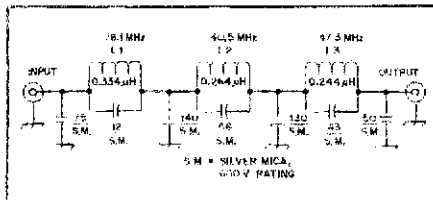


Fig. 24 — Low-pass filter suitable for use with an amateur transmitter. The coils are made from no. 14 enameled copper wire, and are formed on a 1/2-inch dia mandrel. L1 has 8 turns while L2 and L3 each have 6 turns. After the coils are formed, the capacitors are soldered across them, and the parallel branches are initially tuned to resonance by adjusting the turns spacing until a dip meter indicates resonance. The circuits are mounted and checked again. Finally, the shunt capacitors are soldered in. If silver-mica 600-volt capacitors are used, power capability will be 50 W at 28 MHz, 150 W at 21 MHz and 300 W below 14 MHz. All capacitances are in pF.

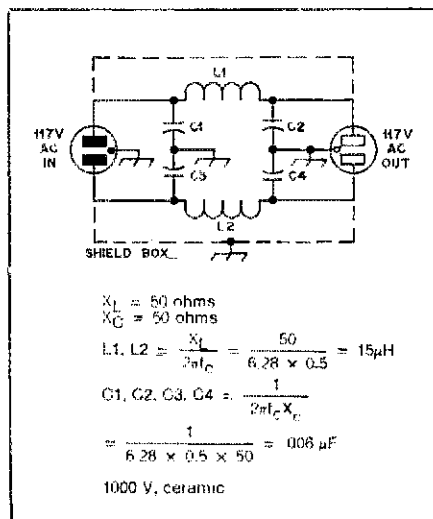


Fig. 25 — Brute-force line filter with cutoff at 500 kHz. The wire size used in the coils must be large enough in cross section to handle the current taken by the equipment with which the filter is used. One half of this filter is suitable for dc-lead filtering.

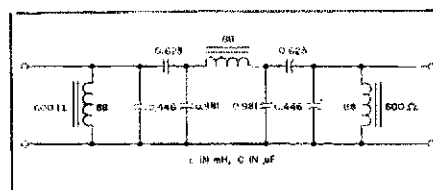


Fig. 26 — Diagram of passive filter using standard-value toroids with a response similar to original CRUD-O-Ject. All capacitances are in microfarads, and all capacitors should be of high-quality paper or polyester dielectric with 75 V or higher rating. See text for information on transforming input and output impedance to 4 or 8 Ω.

of high-speed computers and programmable calculators, approximations were used to calculate the value of components for a filter. The biggest fault of these designs (usually called image-parameter filters) is that they are not easily predictable out of the passband. Several different

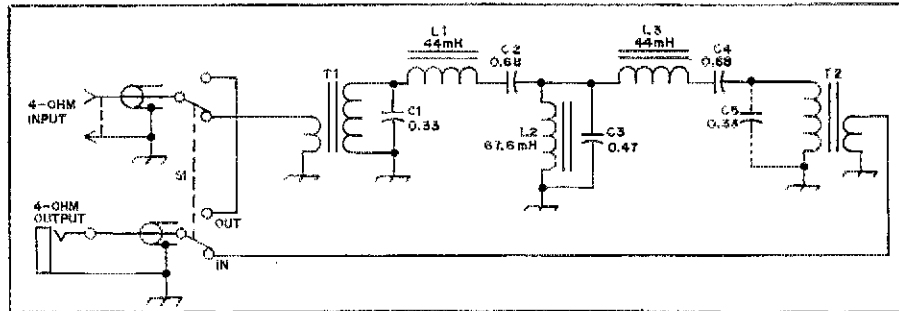


Fig. 27 — Circuit diagram of the SSB Crud-O-Ject. The capacitors should be of good quality (see Fig. 26). Capacitances are in μF.
 L1, L3 — 44-mH toroid inductor.
 L2 — Modified 88-mH toroid inductor. A total of 94 turns must be removed from the winding.
 S1 — Dpdt toggle.
 T1-T2 — 88-mH toroid inductor with 100 turns of no. 28 enam. wire wound over the original winding for the secondary.

configurations of band-pass filters are given in Fig. 22.

The mathematics for calculating precisely designed filters has been known since the 1920s, but the complex calculations are too involved to perform without the assistance of a computer or programmable calculator. The general name for these designs is "modern filters," something of a misnomer. They may also be called by the name of the polynomial expression that defines them, such as Butterworth, elliptical or Chebyshev (Fig. 23). It is not usually possible to merely glance at the number and location of components that make up a filter and deduce what type it is — that depends on the shape of its response curve.

Four for Your Shack

Here are four simple passive filters (active filters have recently been discussed thoroughly), that you may find useful 'round your shack. Each of these circuits has appeared in *QST* or one or more of ARRL's other publications. Fig. 24 shows the circuit of a low-pass filter that is suitable for use with an amateur transmitter.² It should be constructed in a well-shielded metal container. Compartments should be constructed for each section of the filter.

Fig. 25 gives the details for a brute-force filter that was designed by Doug DeMaw.³ A brute-force filter is a specialized low-pass filter that allows 60-Hz ac to flow unimpeded, but which filters out any rf component. Like the low-pass filter, this one should be constructed in a well-shielded metal box and should be placed in the ac line near the device that is being powered from it. This can either be an amateur transmitter (to keep rf from getting into the power line) or some device affected by rf from the power line (e.g., a stereo). The filter enclosure should be connected to a good earth ground.

Figs. 26 and 27 detail two passive audio filters that may be useful to an amateur whose receiver lacks sufficient selectivity. Both units are constructed from surplus

44- and 88-mH toroid inductors. Odd-value capacitors may be formed by using a capacitance meter to check paralleled capacitors until a proper combination is found. Fig. 26 is for a cw version of Hall and Myer's CRUD-O-Ject.^{4,5} Although not the original circuit as it appeared in *QST*, it produces an equivalent response with fewer components. Fig. 27 is the schematic diagram of an ssb version of the CRUD-O-Ject.⁶ Notice that the input/output impedance of the cw version is 600 Ω, while that of the ssb version is 4 Ω.

In the ssb version, a secondary winding has been added to the input and output inductors to transform the impedance of the filter to the 4-Ω value more compatible with today's equipment. A similar method may be used with the cw version; calculations indicate that 50 to 60 turns should provide a good match to the 4- or 8-Ω speaker and audio output stages commonly found in modern equipment. Additional construction details may be found by consulting the original articles listed in the notes.

What is a filter? If anyone writes to Hq. saying that it is a piece of white paper that turns brown in their coffee pot, I'll cry. (G5F—)

Notes

- ¹Bloom, "Active Filters," *QST*, July 1980, p. 17.
- ²Welsh, "An Effective Low-Pass Filter," *QST*, January 1966, p. 16. (Essential information is reprinted in *ARRL Electronics Data Book*, p. 65.)
- ³ARRL *Electronics Data Book*, p. 61.
- ⁴Hall and Myers, "The CRUD-O-Ject," *QST*, February 1972, p. 11.
- ⁵Hallock, "Band-Pass Filters in Abundance," Technical Correspondence, *QST*, May 1972, p. 57.
- ⁶Myers, "The SSB Crud-O-Ject," *QST*, May 1974, p. 23.

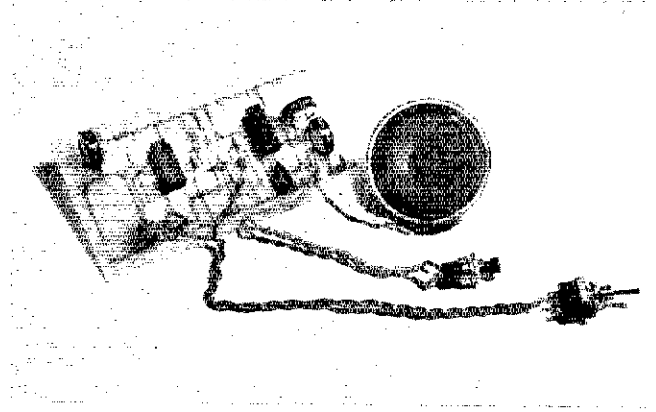
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- Fisk, "Helical-Resonator Design Techniques," *QST*, June 1976, p. 11.
- Wetherhold, "Modern Design Methods Applied to the Speech Filter," *QST*, November 1967, p. 51.
- "Low-Loss Passive Bandpass CW Filters," *QST*, January 1972, p. 56.
- "Low-Pass Filters for Amateur Radio Transmitters," *QST*, December 1979, p. 44.
- A Short Course in Radio Fundamentals*, ARRL, Chapters 7, 8, 9, 10, 12, 15 and 16.
- ARRL Electronics Data Book*, ARRL, Chapter 6.
- FM & Repeaters*, ARRL, Chapter 7.
- The Radio Amateur's Handbook*, ARRL (57th ed.), Chapter 2.
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- Solid State Design*, ARRL, Chapters 3 and 5.

A 10-Minute Timer That Just Won't Quit

Station identification warning timers come in many sizes and shapes, and most circuits require manual resetting. This simple-to-build timer automatically resets itself after giving a 10-minute warning.

By L. B. Cebik,* W4RNL



For under \$5, depending on the frills you add, you can build an automatic timer that just won't quit. If you need a versatile 10-minute timer, the circuit described below may fill the bill. Even if you do not need to be reminded to identify your station, the circuit combinations may give you some good ideas for other timing projects around the shack.

This automatic recycling timer will trigger both visual and audio warnings after 10 minutes of quiet: a set of lights and a tone pulse at half-second intervals for about 10 seconds. Then the timer begins a new 10-minute timing cycle. There are manual overrides so that you can prevent recycling and reset the timer at any time during the cycle.

IC — The Mainspring

Two common NE555 IC's make up the heart of the device. Each 556 contains two 555 timer circuits in a 14-pin DIP IC. This gives us four timers, each of which is set up to do a different job. Pin-out information is shown in Fig. 1. The 555 (or one section of a 556) has been around for quite a while, but few of us really make use of its versatility. Fig. 2 shows the two basic configurations: as a monostable timer and as an astable oscillator. Timing and frequency formulas accompany the figure.

In the monostable mode, a negative (ground) trigger pulse to pin 2 of the 555

(pins 6 and 8 of the 556) starts the timing cycle, whose period is determined by C1 and R1. When the cycle is complete, the high output on pin 3 (pins 5 and 9 of the 556) goes low and remains in that state until the trigger (pin 2) is again grounded.

Fig. 3 shows two timers in series. In Fig. 3A, the trigger of U1 is held high by the 10-kΩ resistor to the Vcc supply. When U1 has finished its on period, its output goes low, briefly discharging the 0.01-μF capacitor and providing a short negative pulse to the trigger of U2, which then starts its cycle. Fig. 3B adds one extra step to 3A. The output of U2 is connected to the trigger pin of U1 through a 0.01-μF capacitor. The trigger of U1 is held high until it receives the end-of-cycle pulse from U2. Now the two timers cycle each other automatically.

Any number of timers can be sequenced. W4EEE has a blinking LED name tag made from four timers. Three of them are set to about a third of a second and light LEDs. The fourth is set to about one second and has no LED. The result is a visual display of the suffix of W4EEE's call, all in the space of two chips.

In Fig. 3A, notice that the reset (pin 4) of each timer is held high by connecting it to the Vcc supply. In Fig. 3B, pin 4 of both chips is held high through a 10-kΩ resistor. When the reset pin is momentarily grounded through the push-button switch, both timers are brought back to the beginning of their cycles. This measure is sometimes necessary with long timing cycles when power is first applied, because both timers may begin their cycles together rather than sequentially. By connecting the reset switch to the trigger of U1 also, we begin the sequence of timing. (If the timing cycle of U1 is short, place a 0.01-μF capacitor between the switch and the junction of pin 2 and the 10-kΩ resistor, Rt. For timing periods over about one second, the capacitor is not needed.)

In the astable mode, the 555 timer produces positive and negative pulses timed by C1, R1, and R2. One pulser can control another by connecting the output of the first to pin 4 (pins 4 and 10 of the 556) of the second. Only when the first has a high output will the second timer operate.

Fig. 4 shows two timers, the first set for long pulses, the second for audio frequencies.

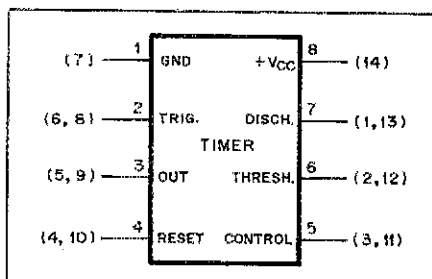


Fig. 1 — Pin-out configuration of the 555 and 556 timers. Pin numbers near the rectangle are those for the 555. Pin numbers inside the parentheses are those for the A and B sections of the 556, respectively.

we will hear a series of "beeps," that is, tones whose duration is controlled by the period of the first timer. We may also pulse lights or any other warning device. Fig. 5 shows a variation. When U1 has a high output, U2 oscillates at one tone. When the output of U1 is low, U2 shuts off, but U3 comes on because its ground (pin 1) is made low. By carefully selecting frequencies for U2 and U3, we can achieve a pleasant warbling effect.

Time After Time

We are now ready to combine four timer circuits into one station identifica-

tion timer. Fig. 6 shows the circuit and the timing cycles. U1A, a monostable timer, provides the 10-minute cycle. The green LED tells us that all is well. Since 555/556 timers are dependent on capacitor quality for accurate timing, you may need to try several different electrolytics at C1 to obtain 10 minutes near the center of the range of R1. Note that S1, an spst miniature toggle switch, permits us to defeat the automatic reset pulses from U1B. In the manual mode or when power is first turned on, the timer can be triggered or reset by S2, a push-button momentary switch.

U1B, a second monostable timer, has a period of about 10 seconds. If R2 is made variable, you can alter this period to suit your taste. The output of U1B goes in three directions. First, it lights an amber LED to tell us this timer is on. Second, it returns through a 0.01- μ F capacitor to the trigger of U1A for automatic reset. Third, it controls U2A, turning it on.

U2A is an astable oscillator with a one-second cycle (about 1/2-second on, 1/2-second off). Varying R3 will change the pulse durations; it operates only when U1B has a high output. U2A is the basic warning-control pulser. The output from

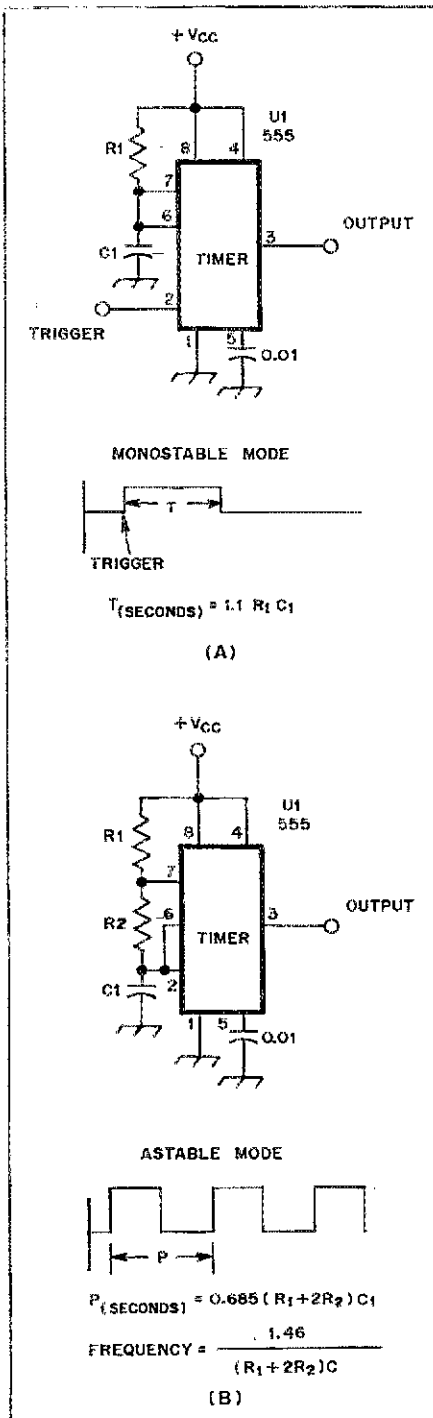


Fig. 2 — Basic circuits for the 555 timer.

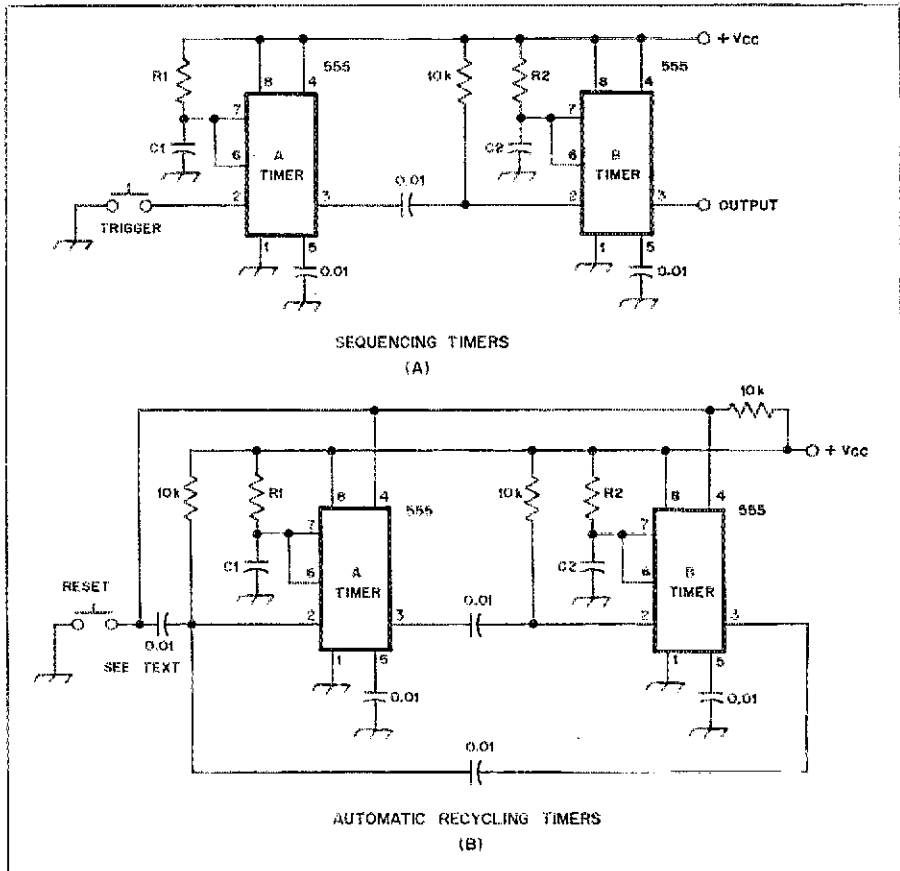


Fig. 3 — Methods for sequencing timers. The circuit at A is simply one timer being used to control a second. At B, the additional feature of automatic recycling is added by tying the output of U2 back to the trigger of U1.

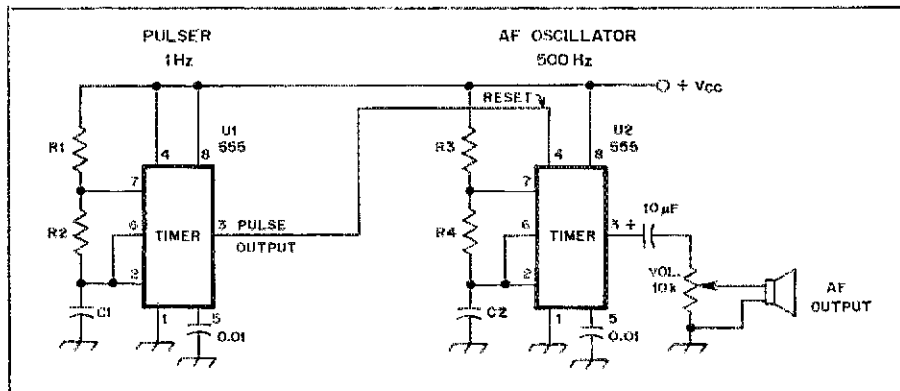


Fig. 4 — Two timers are used here to produce a pulsed audio oscillator.

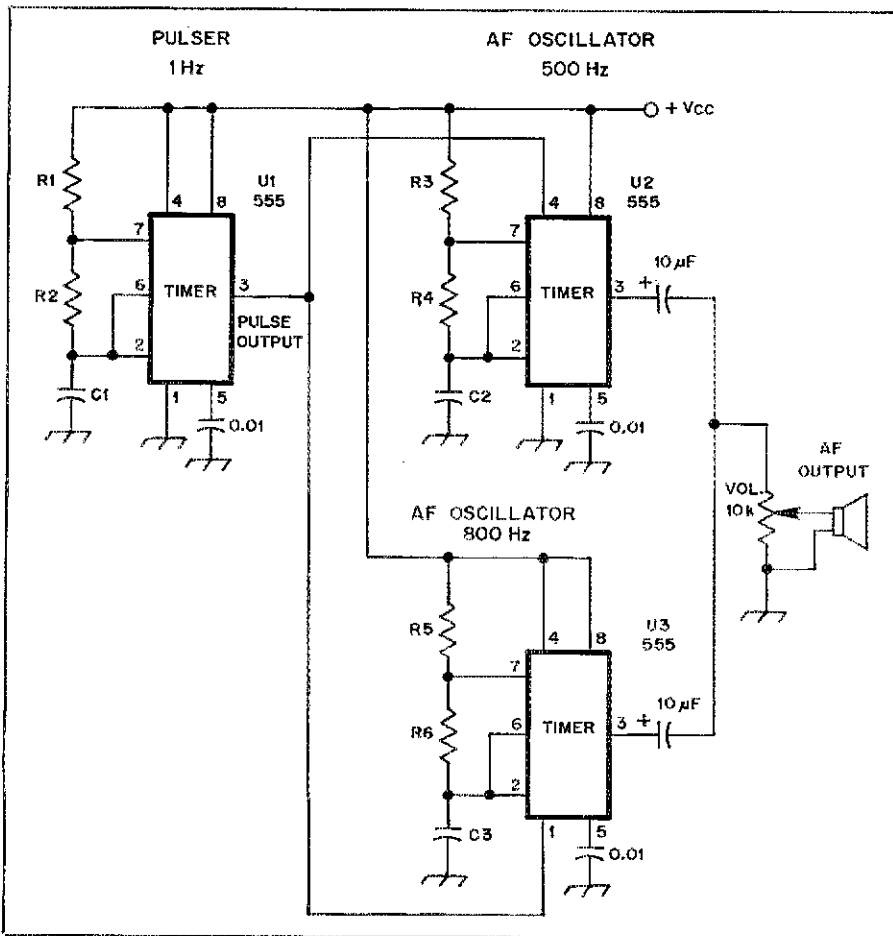


Fig. 5 — The pulsing oscillator of Fig. 4 can be modified to produce a warbling sound by adding another timer as shown here.

pin 5 controls an audio oscillator and an LED. Since the 555/556 timers have a fanout of 10 (can drive 10 standard loads) we can control many other devices. Fig. 7 shows some possibilities. In Fig. 7A, a 7404 inverter chip controls six LEDs which can be arranged in a pleasing geometric pattern. Fig. 7B shows a transistor lamp or relay driver. Fig. 7C shows the timer directly controlling a 6-volt, 400-ohm relay. The devices in Fig. 7 can also be controlled by U1B so they stay on for the entire 10-second warning period. This would permit a tape loop identification or some other continuously operating warning. The variations are nearly unlimited.

U2B (Fig. 6) is an audio-frequency oscillator with volume and tone controls. A two-inch speaker works well for warning tones, since fidelity is not a requisite. With the values shown, the tone can be varied from about 75 to 750 Hz. The volume is enough to warn even a sleeping operator!

Since the 555/556 series of timers operate from roughly 5 to 15 volts, a transistor-radio battery replacement power supply (with the components molded into the plug housing) works very well. If the timers drive ICs from the TTL series, then the supply needs to be 5 volts. A 6-volt radio supply, with a 5-volt, 1-watt Zener (as shown in Fig. 6) works best. If no lights or other heavy current loads are used with the timer, you can use batteries.

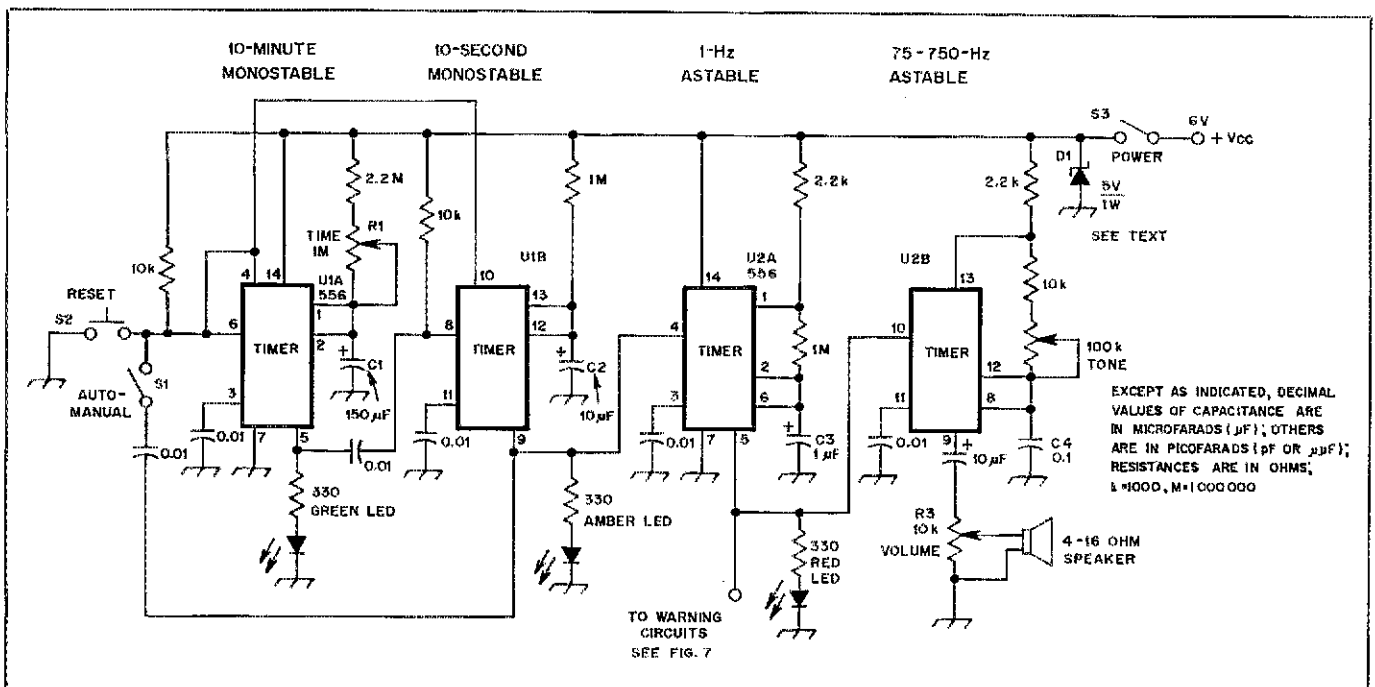


Fig. 6 — Schematic diagram of 10-minute station-identification warning timer. Fixed-value capacitors are disc ceramic unless otherwise noted. Resistors are 1/4- or 1/2-watt composition types. Parts numbers inside parentheses are Radio Shack parts suitable for use in this circuit. C1 — 150- μ F, 16-V electrolytic. Two or more capacitors paralleled to produce proper timing period. (See text.) C2 — 10- μ F, 16-V electrolytic. C3 — 1- μ F, 16-V, electrolytic. The value of this capacitor may be varied to alter the pulsing rate of the audio oscillator. A smaller value will make the pulsing faster. R3 — 10-k Ω , thumbwheel pot (271-218). S1, S3 — Spst toggle switch (275-612). S2 — Spst, normally open, momentary contact (275-1547). U1, U2 — 556, dual section timer (276-1728).

Product Review

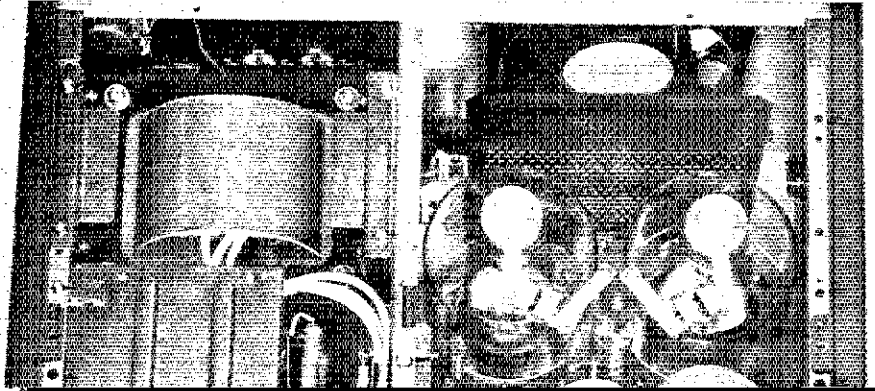
Conducted By Paul K. Pagel,* N1FB

Kenwood TL-922A Linear Amplifier

In compliance with the FCC 10-meter amplifier ban, Kenwood has introduced the TL-922A, a 1-kW cw, 2-kW PEP ssb, linear amplifier. The power supply is included in the 68 lb (31 kg) heavyweight package, and can be wired for a 240- or 120-volt ac input. Naturally, unless a very "stiff" 120-V service is available (that can supply 28 A peak!), connecting the '922A to 240 volts is recommended. The amplifier uses a pair of Fimac 3-500Z zero-bias triodes in the ubiquitous parallel, grounded-grid configuration. Band-switched pi-network input circuits are employed.

Cooling

An efficient system for cooling much of the



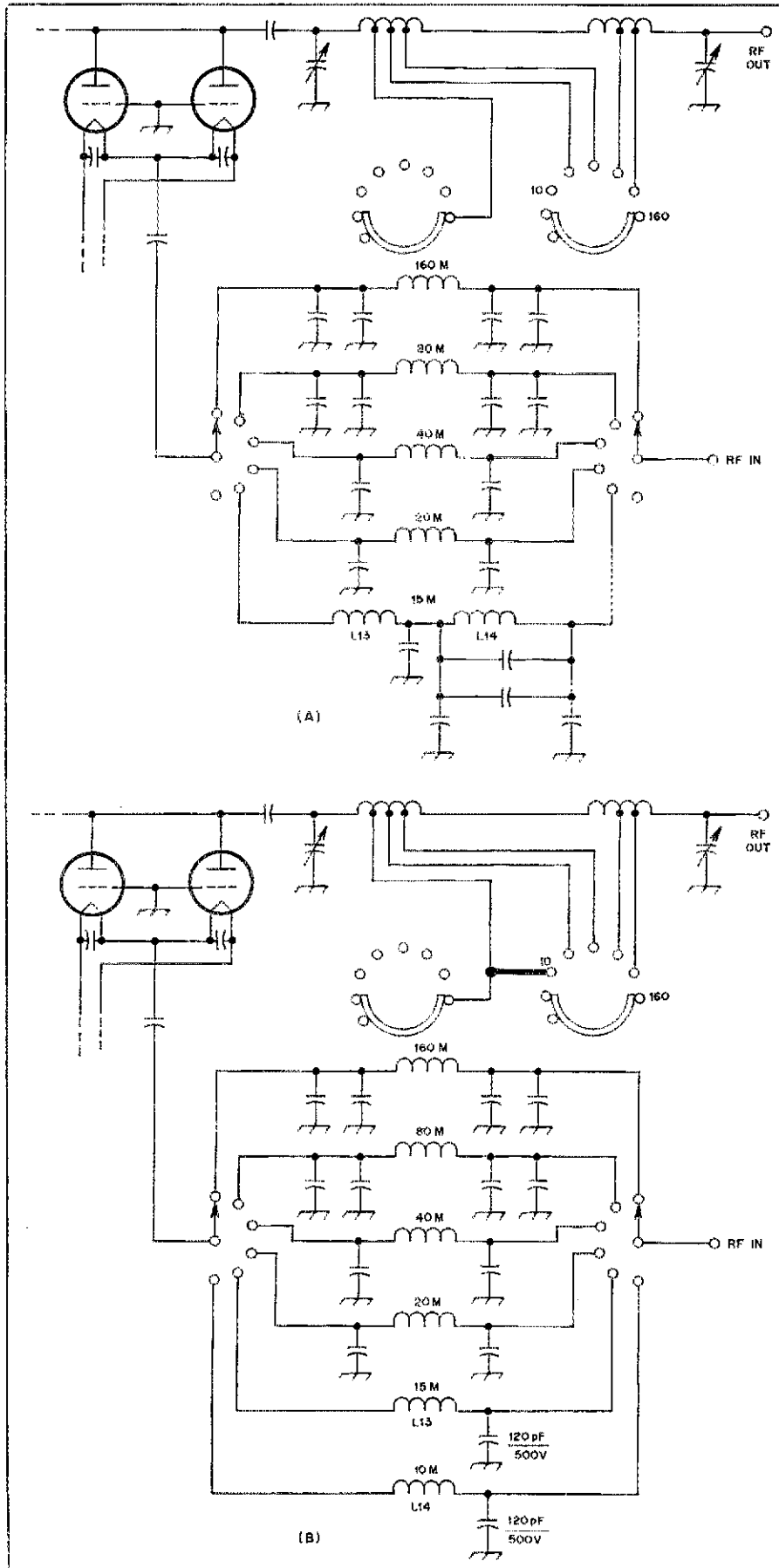


Fig. 2 — A simplified partial schematic diagram of the TL-922 amplifier band-switching arrangements. The original circuit is shown in A. The changes, to convert the '922A to a six-band amplifier, shown in B, are the addition of a jumper wire (the heavy line) in the output pi network, and modifications to the 15- and 10-meter input circuits. Part numbers shown are those assigned by Kenwood.

Kenwood TL-922A Linear Amplifier

Manufacturer's Claimed Specifications

Size (HWD): 7-1/2 x 15-3/8 x 16 inches (190 x 390 x 407 mm).

Power requirements: 120 V, 28 A; 240 V, 14 A; 50/60 Hz.

Input impedance: 50 ohms unbalanced at better than 1.5:1 SWR.*

Driving power required: 80 W nominal, 120 W maximum.*

Duty cycle: Ssb, continuous for 30 minutes. Cw and RTTY, key-down continuous for 10 minutes.

Frequency range: The 1.8- through 21-MHz amateur bands.

Price class: \$1200.

Manufacturer: Trio-Kenwood Communications Inc., 1111 West Walnut, Compton, CA 90220.

*See Table 1 for results of ARRL lab measurements.



Fig. 3 — This photograph shows the spectral output of the TL-922A operating at a 1-kW dc input on 80 meters, which presented the worst case for spectral purity. The horizontal scale is 2 MHz per division and the vertical is 10 dB per division. The second harmonic is down about 43 dB, meeting FCC requirements.

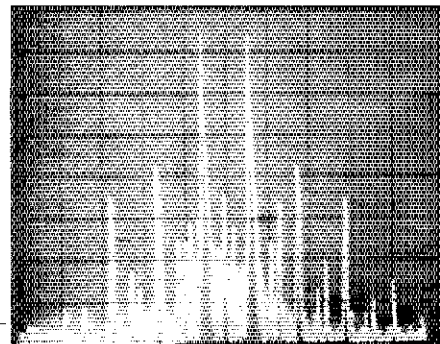


Fig. 4 — A two-tone IMD photograph of the TL-922A operating on 20 meters. The horizontal scale is 10 kHz per division and the vertical scale is 10 dB per division. Third-order products are down 37 dB; fifth-order products are down 45 dB from the PEP level.

exceeding the legal limit, or overdriving the amplifier. Unfortunately, the system gain varied slightly from band to band, so a perfect setting on one hand was never optimum on another.

Speaking of loose ends, while the '922A certainly is excellent evidence that "they can still build 'em like they used to," they don't necessarily solder 'em like they used to. When the amplifier was opened for installation of the

Table 1

Results of TL-922A Tests Performed in the ARRL Laboratory

Band	Power Input (watts)	Power Output (watts)	Efficiency (%)	Drive Power Required (watts)	Input SWR
160	1000	680	68	84	1.49:1
160	2000	1300	65	100+	
80	1000	750	75	110	1.63:1
80	2000	1490	75	100+	
40	1000	780	78	86	1.20:1
40	2000	1550	78	100+	
20	1000	720	72	73	1.58:1
20	2000	1480	74	100+	
15	1000	630	63	66	1.23:1
15	2000	1540	77	100+	
10	1000	680	68	73	1.37:1
10	2000	1500	75	100+	

power tubes (they come packed in a separate carton), an unsoldered wire on the "meter unit" circuit board was noticed. The wire was neatly wrapped around its terminal, but was completely untouched by solder!

One evening while using the amplifier on 80-meter cw, an rf arc occurred somewhere in the final-amplifier compartment. It persisted for a few seconds, and then burned itself out. After removing the covers and poking around a bit, I discovered the cause of the undesired electrical activity: A metal strap connected to a pi-network coil tap had arced through its insulation to the chassis. Of course, I repositioned the strap to prevent further problems, but in so doing, I disturbed the coaxial cable which connects the pi-network output to the T-R relay. The center conductor had apparently been only tacked to the pi-network output, because it broke loose with only the slightest prodding. I'm glad I discovered this before any serious damage was done!

Despite the irregularities just mentioned, my overall impression of this amplifier is quite favorable. Its operation was smooth, predictable and stable. This, coupled with the relatively inexpensive cost of replacement tubes,

makes it a very desirable station accessory. — *John C. Pelham, W1JA*

HEATH HM-2141 VHF WATTMETER

□ This station accessory measures rf power in the frequency range of 50 to 175 MHz, which makes it useful on the 6- and 2-meter amateur bands. In normal operation, the left-hand meter indicates reflected power in two selectable ranges: 0 to 10 and 0 to 100 watts. The right-hand meter reads forward power in the ranges of 0 to 30 and 0 to 300 watts. Owners of efficient kilowatt amplifiers will no doubt be disappointed that a higher power range isn't included. Another mode of operation may be selected in which the '2141 will calculate the SWR: The right-hand meter indicates forward power and the left-hand meter reads reflected power on a scale calibrated from 1:1 to 3:1.

This versatile instrument can also measure peak-envelope power on ssb or a-m (or cw, for that matter). A peak-detecting and holding circuit using a quad op-amp IC is employed. This circuit is powered by a 9-volt transistor-radio battery. The battery is used only when the PEP-AVG switch is in the PEP position, so one must

remember to return the switch to the AVG position when the wattmeter is not in use. If the SWR sensitivity control is rotated fully counterclockwise to an unmarked calibrate position, and the PEP-AVG switch is in the PEP position, the battery voltage may be checked on the right-hand meter. Alternatively, an ac adapter to take the place of the battery may be purchased from Heath.

Building the Kit

Following the superbly written Heathkit instructions, I completed the assembly of this kit in exactly two hours, including time to test each resistor, capacitor and diode with an ohmmeter, and calibrate the PEP circuits. (Testing components is standard procedure whenever I build a kit — defective parts are *much* easier to spot when checked apart from the rest of the circuit!) All Heathkits I had built previously used a phenolic material for all the circuit boards. I was impressed by the neat glass-epoxy circuit board used in this kit; solder resist applied to the foil side of the board made it easy to conserve solder while obtaining a good-looking result.

The remote sensor is assembled, calibrated and sealed at the factory. The instructions contain warnings that breaking the seal can void the warranty.

Using and Testing the Meter

When assembly was finished, I had one leftover nut, one lockwasher, a small amount of solder and a completed wattmeter for my efforts. The unit worked perfectly the first time it was used, and continued to function without a snag. I observed only one minor operating inconvenience: I feel that Heath should have used toggle or slide switches instead of the four push-button switches located under the meters. When the front panel is viewed from directly in front (as it should be viewed to avoid parallax error when reading the meters) it is very difficult to tell if the buttons are in or out in my dimly lighted shack. Toggle or slide switches would have obviated this difficulty.

The unit was tested in the ARRL laboratory with the aid of a Bird wattmeter and a 50-ohm dummy load. A power level of 10.0 watts (according to the Bird meter) was used on 50 and 144 MHz. The HM-2141 indicated 9.9 watts on 6 meters and 9.1 watts on 2 meters. Heath's specification of ±7.5% of the full-scale reading on the 30-, 100- and 300-watt scales translates to ±2.25 watts on the 30-watt scale that was used. The maximum 0.9-watt error on 2 meters is well within this specification. The dimensions of the meter unit (HWD) are: 4-1/8 × 7-1/2 × 6-3/8 inches (105 × 191 × 162 mm). The price class of the HM-2141 is \$75. It is available from Heath Company, Benton Harbor, MI 49022 or from Heathkit retail stores. — *John C. Pelham, W1JA*

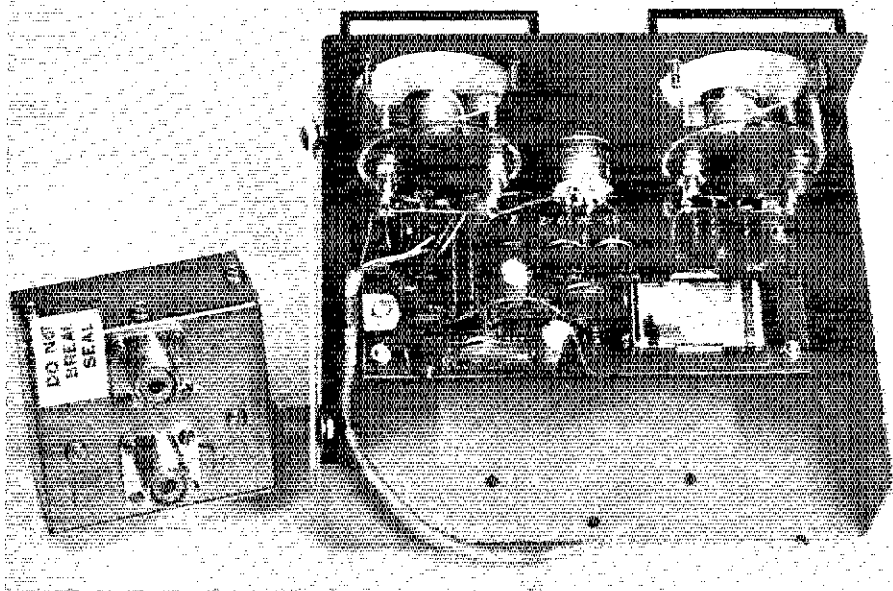


Fig. 5 — The Heath HM-2141 wattmeter is shown here (with top cover removed) with its remote sensor. The sensor can be attached inside the rear of the case, and the wattmeter used as a single, integral unit.

**COMMUNICATIONS SPECIALISTS
TE-64 TONE ENCODER**

□ You mention PL¹ to most hams who are active on fm and the reaction is usually negative,

¹PL stands for Private Line; both terms are registered trade marks of Motorola. General Electric refers to a similar system as Channel Guard. The generic name is Continuous Tone Coded Squelch System, which is cumbersome, even in its abbreviated form, CTCSS. Since PL is used as the generic term in popular amateur parlance, we have chosen to use it here.

Communications Specialists TE-64 Tone Encoder

Manufacturer's Claimed Specifications

Frequency accuracy (subaudible) — ± 0.1 Hz maximum, -40 to $+85^{\circ}$ C.
Frequency stability (audible) — ± 1 Hz maximum, -40 to $+85^{\circ}$ C.
Output level — 5-V pk-pk, adjustable, flat to within 1.5 dB over range selected.
Wave shape — Sine wave.
Power requirement — 8 mA at 6- to 30-V dc (may be operated by adding internal 9-V transistor battery.)
Reverse polarity protection built in.
Off position for no tone output
Size of case without mounting bracket — $5\text{-}1/4 \times 3\text{-}1/3 \times 1\text{-}2/3$ inch (133 \times 85 \times 43 mm).
Weight — 8 oz (0.2 kg).
Color — Black.
Price Class — \$80.

Measured in ARRL Lab

± 0.1 Hz at room temperature.
 ± 1 Hz at room temperature.
5.2-V pk-pk, adjustable, flat to within 1 dB over range selected.
Sine wave.

if not down-right hostile. A long time ago, back in the dawning ages of amateur fm operation, frequency space was not at a premium, even in southern California. A few groups picked up on PL-type operation at the time with the expressed or implied attitude of "if you ain't one of us superior, super-select, ultra-cool, noble snobs, get your crummy rig off OUR frequency and don't ever darken OUR repeater with your presence again." Nice guys, huh? These gentlemen soon received the contempt that they had courted and earned with their supercilious behavior. Unfortunately, in the process PL took it on the chin along with these clods. Hence, the general disdain for PL in the amateur circles.

This column is devoted to product review and not ancient history or contemporary social theory of the air waves, so what gives, you say. To appreciate the beauty of the Communications Specialists TE-64 Tone Encoder, you must look beyond how things *are* to how they *might be*. It is my belief that amateur fm-ers are now in a position where they are "cutting off their noses to spite their faces." PL may offer some cheap, practical solutions to problems resulting from the crowded spectrum — particularly 2-meter fm and 10-meter fm.

A PL tone is any one of the 32 standard tones ranging from 67.0 to 203.5 Hz. This group is generally referred to as the subaudible group — subaudible because the tones are set at a very low deviation (usually around 500 Hz in a 5 kHz system) and because the corresponding receiver generally has a high-pass filter installed in the audio chain to attenuate these low frequencies. The tone is activated when the microphone button is pressed and stays on during the entire transmission.

In a PL system, the receiver is equipped with a decoder that is set to recognize the presence or lack of the PL tone. The PL decoder controls a switch that is paralleled with the standard squelch switch. Typically, in a commercial installation, the user has the option of choosing either standard or PL squelch. However, it is simple to parallel them such that either a PL signal or a non-PL signal will open the receiver. Art Reis, K9XI, described a system using this concept whereby the receiver required a non-PL signal to have 20 dB of quieting to open the receiver, while a PL signal would open it at less than 0.15 microvolt.² Objectively viewed, the

old anti-PL argument that PL keeps the transients out doesn't hold up. It just keeps the unwanted weak signals out.

The other valid argument against PL was that one had to install an encoder and purchase a "reed" or similar device for each PL tone to be used. To change from one PL tone to another was time-consuming and expensive. Now, through the same magic that brings you 800 channels in the palm of your hand, there is a device that inexpensively provides you with your choice of any of the standard tones at the turn of a switch. Punch another button and you have the standard "tone-burst" or audible tones plus the tones making up the "touch-tone" system. Again, objectively viewed, the second anti-PL argument does not stand up.

Small Package, Smaller Contents

Upon first seeing the outside of the TE-64, I was struck by the complexity of the front panel. The selector knob has 32 lines extending out to 32 sets of dual tone markings — one each for subaudible and audible tones. There is also a push switch that allows the user to

choose between the audible and the subaudible groups. Surely, such a small package with so much on the front panel must be jammed full of circuitry inside.

After loosening the two thumbwheel retaining screws, I removed the top cover and was shocked! This small package could have been made a lot smaller! There are three 8-pin ICs (dual op amps), one 18-pin IC (a Communications Specialists' proprietary chip that does all the fancy work), a 1-MHz crystal and a handful of resistors and capacitors. The two switches are the largest components by far. I do not know of any fm radio (including portables) that does not have enough room in it for the electronics of this device to fit into.

As in most other areas of the U.S., none of the 2-meter repeaters in the Hartford area are equipped for PL operation. I did connect the TE-64 to a 10-meter fm rig and used it to access a couple of 10-meter repeaters. Although the instructions for installation are not overly detailed, anyone familiar with the workings of an fm transmitter and having the schematic diagram for the transmitter in question should have no trouble in satisfactorily attaching the TE-64 to his transmitter. If tone-burst operation (audible) is desired, the user should find it even easier to connect the TE-64 to his transmitter.

In addition to limited on-the-air tests with the unit, we ran it through its paces in the lab. An oscilloscope connected to the output showed that the TE-64 produces sine waves for both the subaudible and the audible groups. There are separate outputs for each group and separate level controls which are completely independent of each other. We did not notice distortion of the waveform at any setting of either level control. The audible group is set up as a "burst" when power is first applied. By merely clipping one jumper, the audible group becomes continuous instead of "burst." Obviously, one could replace the jumper with an spst switch. The "burst" is factory set at about one-half second, but this can be altered by changing one resistor.

I used an Optoelectronics 8010-1.3 frequency counter to check for accuracy. In all cases, the TE-64 was within 0.1 Hz of the specified frequency. It has been my experience with commercial decoders that most will "recognize" a tone that is within 1.5 Hz of the specified frequency. Unfortunately, the ARRL lab does not have facilities for checking equipment at temperature extremes, so no data is available on the amount of drift, if any, as temperature varies. The TE-64 was left running for over an hour with no discernable drift. It seems reasonable to conclude that the accuracy is more than adequate for general amateur use.

Do you find yourself turning off your 2-meter rig because the repeater is constantly keying up on weak signals — signals that are not intended for your repeater anyway? Are you annoyed by the noise and static that comes crashing through your repeater during marginal band openings? Dual squelch systems combined with low-cost, high-technology devices such as the TE-64 may be the answer you are looking for. We can maintain an open, friendly attitude to transients (in the best spirit of Amateur Radio) and keep 2-meter fm a noise-free, static-free, pleasant-to-listen-to, local communications medium. Of course some hams are so rigid in their thinking that they seem to take a perverse delight in "cutting off their noses to spite their faces." — Pete O'Dell, AEGQ

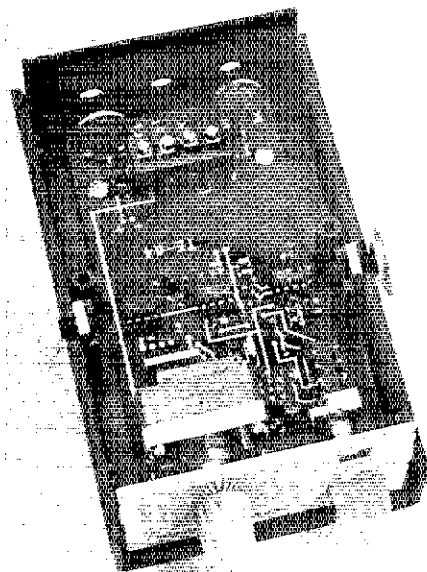


Fig. 6 — The interior view of the TE-64 reveals a rather spacious layout. External connections are made by means of the terminal board located at the rear of the unit.

Reis, "Should Repeaters Use Subaudible Tones?" *73 Magazine*, July 1978, p. 102.

Drill or punch a 5/8-inch hole in the top of the 7/8-inch sweat cap. Slide the cap down over the connector and onto the dielectric. Carefully, tighten the retaining nut. Fold the metal "fingers" down over the bottom of the sweat cap and solder. A hose clamp can be used to hold fingers in place while soldering. — *Pete O'Dell, AE8Q*

VAESU CPU-2500R MANUAL-SCAN MODIFICATION

(1) The manual-scan mode of the Yaesu CPU-2500R scans continuously, ignoring any occupied channels. The installation of either of the following two modifications greatly enhances the utility and enjoyment of the CPU-2500R. The modifications provide for stopping the scan mode on channels and resuming the scan. The two diagrams show simple and proven methods to control the logic to either (1) scan continuously for an occupied or busy channel and lock on that channel, then resume scanning when the status of that channel is changed, or (2) scan continuously for an occupied or busy channel and lock on that channel for one to 10 seconds, then resume scanning.

Both schemes operate by automatically activating the scan logic in the manual mode. This causes a low on the down-scan line. The low is applied by hard-wiring it into the manual position of the AUTO/MAN switch as shown in drawing A. The down switch is used in both of these methods as it is easily accessible.

In diagram B, a 555 IC timer serves as an independent timer to periodically apply a low to the down-scan line. This is the same as pushing the down switch periodically. The period is determined by the setting of a potentiometer. By resetting the AUTO/MAN switch to the AUTO position, the logic will operate in the normal fashion and hold on the frequency desired according to the position of the SCAN-STOP-MODE switch for either busy or clear channels.

The 555 and supporting circuitry can be installed on a small perf board. This may be easily located in the area reserved for the optional tone-squelch unit on the receiver pc board. — *Robert Melke, WB7TSG, Tucson, Arizona*

MORE THOUGHTS ON THE ACCU-KEYER

(2) If you've built WASKPG's version of the Accu-Kekeyer,¹ you may be interested in similar minimum-current arrangements for K8AW's trailing dot eliminator² and N7RT's Accu-Weight control.³ Reversing N7RT's resistance-shunting diode, in a slightly altered "weight" circuit, discharges the small capacitor quickly. The result is that the charging rate (pulse-stretching delay) now becomes directly proportional to the potentiometer setting. The values given are widely different from the original, but work well and take up less room. You could use a 500-kΩ potentiometer and a 0.1-μF capacitor, or other similar values. Subminiature components are fine. Supply voltages in both circuits may be varied within the usual CMOS limits. Total keyer current increases with voltage, as would be expected. — *Albert H. Jackson, VE3QQ, Penetanguishene, Ontario*

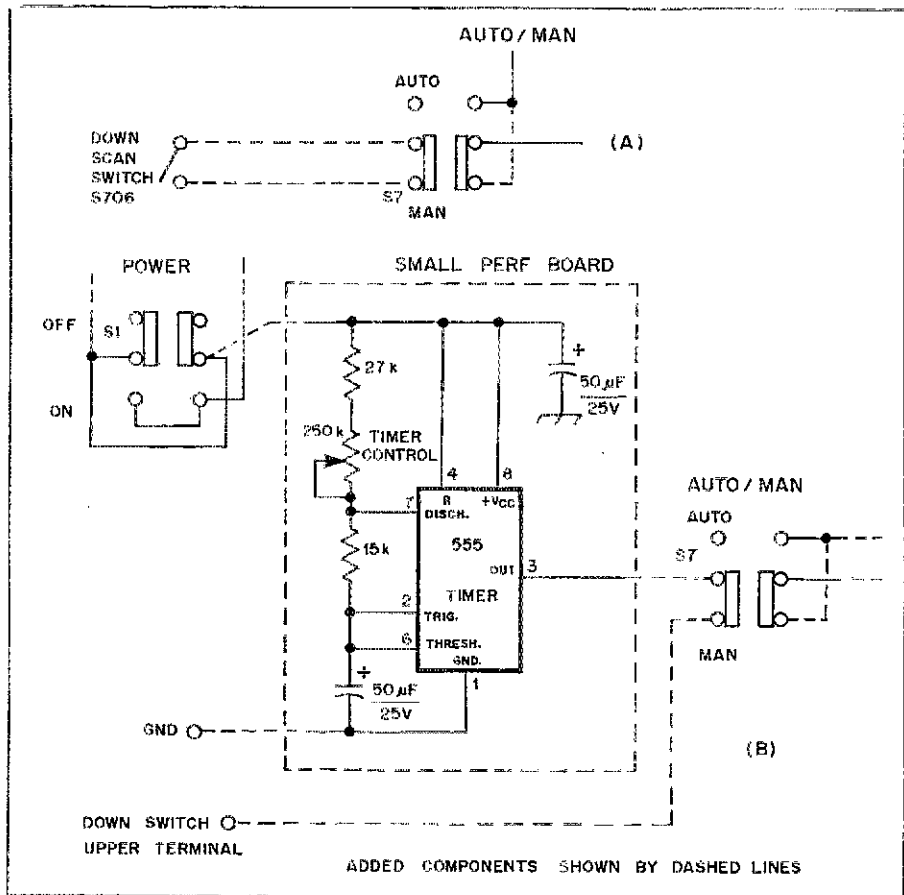


Fig. 4 — A scanning modification for the Yaesu CPU-2500R. Diagram A illustrates a modification for stopping on an active channel. The method shown in drawing B permits the scanning to resume after a selected period. These ideas are furnished by Robert Melke, WB7TSG. Resistance values are in ohms.

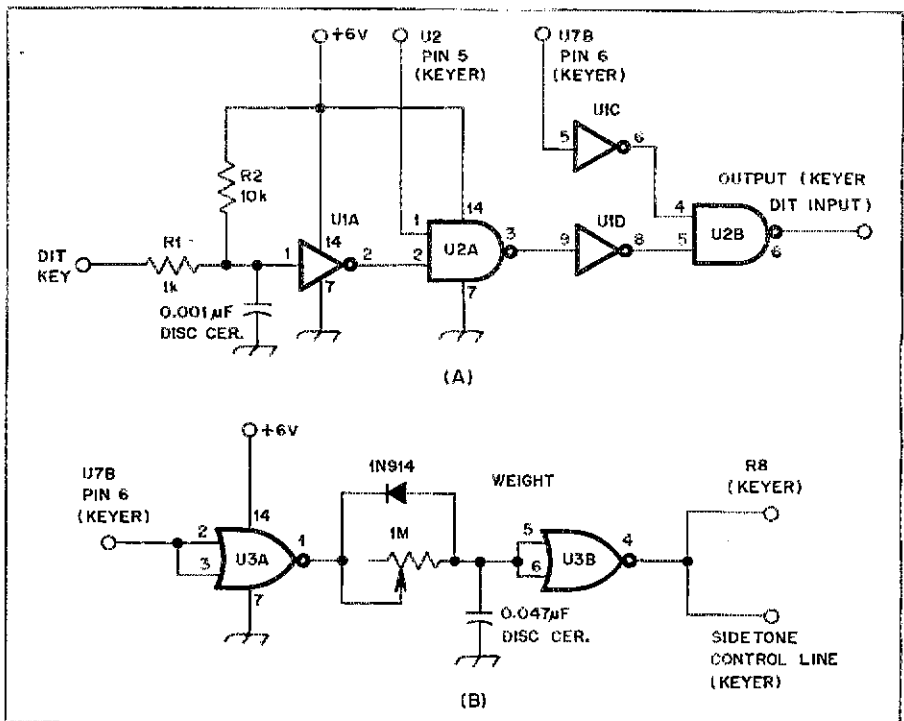


Fig. 5 — A. H. Jackson, VE3QQ, provides a circuit (A) employing a CMOS IC for eliminating the trailing dot noted on some Accu-Kekeyers. He has also shown his circuit (B) that uses a CMOS IC for the Accu-Weight control. In the dot-eliminator circuit, R1 and R2 are 1/4 watt. U1 (74C04) input pins 3, 11 and 13 are grounded. Spare outputs 4, 10 and 12 are left open. U2 (74C00) inputs pins 9, 10, 12 and 13 are grounded. Spare outputs 8 and 11 are left open. In the weight-control circuit, U3 (74C02) inputs pins 8, 9, 11 and 12 are grounded. Spare outputs 10 and 13 are left open. Disconnect the IC end of R8 and sidetone control line from U7B, pin 6 (keyer). Reconnect as shown.

¹Hinkle, "An Accu-Kekeyer for QRPp Operation," January 1976 QST, p. 24.
²Hanthorn, "Eliminating the Trailing Dot," July 1978 QST, p. 34.
³Landskov, "The Accu-Weight," January 1979 QST, p. 50.

Amateurs Assist in Cuban Refugee Operation

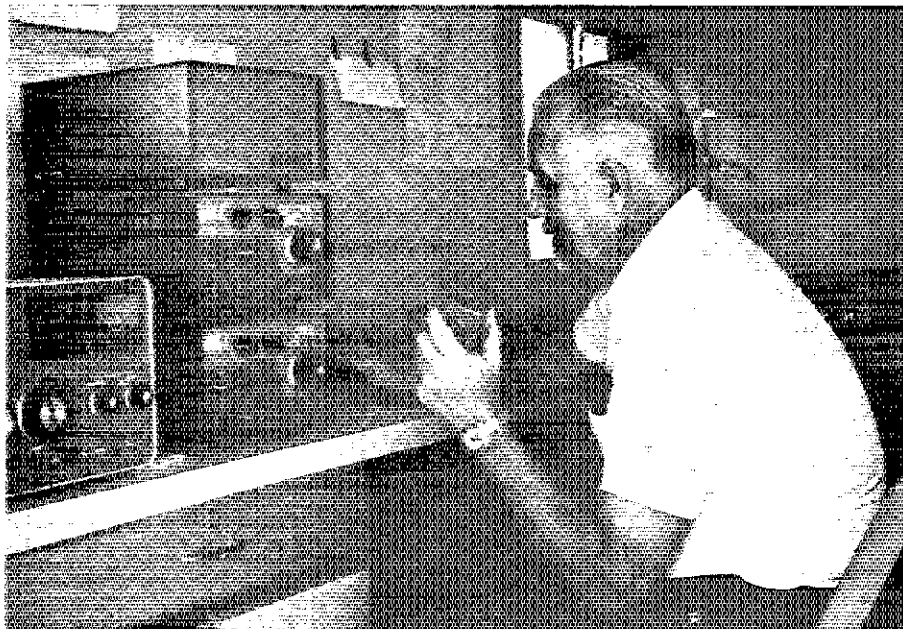
Southern Florida hams played a key role in helping Cubans start a new life in the USA.

By Joel I. Kandel,* KI4T

The sudden and massive influx of Cuban refugees into southern Florida was unlike any emergency Amateur Radio has ever had to face. It was a blend of dire human need, humanitarianism and international political intrigue (something amateurs usually aren't privy to, short of DXpeditions and WARC). More than 100,000 refugees arrived at our shores seeking freedom from repression and, as this is written, the saga continues.

Late Saturday afternoon, April 26, Dade County Civil Defense officials called RACES Officer WA4OUI to request that he set up the county's emergency communications van near Miami's Tamiami Park, site of the Dade County processing center. Communications were needed with Key West, 160 miles to the south, where a trickle of small boats loaded with refugees from Cuba was quickly turning into a full-scale immigration. Key West could no longer handle the situation alone; the immigrants were to be transported to Miami by bus.

The Miami center had to be kept advised, on a minute-to-minute basis, of the number of boats and people arriving, so the necessary arrangements could be made. Food, clothing and medicine, along with medical personnel, social welfare services, and the Red Cross and other agencies, were moving into the processing center. Though Key West and Cuba are separated by a mere 90 miles, some of the refugees were at sea for as much as eight days, many suffering severe dehydration. None left Cuba with any food or belongings other than the clothes on their backs. Some of the people were injured from assaults by dogs or hostile crowds in Cuba as they had made their way to Mariel Harbor, the embarkation point.



Dade County RACES Officer Bill Duggan, WA4OUI, at the 40-meter position, in contact with Key West on 7230 kHz.

In Key West numerous amateurs were stationed right at the docks. WA4CGQ became the relay point between Key West and Miami. Because of his potent vhf signal, he maintained constant contact with Miami on 2 meters, 160 miles away. KØIND, K3ML and W3YWK (all Key West retirees) also served as major relay stations with Miami on both 2 and 40 meters. By this time, Dade County ARRL Emergency Coordinator W4IYT had already established contact with KØIND on 7230 kHz (this frequency was designated the "official" 40-meter frequency, should 2 meters fail). As it turned out, 7230 kHz became very important as the drama unfolded.

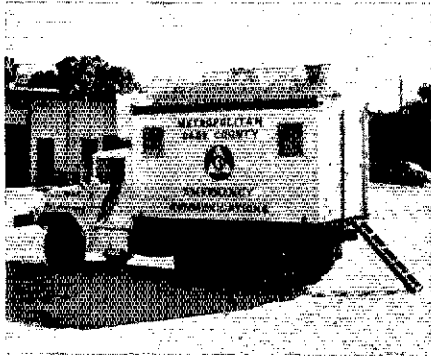
By midnight, the communications van

using the call WC4ACO (the Dade County RACES call sign), was in place at the processing center, its 40-foot tower cranked up with a 2-meter vertical on top and a 40-/80-meter inverted V hanging from it. Inside the van were complete hf and vhf stations, along with commercial gear, linking it with the Dade County Emergency Operations Center. For the next six days, this station was to be on the air on a 24-hour basis.

Severe Weather Complicates Things

As Sunday morning came, the weather in the Florida straits became very unsettled. A front over the Gulf of Mexico was moving south, bringing with it severe weather and 15-knot winds. The seas were

*P. O. Box 523042, Miami, FL 33152



The Dade County c.d. emergency communications van, set up near Miami's Tamiami Park, was used to provide communications with Key West.

swelling to 4 to 7 feet, putting a halt to boat traffic. Those refugees already in Key West were being transported by van or bus to Miami. The Key West contingent radioed head counts and license-plate numbers, so the tally could be confirmed on arrival.

At 1600 local, an urgent call came from K0IND on 40 meters: Two tornadoes had just struck Key West! WA4GCQ's magnificent towers, which had provided the exceptional 2-meter link with Miami, were now lying twisted on the ground. The operations switched smoothly to 40 meters; to the credit of the amateur fraternity, 7230 kHz experienced no jamming or heckling during seven days of continuous operation.

For the next couple of days, the weather was too rough for boats to pass in either direction. By Tuesday evening, April 29, the weather finally cleared, and boat traffic began anew. Larger boats were heading for Cuba; some were returning with as many as 500 people on board.

Cuban-American amateurs spearheaded the communications effort back in Miami. WC4ACO was manned at all times by bilingual amateurs, past residents of Cuba who were familiar with port locations and place-names. K4CAG quickly and efficiently established the WC4ACO operating schedule with KQ4Z, WB4VEE, AA4CM and many others putting in dozens of man-hours at net control. The InterAmerican Radio Club repeater, 75/15, was the main 2-meter net frequency, ultimately interlinking 14 Miami shelters and processing centers. K4ONY, chief of security for Miami's transit system, kept the net informed of the transportation situation at Key West. This information proved valuable to the Key West Latin Chamber of Commerce, which took responsibility for the initial processing.

For hours on end, Amateur Radio traffic from Key West read like the following: SHIP SOLANOT ARRIVED 5:30 AM 240 PASSENGERS. SANTA FE 6:30 48 PASSENGERS X LYETE 7:00 AM 60 PASSENGERS X ARMY BUS CE6620 DEPARTED 10:45 45 PASSENGERS X GREYHOUND BUS NUMBER 5259 LICENSE 68S157 DEPARTED 1931 HOURS 41 PEOPLE.

National Traffic System Hotline Aids Refugees

When the flood of Cuban refugees started arriving at Florida's Eglin Air Force Base, a special MARS station was set up to handle the relief traffic being generated, seeking sponsors for the newly arrived. Locating the sponsors was complicated by the unreliability or obsolescence of addresses and phone numbers, plus the fact that MARS apparently frowns upon non-emergency traffic without phone numbers. Calls to directory assistance was not a surefire solution either; imagine having to plow through six pages of Perezes in the New York City phone book! In light of these problems, WD4HIF of Fort Walton Beach agreed to try handling this traffic through the facilities of the National Traffic System (NTS). In discussing this situation with NTS Transcontinental Corps (TCC) Directors and Area Net Managers, all felt strongly that the System should and could handle the traffic overload. Special TCC hotline skeds were set up soon after this need became clear. WD4HIF made these skeds twice a day throughout the months of May and June, sending traffic to relatives and loved ones of refugees into the NTS network. A large share of the traffic was destined to the Northern New Jersey and New York City metropolitan area. The Big Apple vhf Traffic Net handled much of the latter. It should be emphasized that delivery of such traffic was quite difficult because of insufficient or incorrect addresses, bad phone numbers and the like. The NYC Red Cross offered to translate deliveries. In addition, Assistant SCM KA2CNN contacted *El Diario*, a Spanish-language daily newspaper, which offered interpreters as well as publication of messages that net members could not deliver by mail or phone. As a result

of this activity, there was an interesting cross-fertilization of segments of the Amateur Radio fraternity, as well as the print/broadcast media particularly in the Hispanic community, bonded together by the common goal of serving in the public interest.

Amateurs involved in this aspect of the operation, in particular the tireless efforts of WD4HIF, are to be commended. Here is what the Commander of Eglin AFB had to say:

FROM: 3201ABG EGLIN AFB FL/CC

TO: AMERICAN RADIO RELAY LEAGUE
225 MAIN STREET
NEWINGTON, CT 06111

UNCLAS
ON BEHALF OF MAJOR GENERAL ROBERT M. BOND, COMMANDER ARMAMENT DIVISION (AFSC), I WOULD LIKE TO EXPRESS OUR SINCERE APPRECIATION TO ALL THE AMATEUR RADIO OPERATORS THAT PARTICIPATED DURING OPERATION RED, WHITE AND BLUE (CUBAN REFUGEE RESETTLEMENT OPERATION). WITHOUT THE PARTICIPATION AND SUPPORT OF THIS TRULY DEDICATED GROUP OF INDIVIDUALS, THE MISSION OF THE EGLIN AFB REFUGEE PROCESSING CENTER WOULD NOT HAVE BEEN NEARLY AS EFFECTIVE. THEY ACCOMPLISHED THEIR SELF IMPOSED MISSION IN A HIGHLY PROFESSIONAL MANNER PROVIDING ASSISTANCE IN QUICKLY LOCATING THE SPONSORS OF THE REFUGEES THROUGHOUT THE US THEREFORE EXPEDITING THEIR RELEASE FROM THE CENTER. PLEASE, THROUGH APPROPRIATE MEANS, MAKE PUBLIC OUR APPRECIATION AND CONGRATULATIONS TO ALL THE PARTICIPANTS FOR A JOB WELL DONE. SGD: WILLIAM J. WYCOFF, COLONEL, USAF, COMMANDER CAMP LIBERTY (EGLIN AFB REFUGEE PROCESSING CENTER).
BT
TRANSMIT VIA AMATEUR RADIO



Refugees awaiting one of the processing stages. Many were old and infirm.

Messages going from Miami to Key West had this flavor:

MEDICAL PERSONNEL
LATIN AMERICAN CHAMBER OF COMMERCE
KEY WEST

IF PATIENTS SIGNIFICANTLY DEHYDRATED PLEASE DO NOT TRANSPORT WITHOUT BEING STABLE & WITH I.V. X ALMOST LOST PATIENT IN SHOCK.
S. GONZALEZ, M.D.
GATE 1
MIAMI PROCESSING CENTER

Although Dade County officials had telephone contact with Key West, they felt the amateur link was a good failsafe mechanism, and at no time was our data

very different than that received through official circuits. At 1910 hours on the 29th, however, the following message was sent to WC4ACO from W3YWK in Key West:

ALL TELEPHONES 294-298 ARE OUT OF ORDER IN KEY WEST X DADE COUNTY AUTHORITIES ARE UNABLE TO CONTACT KEY WEST.
OFFICER PAYNE
DADE COUNTY PUBLIC SAFETY

For about a six-hour period, Amateur Radio was the only communication available between Key West and Miami; it was all handled in stride.

On Wednesday, April 30, four days into the operation, it became evident that the influx of Cubans was going to be of major proportions. More than 2000 people a day were landing at Key West, and the processing centers were unable to handle the flow. County officials decided to open additional shelters to hold the refugees until they could be processed at Tamiami.

Two National Guard armories, a church recreation room, the Orange Bowl, Cuban-American social clubs and so on were turned into shelters. But they had no direct communication with the processing center or with one another. At the Orange Bowl, county officials were using pay phones to get supplies and personnel. Again the call went out to the Amateur Radio community for communications help.

Hams Needed in Shelters

On Friday afternoon, May 2, the Dade County ARPSC planning committee, the coordinating body for more than 20 Amateur Radio organizations in the area, had an emergency on-the-air meeting. It was decided to dispatch amateurs to each of the shelters to provide 2-meter communication. By Friday evening most shelters were manned by Amateur Radio volunteers who sent formal traffic to WC4ACO. Requests for food, cots, blankets, clothes and other supplies were radioed to the emergency van; county and National Guard vehicles were dispatched with the needed supplies. Much of this traffic was passed in Spanish and translated into English by the skilled bilingual operators. The accuracy of the texts was impeccable, with not one incident of ambiguity or misinformation reported in hundreds of pieces handled.

Reliance on the amateur operators at the shelters was impressive and even a bit awesome. On Saturday, May 3, KI4T experienced some excitement at the Orange Bowl, then housing 750 refugees. When he arrived at 0900 local, two emergency telephones had just been installed. A number of police officers were using hand-helds on the county public-safety frequency; the National Guard was using its own field telephone network. Feeling a little redundant, KI4T nevertheless strung his 300-ohm Twin Lead J-pole antenna with nylon monofilament in the rafters of the stadium, and stood by with his 2-meter rig. Suddenly, word came that one of the refugees had suffered a heart attack and required an ambulance immediately. The assistant city manager in charge of the shelter turned to KI4T and said, "Let him call the ambulance — it'll get here faster." The experience demonstrated the high regard that officials have placed in Amateur Radio. It was a lesson not easily forgotten or taken lightly. (W4WYR received the call from KI4T and summoned an ambulance.)




This tent city was set up at the Orange Bowl to help handle the massive influx of refugees into the Miami area. Hams provided communications between this and other processing centers.

By mid-afternoon Saturday, exactly a week after the amateurs had been called into action, it was evident that all 13 shelters had adequate landline communications. W4IYT and Assistant EC W4NKJ met with county officials, who reluctantly acceded to the request that the overworked amateurs secure. Many of the individual shelter managers were reluctant to see the amateurs depart — a further credit to the faith that had been instilled by the presence of Amateur Radio. The amateurs, however, had been operating for the better part of seven consecutive days, and were severely exhausted, mentally and physically. At least 70 amateurs had participated around-the-clock, providing critically needed communications. They held up through tornadoes, phone outages, fatigue, bureaucracy and a lot of emergency shelter food.

The amateur community lived up to its hard-earned reputation. The amateurs were there quickly when things were most disorganized, and kept plugging away until commercial circuits were installed. The scope of the operation was not restricted to the Miami area, as hundreds of pieces of formal traffic were handled by MARS and NTS operators. These messages put refugees being processed at Eglin Air Force Base, Fort Chaffee and other bases in touch with their relatives throughout the country.

Now that the Federal Government has taken over, Dade County personnel are taking a much-deserved breather. And southern Florida Amateur Radio operators are also settling back to their peaceful routine — preparing for hurricane season.

KI4T is an assistant director of the ARRL Southeastern Division; assistant EC, Dade County (Florida); alternate RACES officer, Dade County; president of the Dade Radio Club and a member of the Dade County Amateur Radio Public Service Corps Planning Committee. An amateur for 21 years, Joel is active, mostly on cw, on the hf bands. 

Strays

THE OMIK CONNECTION

□ When Lionel Monagus, special assistant to the chairman of the FCC, packed his bags and told his colleagues he was off to address the 27th annual OMIK Electronic Communications Association, Inc. convention, mouths were agape.

"What is OMIK?" one official wanted to know.

"Where is OMIK?" another dared to ask.

It was then that Lionel went into a short dissertation about OMIK. The FCC clan shook their heads in disbelief to learn that OMIK was organized by black hams, and their first recorded minutes were dated August 17, 1952. Eleven amateurs had gathered at the home of Henry Garcia, W8LGC, on the campus of Central State College, Wilberforce, Ohio. There OMIK was born, its name derived from the states of Ohio, Michigan, Indiana and Kentucky.

Today OMIK boasts over 400 members, divided into local chapters. Chester Martin, W3EIL, is national secretary; Marco Vallery, W6PCH, is treasurer and Wilbert Wells, W3DBP, is president.

Because a majority of OMIK's amateurs are technicians and scientists, their Novice classes attract many would-be hams throughout the country. The technical and scientific expertise is also carried over into OMIK convention seminars.

The 1980 OMIK convention was held July 17 to 19 at the Hyatt Regency Hotel in Washington, DC. The 1981 OMIK convention is planned for July, in Bermuda. — *Jack Chancellor, W9SON, Freeport, Illinois*

A HELPFUL HINT

□ A child's "Magic Slate" makes a handy notepad for the hamshack. Notes can be made on the plastic sheet and then transferred to your log. Just lift the sheet to erase, and start over. No more messy notepads or hunting for a pen or pencil. — *Doug Brown, K8APD*

SSTV TESTS

□ Two shortwave broadcast stations have expressed interest in SSTV tests via their facilities if they receive sufficient response from listeners equipped to receive the broadcasts. Interested? Write: Ben Dalfen, Voice of Israel DX Corner, Box 1082, Jerusalem, Israel; and Warren Loulton, Radio Australia Club Forum, Box 428-G, Melbourne 3000, Victoria, Australia. — *Glen Hauser, Editor, Review of International Broadcasting, Knoxville, Tennessee*

Radio Frequency Energy: A Primer for Amateurs

Confused about non-ionizing and ionizing radiation? A brief explanation, courtesy of an ARRL committee that is studying the subject, is timely.

By R. B. Wangler,* W5EDZ

The ARRL Ad hoc Committee on the Biological Effects of Radio Frequency Energy believes it is necessary for the Amateur Radio community to understand and articulate to the layman the differences between *ionizing* radiation and *non-ionizing* radiation. Definition of the ionizing type of radiation and the non-ionizing radiation, which are taken from one of the federal publications, are as follows:

Ionizing Radiation: Ionization occurs when radiation displaces an electron from an atom. These electrons may, in turn, ionize other atoms; approximately 30 electron volts (eV) of energy (depending on the particular element) are required to ionize one atom. Radiation with *short wavelengths* and *high energy*, such as X-rays and gamma rays, contain sufficient energy to cause ionization.

Non-ionizing Radiation: Radiation with *longer wavelengths* and *less energy*, such as ultraviolet, infrared and radio frequencies, do not possess enough energy to produce ionization.

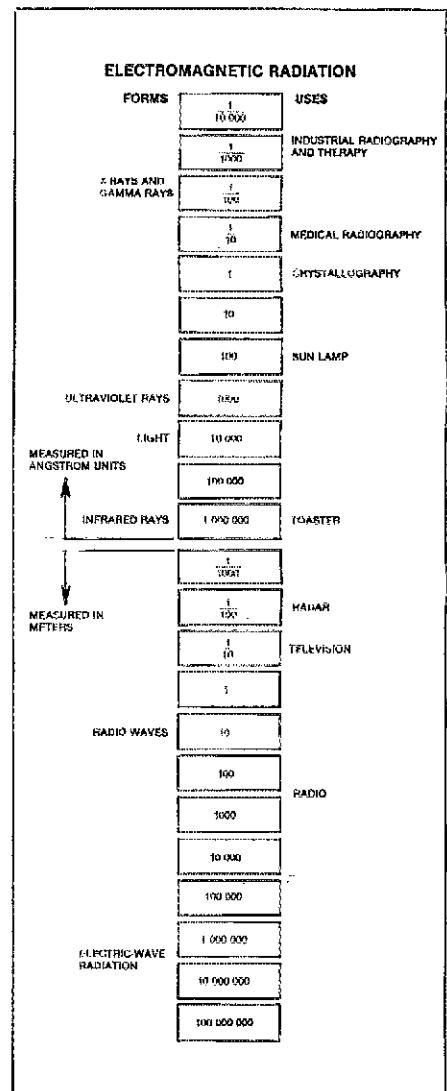
The term non-ionizing radiation, while accurate, is confusing to the public because most people do not know the definitions for the two types of radiation. It is suggested that, in the future, whenever radio amateurs come in contact with the public in any media, or at meetings, that the words *non-ionizing radiation* be replaced with either *electromagnetic energy* or *radio frequency energy*. These more-descriptive terms will help the public understand the significant difference in energy levels between the two types of radiation. The area of elec-

It is suggested that, in the future, whenever radio amateurs come in contact with the public in any media, or at meetings, that the words *non-ionizing radiation* be replaced with either *electromagnetic energy* or *radio frequency energy*.

tromagnetic energy of concern to the Federal Communications Commission lies between audio and light, or from about 10,000 Hz up through the microwave region.

Occupational Exposure Standards

The Occupational Safety and Health Administration (OSHA) radiation-protection standard for persons at the workplace for exposure to radio frequency (including microwave) radiation (29CFR1910.97) applies to the frequencies from 10 to 100,000 MHz. It establishes a limit for occupational exposure at a maximum power density of 10 mW per cm², as averaged over any possible 6-minute period. In the *far field* (see "How Safe Is Your Ham Shack?" June 1978 QST, page 11) a power density of 10 mW per cm² is equivalent to a mean squared electric field strength of 40,000 V² per m², or a mean squared magnetic field strength of 0.25 A² per m². OSHA is enforcing both of these mean squared field strengths averaged



The electromagnetic spectrum has been put to many uses; some of them are illustrated here.

*642 Beryl Dr., San Antonio, TX 78213

From the moment of conception we are bathed in a sea of electromagnetic waves.

over any one-tenth of an hour period as exposure limits for radio frequency energy under its occupational standard for non-ionizing radiation. This, I need to emphasize again, is for the worker at the workplace and does not have application to Amateur Radio or the private sector of the community.

Some side notes on radio frequency energy: From the moment of conception we are bathed in a sea of electromagnetic waves. Some of these waves are benign or even beneficial, while others are definitely harmful. Part of the radiation is natural, and part of it is man-made. Natural radiation includes light, radio waves and cosmic rays from the sun, moon and stars; background radiation from rocks, soil, water and atmosphere of our planets; and the internal radio-activity of our own bodies. Man-made radiation, which forms an increasingly large portion of the total, includes radio and radar waves.

It should be obvious that we are more or less immune to any kind of radiation that normally reaches us from outer

Recent History of ARRL Involvement

In the summer of 1979 the FCC issued an Inquiry concerning the Biological Effects of Radio Frequency Radiation, General Docket No. 79-144. The Board of Directors of the American Radio Relay League decided, after reviewing this Notice of Inquiry, to form an Ad Hoc Committee to respond to this Notice of Inquiry with a technical recommendation on behalf of the Amateur Radio community in the United States. The Board authorized the committee by Minute 27 of its July 1979 meeting in Baton Rouge, Louisiana.

Response to an article appearing in "Happenings" in September 1979 *QST* showed a significant interest among the amateur community to respond to this FCC Notice of Inquiry, and volunteers from all parts of the U.S. offered their assistance. Based on the résumés and information submitted by these volunteers, ARRL President Dannals appointed the Ad Hoc Committee to respond to General Docket 79-144 on behalf of Amateur Radio. The Ad Hoc Committee submitted to the ARRL Board a report responding to every question of the FCC's inquiry that related to Amateur Radio. (See December 1979 *QST*, page 78 and March 1980 *QST*, page 72.) After reviewing the comments filed by other respondents, the Committee felt its response to be adequate in its context and in line with commercial organizations dealing with communications throughout the United States. Therefore, no supplemental response was submitted in March of 1980.

space, yet earthworms are killed by sunlight even when kept damp and cool, and occasionally children are born who are abnormally photosensitive. Sunlight

can induce skin cancer as well as an attractive tan, and certain drugs have a strong photosensitizing effect, which makes it necessary for patients who are taking these types of drugs to use a barrier cream against the enhanced action of ultraviolet rays.

These thoughts are presented so that you may better understand that many forms of energy surround us as human beings, and many of these forms are being used in the medical field for beneficial effects. The effects of some of the things to which we are exposed are not known. The end effect is that we must recognize that there are many forms of energy around us and, with good judgment based on scientific data, determine those that are beneficial. Only where necessary should practical controls be initiated to eliminate or reduce the exposure in these specialized areas. The need for control must be substantiated by scientific evidence of a repeatable nature and not result from panic, misunderstanding, unfounded fear and public pressure that comes about because of a lack of knowledge. Only through knowledge from scientific procedures can a community continue to thrive and go forward. □

The author is ARRL West Gulf Division Director and Chairman of the ARRL Ad hoc Committee on the Biological Effects of Radio Frequency Energy.

Strays



Country music star Ronnie Milsap, WB4KGG (left), was recently presented the ARRL National Certificate of Merit during the Norwich (Connecticut) Rose Arts Festival. ARRL PRA Neai W. Donovan, WA1WIR, presented the certificate in behalf of the ARRL and the Radio Amateur Society of Norwich.

QST congratulates . . .

□ former ARRL staffer George Barker, WB8PBC, who won an award for filming he did in connection with a fire in New Haven, Connecticut. George is a cameraman for WWIT-TV, Hartford/New Britain, Connecticut.

TIPS ON STRAYS

□ Each month the Production Department at Hq. receives hundreds of items for inclusion in *QST* as "Strays." Strays are run as filler material and thus make it into print only if there is room — only about one item in 10 actually makes it into *QST*.

So, how can you get a Stray put into *QST*? There is no sure-fire method, although the following tips may improve your chances. (1) Submit your item(s) before the deadline — the 10th of the second month preceding desired publication (i.e. before October 10 for December *QST*). (2) Submit items that will be of interest to the majority of *QST* readers. (3) Photographs should be good-quality, black-and-white glossy prints. Color prints, slides and instant photos do not

usually reproduce well.

Items submitted are normally acknowledged, but an acknowledgement does not necessarily mean that your item will be appearing in *QST*. If you desire the return of the material, please include a statement to that effect and an s.a.s.e. Good luck. — Dave Bristol, KA2BNV

SPACE HALL OF FAME OPERATION

□ The Alamogordo, New Mexico, ARC (K5LRW) will conduct a special operation, sponsored by the International Space Hall of Fame in Alamogordo, on September 6, from 1600 to 2400 UTC, from atop the Space Hall itself. Operation will be on the 15-meter Novice band from 1600 to 1700 UTC and on the 15-and 20-meter General phone bands from 1700 to 2400 UTC. Special QSLs will be sent from the Space Hall of Fame and will be certified by the AARC operator on duty. QSLs or requests should be mailed to International Space Hall of Fame, Rte. 2001, Alamogordo, NM 88310. SWL requests will also be acknowledged. — David A. Jorgensen, WD5COV, Alamogordo, New Mexico

"SEA-BOARD 80" — The Summer ARRL Meeting

By Perry Williams,* W1UED

When the ARRL Second Board Meeting is scheduled at the Red Lion Inn SEATAC (Seattle-Tacoma Airport) on July 23-24, just before SEANARC (Seattle National Amateur Radio Convention), it asks the nickname SEA-BOARD! Against a background of unbelievable sunshine, the Board produced some very creditable actions for Amateur Radio.

In its first request for implementation of the World Administrative Radio Conference (WARC '79), the Board directed filing of a petition with FCC seeking opening of the 10.1-10.15 MHz shared band to General, Advanced and Extra Class licensees using cw or RTTY (and in emergencies, ssb) with power inputs of 250 watts or less. (The band will *not* be available before 1982.) The action was recommended by an ad hoc committee that reviewed over 600 comments from amateurs before arriving at its proposal. (See minute 26, in "Moved and Seconded" which follows this article.) ARRL will also ask FCC to expand 20-meter phone with 14.150-14.175 MHz for Extras, 14.175-14.225 MHz for Advanced and Extra, and 14.225-14.350 MHz for General, Advanced and Extra. The League will also ask that Extras get access to the 40-meter DX window, allowing them phone privileges in 7.075-7.100 MHz without banning Advanced and General

class cw from the segment (also in minute 26). ARRL supports facsimile and slow-scan on phone frequencies above 3.775 MHz as proposed in Docket 80-252 (see Minute 81 and "Happenings" August *QST* page 57); digital data transmissions in addition to ASCII and Baudot on vhf (minutes 42 and 90); plain-language rules as an aid to self-policing (minute 60); spectrum studies leading toward amateur use of 902-928 MHz (minute 39); continued vigorous defense of the 420-450 MHz band (minute 61) and changes in FCC rules so that interim permits will not expire before the license is issued (minute 75).

Interference in its four major forms (inadvertent, careless, harassing and malicious) is an unfortunate fact of Amateur Radio today. ARRL has embarked on a plan to help amateurs handle the first three kinds of interference through local committee action, to identify and report the fourth kind to FCC/Washington for direct action and to raise the consciousness of newcomers and already-licensed amateurs alike toward considerate operating habits. A principal tool is the Interference Task Force established at minute 27.

ARRL support for the amateur satellite program — which goes back before the launch of OSCAR 1 — is to continue. The Board asked the ARRL Foundation to raise money for the program, and donated \$10,000 as a challenge grant to be matched by private contributors. Other challenge grants are also expected soon. (Minutes 48 and 49.)

After 46 years as SCM, assistant secretary, assistant general manager, general manager and finally treasurer (the first and last of these being unpaid volunteer posts), John Huntoon, W1RW, has retired from active ARRL roles, *cum laude* (minute 59). James E. McCobb, K1LLU, was elected treasurer by unanimous ballot, at minute 3, effective August 15, 1980.

The Polski Związek Krotkotalowcow and Radio Club Peruano were offered congratulations on 50 years of service to the amateurs of Poland and Peru, respectively; RCP also received thanks for sponsoring the 1980 Region 2 Conference in Lima (minutes 41, 45 and 86).

QSL Bureaus and QSLing attracted more attention than usual, with motions calling for a *QST* article (minute 47), authority for bureaus to destroy unwanted cards after 90 days (minute 69), a call for amateurs to be honest about their QSL intentions (minute 76), and praise for Bureau volunteers (minutes 77 and 78).

ARRL's 1979 Award for Technical Excellence was conferred on Edward Oxner, KB6QJ, for his May 1979 article, "Build a Broadband Ultra Linear VMOS Amplifier." Honorable mentions went to Helge Granberg, K7ES, A. C. Doty, Jr., K8CFU and Dr. Allen B. Macnee, ex-W1JIR — see minutes 56 and 57.

And please see the rest of the minutes, in "Moved and Seconded" — we've only been able to skim the top off the work of "SEA-BOARD 80."

*Washington Area Coordinator, ARRL

Moved and Seconded...

Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in second session at the Red Lion Inn/SEATAC, Seattle, Washington on July 23, 1980. The meeting was called to order at 9 A.M. with President Harry J. Dannels, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, K0GA, Dakota Division; Jesse Bieberman, W3KT, Atlantic Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Maurice O. Carpenter, K0HRZ, Rocky Mountain Division; Paul Grauer, W0FIR, Midwest Division; Jay A. Holladay, W6EJJ, Southwestern Division; Don C. Miller, W9NTP, Central Division; Leonard M. Nathanson, W8RC, Great Lakes Division; Lionel A. Oubre, K5DPG, Delta Division; Mitch Powell, VE3OT, Canadian Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; Raymond B. Wangler, W5EDZ, West Gulf Division; L. Phil Wicker, W4ACY, Roanoke Division; and Stan Zak, K2SJO, Hudson Division.

Also in attendance, as members of the Board without vote, were Carl L. Smith, W0BWJ, First Vice President; Larry E. Price, W4RA, Vice President; Max Arnold, W4WHN, Vice President; Noel B. Eaton, VE3CJ, International Affairs Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Lys J. Carey, K0PGM, Rocky Mountain Division; Thomas W. Comstock, N5TC, West Gulf Division; George A. Diehl, W2IHA, Hudson Divi-

sion; Kenneth A. Ebner, K9EN, Central Division; Evelyn Gauzens, W4WYR, Southeastern Division; O. D. Keaton, WA4GLS, Delta Division; Peter F. Matthews, W66UA, Southwestern Division; Ronald D. Mayer, K7BT, Northwestern Division; Gay E. Milus, Jr., W4UG, Roanoke Division; Robert C. Smithwick, W6JZU, Pacific Division; and Hugh A. Turnbull, W3ABC, Atlantic Division. There were also present Honorary Vice Presidents Victor C. Clark, W4KFC, and J. A. Gmelin, W6ZRJ; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS; Associate General Counsel B. Robert Benson, QC, VE2VW; Assistant General Manager David Sumner, K1ZZ; Technical Department Manager Doug DeMaw, W1FB; Communications Manager John F. Lindholm, W1XX; and Washington Area Coordinator Perry F. Williams, W1UED.

2) The assembly observed a moment of silence in recollection of those amateurs who have joined the ranks of the Silent Keys. The Chair welcomed new Directors Butler and Oubre; and new Vice Directors Comstock, Gianzeus and Keaton to the meeting.

3) On motion of Mr. Stevens, seconded by Mr. Sullivan, unanimously VOTED to proceed with the election of a Treasurer. The Chair appointed Messrs. Comstock and Diehl as tellers. Mr. Stevens nominated James E. McCobb, K1LLU. On motion of Mr. Sullivan, seconded by Mr. Nathanson, unanimously VOTED that nominations are closed. The tellers announced the result of the balloting: 16 votes for Mr. McCobb, with no blanks. Whereupon, James E. McCobb, K1LLU, was declared elected, effective August 15, 1980, as Treasurer of the League for the re-

mainder of the current term. The President requested Treasurer Huntoon to escort Treasurer-elect McCobb into the meeting room.

4) On motion of Mr. Sullivan, seconded by Mr. Stevens, unanimously VOTED to proceed with the election of a parliamentarian. Mr. Grauer nominated Mr. Sullivan. Mr. Sullivan declined the nomination, and nominated Vice President Price. On motion of Mr. Stevens, seconded by Mr. Bieberman, unanimously VOTED that the nominations are closed and Mr. Price is elected parliamentarian by voice vote.

5) On motion of Mr. Thurston, seconded by Mr. Wicker, unanimously VOTED that the minutes of the 1980 Annual Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

6) President Dannels presented a written report and additional oral comments covering: his recent meeting with Chairman Charles Ferris of the Federal Communications Commission; further planned presentations to Commissioners and FCC staff; the unfortunate loss of the Phase III satellite as a result of launch vehicle problems and steps necessary, in conjunction with the AMSAT organizations, to develop Phase IIIB; the need for amateurs to explore new modes of communication advancing the state of the art; the value of the League's many committees; and the importance both of ARRL conventions and hamfests, and the League's visibility during these affairs.

7) Next was the report of First Vice President Smith, covering the Ad Hoc Committee on Interference, the final report of which is to be presented

later; the continued importance of, and future plans for, the Intruder Watch Program; the continued interest by amateurs in the results of the World Administrative Radio Conference, Geneva, 1979; and the efforts which are underway to keep the International Amateur Radio Union strong and vigorous in the coming years. The Assembly was in recess from 10:18 to 10:30 A.M.

8) Vice President Price summarized his activities since the January meeting with the Long Range Planning Committee, the Management and Finance Committee and several conventions. His oral remarks dealt with the need for the board to make choices retaining current activities which are good and choosing new ways for progress.

9) The report of Vice President Arnold covered his work with the Membership Affairs Committee and as Chairman of the 10 MHz Ad Hoc Committee which would, later in the meeting, offer a plan for use of this new amateur band. He also suggested that the work load of the standing committees varied considerably from one to the next and suggested a review of assignments.

10) International Affairs Vice President Eaton, who also serves as President of the International Amateur Radio Union, presented an extensive report on IARU affairs, including the hamfest at Friederichshafen during which representatives of 14 European and African societies met with President Eaton and IARU Secretary Baldwin; the Region I Executive Committee Meeting in Maidenhead, England; the Region II Executive Committee Meeting in Santo Domingo; the forthcoming IARU Amateur Direction Finding Championships in Poland during September, and the Region II conference in Lima, Peru, this coming October. In the past six months, IARU membership has grown by the addition of societies from Montserrat, The Gambia, the Solomon Islands and Cuba. An application is also pending from a society representing the French Possessions in the South Pacific.

11) General Manager Baldwin began his extensive oral report with a discussion on the "business" aspects of the League, in excellent shape for the first half of 1980 because of tight control of expenditures and improved revenue from advertising and membership dues. Over the longer term, however, there would be a need for development of additional sources of income. Plans for acquiring an in-house computing system were thoroughly reviewed. Our involvement in international affairs is continuing on a higher level than anyone had predicted at the close of WARC '79. There would be, in the next few years, several specialized world administrative radio conferences such as the WARC/Mobile scheduled for March 1982. On the Washington and national regulatory scene, a report by Washington Area Coordinator Williams touched on FCC discussions of codeless licenses; the secrecy provisions of the Communications Act; the Communications Act Rewrite Bill, S.2827; possible mode adjustments in the hf bands; plain language amateur rules; a new newsletter for Washington, "Amateuradio"; ARRL comments in support of easier identification, and a request for a lifting of restrictions in the 160-meter band. The General Manager concluded by stating his belief that we need to have a clearer vision of the future of Amateur Radio. During the course of his report, the Board was in recess from 11:30 A.M. to 1:05 P.M. for luncheon, reassembling with all persons mentioned above present.

12) Treasurer Huntoon presented his final report to the Board, reviewing the portfolio of securities for operating funds and for the Life Membership accounts. The report was much more encouraging than those of previous years, with market values some 10% above book and income also in the 10% range. Following this report, the Board was in recess from 2:52 P.M. to 3:09 P.M. At this point, Honorary Vice President Robert York Chapman, W1QV, who also is President of the ARRL Foundation, joined the meeting.

13) General Counsel Booth's report covered recent court cases which show promise of benefiting amateurs; filing of petitions with FCC; current legal interpretations of Section 605 of the Communications Act concerning secrecy of communications; and legislation pending before Congress. Associate Counsel Benson reported similarly on legal matters in Canada. A large portion of his work recently has been in connection with corporation matters involved in formalizing the Canadian Radio Relay League. Other concerns have been reduction of tariffs and local land use (e.g., antenna tower) matters.

14) ARRL Foundation President Chapman reported on the assets of this Foundation; its recent activities in connection with the YL ISSB scholarship fund; and its readiness to tackle fund-raising for amateur satellite programs.

15) Canadian Director Powell presented a report as Acting President of the Canadian Radio Relay League, including resignation of founding President

Hesler; appointment of Liaison Officers to the government and to IARU; Communications Department activities in Canada; and reciprocity between Canada and other countries.

16) Reports of the standing committees came next. Mr. Zak, as Chairman, presented the report of the International Affairs Committee, including its procurement of pins for members of the IARU WARC '79 team; plans for attendance at the Region II conference in Lima, Peru, and the need for more information in QST concerning international affairs. On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that, in order to show appreciation for their outstanding work in support of the Amateur Radio Service at WARC '79, the Board of Directors of the American Radio Relay League, headquarters of the International Amateur Radio Union, does hereby award a distinctive lapel pin to each Amateur Radio operator who was an active participant in the conference activities at the World Administrative Radio Conference in Geneva in the Fall of 1979. Following adoption of the motion, President Dannals presented the first of the pins to IARU President Eaton (ap- plause).

17) Mr. Holladay, as Chairman, presented the report of the Plans and Programs Committee covering the Intruder Watch; the 902-928 MHz amateur band made possible by WARC '79; plans for expansion of the 20-meter phone segment; the content of QST magazine and component advertising therein; the need for ARRL to take a lead in digital data transmission; and the publication revision program.

18) Mr. Sullivan, as Chairman, presented the report of the Membership Affairs Committee concerning the possibility of special rates for certain classes of members; a study involving a bi-weekly DX publication; information presented on ARRL ballots; a study of the ARRL QSL Bureau organization; the ARRL Hall of Fame; and QST awards for technical excellence.

19) Mr. Stevens, as Chairman, presented the report of the Management and Finance Committee which covered a study of pre-paid legal service; a search for candidates for Treasurer; the role of Vice Directors in the League; and a study on the necessity for a personnel manager at Headquarters. The Committee authorized the Treasurer to make changes in the investment portfolio; approved the conflict of interest policy for employees; approved the advertising acceptance policy revisions proposed by the General Manager; and reviewed the zero-based budget process which has showed excellent cost control results so far this year. Moved, by Mr. Price, seconded by Mr. Wicker, that the 1981 Annual Meeting of the Board of Directors of the American Radio Relay League be held in Orlando, Florida, on March 11, 1981. But, after discussion, the motion was LOST, 7 votes in favor to 9 opposed.

20) Mr. Carpenter, as Chairman, presented the report of the Legal and Regulatory Committee, dealing with possible revisions to Article II concerning eligibility for service on the Board of Directors, and dealing with reciprocal operating privileges.

21) Mr. Clark, as Chairman, presented the report of the Long-Range Planning Committee. At the request of the committee, Florida State University had conducted a survey of every 44th amateur listed in the Callbook. Of 9300 questionnaires mailed, 6317 had been returned, 67.7%. The results are being tabulated and will be available at a later time.

22) The Board recessed for dinner at 5:52 P.M., reassembling at the same place at 8:18 P.M. with all persons listed above present.

23) Mr. Holladay, as Chairman, presented a brief report for the Amateur Satellite Service Council mentioning the future UOSAT scheduled for September 1981; possibility of a Phase IIIB launch in 1982; and a proposed international amateur satellite meeting at Surrey, England.

24) Mr. Smith, as Liaison, presented a brief report for the Radio Frequency Interference Task Group, concerning the status of S.2827, a Senate bill which would provide, among other things, for television interference susceptibility standards, and the status of FCC docket 78-369, a general study of RFI. Vice Director Turnbull, of the Atlantic Division, has been newly named as ARRL Liaison to the RFI Task Group.

25) Mr. Wangler, as Chairman, presented the report of the Committee on Biological Effects of Radiofrequency Energy. The goal of the committee is to educate the public on the differences between ionizing radiation and electromagnetic energy through an article to appear in QST, articles in general interest publications, formation of a speakers bureau, and establishment of a small reference library at headquarters.

26) Mr. Arnold, as Chairman, presented the report of the Ad Hoc Committee on 10 MHz. The report outlined the steps the committee had taken to arrive at a proposal for use of the new 10 MHz band when it

becomes available. Whereupon, Mr. Butler moved, Mr. Holladay seconded, that the recommendations of the 10 MHz Ad Hoc Committee are adopted as follows: that a petition for rule making be prepared promptly for filing with the Federal Communications Commission, proposing (1) that only A1 and F1 (300 baud or less) emissions be permitted in the 10.1-10.15 MHz band; (2) that the power limit be 250 watts input; (3) that General, Advanced and Extra Class licenses be authorized full privileges in the band; (4) that some provision be made in the Commission's rules for the use of single-sideband telephony in the band in emergency, along the lines of the present section 97.107; (5) that 7.075-7.100 MHz be made available for single-sideband telephony operation by Extra Class licensees; (6) that the 14-MHz telephony sub-band be extended by 50 kilohertz to 14.150 MHz and sub-divided as follows: 14.150-14.175 Extra Class; 14.175-14.225 Advanced and Extra; 14.225-14.350 General, Advanced and Extra; (7) that Section 97.112(b)(2) be modified so as to exclude the 10 MHz band; and further moved, that these recommendations, as appropriate, be made the basis for an ARRL submission to the IARU Region 2 Triennial Conference in Lima. After discussion, moved by Mr. Zak, seconded by Mr. Nathanson, that the matter be laid on the table. But the motion to table was LOST. On motion of Mr. Sullivan, seconded by Mr. Zak, VOTED to divide the question: Items 1-4, 7 and the conclusion as the first question, Item 5 as the second question and Item 6 as the third question. The first question was unanimously ADOPTED. The second question, in reference to the 7.075-7.100 MHz segment, was decided in the affirmative, 9 votes in favor to 7 opposed. Moved, by Mr. Bieberman, seconded by Mr. Wicker, that Item 6 be amended to read 14.175-14.200 Extra; 14.200-14.250 Advanced and Extra; and 14.250-14.350, General, Advanced and Extra. A roll call vote being requested, the amendment was LOST with Directors Bieberman, Grauer, Powell and Sullivan voting in favor, and the remainder of the Directors voting opposed. The question then being on paragraph 6 as originally presented, a roll call again being requested, the matter was decided in the affirmative with all Directors voting Aye except Messrs. Bieberman and Powell. The assembly was in recess from 9:57 to 10:10 P.M.

27) Mr. Smith, as Chairman, presented the report of the Ad Hoc Committee on Interference. The report covered the nature of the problem, response to the March editorial, definitions and analysis, and proposed procedures for dealing with the problem. On motion of Mr. Anderson, seconded by Mr. Sullivan, it was unanimously VOTED that the President, together with the General Manager, establish an interference task force which shall include at least one member of the Board of Directors, one member of the Headquarters staff, and the General Counsel or his designate, for the purpose of initiating an ongoing program of assistance to local interference committees, clubs or individuals. This task force shall (1) coordinate an educational program to include appropriate articles in QST and in Club and Training publications, (2) provide a reference manual and guidelines for interference committee operating procedures, and (3) provide liaison at the national level for those cases to be referred to the Federal Communications Commission for their handling. The overall objective shall be to encourage efforts by the Amateur Radio Service to continue to justify its reputation as a self-policing service by the reduction or elimination of all types of interference on amateur frequencies. The Interference Task Force shall make regular reports to the ARRL Executive Committee.

28) The Board was in recess at 10:33 P.M., reassembling on July 24, at 8:30 A.M. with all persons herein before mentioned present except Mr. Smithwick.

29) Mr. Diehl, as liaison, delivered the report of the VHF Repeater Advisory Committee. Moved by Mr. Smith, seconded by Mr. Carpenter, that the ARRL Board of Directors approve and adopt a band plan for the 15 kilohertz "splinter" channels commonly used in the 146-148 MHz portion of the 2-meter band as follows: (a) the existing local usage in the Pacific Northwest of 20 kilohertz channel spacing is recognized as the standard arrangement for that area; (b) the existing California area utilization of inverted 15 kilohertz "splinter" channels is recognized as the standard arrangement for that area; (c) the repeaters east of the continental divide operating on 15 kilohertz "splinter" channels will utilize upright operation, i.e. outputs are in the 146.61 to 147.39 MHz portions of the band. During the course of the discussion, Mr. Smithwick joined the meeting at 8:50 A.M. After discussion, on motion of Mr. Stevens, seconded by Mr. Oubre, voted that the matter is laid on the table.

30) On motion of Mr. Smith, seconded by Mr. Wangler, unanimously VOTED that the ARRL Board of Directors adopt the 10-meter CTCSS tone control squelch frequencies listed below for voluntary incor-

poration into 10-meter repeater systems to provide a uniform national system:

Call area	Tone 1	Tone 2
W1	1B-131.8 Hz	ZZ- 91.5 Hz
W2	4Z-136.5	ZA- 94.8
W3	4A-141.3	ZB- 97.4
W4	4B-146.2	1Z-100.0
W5	5Z-151.4	1A-103.5
W6	5A-156.7	1B-107.2
W7	5B-162.2	2Z-110.9
W8	6Z-167.9	2A-114.8
W9	6A-173.8	2B-118.8
W0	6B-179.9	3Z-123.0
VE	3A-127.3	YB- 88.5

31) Mr. Anderson delivered the report of the Contest Advisory Committee, noting that the ARRL DX Contest format will revert to that used prior to the 1980 contest as a result of recommendations by the CAC. Mr. Mihus, as liaison, presented the report of the DX Advisory Committee, including recommendations that have been agreed to by the headquarters on Okinawa-Torishima and the so-called African "homelands." Mr. Sullivan, as liaison, delivered the report of the Emergency Communications Advisory Committee. Mr. Holladay, as liaison, presented the report of the VHF/UHF Advisory Committee, noting the desirability of additional publicity for voluntary band plans in *QST* and other media.

32) Mr. Zak, as liaison, delivered the report of the Public Relations Advisory Committee. On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that, on recommendation of the Public Relations Advisory Committee, the title of Public Relations Assistant is changed to Public Information Assistant.

33) On motion of Mr. Sullivan, seconded by Mr. Thurston, unanimously VOTED that applications for the Hall of Fame received prior to October 1, 1980 be reviewed by the Membership Affairs Committee for eligibility and reported to the Executive Committee no later than December 31, 1980. The Executive Committee shall further review the list of nominees and present the qualified nominees to the Board of Directors at the Annual Meeting 1981. The Board of Directors will conduct an election at the Annual Meeting in accordance with the previously published balloting procedure. The requirement that *QST* publish a list of nominees shall be waived for this one election.

34) On motion of Mr. Sullivan, seconded by Mr. Wicker, unanimously VOTED to amend Paragraph 3 of the Hall of Fame guidelines by inserting between 3(b) and 3(c) the following: "Nominations received prior to October 1 will be reviewed by the Membership Affairs Committee for eligibility. Nominations received after October 1 will be held for consideration the following year. The Membership Affairs Committee will present a list of eligible nominees to the Executive Committee no later than December 31. The Executive Committee will review and present a list of nominees to the Board of Directors at the annual meeting." The amended guidelines are to become effective July 1, 1981.

35) Moved by Mr. Stevens, seconded by Mr. Wicker, that on a trial basis during 1981, the 1981 Annual Meeting of the Board be held in Orlando, Florida, March 11, 1981, and the second Meeting of the Board be held in Hartford, Connecticut, on September 16, 1981. A roll call vote being requested, the motion was ADOPTED, 13 votes in favor to 3 opposed. Messrs. Holladay, Thurston and Zak voted opposed.

36) On motion of Mr. Wicker, seconded by Mr. Zak, unanimously VOTED that the ARRL delegate to the 1980 Region 2 IARU conference is instructed to seek agreement on QSL card dimension tolerances to facilitate the work of the International QSL Bureaus.

37) Moved by Mr. Butler, seconded by Mr. Grauer, that a new sub-paragraph (e) be added to Section 1 of the By-Laws, to read as follows: "Provided that a member is fully retired, is at least 65 years of age, and has held membership in the League for at least 25 total years (not necessarily continuous), with one year of membership in the last three years prior to application, he may request to pay dues at a rate equivalent to 83% of the annual dues." After discussion, on motion of Mr. Bieberman, seconded by Mr. Stevens, VOTED that the matter is laid on the table; Messrs. Sullivan and Grauer requested to be recorded as voting opposed. The Board was in recess from 9:53 to 10:10 A.M.

38) On motion of Mr. Holladay, seconded by Mr. Thurston, unanimously VOTED that the General Manager is directed to review the current Intruder Watch Program to determine how many participants also serve as Official Observers, and to further determine whether the two programs can be more effective-

ly administered by a single Headquarters department. The General Manager is requested to present his findings to the Executive Committee at their September 1980 meeting.

39) On motion of Mr. Wangler, seconded by Mr. Wicker, unanimously VOTED that the President appoint an Ad Hoc Committee of amateurs who are knowledgeable of current uhf spectrum management activities and that this committee develop a detailed proposal and supporting rationale for an amateur band in the region 902 to 928 MHz. The results of the committee's efforts are to be embodied in a petition to FCC after review by the Executive Committee.

40) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the General Manager consider the feasibility of publishing a book on troubleshooting of amateur receivers, transmitters, etc., and report on the same at the next Board Meeting.

41) On motion of Mr. Powell, seconded by Mr. Eaton, unanimously VOTED that the Board of Directors of the American Radio Relay League extends its hearty congratulations to the Radio Club Peruano on the occasion of its 50th anniversary, and hopes for continued close association with the RCP in the activities of the IARU in the years to come.

42) On motion of Mr. Miller, seconded by Mr. Anderson, unanimously VOTED that the General Manager and staff prepare a petition to FCC requesting that the amateur regulations be revised to permit digital data communications at vhf (50 MHz and above) without restrictions as to use of a specific code such as ASCII or Baudot. Current regulations regarding maximum band widths and station identification would be maintained. The petition will be reviewed by the Executive Committee prior to submission to FCC.

43) On motion of Mr. Oubre, seconded by Mr. Zak, unanimously VOTED that the General Manager is directed to review the current *QST* advertising policy to determine whether changes can be made to make it more feasible for suppliers of small electronic components to advertise in *QST*, while maintaining reasonable standards of protection for the customer. Recommendations are to be made to the Board at the 1981 Annual Meeting.

44) Moved by Mr. Nathanson, seconded by Mr. Grauer, that the League furnish each contributor to Project Goodwill the names and addresses of each recipient of transmitters and receivers. Further, that the recipients' names be published in *QST*, the official journal. After discussion, during which it was brought out that the first half of the motion agreed with plans which were already under way, on motion of Mr. Anderson, seconded by Mr. Sullivan, VOTED that the matter is laid on the table; Messrs. Miller and Nathanson requested to be recorded as voting opposed.

45) On motion of Mr. Zak, seconded by Mr. Eaton, unanimously VOTED that the Board of Directors of the American Radio Relay League extends its hearty congratulations to the Polski Związek Krokofalowcow on the occasion of its 50th anniversary, and hopes for continued close association with the PZK and the activities of the IARU in the years to come.

46) On motion of Mr. Grauer, seconded by Mr. Thurston, unanimously VOTED that the date for the 1982 July board meeting to be held in Cedar Rapids, Iowa, is changed from July 14 and 15 to July 21 and 22, 1982.

47) On motion of Mr. Sullivan, seconded by Mr. Wicker, unanimously VOTED that the General Manager prepare an article or series of articles for *QST* on the subjects of QSL bureaus, incoming and outgoing, and QSL managers, and that such article or combination of articles be made available as a reprint for distribution to new members and upon request at conventions, hamfests and club meetings.

48) On motion of Mr. Holladay, seconded by Mr. Powell, unanimously VOTED that the Board requests the ARRL Foundation, working with the General Manager, to pursue an active Amateur Radio satellite fund-raising campaign for the support of amateur space activities.

49) On further motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the ARRL contribute the sum of \$10,000 to the ARRL Foundation Amateur Radio Satellite Fund. This contribution is to be made on a matching-fund basis.

50) On motion of Mr. Wangler, seconded by Mr. Thurston, unanimously VOTED that the President appoint an Ad Hoc Committee to study the five standing committees. This study shall include but not be limited to consolidation or expansion of the committees if required. Consideration shall be given to the need for staff assignment for liaison purposes to each committee.

51) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the General Manager investigate the possibility of having written

and published a sequel to Clinton B. Desoto's book "200 Meters and Down," which was published in 1936, in order to bring the history of Amateur Radio up to date.

52) Moved by Mr. Miller, seconded by Mr. Zak, that, as of 1 January 1981, authors of contributed technical articles which are published in *QST* be paid at a per-page rate to be set by the Executive Committee. After extended discussion, a roll call being requested, the motion was LOST. Eight directors voted in favor, with eight opposed. The Chairman broke the tie by voting opposed. Directors voting in favor were Messrs. Bieberman, Holladay, Miller, Nathanson, Oubre, Stevens, Wangler and Zak. All others voted opposed. The Board was in recess for luncheon from 11:55 A.M. to 12:50 P.M., reconvening with all persons hereinbefore mentioned present.

53) Moved by Mr. Oubre, seconded by Mr. Holladay, that the General Manager is requested to file comments in FCC Docket 80-252, favoring adoption of rules allowing transmission of television and facsimile emissions on all frequencies where voice is allowed, subject to current bandwidth limitations and identification requirements. After discussion, on motion by Mr. Zak, seconded by Mr. Nathanson, VOTED that the matter is laid on the table.

54) On motion of Mr. Nathanson, seconded by Mr. Zak, unanimously VOTED that the Membership Affairs Committee investigate the possibility of an envelope-type membership application to facilitate mailing and to promote easier application procedure.

55) On motion of Mr. Zak, seconded by Mr. Holladay, unanimously VOTED that the General Manager is directed to take steps to assure that *QST* regularly include comprehensive information on international Amateur Radio affairs in order to improve awareness of affairs in other countries, to better inform members of the differences in privileges, activities and interests that exist in other parts of the world, and to recognize the efforts and achievements of radio amateurs abroad, this responding to *QST*'s role as the official organ of the International Amateur Radio Union.

56) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the 1979 award for the *QST* article showing technical excellence be awarded to Edward Osner, KB6QJ, for his article, "Build a Broad-band Ultra Linear VMOS Amplifier," in *QST* for May 1979.

57) On further motion of Mr. Grauer, seconded by Mr. Wicker, unanimously VOTED that an honorable mention be awarded for the 1979 award for the *QST* article showing technical excellence to the following authors: Helge Granberg, K7ES, "Printed Line Techniques Applied to VHF Amplifier Design," in *QST* for September 1979; and A. C. Doty, Jr., K8CFU, and Dr. Allen B. Macnee, ex-W1JIR, "Introducing the Incon," in *QST* for February 1979.

58) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED to remove from the table the motion concerning reduced rates for retired members over 65 years of age. Mr. Sullivan moved the question. A roll call vote being required, 8 directors voted in favor, with 8 opposed. Those voting in favor were Messrs. Bieberman, Butler, Grauer, Miller, Nathanson, Powell, Sullivan and Zak. Because the motion concerned a change in the By-Laws, requiring a three-fourths majority for passage, the motion was LOST.

59) On motion of Mr. Wicker, seconded by Mr. Thurston, unanimously RESOLVED that the ARRL Board of Directors expresses to John Huntoon, W1RW, its deep appreciation for his conscientious, thorough and effective performance as ARRL Treasurer during the past four years. We would call attention to the fact that Mr. Huntoon's contribution in this volunteer role brings to some 46 years his service to ARRL, including five years as Section Communications Manager of Illinois, and 36 years as a member of the ARRL Headquarters staff, 14 of them as General Manager, and we are indeed grateful for this long record of dedication. The Board of Directors looks forward to Mr. Huntoon's continued availability as a valued source of experience and wisdom.

60) On motion of Mr. Carpenter, seconded by Mr. Grauer, unanimously VOTED adoption of the following resolution: Whereas, the heart of amateur self-policing lies in thorough understanding of the rules, now therefore the Board of Directors of ARRL goes on record as supporting the principle of having the amateur rules in plain language which can be understood by people without technical backgrounds.

61) On motion of Mr. Holladay, seconded by Mr. Wangler, unanimously VOTED that the President and the General Manager are directed to take all steps necessary to insure that the entire 420-450 MHz band continues to be available for amateur use.

62) On motion of Mr. Wangler, seconded by Mr. Holladay, unanimously VOTED that the Board approves the holding of the national ARRL convention in Houston, Texas, in 1983, proposed dates to be July 29-31.

63) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the General Manager, after appropriate research, produce an information sheet to indicate guidelines for properly using un-reimbursed expenses on behalf of ARRL as a tax deduction and further that such information be made available to all ARRL volunteers, e.g., Assistant Directors, SCMs, PTAs, etc.

64) Moved by Mr. Powell, seconded by Mr. Eaton, that ARRL Field Day dates be advanced one week in appropriate years, for the purpose of avoiding a Canadian holiday conflict and insuring continued high activity from the Canadian amateur community. On motion of Mr. Sullivan, seconded by Mr. Oubre, unanimously VOTED that the matter is referred to the Contest Advisory Committee for study.

65) On motion of Mr. Miller, seconded by Mr. Sullivan, unanimously VOTED to lift from the table the motion concerning Project Goodwill. On motion of Mr. Stevens, seconded by Mr. Thurston, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: the General Manager is directed to promptly proceed with the further distribution of remaining Project Goodwill equipment and further to appropriately notify donors of the distribution made. The vote then being on the motion as amended, the same was unanimously ADOPTED. During the course of the above, the Board was in recess from 1:57 to 2:07 P.M.

66) On motion of Mr. Zak, seconded by Mr. Wicker, unanimously VOTED that the ARRL delegate to the IARU Region 2 conference in Lima is instructed to encourage development of a regional policy which will lead to (1) preparation and promulgation of educational information to all Western Hemisphere amateurs regarding the proper phone patch and third-party traffic procedures and practices; (2) closer cooperation among IARU member societies in reporting and correcting improper use of international phone patch privileges; (3) collection of information and initiation of requests for appropriate government action in cases of deliberate abuse.

67) Moved by Mr. Grauer, seconded by Mr. Sullivan, that biographical information supplied with election ballots contain only material pertinent to Amateur Radio, excepting candidates' occupation, this material to be provided to the membership on a separate printed sheet. After discussion, on motion of Mr. Anderson, seconded by Mr. Stevens, unanimously VOTED that the matter is laid on the table.

68) Mr. Smith assumed the chair at 2:24 P.M.

69) On motion of Mr. Sullivan, seconded by Mr. Grauer, after discussion, unanimously VOTED that the QSL Bureau guidelines for card retention be changed from one year to 90 days.

70) Moved by Mr. Carpenter, seconded by Mr. Thurston, that Article II of the Articles of Association be revised to read as follows: "No person shall be eligible for the office of Director, Vice Director, President, Vice President or Treasurer who has not been a full member of the League for at least four continuous years and who has not held continuously during that period a valid authorization as a radio amateur in accordance with the applicable laws and regulations of the United States or Canada prevailing at the time of his election and throughout his term of office. No persons shall be eligible for, or hold, the office of Director, Vice Director, President, Vice President, or Treasurer who is commercially engaged in the design, manufacture, distribution, sale, rental, installation, servicing or repair of apparatus, equipment or components intended for use in radio communication; is commercially or governmentally engaged in frequency allocations planning or implementation; or is engaged commercially in the authorship or publication of books, manuals or periodicals directed in whole or in part for consumption by radio amateurs, or is commercially engaged in offering or performing services primarily for or on behalf of radio amateurs. Apparatus, as used in this article, means a number of components which, when assembled, performs a function." On motion of Mr. Nathanson, seconded by Mr. Anderson, unanimously VOTED that the Board does now, at 2:35 P.M., resolve itself into a Committee of the Whole for the purpose of discussing this motion. The Committee rose and reported to the Board at 3:10 P.M. On motion of Mr. Nathanson, seconded by Mr. Powell, unanimously VOTED to amend the motion, striking all changes with the exception of the addition of "Treasurer" to the list of enumerated officers. The question then being on the motion as amended, a roll call vote being required, the same was ADOPTED, with all Directors voting in favor.

71) Moved by Mr. Bieberman, seconded by Mr. Butler, that the Management and Finance Committee study the possibility of establishing a reduced membership fee for handicapped persons, and senior citizens living on a fixed income, on a case by case basis, depending on need, and report on same at the next board meeting. On motion of Mr. Stevens, seconded by Mr. Anderson, VOTED that the matter is

laid on the table.

72) Moved by Mr. Powell, seconded by Mr. Stevens, that the General Manager and Technical Staff prepare and publish on an annual basis, a compilation of technical articles that have been accepted during the calendar year but not published in QST because of time and space constraints. On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED that the matter is referred to the Membership Affairs Committee for study.

73) Moved by Mr. Miller, seconded by Mr. Bieberman, that the Membership Affairs Committee study methods by which the publishing of "State of the Art" articles can be accelerated. But, after discussion, the motion was LOST.

74) On motion of Mr. Zak, seconded by Mr. Wicker, unanimously VOTED that the Board of Directors instruct the ARRL delegate to the 1980 IARU Region 2 conference to expose and support the principle of region-wide uniformity in the subdivision by transmission modes of the new high-frequency bands which are to become available to the Amateur Radio Service as the result of the 1979 World Administrative Radio Conference.

75) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the staff is directed to seek amendment of present FCC interim permit procedures so as to provide that such permits will not expire prior to the issuance by the Commission of the new license which replaces the permit. The Board was in recess from 3:36 to 3:48 P.M.

76) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the General Manager encourage the membership to indicate to foreign amateurs their true intention or desire to send or receive QSL cards.

77) On motion of Mr. Sullivan, seconded by Mr. Grauer, the following resolution was unanimously ADOPTED: "Whereas the final courtesy of a contact by Amateur Radio is the QSL, and whereas, QSLs move from originator to recipient almost entirely by "volunteer power," and whereas, hundreds of anonymous amateurs give up operating time at their own stations to keep the QSLs flowing, and whereas, the usual praise they receive is simply the absence of complaints, now therefore, BE IT RESOLVED by the Board of Directors of the American Radio Relay League in meeting assembled in Seattle, Washington this 24th day of July 1980, that the Board does extend to each one of these unsung workers a hearty thanks and well done."

78) On further motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the resolution commending the QSL bureau personnel be presented to and personalized for each member of the incoming QSL bureaus.

79) On motion of Mr. Thurston, seconded by Mr. Wicker, unanimously VOTED that the ARRL delegate to the 1980 Region 2 IARU conference is instructed to encourage region-wide participation in the Intruder Watch program and to assure the delegates of the full support of ARRL, as the IARU headquarters society, for this important program.

80) On motion of Mr. Powell, seconded by Mr. Anderson, unanimously VOTED that the General Manager initiate as soon as possible a membership mailing campaign for the Canadian division, similar to the recent one for U.S. divisions. Computer tapes available from the DOC or Callbook lists can be used for non-League-members mailing, and liaison should be with the Canadian Division Director or Delegate.

81) On motion of Mr. Miller, seconded by Mr. Holladay, VOTED to remove from the table the motion concerning Docket 80-252. On motion of Mr. Anderson, seconded by Mr. Wangler, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: that the General Manager is requested to file comments in Dockets 80-252 supporting the commission's proposals with respect to A4, F4, A5 and F5 emissions. The question then being on the motion as amended, the same was unanimously ADOPTED.

82) Moved by Mr. Miller, seconded by Mr. Zak, that the Board of Directors requests the VHF/UHF Advisory Committee to examine the possibilities for establishing recommended band segments for digital data communication, including ASCH, Baudot and packet transmissions employing 16F2 emission, in the 50, 144, 220 and 420 MHz bands, with the results of the committee's study to be reported to the Board not later than November 1, 1980. After discussion, on motion of Mr. Wicker, seconded by Mr. Anderson, unanimously VOTED that the matter is laid on the table.

83) On motion of Mr. Anderson, seconded by Mr. Wicker, unanimously voted that, in view of present economic conditions, and in the interest of effecting all possible expense control, the Management and Finance Committee is directed to study the scheduling of meetings and associated travel expense of elected and appointed officials, and make any recommenda-

tions at the next board meeting.

84) On motion of Mr. Zak, seconded by Mr. Sullivan, the following resolution was unanimously ADOPTED: "Whereas the Department of Communications of Canada has recently amended the regulations pertaining to reciprocal operations in Canada by visiting alien amateurs and whereas, those regulations are being presently interpreted to limit the privileges authorized to alien operators to those of the licensing authority of the amateurs' home nation, and whereas, Canada is the only nation known to have introduced such limitations, and whereas, in most nations reciprocal operation is based upon the requirements that visiting operators shall comply only with the licensing conditions of the host nation, and whereas, the 48 member societies of the Region 1 Division of the IARU have now requested that the Department of Communications return to the previous interpretation of alien privileges which is consistent with world practice, now therefore BE IT RESOLVED by the Board of Directors of the ARRL, that the Canadian Division Director is requested to seek a return by the Canadian Department of Communications to an interpretation of reciprocal amateur operating privileges which is consistent with world practice."

85) On motion of Mr. Grauer, seconded by Mr. Oubre, unanimously VOTED that the General Manager investigate the cost of a metal diamond for sale, to be mounted on the auto license plate or bumper.

86) On motion of Mr. Eaton, seconded by Mr. Powell, unanimously VOTED that the Board of Directors of the American Radio Relay League extends its sincere thanks to the Radio Club Portuense for undertaking the responsibility of hosting the triennial conference of IARU Region 2, to be held in Lima in October of this year.

87) On motion of Mr. Eaton, seconded by Mr. Smith, the following resolution was unanimously ADOPTED: "Whereas Mr. Roy F. Stevens, G2BVN, was first licensed as an Amateur Radio operator in the United Kingdom in 1937; whereas since that date he has amassed an unparalleled record of service to Amateur Radio internationally, particularly in his performance as Secretary of the IARU Region 1 Division; whereas his career has included service in a variety of volunteer posts for the Radio Society of Great Britain; whereas he has served as an advisor to the United Kingdom delegation to a number of conferences of the International Telecommunication Union including the 1979 World Administrative Radio Conference; and whereas his accomplishments and contributions in these capacities have inspired Her Majesty Queen Elizabeth II to name him as a Member of the Order of the British Empire, now therefore, BE IT RESOLVED that the Board of Directors of the American Radio Relay League does hereby convey to Mr. Roy F. Stevens, G2BVN, its most sincere congratulations on his being accorded this honor."

88) Moved by Mr. Butler, seconded by Mr. Sullivan, that By-Law 25 be amended by deleting from Line 52 the phrase "and the Canal Zone." A roll call vote being required, the motion was ADOPTED, with all 16 directors voting in favor. The Board was in recess for dinner from 5:55 to 8:00, reconvening with all persons heretofore mentioned present except Mr. Smithwick.

89) On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED that in view of the reassessment of communications needs now under way by the disaster response community as a result of the creation of the Federal Emergency Management Agency, the General Manager is directed to initiate contact with the American Red Cross to assure that the current requirements for disaster communications are clearly understood and that appropriate action is taken to enable the Amateur Radio Service to strengthen its contribution in this important area.

90) On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED to lift from the table the motion concerning recommended band segments for digital data communication. On further motion of Mr. Holladay, seconded by Mr. Nathanson, unanimously VOTED to amend the motion by striking the phrases "including ASCH, Baudot and packet transmissions employing 16F2 emission" and "not later than November 1, 1980." The question then being on the motion as amended, the same was unanimously ADOPTED.

91) There followed informal remarks by all those present. There being no further business, on motion of Mr. Sullivan, seconded by Mr. Wicker, the Board adjourned, *sine die*, at 10:26 P.M. Total time in session as a Board 18 hours 49 minutes; as a Committee of the Whole 35 minutes; total direct authorizations \$10,000.

Respectfully submitted:
Richard L. Baldwin, W1RU
Secretary

Rules Adopted for Amateur Satellite Service (ASAT)

FCC has adopted formal rules for the Amateur Satellite Service (ASAT). The International Telecommunication Union established the service at the World Administrative Radio Conference for Space Telecommunications (Space-WARC) in 1971. The new FCC rules will add another subpart to Part 97 effective November 3, 1980. Under the new rules, licensees of space stations will no longer have to apply for a lengthy series of waivers of the rules applicable to terrestrial Amateur Radio communications. The ASAT rules will list the frequencies allocated to amateur space operations, but it

will not include the additional frequencies allocated to ASAT at General-WARC 1979 because they will not be effective until January 1982 and U.S. Senate ratification.

The Commission has adopted international coordination of space operation as proposed in the Notice of Proposed Rulemaking in Docket 19852. (See February 1980 *QST*, page 80.) However, it could waive the first notification at 27 months and possibly the second at 15 months. But it pointed out that the amateur licensee would run the risk of later being directed to cease operation in favor of a

previous space operation or for avoiding interference to other radio services because of incomplete international coordination.

The new rules will permit any Amateur Radio operator, with FCC authorization, to be the control operator of a station in space operation. Also, the Commission said it saw no useful purpose for the space station licensee to log the third-party traffic passing through the satellite. League members may obtain a copy of the new rules by sending a long self-addressed, stamped envelope to ARRL Hq., Newington, CT 06111. Please ask for "ASAT Rules."

SECRECY PROVISIONS APPLIED TO HAMS, GUYANA TAPES WITHHELD

The United States District Court of the District of Columbia has denied author James Reston, Jr., copies of tape recordings made by the FCC of Amateur Radio contacts between stations associated with the People's Temple religious organization.¹ Reston, who is compiling material for a book about the tragic mass suicide at People's Temple settlements in Guyana, South America, had filed a request for the tapes under the U.S. Freedom of Information Act. The FCC had amassed 25 tape cassettes and four larger reels of tape in the course of its investigation of rule violations by stations WD6DVI and WA6DTJ in San Francisco, California, and WB6MID/8R3 and WB6MWH/8R1 in Jonestown and Georgetown, Guyana. Prior to Reston's FOIA request, the only release of tapes by the Commission was made under subpoena to a federal grand jury in California and to the Committee on International Relations of the U.S. House of Representatives, both of which were investigating the events in Jonestown which led to the deaths of U.S. Congressman Leo Ryan and others.

FCC had in July 1979 turned down Reston's request for the tapes, citing the Secrecy Provisions of the Communications Act of 1934 (Section 605). The Commission also cited a rule which barred disclosure on the basis that such disclosure would interfere with the ongoing law enforcement proceedings of the California grand jury. Reston appealed the Commission's decision to the Federal District Court, and the Court agreed with the Commission's argument that the tapes be denied under the Secrecy Provisions.

District Court Judge Joyce Hens Green, in a 20-page decision, noted that section 605 of the

Communications Act provides few exceptions to the rule that "no person receiving . . . [or] . . . transmitting any interstate or foreign communication by wire or radio shall divulge or publish the existence, contents, . . . or meaning . . . to any person other than the addressee . . ." The last sentence of Section 605 states, "This section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication which is broadcast or transmitted by amateurs or others for the use of the general public, or which relates to ships in distress."

The controlling question is whether all Amateur Radio communications are exempted from the Secrecy Provision, or whether only those amateur transmissions directed to the general public are exempt. Judge Green's decision reviewed the legislative history of Section 605 back to the Radio Act of 1912, but decided that the intent of Congress is unclear. However, when she took note of the grammatical syntax of the controlling phrase and related its construction to international agreements and treaty provisions involving radio communications, it appeared, on balance, that amateur communications *are* protected by the Secrecy Provisions. The only exception would be if the communications are intended for the use of the general public. A "CQ," for example, would be exempt from the Secrecy Provisions.

Because the tapes of Amateur Radio contacts between People's Temple stations were not intended for the use of the general public, Judge Green held that the communications were protected under the Secrecy Provisions of the Communications Act. Therefore, judgment was made in favor of FCC and Reston was not allowed access to the tapes.

LEAGUE FAVORS PROPOSAL TO SIMPLIFY AMATEUR I-D

The FCC, in Docket 80-136, has proposed to amend its rules to simplify station identification by amateurs. The proposed amendment seeks to remove the present requirement in §97.84(a) of transmitting the call sign of the corresponding station at the end of the contact unless international third-party communications is involved. (See "Happenings," June, 1980 *QST*.)

In comments filed July 16, 1980, the ARRL expresses support for the Commission's proposal, which would ". . . make operation more efficient and convenient, and save air time for stations engaged in emergency communications and other forms of high volume radio traffic by which amateurs continue to serve the public." The League also heartily endorses the proposed exception when international third-party traffic is involved, thereby facilitating the task of monitoring and enforcement, and preserving the effective self-regulating activities of the Amateur Radio Service.

In addition, the League feels that one identification might be sufficient for extremely brief communications of 30 seconds or less. Communications involving message-handling, emergency traffic and contest exchanges often take place in less than 30 seconds — a single identification would greatly facilitate these types of operating. Accordingly, the League proposes that the Commission consider an additional amendment of §97.84(a) to allow stations to identify only once during an exchange of less than 30 seconds' duration.

In its closing remarks, the League expresses its appreciation for the Commission's perception of the need to relieve the Amateur Service of unnecessary restrictions and hopes that the proposals will be enacted as soon as is practicable. *Rick Palm, K1CE*

YL ISSB MEMORIAL SCHOLARSHIP FUND

The officers of the Young Ladies International Single Sidebanders, Inc. and the directors of the ARRL Foundation are pleased to join efforts in the sponsorship and administration of a new scholarship. The \$300 award, entitled the YL ISSB Memorial Scholarship, will be given in September of each year to a qualified student who demonstrates an interest in pursuing electronic, technologic or radio-oriented studies. Precedence in selecting the recipient shall be shown to licensed radio amateurs and to members of YL ISSB, or relatives of deceased members. Academic merit and financial need shall be determining standards for all applicants, and transcripts, confidential financial statements and character references may be sought to establish these qualifications. Interested applicants are invited to request fur-

¹Reston v. Federal Communications Commission, U.S. District Court for the District of Columbia, No. 79-2476 (1980). Editor's Note: ARRL has consistently supported clarification of this point in Section 605 through the various proposed amendments and rewrites of the Communications Act. The League supports exempting amateur communications from the Secrecy Provisions.

*Deputy Manager, Membership Services, ARRL.

ther information and application forms from the ARRL Foundation Secretary-Director Andrea T. Parker, K1WLX, c/o ARRL Hq. Deadline for filing completed applications for the 1981 YL ISSB Memorial Scholarship is May 1, 1981. — *Andrea T. Parker, K1WLX*



NEW WASHINGTON, DC NEWSLETTER

In July, Hq. unveiled a new publication that, unlike other ARRL publications, isn't written for hams. *AMATEURADIO*, a newsletter about amateurs written for non-amateurs, is designed to be a reliable source of information for federal decision-makers whose policies affect the Amateur Radio Service.

Each month, *AMATEURADIO* gives federal legislators and regulatory officials news of the latest developments in Amateur Radio — from the recent happenings in the amateur satellite program to amateur public service activities such as those during the recent Mount St. Helens eruptions — as well as hard-hitting commentary on FCC and congressional actions affecting our hobby. — *Andrew Tripp*

REPEATER ENDORSEMENT ON LICENSE NOT FEASIBLE — FCC

FCC had denied a petition, RM-3461, which requested the Commission to require an Amateur Radio station license endorsement to authorize repeater operation. The Ohio Area Repeater Council (OARC), Circleville, Ohio, which brought the petition, argued that it is impossible for frequency coordinators to learn of new repeater stations until the stations become a source of interference. OARC contends that an endorsement on the license would give voluntary coordinators the notice they need to coordinate amateur repeater frequency usage and solve actual or anticipated interference problems. The endorsement would be a statement by the applicant that he/she has gotten the approval of the frequency coordinating group for the repeater's coverage area or a statement that no frequency coordinating group exists for that area. OARC further contends that many repeater groups have abandoned efforts to coordinate frequencies, and that voluntary self-regulation is breaking down in the face of irresponsible action by a defiant minority.

After reviewing OARC's petition, the Com-

mission concluded that a repeater endorsement is not feasible. "There is no central recognized organization that is willing to undertake such frequency coordination for repeater operations. . . . Furthermore," the Commission summarized, "in view of our own limited resources for licensing stations in all private radio services, we do not feel that an additional endorsement on the station license would be warranted."

MOVE TO BAN CLOSED REPEATERS, LOWER POWER, FAILS

The FCC has denied a petition which requested that "closed" repeaters be banned from the Amateur Radio Service. Closed repeaters are repeaters whose access is limited to stations using tone-bursts, sub-audible tones, or other devices and procedures not generally used by other radio amateurs. Jones P. Talley, W5TJE, of Dallas, Texas, submitted the petition, RM-2844. Mr. Talley said he feels that the Amateur Radio Service should remain open and clear for all properly licensed Amateur Radio operators. He also requested the Commission to decrease the maximum power allowed to repeaters because most repeaters cover more than just a local area, thereby causing interference between repeaters in surrounding areas.

In its statement denying the petition, FCC said it could not agree with a stance "forbidding a station in repeater operation to be closed to anyone. . . . The control operator of the station must be in a position to deny access to any person who is violating our rules." The Commission also reasoned that a more fundamental principle was at stake. "At all times, the control operator of a station is responsible for the proper operation of the station. Open repeaters would militate against that basic operator accountability."

Also, the Commission could not agree with Mr. Talley's proposal that the maximum power levels allowed repeaters be lowered, because "less power may always be used." "In fact, we expect Amateur Radio operators to take appropriate means to avoid interfering with each other's transmissions. Amateur Radio licensees have always been known for self-disciplining and a cooperative spirit in the use of Amateur Radio frequencies. There is no reason to believe that they have relinquished working together to solve mutual usage problems."

AUTOMOTIVE IGNITION INTERFERENCE DOCKET HELD OPEN

The Commission has decided to continue its inquiry into electromagnetic interference caused by spark-type ignition systems in motor vehicles. Docket 20654.

In its action, the FCC noted its field surveys have shown that "the major portion of radio frequency man-made noise in the spectrum above 25 MHz is created by the ignition systems of motor vehicles." This indicates a clear signal to the motor vehicle industry that it must take further steps to suppress ignition radiation and protect radio communications from ignition interference. The Commission said although it appreciated efforts made by motor vehicle manufacturers to date, sufficient progress has not been made toward developing cost-effective devices that would decrease ignition radiation.

In continuing its inquiry, the Commission said it would not impose regulation at this time, but would keep the proceeding open for possible future action. The Commission will continue to accept comments from parties affected by ignition noise. — *FCC News Release*

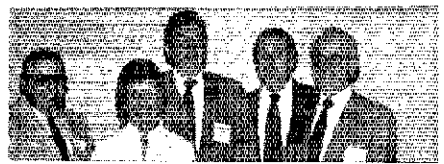
PHONE PATCH SUB-BANDS PROPOSAL DISMISSED

The FCC has dismissed a petition to establish sub-bands within the existing amateur frequencies where third-party phone patch traffic must be conducted. RM-3074, submitted by John P. Weber, Jr., of Melbourne, Florida, asked that the sub-bands be established to aid the Commission in policing the bands for illegal third-party traffic and to reduce interference to other stations.

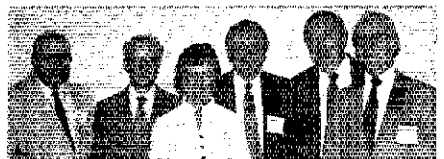
In its statement denying the petition, the FCC said it was more desirable to allow amateurs the flexibility of choosing the frequencies for phone-patch traffic. Moreover, it expected that such sub-bands might encourage more phone-patching and thus exacerbate interference problems. The Commission also stated that it expected amateurs to "solve frequency-sharing conflicts by cooperating with each other in the use of the resource, rather than calling for the Government to impose more regulations."

HAMS PARTICIPATE IN IEEE ELECTRO/80

Because of space limitations in last month's "Happenings," a news item about "ARRL-Organized IEEE Technical Sessions" was presented without the photographs and credit lines for the technical speakers of our two sessions at IEEE ELECTRO/80 in Boston. Shown here are group pictures of the principals of Sessions 5 and 8. Missing is Dr. Ulrich Rohde, DJ2LR, who had to leave immediately after his paper was given. The ARRL extends its deep gratitude to those amateurs who gave of their time and money to participate in ELECTRO/80 and past IEEE programs organized by the ARRL. — *Doug DeMaw, W1FB*



Session 5 participants, left to right, are ARRL Director John Sullivan, W1HHR; ARRL Technical Secretary Marian Anderson, WB1FSB, who chaired both sessions; Mike Elliot, W8KRR, from R. L. Drake Co.; Doug DeMaw, W1FB, from ARRL Hq., and Ed Oxner, KB6QJ, from Siliconix, Inc. Not shown in this photograph is speaker Ulrich Rohde, DJ2LR, of Rohde & Schwarz Sales Co., USA.



Session 8 was presented by (left to right) W1HHR: Nat Sokal, WA1HQC, of Design Automation; WB1FSB: Jerry Sevick, W2FMI, from Bell Labs; W1FB and KB6QJ.

A Safari Through the Technical Standards Jungle

The word *standard* implies consistency and order — and the maintenance thereof is what the Technical Standards section of the FCC rules are all about. Although amateurs have traditionally been self-directing, the Commission has established these standards as a basic framework so that the seemingly infinite number of facets of the hobby can peacefully coexist within a finite resource — the Amateur Radio spectrum. So, to avoid a bungle in the jungle, let's take a safari through this intriguing subpart: The Technical Standards.

Q. Where in the rules can authorized frequencies and emissions for the Amateur Radio Service be found?

A. Subpart C contains, in §97.61, a table listing all amateur frequency bands and types of emissions allowed on each. The classification of emissions can be found in Subpart H, Appendix 3, which defines the emission symbols A0, A1, A2, A3, A4, A5; F1, F2, F3, F4, F5 and P.

§97.61 also contains a table showing all power limitations, in all geographical areas, on the 160-meter band. The reason for these 160-meter restrictions is that the band is used by amateurs on a shared basis with the LORAN-A radionavigation system, and interference must be avoided.

Within the authorized frequencies and emissions, a control operator may select and use a frequency that is consistent with his license class privileges only (97.63[c], 97.7).

Q. I heard recently that amateur TV and facsimile are being considered for authorization in all voice bands above 80 meters. What's the story?

A. The Commission has proposed a rule change which, if adopted, would permit amateur television and facsimile on all amateur frequencies above 3.775 MHz where voice transmissions are currently allowed. Presently, on amateur bands between 80 meters and 15 meters, amateur television is restricted to the Advanced and Amateur Extra Class subbands. Bandwidth restrictions in §97.65 of the rules that presently apply to amateur TV below 225 MHz would also apply to the expanded TV and facsimile privileges below 225 MHz. Comments on this proposal, in Docket 80-252, are due September 22, 1980. Reply comments are due October 22, 1980. See "Happenings," August 1980 *QST*, page 57, for details.

Q. How about maximum authorized power in the ham bands?

A. No doubt every amateur knows that the maximum power input authorized is 1000 watts — but this isn't always the case! Section 97.67(b) of subpart C says "... amateur stations shall use the minimum amount of transmitter power necessary to carry out the desired communications." How many hams do you know who violate this rule every day? Ad-

ditionally, stations are limited to 250 watts of input when operating within the Novice subbands (97.67[d]). Further power restrictions in certain geographic areas and bands are defined in §97.61(b). Section 97.61(c) and (d) specify frequencies available for repeater and auxiliary station operation.

Remember that if you're running over 900 watts to the plate circuit of your amplifier, you must provide a means of accurately measuring the plate power input to the vacuum tube(s) supplying power to the antenna (97.67[a]).

Q. What are the rules governing ASCII and RTTY?

A. Section 97.69 applies to digital transmissions. Subject to certain limitations, the use of the Baudot and ASCII codes are permitted "for such purposes as (but not restricted to) radio teleprinter communications, control of amateur radio stations, models and other objects, transfer of computer programs or direct computer to computer communications, and communications in various types of data networks (so-called "packet switching systems"). §97.69 (a) and (b) restrict transmitting speeds and frequencies. For further information on ASCII, see "Washington Mailbox," June 1980 *QST*. Further details on RTTY can be found in "Washington Mailbox," November 1979 *QST*.

Q. What are the restrictions concerning purity of emissions?

A. "... all spurious emissions or radiation from an amateur transmitter, transceiver, or external radio frequency power amplifier shall be reduced or eliminated in accordance with good engineering practice" (97.73[e]). A spurious emission is any emission or radiation which is outside the authorized Amateur Radio Service band being used. Section 97.73(a) and (b) further defines standards of attenuation for spurious emissions from a transmitter, transceiver or external rf power amplifier built after April 15, 1977, or first marketed after January 1, 1978.

"If any spurious radiation, including chassis or power line radiation, causes harmful interference to the reception of another radio station, the licensee may be required to take steps to eliminate the interference in accordance with good engineering practice" (97.73).

Q. I am the proud owner of an old Model BA-1 (Boat Anchor-1) transceiver, but it's not very stable. What are the requirements concerning frequency measurements?

A. There's a rule in Subpart C (§97.74) that states: "The measurement of the emitted carrier frequency or frequencies shall be made by means independent of the means used to control the radio frequency or frequencies generated by the transmitting apparatus and shall be of sufficient accuracy to assure operation within the amateur frequency band used." So, if you were operating a separate transmitter and receiver combination, you'd be okay. But using just a transceiver could conceivably be in violation of this rule because the same VFO

used to control the transmit frequency also determines the receive frequency. Note, however, that you only have to measure the carrier frequency accurately enough to guarantee that it falls within the authorized amateur band. Usually a crystal calibrator is sufficient to do this, and many manufacturers install them in transceivers. Your receiver or crystal calibrator should be checked from time to time against WWV or some other accurate standard. Outboard frequency counters are also becoming popular as a means of accurate frequency measurement (97.74).

Q. Is it illegal to use amplifiers on 10 meters?

A. No — amateurs may use amplifiers capable of operating on 10 meters. In 1978, the FCC banned the manufacture and marketing of any external rf power amplifier or amplifier kit that is capable of operation on any frequency below 144 MHz, unless the FCC has issued a grant of type acceptance for that model amplifier. This ruling makes it impossible to buy a new, commercially manufactured amplifier capable of operation on 10 meters, but the Commission will allow those amateurs with the appropriate class of license to modify an amplifier to restore or include 10-meter capability (but an amateur may not modify more than one unit of the same model amplifier in any year, without a grant of type acceptance) (§97.75[b]).

Q. Sections 97.75, 97.76 and 97.77 pertain to rf power amplifiers, standards and something called "type acceptance." Just what is this type acceptance?

A. Type acceptance is an equipment authorization granted by the FCC. It is based on data submitted by the manufacturer concerning equipment that is to be used in the proper manner of the service for which it has been accepted (FCC rules, §2.905(a), subpart J). This acceptance applies to all identical units marketed by the grantee. Amplifiers capable of operating below 144 MHz are the only sort of amateur equipment requiring type acceptance. A list of type-accepted equipment may be inspected at FCC headquarters in Washington, DC, or at any FCC District Office. (For more information on amplifier restrictions and type acceptance, see "Washington Mailbox," March 1979 *QST*.) Sections 97.75, 97.76 and 97.77 in subpart C specify restrictions, and standards for type acceptance, as they pertain to rf power amplifiers.

One final note — although not included in subpart C, §97.78 in subpart D is important: "Practice to be observed by all licensees. In all respects not specifically covered by these regulations each amateur station shall be operated in accordance with good engineering and good amateur practice." [97.78]

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at AKRL, have been reviewed by FCC staff. Interpretations contained herein concur with those of the FCC's Personal Radio Branch. Numbers in parentheses refer to specific sections of the FCC rules.]

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Correspondence

Conducted By Bruce R. Kampe,* WA1POI

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

20-METER RAZZMATAZZ

□ W6KPC was so enamored with the computer-controlled Razzmatazz aspect of his Collinear Yagi Sextet (June 1980 QST) that he forgot to relay to the DXing membership the core, the essence, indeed the very "stuff dreams are made of" in his article, specifically, the performance of the antenna itself.

Enough with binary bits! Milliseconds, cease and desist! Pray tell us W6KPC, what happened when you tuned across the low end of 20 meters and called "CQ DX"? This mono-band-dipole-city-dweller-type can only drool at the very thought! — Edward Peter Swynn, VESCU1, Whitby, Ontario

BILLION DB PATH LOSS

□ Please pass my congratulations on to the Canadian Dominion Observatory for having an excellent antenna system, or at least fantastic luck with their propagation.

I have just returned from seeing *The Empire Strikes Back*, and I was amazed to discover that while on the planet Hoth, the Rebel Alliance makes good use of the signals emanating from CHU.

I must wonder, though, I can understand how CHU gets through to Hoth, even though it is "in a galaxy far, far away . . ." but how the devil do they get around the "long, long ago" problem? What would the Rebellion want with Eastern Standard Time, anyway?

Is it true that Darth Vader operates on CB under the handle "Lukedaddy"? — Ron Notarius, W3NVAW, Boalsburg, Pennsylvania

[Editor's Note: Upon hearing CHU while viewing *The Empire Strikes Back*, this editor was so surprised he almost spilled popcorn all over his date. We've heard Darth and "The Empire Radio Club" can be found using ASCII-encoded speech near the hydrogen line frequency. Amateurs who can afford subspace radio receivers may hear the Klingon Empire from the future, but that's another story.]

5NN BUT NO COPY

□ I read with interest and some amazement the reprinted article by DJ7DO regarding the RST system in "Operating News" for July 1980 QST.

The statement is made: "what commercially produced equipment nowadays will produce other than 19 quality in general?" Take any of the engineering monstrosities which use a "pure" 1000-Hz signal and the VOX to generate the cw signal. If there are disbelievers, I suggest listening to these signals in the a-m mode with the ave off. Notice the hiss? That is splatter due to impurities in the audio note. Shift back to the cw mode and listen carefully just above and below the main signal. Those are not instant echoes, they are spurious signals due to audio harmonics. Most of the commercially made equipment have peculiarities such as the above, they also possess the equally exasperating loss of the first dot sent due to delay in VOX coming on line. — Rue O'Neill, W0NN, St. Louis, Missouri

□ Darn right that system needs changes; what

a farce. That "Q idea" seems very simple and worthy, but what about the SINPO system?

Something should be in standardization for hams worldwide. The SINPO system has long been in use but has not won total adoption. Although a little bulky and hard to remember, it is very comprehensive and as a whole the best yet. — Clement Bourgeois, Jr., NSADK, Erath, Louisiana

[Editor's Note: SINPO is a thorough rating system traditionally used by SWLs. It involves five parameters, each on a scale of one to five: signal, interference, noise, propagation and overall merit.]

□ Perhaps the RST system should not last until Judgement Day but for non-fm work the RS system should. On the low bands it is possible for a station to be S9 and still be R3 due to QRM or QRN. S-reports are an aid in antenna work, loading and rig adjustments.

I would like to see an S-meter which gives readings in dB over noise or dB over average signal level on the band. I used to give reports like that when I had a spectral display. — David L. Wiesin, K2VX, Newark, New Jersey

□ It is apparent the author never worked much cw under trying conditions, nor does he work on his own gear. Also, poor tone quality is sometimes an indicator of transmitter trouble.

Last September I went on the air with a manufactured rig. After a bad tone report I shut down and went on a dummy load to check out the transmitter. After about 15 minutes on the dummy load my finals blew. Four days later I received a letter from another ham indicating my on-the-air signal was so broad it was over the band edge. Had I not gotten the RST report and acted upon it, I would have been broadcasting broad QRM for an additional 15 minutes. When one is putting out a really bad signal most hams will help by letting one know, and the RST system is the quickest way to indicate this condition on cw.

The author says RST is redundant, but I think it's the most important information in the QSO. — Jack Birdwell, WD5CAA, Clinton, Arkansas

□ It is quite correct that a scale of nine divisions (S1 to S9) is probably too detailed for practical amateur use. Let us suppose the normal voltage range across the receiver input terminals is from 1 to 50 microvolts, or a 34 dB range. One could call this range approximately 36 dB and divide it into five normal 6-dB steps plus a "plus" step for the kilowatt set. Psychologists tell us that a smaller number of scale graduations, five instead of nine, are more easily evaluated by the human nervous system.

Misadjustment might mar the tone of the finest transmitter and troubles the operator may not be aware of can develop. Those of us, particularly among the QRP-set, who continue to build and use home-built transmitters, need and appreciate a cw tone-quality scale.

To conclude, we propose a five-unit scale for all units of the present RST signal report system. With such a scale, the average signal report would be RST 434. Only the super-signal would rate an RST 555. Handing out

5NN reports to everyone might possibly be curtailed. We thank Mr. Hertzler for stimulating our thoughts in this direction. — C. F. Rocky, W9SCH, Albany, Wisconsin

ON-OFF, HI-LO, YES-NO

□ The lead editorial by Perry F. Williams, WIUED, in the June 1980 QST on "Digital Licenses: Yes or No?" may give a misleading impression when it asks, "Should the United States follow the example of Canada . . . and produce a new class of license — above the Novice level — for digital scientists and experimenters?"

The Canadian Amateur Digital Operator's Certificate is based on a level of knowledge far above that required for the U.S. Novice license.

The candidate for the Amateur Digital Radio Operator's Certificate does not demonstrate proficiency in Morse code, but does write a three-hour examination on radio communication theory and operation at the same level of proficiency as a candidate for the Canadian Advanced Amateur Certificate. Also, the candidate answers questions on theory of communication, computing, analog and digital transmission, queuing theory, packet radio, microprocessors, error detection schemes and reliability, plus Canadian and International regulations.

It is not an easy "no-code" ticket, but reflects a specialized form of advanced communication. I hope that this clarification will relieve the anxiety in the Amateur Radio fraternity that an easy back door into Amateur Radio will be created by the introduction of a similar digital license in the United States — Stuart M. Fedak, VE3LOI, Ottawa, Ontario

□ No! A digital license is unnecessary and indeed outside the purview of the FCC! I side with those opposed to code-free licenses of any classification. Five words per minute just isn't that hard, and no other method of communication is so reliable and can be accomplished with such a minimum of equipment under emergency conditions.

A test on computer language and techniques is completely foreign to the charter of the FCC. A fair examination would be extremely difficult to prepare. What languages would be represented? Should the test include machine languages?

The commission has no more right to tender such tests than it does to give a singing test to a performer. The charter for the commission is to regulate communication over the air, not the methods for generating the intelligence that is transmitted! The fact that an individual is capable of writing a computer program or building an interface has nothing at all to do with his or her qualifications as an amateur.

Already, the license class of Technician would allow a person without a lot of interest in cw to zing his *Star Trek* games over the air. A digital license makes no more sense than offering a code-free license to chess players for 1215 MHz if they can pass a test on chess rules. — LeRoy J. Kniskern, WB4DQZ, Christiansburg, Virginia

*Membership Services Assistant, ARRL



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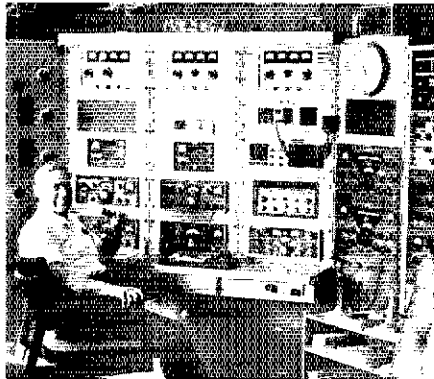
1979 "Amateur of the Year" Plans New Radio Museum

Fred Hammond, VE3HC, is one of the best-known amateurs in Canada. We visited him recently, and thought you might be interested in what he's doing.

One thing Fred has been doing for years is assembling a very impressive station. He has a lot of equipment. It's all mounted on racks and takes up an entire room of his house. Fred's philosophy is "A separate rig for each band." Above the Collins S-Lines are homebrew linears, one each for 75, 40 and 20 meters. To the left are banks of antenna tuners and rotator controls. To the right is a rack of receivers, mostly vintage Collins, just for listening.

Behind the house is Fred's antenna farm. Separate three-wire dipoles for 160, 75 and 40 meters are strung between towers and telephone poles and fed with open-wire line. The towers are all high, and the quads and Yagis they carry are homebrew, large and ruggedly built. The seven-element, 20-meter Yagi long ago overpowered its rotator, and now sits locked on western Canada, where Fred maintains skeds with friends.

Also behind the house is the radio museum. Fred began serious collecting 20 years ago, and assembled the museum about 10 years ago. The museum building is a single room, about 450 square feet. Shelves on one wall display radio parts, among which are several DeForest audions and a rare Fleming valve. Shelves on three other walls display early broadcast receivers and amateur equipment, among which is a working rotary spark-gap transmitter, a Paragon RA-10 receiver — the same model that Paul Godley took to England for the 1921 trans-Atlantic tests — and a scanning-



Left: Fred Hammond, VE3HC, at the microphone. Right: An impressive collection of tubes is just one aspect of his extensive assortment of radio gear.

disc television set. In the center of the room is Fred's tube collection. The sockets are all wired, and the filaments all light up.

Many people have donated equipment, and Fred's collection has now outgrown the museum building. This fall, Fred will be moving his collection to the new Hammond Manufacturing plant in Guelph, Ontario. Visitors who enter by the front door will find on their right, a cafeteria designed to accommodate large groups of amateurs, and on their left, the new museum. Eighteen-hundred square feet of floor space will allow Fred to properly display equipment that now sits on shelves three units deep, or is not displayed at all. Fred also plans to construct working amateur stations of several different vintages,

Down the hall, visitors will be able to look in where Hammond Manufacturing will be building their new line of linear amplifiers and antenna tuners for the amateur market.

Fred is supposed to be retired, but he goes to the plant each day and still takes an active part in running Hammond Manufacturing. As an amateur, Fred keeps very busy. He is president of Southern Ontario Chapter QCWA and Guelph ARC, and an assistant director of the League. And Fred is always helping other amateurs — quietly, so no one will notice. Word does get around, however, and in 1979, Fred was named CRRL Amateur of the Year. There couldn't have been a better choice. Fred Hammond continues to be one of Canada's great radio amateurs.

DOC NEWS

DOC recently announced that reciprocal licensing agreements have been concluded with Haiti and Chile. There is not yet a third-party agreement with Haiti. Canadian amateurs may handle third-party traffic from stations in Bolivia, Chile, Colombia, Costa Rica, Dominica, El Salvador, Guatemala, Guyana, Honduras, Israel, Jamaica, Mexico, Nicaragua, Peru, Trinidad and Tobago, United States (including all territories and possessions), Uruguay and Venezuela. Canadian amateurs may not communicate with stations in Iraq, Kampuchea

(with the exception of NU1AA), Libya, Somalia, Turkey, Viet Nam and Yemen.

On June 18, DOC held a meeting in Ottawa to discuss domestic implementation of decisions made at WARC '79. Canadian League members were represented by CRRL President Mitch Powell, VE3OI. DOC acknowledged the excellent preparation and teamwork of IARU, the International Amateur Radio Union, at Geneva. (President of IARU is Noel Eaton, VE3CJ, who also attended the Ottawa meeting. CRRL is the Canadian membership society of IARU). At WARC '79, it had been recommended that a number of post-WARC mini-conferences be held, beginning in 1981. The DOC is organizing five Government/Industry Working Groups to prepare proposals and positions for these mini-conferences. DOC

invited CRRL to name a representative to each Working Group, to provide input on behalf of Amateur Radio.

Section 64.1(1) of the amateur regulations requires amateurs to obtain written permission from the master of a ship, and take adequate precautions not to interfere with a ship's other radio services, before installing an amateur station aboard a ship. So what's a ship? Ray Perrin, VE3FN, our man in Ottawa, did some research, and found that "ship" refers only to a "sea-going vessel." Amateurs operating from vessels in the Great Lakes, for instance, would not be subject to this regulation. Neither would amateurs operating from vessels of non-Canadian registry. Such vessels would be subject to the requirements of their country of origin.

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West Germany Revises Amateur Regulations

A major revision of the Amateur Radio regulations in the Federal Republic of Germany became effective on June 1. Since 1967 there have been three classes of amateur license in West Germany: Class C, for vhf only, with no Morse code requirement; Class A, with a power limitation but otherwise a full-privilege license; and Class B, the full-privilege license, which was available only to holders of the Class A license who had operated without complaint for one year. Most of the changes involve the Class A license, with existing holders of the Class A license automatically upgraded to Class B. The new Class A license will convey high-frequency operating privileges similar to those of the Novice license in other countries.

The Class C license permits the use of telephony, RTTY, FAX and ATV on frequencies above 144 MHz with a peak rf output power of 75 watts (formerly 10 watts plate or collector dissipation in the final amplifier). While all examinations include questions on

regulations and amateur operation with a passing mark of 65%, the technical part of the Class C examination has a passing mark of 50%. No knowledge of the Morse code is required. Call signs for Class C licenses begin with the prefixes DB, DC, DD and DG, followed by a single digit and a two- or three-letter suffix.

The Class A license conveys the following privileges: 150 watts of peak rf output power on cw and RTTY in the bands 3.52-3.60 and 21.09-21.15 MHz; 150 watts of peak rf output on all permitted modes in the amateur bands between 28 and 1300 MHz; and 75 watts above that frequency. The Class A applicant must pass a Morse code test at six words per minute, and the passing grade on the technical part of the examination is 65%. New Class A licensees will use call signs with the prefix DH followed by a single digit and a three-letter suffix.

The Class B license conveys full frequency and mode privileges with a maximum peak rf

power output of 750 watts (75 watts in the 160-meter band, 1.815-1.835 MHz, and above 1300 MHz). The code test is 12 words per minute, and the passing grade on the technical examination is 75%. Since the prefix blocks DF, DJ, DK and DL are almost exhausted, in the future the prefix DL will be issued followed by a single digit and a three-letter suffix.

The new regulations streamline administrative procedures in a number of areas and relax somewhat the former strict ban on maritime mobile operation aboard commercial craft. The Deutscher Amateur Radio Club successfully opposed the raising of the license fee from DM 3.-- to DM 5.-- per month (equivalent to \$1.70 and \$2.80, respectively). Unfortunately, DARC opposition to the cancelling of amateur privileges in the subband 2300-2320 MHz has been unsuccessful so far.

There are now more than 40,000 amateur licensees in the Federal Republic of Germany. -- DL1FL and DL1XJ, for the DARC

WARC HONORS

Back in January 1977 we announced the Albert L. McIntosh Award, to be awarded to that individual who, in the opinion of the judges, made the most outstanding contribution to WARC-79 in terms of preparation for and adoption of proposals favorable to the amateur service. The award was named in honor of K7AL, who had been an outstanding spokesman for Amateur Radio at the 1959 Geneva WARC and who had recently become a Silent Key. We refer you to page 41 of the January 1977 issue of QST for further details not only about the award but about the contributions of K7AL to Amateur Radio.

During WARC-79 it became obvious to the judges (VE3CJ, W2HD, HB9QC) that it was next to impossible to select that single individual who had made the greatest contribution, and finally three names were chosen. During the conference, and immediately afterwards, the Albert L. McIntosh Trophy was presented to Roy Stevens, G2BVN; Thormod Boe, LA7OF; and Charles Dorian, W3JPT.

Roy Stevens, G2BVN, past president of the Radio Society of Great Britain and long-time secretary of Region 1, IARU, has dedicated his whole life to Amateur Radio. Those of us who know him well have never ceased to marvel at the reservoir of energy he

calls upon to make it possible for him to participate actively in a number of areas. Steve is on the DXCC Honor Roll, he has been active in all phases of management and operation of the Radio Society of Great Britain, and he has been perhaps the single hardest worker in the International Amateur Radio Union for many years. He was instrumental in guiding Region 1 IARU societies in their preparation for WARC-79. He actively advised the British government on their preparations. He organized many Region 1 Conferences and Executive Committee meetings to enhance the work of Region 1. He traveled widely in support of WARC-79 preparations, and he established a rapport with ITU officials in Geneva second to none.

Tom Boe, LA7OF, is a long-time veteran of ITU conferences, and was Norway's number one spokesman in frequency-allocation matters at WARC-79. It was almost entirely the determined position taken by Norway, as presented by Tom, that prevented many countries from adopting or participating in footnotes that would have resulted in greater sharing of amateur frequencies by other radio services. He spoke forthrightly on the floor in support of Amateur Radio, and he participated in many of the unofficial meetings during which solutions were negotiated for sticky points which had bogged down on the floor of the conference. Tom Boe, LA7OF, was a conference delegate around whom the amateurs rallied on many a difficult occasion. He was, as one of the IARU Observer Team put it, "a tower of strength."

Chuck Dorian, W3JPT, a former Coast Guard communicator, has been active in international

telecommunications conference work for many years, and was a member of the U.S. delegation to WARC-79. Chuck was particularly active in pre-WARC preparation in the United States, and was able to provide a great deal of support for the amateur service, both during the preparatory phases and during WARC itself. A particularly important part of the work of the International Telecommunication Union is performed by the CCIR (International Radio Consultative Committee), which examines various technical questions with a view to aiding the work of the conferences. W3JPT is and has been heavily involved in this area of conference preparation, an area which has been particularly valuable for the Amateur Radio Service.

These three radio amateurs have been honored by the Award of the Albert L. McIntosh Trophy for their contributions to the success of Amateur Radio at WARC-79. Their dedication to Amateur Radio was to your benefit.

Each year the Queen of England honors certain British subjects who have performed some outstanding service on behalf of Britain. For Steve's contributions to telecommunications, the Queen this June announced the appointment to the MBE — Member of the Order of the British Empire — of Roy F. Stevens, G2BVN. This is a great honor for a citizen of Great Britain, and all of us on the western side of the Atlantic extend our congratulations to G2BVN, not only for the honor which has come to him but for the honor which he has brought to Amateur Radio. Having worked closely with G2BVN for the past 16 years, we know the honor couldn't have come to a finer person. -- W1RU

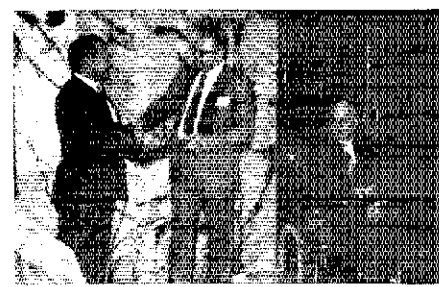
*Assistant General Manager, ARRL



Richard L. Baldwin, W1RU, IARU secretary, presents the Albert L. McIntosh Trophy to Roy F. Stevens, G2BVN, at an IARU reception during the closing days of WARC-79.



Harry Dannals, W2HD, ARRL president, presents the Albert L. McIntosh Trophy to Charles Dorian, W3JPT, at the QCWA banquet in Gaithersburg, Maryland, in March 1980.



W1RU presents the Albert L. McIntosh Trophy to Thormod Boe, LA7OF, while G2BVN looks on. The occasion was the IARU reception during December 1979.

Two-Meter Band Utilization: The Abitabilo-Reilly Report

The competition for 2-meter repeater space continues to grow more severe. Coordinated frequency assignment now takes months rather than weeks. When the band segment between 145.5 and 146.0 MHz became available, the competition for the channels between 146 and 148 MHz decreased. Now, this new space is filling up, too.

The demand on this limited set of frequencies has caused several problems. Interference between repeaters has worsened as power and coverage has increased, while the distance between repeaters has decreased. "Pirate" repeaters now operate, snubbing the recommendations of the local repeater coordination committees. Meanwhile, some repeaters are used infrequently and waste available space. Such repeaters benefit only a limited number of people and provide little benefit to the Amateur Radio Service as a whole.

Keep in mind that repeater frequencies are a fixed resource. Their use must be optimized.

The continued demand on the vhf spectrum raises several questions, which the amateur community must answer in order to obtain the most effective use of the spectrum. Who should own a repeater and who should use it? Where should the repeater be located? What kind of geographic coverage should a repeater have? What criteria should establish the right to exclusive use of a public facility?

Several actions have been taken as a result of the heavy demand in the 2-meter spectrum. Some may be harmful, such as the increased number of requests for federal regulation. Beneficial effects also have resulted. Repeater coordinating groups have been formed to plan effective use of the band. However, these councils at times have been seriously hampered in their ability to enforce their decisions because they require a large degree of cooperation by the users.

Increased volume of communications can come about through three mechanisms. The band can be expanded. Technical advancement can increase the number of channels in a band of fixed size; private line (PL) can increase the quality of operation by decreasing mutual repeater interference and eliminating transmissions not directed to the repeater. Continuous tone-coded squelch systems (CTCSS) can permit several infrequently used repeaters to share the same channel.

The third mechanism is band planning. For example, assignment according to repeater class can be made to clear-channel, wide-coverage repeaters or to low-power repeaters with local coverage. Wide-coverage repeaters could be used during emergencies or as calling channels operating in a remote-base mode. Ratchewing could be effectively handled on simplex channels of local repeaters. Assign-

ment of repeaters to groups who have similar interests or functions may also reduce the demand for frequencies.

The determination of channel assignment and repeater class will ultimately fall upon the coordinating committees that must make the decisions to optimize frequency usage based upon the activity in their area. In order to make effective decisions, the committee must be able to systematically determine whether members of a user group require the use of a limited coverage or wide-coverage remote base or repeater.

We had several reasons for becoming interested in this project. We have been asked not to hold a QSO on an "emergency channel." We have made a call on a channel, received no answer and a minute later, heard a second person have a QSO with a third. The major purpose of this project was to develop an effective method of monitoring all channel activity in a given locale to gather accurate information that is vital to the effective operation of the coordinating committees.

To accomplish this, we developed a system consisting of a KIM microprocessor and a Heath HW-2036 transceiver. The KIM permitted scanning the desired frequencies every six seconds. During each scan, the micro recorded whether or not each channel was used and tallied the number of channels being used simultaneously.

We set up this system in the New York City area. Band activity was sampled during weekdays over a two-month period. The repeaters monitored for this study were located in the New York City metropolitan area. Data summaries and statistical analysis were carried out by using standard statistical programs.

The average band activity is shown in the accompanying table. There is a single peak of activity (42.7% of maximum) corresponding with the time that most of the users are returning home from work. Two lesser peaks occur between 7:30 and 9 A.M. and 6 and 10 P.M., at which time the average activity was approximately 25%. Lower levels of activity occur during working hours (17%), and the early morning hours (2.7%).

The interesting fact that these results show is despite talk that there is insufficient band space,

the available space is being used only about 25% of the time. Even during the peak time, less than half of the repeaters are being used for more than 30 minutes per hour. And when we looked at the average repeater activity during other periods of the day, most of the repeaters are being used less than 10 minutes per hour except during the peak period. It seems absurd that only four repeaters are being used over 50 minutes per hour during only one hour throughout the day. Clearly, the repeaters are occupying space that is unused much of the time.

By classifying repeaters as to whether they are open and carrier-operated or whether their access is restricted a different picture emerges. The restricted repeaters are largely unused. Over 30% of them are used less than 10 minutes per hour, whereas over 50% of the open repeaters are being used more than 30 minutes per hour. No matter what the time of day, restricted repeaters are used less frequently; the average activity of the restricted repeaters is 71% less than open repeater activity. These results indicate that the Amateur Radio community receives little utility from restricted repeaters.

Although band utilization can be characterized by inactivity most of the time, some repeaters are used heavily, even during early morning hours. We speculate that there are several reasons for the marked difference in usage. The attitude and policies of the repeater owner play a significant role. One of the most heavily used repeaters has a policy that anyone can use it whether he is a member of the repeater group or not. Clearly, the attitudes of groups maintaining closed repeaters result in a significant reduction in utilization of the available spectrum.

The most significant conclusion of our study is that there is more available space than realized. Although most of the frequencies are assigned, there is much free time on these same frequencies that can be utilized. Demand for channel space is heavy; this seems to be caused by people holding their piece of spectrum like feudal landholders. Private use of channels results in a large loss of available channel resources. Our study suggests that, in the New York City area, continuous tone-coded systems may provide a means of increasing band utilization by permitting several repeaters to share the same frequencies.

The study also showed that a few repeaters were being used heavily. This indicates that the management of some repeaters can be quite effective. Evaluation of repeater-group attitudes could result in encouraging the use of largely unused repeaters. Finally, the mating of a microprocessor with a synthesized transceiver has been a very effective evaluation system that can improve the effective use of our ham bands. — Neil Abitabilo, WA2EZN and Thomas A. Reilly, W3GAT

Table 1
Average Band Activity

Mins. per hr.	0-9	10-19	20-29	30-39	40-49	50-59
	Number of repeaters					
1-6 A.M.	35	1	0	0	0	0
7:30-9:30 A.M.	17	9	3	4	3	0
10 A.M.-4 P.M.	26	9	1	0	0	0
5-6 P.M.	11	4	6	5	6	4
7-10 P.M.	20	7	4	4	1	0

*72 Stiles St., Waterbury, CT 06706

YL News and Views

Conducted By Jean Peacor,* K1JUV

A Net for Everyone

ARRL's National Traffic System (NTS) has a net for everyone. There are training nets in the Novice bands, local nets on vhf, section nets as your license advances and region nets as you gain experience, followed by area nets. NTS is one of the most intriguing aspects of Amateur Radio. ARRL's *Net Directory* will provide you with information as to where the nets are, as well as covering net procedure, how to originate messages and how to receive them. It explains how the system works. The ARRL booklet *Operating an Amateur Radio Station* is also invaluable.

For a fascinating evening of radio enjoyment, you can listen to NTS in action. Check into your section net. In fact, check in with a message you have originated to someone outside your section. Through listening, you can now follow your message almost to its destination. A representative from your section net will take your message. At the close of the section net, the representative goes to your region net. Check for that net's time and frequency and listen. You'll hear your message. If the message is destined for outside your region, another representative will receive it for transmitting on your area net. By listening there, you'll again hear your message. If it's going outside your area, it is handled by the Transcontinental Corps. NTS is quite a system. You'll hear some excellent operators by following this process, as efficiency in operating is the name of the game.

NTS attracts those looking to improve their operating skills. It's for YLs, OMs, young, old — everyone is welcome. Participants are all "just hams." Many YLs are involved, however. In writing about a few, it's my hope to introduce to traffic handling both newcomers as well as old timers who are just waiting to be spurred on.

Daytime Area Net Manager

ARRL's Daytime Eastern Area Net Manager, Joyce Dolby, WB4PNY, has been active in NTS for 10 years. She became interested in traffic handling as a Novice in 1970 when WB4EKJ, active in NTS in Alabama, answered her CQ on 40 meters. Jim explained Novice training net procedures and followed that up with a phone call in case Joyce had any questions. Joyce then became a member of AEND, a training net in North Carolina. She made her first BPL (Brass Pounders League) as a Novice in 1970. She obtained her General in July and by September her activity in traffic



Joyce Dolby, WB4PNY, of Richmond, Virginia.

nets led to her becoming Net Manager in North Carolina.

Joyce met her OM, Pat, WA4EQW, via the airwaves in 1972 when he was G3KSN/W4. They've been "communicating" ever since, and Pat has a great understanding of Joyce's NTS activities. They moved to Virginia in 1972, where net activities resulted in her becoming the Fourth Region Net Daytime Manager with the introduction of the new daytime cycle of NTS. Moves and motherhood curtailed Amateur Radio activities for a while, but in 1978 Joyce became Fourth Region Net Manager again. This led to her current EAN Manager appointment. She has held appointments as Emergency Coordinator, District Emergency Coordinator and is presently an Official Traffic Station and Official Emergency Station.

Joyce enjoys all types of operating. You'll hear her operating mobile and chasing DX, but she feels there is nothing quite like the disciplined operators that you will find in NTS.

Traffic Handling — Her Niche

Shortly after becoming licensed, Noreen Nimmons, VE3GO1, of Thornhill, Ontario, discovered that traffic handling is her niche. She holds net certificates at all levels of NTS for both cw and phone with 16 BPLs to her credit, having missed five more by a hair's breadth. Noreen's enthusiasm and efforts have resulted in many ARRL appointments. She has been the Assistant Section Communications Manager for Ontario Section of ARRL since 1974, Section Traffic Manager since 1978 and is currently Member at Large for the NTS Eastern Area Staff. She serves as an Assistant

Director for the Canadian Division, acting as the Director's senior executive for Ontario — visiting clubs, speaking at banquets and assisting in much preliminary work for setting up the public relations program for the newly created PRAs. She has been the recipient of several awards, among which was "ARRL Amateur of the Year" in 1977.

Noreen's expertise in times of emergencies (Hurricanes Eloise and David) led to her appointment to a special subcommittee of the Canadian Red Cross for Emergency Planning Services. The committee's efforts have resulted in the recent signing of an agreement between the Canadian Red Cross and ARRL for Ontario.

The only ham in her family, Noreen maintains her own equipment and antennas. If the problem is too extensive, good technical advisors rally to the cause. She is presently active on vhf and hf, A1, A3 and F3 modes. Above all, Noreen likes to sit quietly at her key or mike and pass traffic.

Only Two-Time Award Winner

Peggy Coulter, W9JUI, of Muncie, Indiana, was named "Amateur of the Year" by the Indiana Radio Club's Council in 1951. She had been licensed a year. Much to her surprise, she again received this award last year. Peggy is the first to earn this award twice.

Peggy became an avid traffic handler during her first year of being licensed. It wasn't long before she became Manager of QIN (Indiana cw traffic net).

Moving to a new QTH and family interests curtailed Peggy's radio activities for a few years. She became interested in flying (she's a member of Indiana Ninety Nines), golfing and travelling with her husband and two children. Her OM became a silent key seven years ago. With her son-in-law's help, Peggy got on the air once more. The first place she headed was back into traffic handling. She again became Manager of QIN, followed by Section Traffic Manager of Indiana. She also became Director of the Daytime cycle of Central Transcontinental Corps.

For a long time Peggy operated strictly cw. Now active on both cw and ssb, she has discovered that for the greatest efficiency in traffic handling, both modes of operation are essential.

These are but three YLs who have tried NTS and liked it. NTS does have a net for everyone. You'll like it too — try it!

DX YL TO NA YL CONTEST RESULTS

Phone	DX	YL	Score
WB9ZBE 987	Gold Cup	PS8Y1	3045*
WD5FQX 640	Second Place	1X1SM	2835*
WB3GR1 619*	Third Place	YK9IX	2059*

*Country Club Dr., Monson, MA 01057

CW

NA	DX	Score
WA2NY 112	Gold Cup	HPIXF 220*
N7YI 80*	Second Place	DK6FM 146*
WD5FQX 63*	Third Place	VK3KS 120*

*Low-power multiplier.

NOVICE TODAY — ADVANCED TOMORROW

Al Jordan, WB1GKO, of West Hartford, Connecticut, is a

proud OM. His wife, Judi, enrolled in a 10-week Novice class last February. She took her Novice exam in April. Judi then enrolled in a General-and-up theory class. She copied WIAW's cw at least twice each day. On May 27 Judi received her Novice ticket in the mail (K1FFZ). The following day, May 28, Al drove her to Boston, Massachusetts, where she passed the 13-wpm cw, General theory and Advanced theory — all this with no prior knowledge in electronics. Her application is in for a 2 X 2 call.

Judi's now active on Hartford's 2-meter repeaters as well as on 15- and 40-meter cw and 75-meter phone. Welcome to Amateur Radio, Judi. 155*

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO



Progress Toward A Worldwide Locator System

This column for September 1979 included a discussion of the QTH Locator System used by European vhf-ers for the past 20 years. Some of the advantages of using such a system were presented at that time. Not the least of the benefits that such a system provides is equitable multipliers for contests. In current ARRL vhf contests, except for the uhf contest, Rhode Island and South Texas both count the same as far as multipliers are concerned. In addition to contests, the availability of some kind of geographical divisions not based on politically drawn boundaries is very beneficial, especially for vhf and higher. Some of the Europeans have collected over 300 1- by 2-degree squares. Maps on shack walls with all of those squares colored in must be very impressive. Contrast this with our custom of rating accomplishments by counting states. On the hands up to 70 cm this may be okay, but certainly, on the microwave bands, states do not make much sense as collectibles. While a station located in the Northeast may be able to run a relatively impressive total, someone in California or the middle of Nebraska could have a tough time getting across the state line.

In addition to describing the present European system, the September 1979 column discussed various alternatives that might be usable worldwide, including one suggested by this conductor. The subject of a worldwide system, including all of those presented in these pages a year ago, and a new one proposed by G4ANB, were examined at a meeting of European vhf managers held in London in April. At that time it was concluded that a worldwide locator system would be beneficial to vhf and other amateurs anywhere on earth. Further, they agreed that the G4ANB system offered the

best compromise among the systems considered. Its principal advantage is that it is applicable worldwide, while being compatible with the main elements of the existing European-based system. Specifically, all of the hard-won Awards, based on 1- by 2-degree squares would remain valid. Although the designations in the new proposed system are not the same as in the existing system, they are translatable. It has been clear for some time that any new proposed worldwide locator system would have to include this feature if it were to stand a chance of being accepted by the Europeans.

The new system proposed at the London meeting works as follows: The earth's surface is divided into 324 pieces, called "fields." Each field is 10° in latitude by 20° in longitude. Each field is designated by two letters beginning with AA, which is located at minus 90°

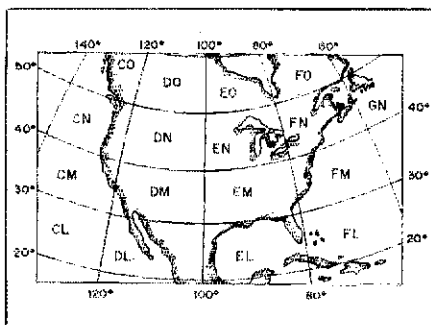


Fig. 1 — Field designations for our part of the world in the proposed locator system. See text for further breakdowns.

latitude (the south pole) and 180° longitude (the international date line). Starting at the date line is attractive to the Europeans, since an alternative starting place, the zero meridian, would have split populous Great Britain. Each field is divided into 100 squares, beginning with Square 00 at the southwest corner and proceeding to Square 99 in the northeast corner. Thus, each square is 1 by 2 degrees. This is the same measurement as the present squares in the European QTH Locator System and, in Europe, the new squares can be translated into the old ones. To pinpoint the location of a particular station more accurately, each square is divided into 24 sub-squares each measuring about three by six miles at the equator. At mid-latitudes, where most of us live, both the square and sub-squares become more nearly square in terms of miles or kilometers. This is, of course, the reason that the 1- by 2-degree dimension was selected in the first place. The sub-squares are designated AA through XX, beginning in the southwest corner. Thus, in this proposed system, the designation of W3XO located at 39° 05' North and 76° 58' West is FM19MC. For contests and most other purposes this would be reduced to FM19.

The Region 1 IARU vhf managers have made an offer to the rest of the world involving a major change to their existing popular QTH locator system. With this change, a worldwide locator system is possible. If adopted, and widely used, it should be a real boon to all of us. Another meeting is planned for next April. Before that time the Europeans would like the rest of the world to consider their new proposal. If it appears that there is support for the system, it is expected that it will be adopted for worldwide use at that time.

MID-ATLANTIC VHF CONFERENCE

The 1980 Mid-Atlantic VHF Conference will be held October 4 at the Warrington Motor Lodge Warrington, Pennsylvania. The gathering, which begins at 9 A.M., features talks by well-known vhf-ers. An informal get-together will be held at 6:30 P.M. followed by a buffet dinner. The next day is Hamarama, one of the big flea markets in the East. Because so many vhf-ers attend this event, it usually boasts more than the average amount of vhf and uhf goodies for sale. Both the conference and Hamarama are sponsored by the Mount Airy VHF Radio Club, known far and wide as the Pack Rats. For many in the mid-Atlantic states, who do not feel that they can attend the vhf conferences held in other parts of the country, this one is ideal. I hope to see many of you there. For further information and registration forms, contact Ron Whitsel, WA3AXV, at P. O. Box 353, Southampton, PA 18966, or phone 215-355-5730.

ON THE BANDS

6 Meters — It seems that just as soon as I commit to paper a statement dubbing this as a "so-so" season, the F clouds literally pop out all over the place. Well, it that's all I have to do to get such results, I'm glad that I did it. The days immediately following the June

VHF QSO Party were a veritable gold mine, especially for the newcomers who picked up states at a rapid rate and overlook many who had been on the band for some time. A typical account is that of KB7Q of Bozeman, Montana. Gene has been on 6 meters since last December. During the contest he worked 31 ARRL Sections, including NP4A Puerto Rico (West Indies Section) and C6ACY Bahamas. But the "big" day came on the 18th when 33 states, four Canadian provinces, plus C6ACY again went into the log. That day accounted for a total of 275 QSOs. I know that he made a lot of people happy with a Montana contact. From another normally hard-to-get state comes a similar tale. W7WKR, not exactly new to 6 meters (former call was N6HZ), but new to Idaho, Dick sends along an impressive list of states worked. For example, on June 18 he bagged 21 and also nabbed K4, H8 and C6A. But the 27th, between 0300 and 0400Z, was his big day, as he netted contacts with KI7NO, WL7ACY, WL7AFA, VE8BY and VY1s AU and BQ. Since setting up shop in February, Dick as of the end of June has 46 states needing only Maine, Vermont, Mississippi and Hawaii. Also reported by W7WKR is the reception of a strange noise having a bandwidth of about 50 kHz. He heard it beginning at 0400 Z June 25 at 50.170 MHz. It proceeded to drift up in frequency and ended up at 50.230 MHz one hour later. Dick says that it peaked about 60° and definitely was not of local TV origin. Has anyone else heard a similar noise?

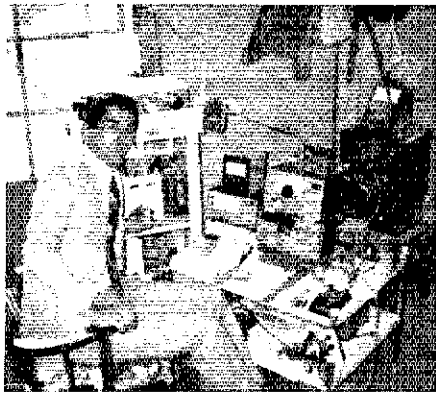
"The most intensive, longest duration double-hop opening I have ever witnessed." That's how WA3WUL Wilmington, Delaware, describes the antics of June 18. For Bruce, the super opening began at

1800Z with WA6HXW and ended with KB7Q at 0300Z, nine hours later. Altogether, seven western states were contacted including Utah stations WA7ADK and K7GMW making state number 49 and leaving only KH6. The same period was productive for VE1BNN and VE1UW. VE1BNN reports that he worked H8DAF, P22DEW, W4UWH/KV4 and WP4ACV in addition to a pile of western stations. Reg says that VE1UW worked the H8 as well and also came up with HK4BW on cw at 0015 June 19. On the 17th, the ZB2VHF beacon was heard via ES at VE1BNN's QTH from 1500 to 1605Z. It peaked up to 599 at times. The same beacon was reported "on several occasions this summer" by W1DDV/C6A.

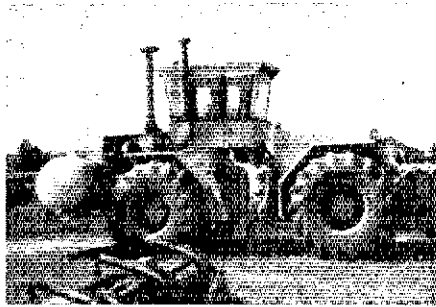
Another long distance ES report comes from the other side of the continent. N7DB near Portland writes describing what can only be called "a crazy E opening." It occurred June 26 and began at about 0500 Z with VY1s AU and BQ being contacted. Then, hearing a weak female voice calling him, Dave listened intently expecting it to be a K17. It turned out to be JH8WHL. That was the first of some 70 JAs that N7DB worked over the next three hours. In addition to its length, the thing which set this opening apart from those of previous years was the strength of the signals. Some ran as high as S6 but most were in the S2 to -3 range. Also worked the same evening were KL7s ABO and H-P, and WL7s ACY and AFA. From his Idaho QTH, W7WKR notes the same opening. Dick reports working 40 JAs in all call districts except 9. He also hooked up with a string of KL7s.

In the QTH department, N4JS/5 wants it known that his *Callbook* address is wrong. Cards may be sent

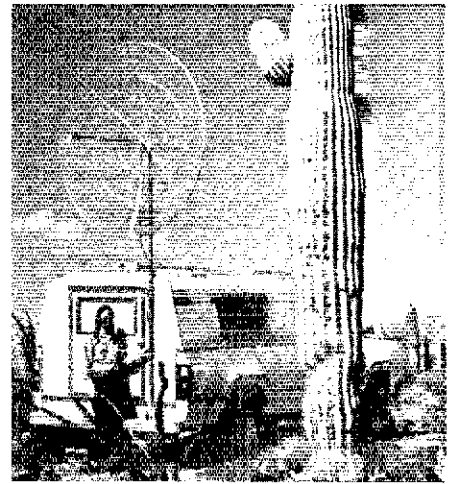
*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.



Well known Japanese EMEer and satellite operator JA9BOH.



When you have to plow, you have to plow, but that chore doesn't stop KB9DU from doing what he would rather be doing. Bill's 2-meter-ssb rig and home-built turnstile are mounted on this vehicle. Best tractor DX so far is 150 miles.



The Arizona end of the K6ZMW/K7GNV 23-cm contact reported in this column for June. The 6-foot home-built dish is made of brazen aluminum parts covered with wire mesh. AB7U stands beneath it.

to John L. Sielke, 4903 Skyland Dr., Meridian, MS 39301. QSL manager for WIDDV/C6A is N7YL, and for C6ACY it's K4ZGB.

On Saturday morning July 12 the ZB2VHF beacon was heard again on the East Coast. N3AHH Allentown, Pennsylvania, reported hearing it from 1157 to 1330Z. This conductor, following a tip from K3HCE, also received it for upwards of an hour beginning about 1355. The signal characteristics were unusual in that there was only slight QSB, the strength running about S5 and slowly dropping. A few days later, this valuable signal source was received again. K1DH heard it beginning at 2200Z on the 15th. Don then got busy and called Jimmy on the phone and informed him what was going on. That piece of public service brought QSO with ZB2BL for W1RJA, W1QXX, W2CAP/I, N3AHJ, WB1FUB, K1JRW, WA1UQC and possibly others, as well as K1DH. Don also put in a call to F12W to see if the path to Ireland was open for, but nothing came of that attempt. The following day produced more of the same. WA2TMC near Rochester reports hearing ZB2VHF/ZB2BL from 2300Z July 16 until 0100Z July 17 and working ZB2BL at 0007Z. Power at WA2TMC is a mere 10 watts.

Strange doings: Are we going to experience such weird and wonderful things during Es seasons when solar activity is low? If the activity can be maintained and the beacons kept in operation, we may find out in a few years.

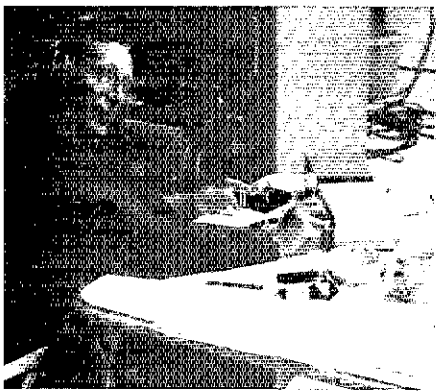
2 Meters — "Gone are the easy 100 percent contacts of winter." That's how VE7BQH describes 2-meter EME conditions during these high solar activity summer months. Nevertheless, Lionel did complete two very enjoyable contacts during early June. On the 6th, he worked WD5CRK in Oklahoma for that station's first EME QSO. WD5CRK has a fine tropo station using four Yagis but does not have elevation-aiming capability. So, it was the setting moon or none. It would appear that many more stations who have never tried moonbounce could get started in this way. The other station worked was K1ZZ on the 8th, the first success on EME for Dave. VE7BQH says that the four Boomers at K1ZZ seem to be doing a fine job. South America is all he needs for WAC, and Lionel is bending every effort to get YV5ZZ on so he can wrap it up.

A letter from WIDDV/C6A fills us in on 2-meter happenings in the Bahamas. Dave says that C6ACY is putting in a major effort on the band. Tim has an IC-251 driving an amplifier presently in the works and will soon be putting up a bigger antenna. Here may be a good chance for a new country for non-FME stations in the eastern and central parts of the country.

A "Worked One Hundred Stations via EME" award is suggested by WA1JXN/7. Lance feels that such an award, which he dubs the EMECC, would be very helpful in providing incentive for those who have completed WAS to continue their activity. What do you think?

At deadline, the 2-meter band erupted with Es. On July 17 a widespread, many-hour opening took place; it was the best that this conductor has ever heard. Stations in Minnesota, Iowa, South Dakota, Kansas and Nebraska were received here in Maryland for several hours. Even stations running 10 watts were having great success making contacts. There are reports that "the band was open all day." K5FF near Albuquerque says she worked stations as far east as Virginia and Maryland. This 2-meter opening was accompanied by one on 6 meters that boasted very short skip and strong backscatter signals. I'll have more details on this historic Es session in October's column.

The EME DXpedition to Rhode Island mounted by W1JR and company provided a lot of excitement for moonbouncers. One very happy operator to make the grade and, apparently, become the first gal to com-



K3LFO operating portable EME station K6LEW/3 Delaware.

plete WAS on 2 meters, is K5FF. Lee's accomplishment was followed shortly thereafter by OM Fred, W5FE, for his 50th state.

70 Cm — The high-pressure air mass that caused the intense heat wave to blanket large portions of the Midwest and South-central portions of the country also produced some rather phenomenal tropo conditions on the vhf and uhf bands. One example is WB5LUA's contact with K8WW near Cleveland, Ohio, on June 28. That's about 1000 miles (1600 km). Al worked Tennessee and Indiana stations the same evening and Tennessee the following night. From Illinois, WB9SNR reports that things started to perk up in his area during the evening of June 25 with contacts into Kansas (W0RT) and Oklahoma (K5JL). The next morning Jim worked WB5LUA and K5JL again. This time Jay's signal was over 59. On June 30, WB9SNR contacted WA4PGI and WA4UWR (both Tennessee), and the next morning WA4CQG Alabama. Jim notes that Minnesota stations were working into Alabama and Georgia on the evening of June 30. On the eve of July 4, stations to the east began to appear, and Jim snagged W3ANX and W3RUE Pittsburgh, followed by VE3QF, W2PGC and W2CNS western New York and K2CBA eastern New York. He also reports working W2PGC on 1-1/4 meters for a new state on that band.

23 Cm and down — K6ZMW reports that he was quite busy during the June contest working 11 stations in six sections on 23 cm only. Joe adds that he learned two important lessons during the weekend. First, the myth that DX on 23 cm requires high power, huge antennas and ultra-low noise receivers is exactly that: a myth! Best proof, he says, is N6CA's working Arizona with a single loop-Yagi at about 30 feet and 8 dB feed line loss! With only 10 watts at the antenna and receiver NE greater than 8 dB, Chip quickly completed the contact with surprisingly little effort! Second, it seems rather clear that long distance on 23 cm, in excess of about 30 to 50 miles, can be made infinitely easier if stations can schedule and coordinate their efforts via a separate band while simultaneously transceiving on 1296! Blindly calling CQ or trying to piggy-back on someone else simply doesn't work when using extremely sharp antenna patterns to chase very weak signals. A separate liaison channel should be im-

mediately available in real time to the 1296-MHz op who means business! Multi-op contest sites should not rely on their 2-meter position (for example) to provide such support effectively. Typically, the two positions may be widely separated and can not easily communicate. Also, each is apt to be too busy to assist one another.

The obvious and effective answer, K6ZMW concludes, is a separate hf rig for long-haul liaison! Those who had such facilities, he notes, found the going substantially easier during the June contest, using 7180 kHz during the day and 3815 kHz at night for effortless coordination over the 100- to 500-mile distances involved. Horizontal antennas such as dipoles were found to be more effective than verticals using these paths because of the higher radiation angles involved.

EME for the "average" 23-cm amateur? That's what may be transpiring about the time this appears in print. According to a note supplied by K2UYH and published in the July issue of "Cheese Bits," the club paper of the Mount Airy VHF Radio Club, better known as the Pack Rats, the activity that may make this possible is to be from SK2GI, a club station located at the Kiruna Geophysical Institute in extreme northern Sweden. The group has available, for a short time, a 32-meter dish that is expected to produce a gain of 50 dBi at 1296 MHz. Coupled with the 200-watt transmitter the members of the club have assembled, that should produce a signal copiable with a +3 dB signal-to-noise ratio in a 500 Hz bandwidth using a 3 dB NF front end and a 20 dB antenna. If they come up with the hoped-for 50 K preamp, the Swedish group expects to be able to copy stations that can develop 3 kW ERP (2C39 and a four- to six-foot dish). Otherwise, they have a 1.5-dB unit available which will, of course, require more power from the stations attempting to make contact.

One certainly could not ask for a better opportunity to break the EME ice on 23 cm. Up-to-the-minute details will be available on the EME nets, which meet on 14,345 kHz beginning at 1600Z each Saturday and Sunday.

WB5LUA near Dallas keeps up his steady progress on the 23-cm band. On June 26, Al worked his second Illinois station, W9UD. As reported last month, he worked W9ZFH three weeks earlier. W9UD was running only 5 W output. Four days later, on the 30th, WB5LUA captured his third state by hooking up with WB5LBT Baton Rouge, Louisiana. Bob negotiated the 360-mile (580-km) path with his just-received Microwave Modules transverter, producing 1 watt and feeding a 45-element loop Yagi at 20 feet. WB5LUA is now using four similar antennas at 85 feet and concedes that his 0.7 dB GaAsFET preamp, mounted at the antenna, helps. He has also recently improved the transmit end with an amplifier producing 250 watts. It employs the O29CR design using six 7289s.

WB5LUA also passes along the information that W5HN, Dallas, contacted W5UKQ Baton Rouge on July 7, bringing the state total of both stations to two. How many years has W5HN been on the band and never got out of Texas? It is a big state! Anyone for grid squares?

W1R's next challenge is the 13-cm band. Joe is putting up a 44-element loop Yagi and is looking for skeds around 2304 MHz as well as on 1296 MHz. [E-1]

Silent Keys

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

WICQO, Harold I. "Brownie" Colburn, Mansfield Center, CT
 ex-W1DBW, David F. Karrmann, Cheshire, CT
 WB1DOZ, Norton I. Katz, Greenwich, CT
 WA1GBF, Charles A. Chabot, Wellesley, MA
 ex-W1RO, Verne W. Loper, Pompano Beach, FL
 W1YQI, William E. Keves, Marblehead, MA
 WA1ZGM, James M. Lawrence, Quaker Hill, CT
 W2BUX, George C. Bluz, Andover, NJ
 *K2DE, Victor J. Braidwood, Pensacola, FL
 W2MEG, Wilhelmina A. Grabner, Jersey City, NJ
 ex-W2UWK/WA4QYO, Frederick W. Wright Jr., Lynchburg, VA
 W3CD, Vernon G. Swann, Perkiomenville, PA
 KA3DKB, Janet P. Wright, Silver Spring, MD
 W3EYY, Wilson V. Chambers, West Willow, PA
 W3HI, William E. Hough Jr., Lancaster, PA
 W3IYO, Armand Cioccio, Silver Spring, MD
 WA3RBV, John C. Eckman, Hatfield, PA
 *W3TM, Edwin E. Laker, Ijamsville, MD
 W4AD, Louis E. De La Fleur, Tegucigalpa, Honduras
 N4BCA/ex-W3ILY, Charles H. Hoover, Perry, GA
 WA4DUD, John T. McIntosh, Jacksonville, FL
 WB4EZZ, Sol S. Katz, Miami, FL
 K4HXV, Leslie F. Hiler, Eau Gallie, FL
 K4IGC, Frank G. Howard, Asheville, NC
 K4IPN, Johnny W. Joseph, Tuskegee, AL
 K4MBG, Carl J. Bludau, Virginia Beach, VA
 K4NWB, Robert E. McLam, Kingsport, TN
 W4OBI, Robert H. Hackworth, Ft. Lauderdale, FL
 WB4EII, Wilsie White, Central City, KY
 K4SUD, Waymon D. Grammer, Atlanta, GA
 K4ZL, Richard L. Smith, Zephyrhills, FL
 W5AEZ, Vestle E. Brock, Paris, TX
 W5BOT, Dr. Ronald W. Wheeler Jr., Commerce, TX
 W5FKB, Harland V. Newsom, Duncanville, TX
 *Life Member, ARRL

WA5HXH, Howard C. Holloman, San Benito, TX
 K5IKL, Lee M. Lanterman, Frederick, OK
 W5LEB, Robert Moffit, Clinton, LA
 W5MKE, William Meador, Bosque Farms, NM
 W5MQZ, Robert W. Johnson, Houston, TX
 W5NOX, Fernando A. Donadieu, Gramercy, LA
 W5WSY, Raymond E. Condon, Metairie, LA
 W5YPL, Wilbur H. West, Wink, TX
 *W5ZGW, Raymond W. Holcomb, Baytown, TX
 WB6AVT, William A. Francis, Lompoc, CA
 WA6FWZ, Lee E. Stetson, Gilroy, CA
 K6GI, George R. Mackin, Saratoga, CA
 W6HFO, Clifford K. Carter, National City, CA
 W6KCG, John J. Haggerty Sr., Santa Barbara, CA
 ex-W6KMD, Kenneth Richardson, Lynbrook, NY
 N6LE, Wesley E. Lees, San Diego, CA
 W6LP/ex-W6MUC, Alden M. Clark, Los Altos, CA
 W6NCM, Carlton B. Gearhart, Point Reyes Station, CA
 W6OEO, Julian S. "Joe" Hatcher, Los Angeles, CA
 W6PHX, Edward J. Litton, San Diego, CA
 *W6PWB, Selby K. "Bud" Santmyers, Tracy, CA
 WA6QBP, Pearl M. Mahaffey, National City, CA
 W6QOE, Walter M. Alvarez, Paramount, CA
 W6RIL, Vernon P. Bourg, Fremont, CA
 K6TY, Kenneth E. Robinson, Paradise, CA
 W6VOZ, William A. Lentz, Riverside, CA
 W6WQJ, James M. Clearwater, Goleta, CA
 WB6WZR, John Fotheringham, Waldorf, MD
 K6ZMB, Joseph H. Almgren, Redding, CA
 WA7BAI, Beulah G. Douglas, Apache Junction, AZ
 K7DXW, Robert L. Reed, Aloha, OR
 WR7ERL, George L. Zimmerman, Sequim, WA
 K7KYG, Eric J. Young, Seattle, WA
 K7SRI, John D. Oakley, Bellevue, WA
 ex-8AOK, Maurice A. Knight, Pittsburgh, PA
 WB8APV, Harold Phippen, Smiths Creek, MI

W8HKJ, Wells B. Kollar, Jackson, MI
 W8KAQ, Robert E. MacDonald, Ferndale, MI
 WB8MFK, Lawrence B. Avoy, Ocala, FL
 W8N1/ex-W8JEY, Milton N. Keed, Crestline, OH
 K8OFD, James O. Schassberger, Adrian, MI
 K8OQC, Robert C. Martin, Batavia, OH
 W8UQR, George "Ken" Glass, Koyal Oak, MI
 W8ZUL, William F. Etelamaki, Negaunee, MI
 W9HEE, Herman F. Reger, Schofield, WI
 W9OL, William P. Atchison, Springfield, IL
 W9YVL, Charles A. Bressette, Sturtevant, WI
 W0AUB, Wilfred J. Bergmann, Webster Groves, MO
 W0DES, Harry B. Domke, Sioux Falls, SD
 W0FXW, Erwin S. Bland, Independence, MO
 W0HKU, Herman G. Keece, Edina, MN
 WA0KDI, Harlan W. Newell, Roseville, MN
 W0KSB, Paul F. King, Colorado Springs, CO
 W0LU, Lu F. Waelterman, St. Louis, MO
 WA0SHD, Loy D. Robbins, Kearney, MO
 W0TJM, William D. Mitchell, Minneapolis, MN
 W0VJM, Leo Bures, Columbus, NE
 W0YVV, Max N. McKinney, Corning, IA
 WB0HR, Luther Lucker, Salina, KS
 ex-VEIUG, LeMert Dakin, St. John, NB
 VE1YA, Aubrey T. White, Bedford, NS
 VE3HCW, Ernie Hillard, Scarborough, ON
 T2REA, Roberto E. Aragon, San Jose, Costa Rica

Correction

The address of James E. Reynolds, W0JMB, was listed incorrectly in the June "Silent Keys" column. It should have read Colorado Springs, CO.

Note: All Silent Key reports sent to HQ, must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column.

50 Years Ago

September 1930

[1] In his editorial, K. B. Warner says the amateur outside of the U.S. and Canada and a few other places seems to be in mortal fear of his government. With an international communications treaty meeting coming to Madrid in 1932, KBW makes an eloquent plea for foreign amateurs to work toward better ties with the officials.

[2] In "Making Practical Use of the 56-Mc. Band," J. I. Long, Jr., W8ABX, describes experiments in the Rochester, N.Y., area using modulated oscillators, regenerative receivers and a superhet. Dipole antennas were used, and a reflector a quarter wavelength below the dipole doubled the signal strength! Elsewhere in the issue, Harry Hooton, W8BKV, in West Virginia, reports results on 5 meters with similar gear and a dipole and reflector in the horizontal plane. He observed shadow effects apparently caused by houses and hills.

[3] The "dynatron" oscillator circuit uses a vacuum tube adjusted to give a negative-resistance characteristic (plate current decreases with increase in voltage) over part of its range. In "Bringing Frequency Measurements Up to Date," George Grammer points out the advantages of the dynatron circuit and gives operating values for an instrument using the Type 32 tetrode. And in "Experiments With Dynatron Oscillators" O. P. Susneyan, W1BLH, relates the superior dynatron results he obtained with a tube designed especially for the application.

[4] H. A. Robinson, W3LW, winds up the concluding half of "Operating Characteristics of Vacuum Tube Detectors" with a summary of the virtues and disadvantages of triode and screen-grid detectors under various signal-level conditions.

[5] Boyd Phelps, W2BP/W9BP, describes "QSY With Crystal Control," not so much for netting purposes as for getting out from under stubborn stations who occupy the same frequency. After dismissing as a practical method the use of wide-range temperature control (too sluggish), Boyd settles for a crystal holder with an adjustable air gap.

[6] "With 1PH in Mexico" is a most amusing and exciting account by Bertram Sandham, W6EQE, Los Angeles 5CM and member of the First International Pacific Highway Exploring Expedition, outfitted by

the Auto Club of Southern California, with orders to "proceed as far south as was humanly possible." The five cars and light trucks were not "off-road" vehicles in the 1980 sense; they were simply road vehicles driven through terrain where there were no roads. 1PH got as far as Mexico City before the rains put an end to any more southerly ambition. The easterly route back was no picnic either! Imagine entering the U.S. at Laredo and driving across Texas, New Mexico, Arizona and California -- all without air conditioning!

The station of George Taylor, N9BAN in Henderson, Ky., is typical. Battery-powered 4-tube receiver with untuned r.f. detector and two audio, a.c.-powered high-C push-pull 210s transmitter, battery-powered monitor, and a 40-meter Zepp antenna.

25 Years Ago

September 1955

[1] The cover photograph and the lead article feature "Solarized QSO" by young Laird "Tex" Campbell, W1CUT. Power supply for this Scout's Dream was six solar cells delivering 2.8 volts at 0.5 ma. The transmitter used an 1800-ke. crystal and a 2N76, c.w. or "phone, and the receiver was a 1N34 f.s. meter plus transistor boost. The power supply was hand switched between receiver and transmitter; loud c.w. was copied by the rushing noise.

[2] In "Upper-Air Conditions for Two-Meter DX" James Collier, W2QBB, presents six graphs of the actual temperature and water-vapor conditions during cases of *superrefraction* (unusual tropospheric bending).

[3] The indefatigable Phil Rand, W1DBM, describes "A 28-Mc. Civil Defense Package" that is readily transportable and can be used for fixed, portable or mobile use.

[4] Robert Bonebrake, W9GCQ, shows how to utilize the hood-mounted car antenna for "A Miniature Mobile Antenna" on 40, 20 and 10 using plug-in coils. Staffer Vern Chambers, W1JHQ, describes a combined signal and field-strength meter for mobile use calls. "The S-F-S Indicator."

[5] Still-available war-surplus triodes, 6K-54s, make possible "A 500-Watt 144-Mc. Amplifier" by Leonard Garrett, W7JJP. — *By Goodman, W1DX*

Strays

BOYSTOWN DXPEDITION

[1] Fremont, Nebraska, hams will be operating from Father Hanigan's Boys Home, Boystown, Nebraska, from 1700 UTC, September 27, to 1700 UTC, September 28. Frequencies will be 5 kHz plus or minus 3905, 7235, 14,305 21,405 and 28,605 kHz. Special commemorative QSL cards in envelopes with a Boystown postmark will be mailed for all contacts upon receipt of s.a.s.c. or IRCs. QSL to W0RHC, Pioneer Radio Club, RFD 3, Fremont, NE 68025.



Ed Bizub, WA2CBB, of Clark, New Jersey, is the proud recipient of the fifth Satellite DXCC award. Ed is shown receiving the award from his 11-year-old son, KA2HSF. It took Ed seven years to achieve this goal, using OSCARs 6, 7 and 8.

Coming Conventions

September 5-7
Southwestern Division, Los Angeles, CA

September 26-28,
Dakota Division, Fargo, ND

September 27-28
Kentucky State, Louisville

October 3-5
New England Division, Boxborough, MA

October 3-5
Virginia State, Virginia Beach

October 10-12
Midwest Division, Lincoln, NE

November 1-2
South Florida Section, St. Petersburg

November 7-9
Hudson Division, South Fallsburg, NY

ARRL NATIONAL CONVENTIONS

March 13-15, 1981
Orlando, Florida

July 23-25, 1982
Cedar Rapids, Iowa

DAKOTA DIVISION CONVENTION

September 26-28, 1980, Fargo, North Dakota

The Fargo Repeater Association will sponsor the Dakota Division Convention at West Acres Holiday Inn from Friday, September 26 to Sunday, September 28, 1980. The convention is being dedicated to our good friend and former President of the American Radio Relay League, Goodwin L. Doslaud, W0TSN. He served as president from 1952 until 1962 and traveled all over the United States and to several countries representing the American amateur. "Dos" is now retired after serving many years as a judge in the Moorhead area. He and his lovely wife, Mary, are still active hams and talk to their friends daily on the bands, especially 2 meters.

A full program of activities is being planned, with technical seminars, an ARRL open forum, and activities for the XYL and the kids, too. A number of organizations are planning luncheons and will have a booth near the convention registration desk for those wishing to sign up. Some of the organizations expected are: 3900 Club, QCWA chapters from the three-state area, Goose River Net and Handi-hams of Minnesota. Saturday evening will be filled with a cocktail hour, banquet and speakers. After all this is done, there will be a special event for those who aspire to the Royal Order of the Wouff Hong. Buses will be provided for sightseeing. Bonanzaville, an historical village, is one of the big attractions in Fargo. Ladies will be interested in visiting the "West Acres Shopping Center," a short walk from the motel. You will find 200 stores of all types under one roof. We are expecting a number of dealers to be showing the latest in equipment, and we plan a flea market with swap tables available at \$5. There are excellent facilities — good parking and everything under one roof. Something for every ham and for family members as well.

Advanced registration is available at \$4.50; at the door \$6. Early registration and reservations are recommended. Banquet tickets are \$11 and can be reserved along with early registration, or obtained at the door. For registration, tickets and general information on the convention contact Ken Covey, W0ZQJ, P. O. Box 675, Moorhead, MN 56560, Tel. 218-233-1551.

VIRGINIA STATE CONVENTION

October 3-5, 1980, Virginia Beach

The ARRL Virginia State Convention and Fifth Annual Tidewater Hamfest/Computer Show/Flea Market will be held in the great new Virginia Beach

Arts and Conference Center October 4-5, 1980. Exhibit and flea market space is available in a 65,500 sq. ft. air-conditioned area. Take Highway 64 to Highway 44, which passes right by the door and into the beach resort area.

Featured are ARRL, traffic, DX, technical forums, XYL free bingo and lounge. Optional Saturday evening activities are planned.

Admission \$3.50. Purchase of an advance ticket will make you eligible for a special award. Big car pool prize for those in a car pool of three or more people. Flea market spaces \$3 per day. Tickets and information: TRC, P. O. Box 7101, Portsmouth, VA 23707 (S.A.N.C.)

KENTUCKY STATE CONVENTION

September 27-28, 1980, Louisville

The Kentuckiana Radio Club, Inc. is proud to present the Kentucky State ARRL Convention and 10th Annual Greater Louisville Hamfest on September 27 and 28 at the West Hall of the Kentucky Fair and Exposition Center, which is the largest single-floor exposition center in the USA. Take the Fairgrounds exit off I-65 or I-264 and follow the QSY signs.

Everything is indoors in air-conditioned comfort. Over 18,000 sq. ft. of exhibitor space and 45,000 sq. ft. of flea market space is available. ARRL Great Lakes Division Director Leonard Nathanson, W8RC, will head the ARRL forum. Bob Scheuck, N200, will be the featured speaker at the DX Forum. Other activities: computers, antennas, amateur TV, OSCAR, MARS meetings, Kentucky Nets and ARS meetings, and a great ladies program.

Registration in advance is \$3.50, at the door \$4.50, children 12 and under free. For information contact The Greater Louisville Hamfest, P. O. Box 34444, Louisville, KY 40232. Tel. 502-634-0619.

NEW ENGLAND DIVISION CONVENTION

October 4-5, 1980, Boxborough, Massachusetts

The Boxboro show this year has many new features. Important to the thousands who couldn't find parking in 1978 is a huge, free parking area with constant free shuttle-bus service to and from the hotel. Another reflects the increased activity in home-brew gear. There will be a big display and contest of ham-made equipment. The flea market will be under an 80-foot tent (this will guarantee sunny weather!). Booths from every leading manufacturer and dealer will, as usual, excite the pocketbooks. Leading experts in their fields highlight the speakers scheduled for both Saturday and Sunday.

EXC exams will be held — one of the few conventions to have exams this year for General, Technician, Advanced and Extra Class. Exams on Saturday only and by previous appointment. Send a form 610 correctly completed to Mike Goldberg, 40 Isabella St., Stoneham, MA 02180. Forms received after September 10 will be returned. You will be notified of your appointment time.

A top notch night club-style entertainment will follow the banquet Saturday evening with dancing 'till midnight. For the first time in several years, unsuspecting hams will be inducted into the Royal Order of the Wouff Hong at a midnight ceremony. Lots of fun!

A "Save OSCAR 99" matching fund will help raise money for another try at a Phase III satellite. If you add 50 cents to your early-bird ticket price the committee will match it with another 50 cents. There will also be AMSAT information at the show. Early-bird registration \$4 (\$5 at the door). Show and banquet tickets \$12. Order from George Stewart, W1ZQO, 17 Barnes Ave., East Boston, MA 02128. Sheraton Boxboro Hotel reservations must be made with the hotel by mail — no phone reservations accepted. Special convention rates: Single \$42, double \$46. QTH: Boxboro, MA 01719.

MIDWEST DIVISION CONVENTION

October 10-12, 1980, Lincoln, Nebraska

The Lincoln Amateur Radio Club invites all amateurs to participate in the 1980 Midwest Division Convention sponsored by the Lincoln Amateur Radio Club, Inc. This year's program offers a variety of timely forums and interesting lectures. Forums: FCC — Sam Spelts, W6SS, regional director; ARRL — President Harry Dannels, W2HD; Director Paul Grauer, W0FIR; and John Lindholm, W1XX, manager, Communications Department, ARRL hq. Lectures: "Moving into the New Amateur Bands," George David, W0OHP; "Nuts and Bolts of Antennas," Al Caplan, W0RIC; "DXpeditions," Randy Roe, N0TG; "Computers in Amateur Radio," Lew McCoy, W1ICP; and "Winning Contests," John Lindholm, W1XX. Other programs to be presented are "Enhancing Your Public Image," K0GND, and "QRP-Design and Application," N0ABN.

With so many interesting forums and lectures to attend you will have to budget your time carefully so you won't

miss all the exhibits — commercial and noncommercial — the enclosed flea market and the transmitter hunt.

There will be a complete ladies program on Saturday and Sunday, including a craft flea market.

A nationally known speaker will be featured at the convention banquet. Induction ceremonies will be conducted for those wishing to become members of the Royal Order of the Wouff Hong.

For information, registration, accommodations and tickets, write to LARC, P. O. Box 5006, Lincoln, NE 68505. [95F-1]

Hamfest Calendar

Alabama: The Central Alabama Radio Association will hold its third annual hamfest on Sunday, September 7 at the Civic Center in Montgomery. Free admission and free parking. 22,000 square feet of air-conditioned activities including flea market. Set up at 6 A.M., doors open 8 A.M. to 3 P.M. Prizes, refreshments (available at the Civic Center). Several restaurants and motels within easy walking distance. Talk-in on 04/64 or 52. For further information or flea market reservation write Hamfest Committee, P. O. Box 3141, Montgomery, AL 36109.

Alabama: The Calhoun County ARA will hold its Anniston Hamfest on September 27-28 at the Municipal Auditorium, 1128 Gurnee Ave., Anniston, from 9 A.M. to 5 P.M. Saturday and 9 A.M. to 3 P.M. Sunday. Admission is free. Activities include commercial exhibits, flea market, free bingo, hospitality room and reduced rates at the Downtowner Motel. Exhibit tables \$3 a day, \$5 for two days. Free overnight parking for self-contained RVs at site. Outside flea market free. Talk-in on 69/09. For reservations and additional information contact W4PCK, c/o CCARA, P. O. Box 1624, Anniston, AL 36202.

Colorado: The Boulder ARC will sponsor BARCFEST '80 on Sunday, September 28, beginning at 9 A.M. at the Boulder National Guard Armory at the city limits on North Broadway. Admission is \$2 per family including prizes and swap space. Talk-in on 10/70 and 52. For further info contact Mark Call, N0MC, 4297 Redwood Ct., Boulder, CO 80301, Tel. 303-442-2616.

Georgia: Lanierland ARC will hold its seventh annual HAMNIC at Lake Lanier Islands on September 28. Large covered pavilion and large parking area for Swap Shop and Exhibits. Food available. No entry fee for HAMNIC; but there is a \$2.50 entry fee per car to Lanier Islands. Picnic, hiking and swimming for the kids. Trailer hookups and camping available on site. Prizes. Talk-in on 07/67. For further info write Fred Runkle, K4KAZ, 25 Stonehedge Dr., Buford, GA 30518.

Illinois: The Northern Illinois DX Association will host the W9DXCC Convention September 13 at the Arlington Park Hilton, Arlington Heights. A full program for DXers is planned. For details write: Howie Huntington, K9KM, 65 South Burr Oak Dr., Lake Zurich, IL 60047.

Illinois: The Peoria Area ARC presents Superfest '80 to be held September 20-21 at the Exposition Gardens, West Northmoor Road, Peoria. Admission \$2 in advance and \$3 at the door. Activities include: Forums, product demos, amateur and computer displays, free flea market, ladies' and children's activities, ATV, RTTY, SSTV. Services include full camping facilities. Talk-in on 16/76. Saturday night informal get together at the Heritage House, 8209 N. Mount Hawley Rd., no reservations required. For more info contact Larry Saletzki, 5808 North Andover Ct., Peoria, IL 61614, tel. 309-692-8763.

Illinois: The Sangamon Valley Radio Club of Springfield will hold its fifth annual hamfest September 28 at the Sangamon County Fairgrounds in New Berlin. A large covered pavilion will be provided for commercial exhibitors and private individuals. An indoor exposition building will provide 10,000 sq. ft. of display area. No charge for set-up in either area. Tables and spaces can be reserved by mail, free of charge, on a first-come, first-served basis. Food and refreshments will be available. Overnight camping on the fairgrounds Saturday night. Programs include a slide presentation from Randy Rowe, N0TG, of St. Louis, a member of the recent Navassa DXpedition, exhibits, activities for the ladies and children, prizes.

Tickets are \$1.50 in advance and \$2 at the gate. For more info contact Joe Suarez, WB9RPF, SVRC, 1025 South Sixth St., Springfield, IL 62703.

Indiana: The Grant County ARC will hold its hamfest on September 14 at the Grant County Fairgrounds, Marion. Admission is \$2 in advance and \$2.50 at the door. For more info contact A. Eckstein, WD9IHH, 252 Sunset Dr., Marion, IN 46952.

Indiana: The Porter County ARC will hold its annual hamfest September 14 at the Porter County Fairgrounds in Valparaiso. Activities include flea market, technical sessions, prizes, bingo and refreshments. Dealers and commercial exhibitors; free indoor and outdoor space. Gates open at 6 A.M., talk-in on 96/36 and 52. Advance tickets \$1.50, at the gate \$2. For tickets and information write to Charles Baker, W9SJK, P. O. Box 251, Portage, IN 46368.

Iowa: The Cedar Valley ARC will hold its annual hamfest on October 5 at the Hawkeye Downs Exhibition Hall, Cedar Rapids. Activities include technical talks, flea market. Manufacturers and dealers welcomed. Talk-in on 16/76, 52, 223.34/94. Advance tickets \$2, \$3 at the door. Overnight camping, picnic facilities, concession stand, ARRL representatives, movies. The first flea market table is \$5, all others \$7. For additional info contact James R. Maccani, W0HUP, 1440 Blairs Ferry Rd., Apt. C-12, Hiawatha, IA 52233 or write CVARC Hamfest, Box 994, Cedar Rapids, IA 52233.

Kansas: The Sandhills ARC is holding a Swap Fest on September 21 in the 4-H Building at the Finney County Fair Grounds, Garden City. Doors open 9 A.M. to 4 P.M. Bring a covered dish and silverware. Program for the NYT. Talk-in on 31/91 and 52. For more info contact Samuel C. Gardner, W0OAG, 1708 Prairie Park La., Garden City, KS 67846.

Maryland: The Foundation for Amateur Radio presents their 24th annual hamfest on September 14 at the Gaithersburg Fairgrounds, Gaithersburg. Activities include a rummage sale. Tables will be assigned on a first-come, first-served basis. Only Amateur Radio-related items may be offered for sale at this hamfest, as required by Maryland state law. Gates open at 8 A.M. for setting up displays, rummage tables and tailgating. Commercial exhibitors will be admitted as early as 6 A.M. Gates open for general registration at 9 A.M. Admission is \$3 at the gate; children under 12 free, but parent must be registered for children to participate in organized programs. Ladies programs. For further info and reservations write Foundation for Amateur Radio, P. O. Box 523, Bowie, MD 20715.

Massachusetts: The Hampden County Radio Association will hold its annual auction on October 3rd at Feeding Hills Congregational Church, intersection of Rtes. 57 and 187, Feeding Hills. Doors open at 7 P.M., auction starts at 8 P.M. For more info contact Andre M. Bouchard, WB1BZW, 650 Southwick St., Feeding Hills, MA 01030, or Tel. 413-786-9735.

Michigan: The Lause Creuse ARC presents its eighth annual Swap and Shop at the Lause Creuse High School, Reimold Street, Mount Clemens, on September 21 from 9 A.M. to 3 P.M. Prizes, free parking, talk-in on 69/09 and 52. For more info or tickets send s.a.s.a.c. to Doug Kahrel, W8QHS, 38344 Wooster, Mount Clemens, MI 48043.

Michigan: The Genesee County ARC, Bay ARC, Lapeer County Amateur Radio and Repeater Club, Saginaw Valley ARC and the Shiawassee ARA will sponsor the Five County Swap-N-Shop on September 21 from 7:30 A.M. to 4 P.M. at the Southwestern High School 1420 West 12th St., Flint (south off Rte. 69 on Hammerberg Road, turn left at 12th Street). Food concession, free parking, prizes, talk-in on 52. Tickets are \$2 per person in advance, \$3 at the door, children under 12 free. For reservations contact Bob Ross, P. O. Box 7671, Flint, MI 48507, or Tel. 313-239-0197.

Michigan: The Adrian ARC will sponsor its eighth annual Hamfest on September 28 at the Lenawee County Fairgrounds, Adrian. Prizes, games and programs will be offered. Talk-in on 31/91 and 52. Tables: \$5 per 8 ft., \$3 per 4 ft. and \$2 for inside space. For tickets, tables and info write to Adrian ARC, P. O. Box 26, Adrian, MI 49221 or Tel. 517-263-3592; ask for Sally or Bob Fay.

Michigan: The Blossomland ARA will hold the 1980 Blossomland Blast on October 5 from 8 A.M. to 3:30 P.M. at the Lake Michigan College Community Center, located off exit 30 on Highway I-94 near Benton Harbor. Admission is \$2 in advance, \$3 at the door, children under 16 admitted free. Activities include: flea market, Heathkit factory A-V show, cw contest, Novice Forum, XVI program. Services include: food, flea market tables (\$3 each), and free parking. Talk-in on 22/82 and 52. For more info contact Matt Beha, N8BPI, 3752 Lane Cir., St. Joseph,

MI 49085. Tel. 616-982-3208 days, or 616-429-8743 after 5:30 P.M.

Mississippi: The Mississippi Coast ARA will hold its fourth annual Ham-Swapfest October 4-5 at the International Plaza in Biloxi. Free admission. Prizes, old-time shrimp boil, flea market, commercial displays, forums, talk-in on 14/73 and 52. For further info contact Bob Wyatt, WB5VCI, Box 114, Whispering Pines Drive, Waveland, MS 39576.

New Hampshire: The Connecticut Valley FM Association will sponsor the CVFM Hamfest on September 28 from 9 A.M. to 5 P.M. at the King Ridge Ski Area located at exit 11 off I-89, Sutton. Admission is \$3. Activities include: Giant indoor/outdoor flea market, florist exhibit for the ladies, frisbee toss, horseshoe competition, dealers' exhibits, scenic vista. Food served in ski lodge, overnight camping for self-contained units only, talk-in on 16/76, 24/84, and 52. CVFM club will sponsor a consignment room. For more info, contact: C. A. Breunig, 54 Myrtle St., Newport, NH 03773.

New York: The ninth annual Hamburg International Ham-o-Rama will be held September 12-13 at the Erie County Fairgrounds, Hamburg, Friday, 5 P.M. to 9 P.M., Saturday from 7 A.M. to 5 P.M. Admission \$3 in advance and \$4 at the door. Activities include: exhibits, tech programs, awards, flea market, talk-in on 31/91 and 52. Motels available nearby. Free parking, free RV hookups. For additional info contact Ron Brodowski, K2CP, 260 Hilltop Dr., Elma, NY 14059 or Tel. 716-652-6754.

New York: The TU-BORO ARC will hold its annual Auction on September 18 at the Odd Fellows Hall, 149-14 14th Ave., Whitestone, Queens. Opens 6 P.M. for sellers, 7 P.M. for buyers. Donation \$1 per person. Refreshments available. Talk-in on 146.52. For information call Walt, WB2PFO, at 212-746-4082.

New York: The Orange County ARC will hold its annual auction on October 4 at Munger Cottage, Cornwall, beginning at 11 A.M. Admission \$1. Talk-in on 52. For more info contact William Lazzaro, N2CF, 11 Jefferson St., Highland Mills, NY 10930.

New York: The Kings County RC will hold its hamfest on October 5 at Manhattan Beach Park. Large outdoor electronic flea market, ample parking area available. Talk-in on 52. Sellers \$3, buyers \$1, children and spouses admitted free. Bring your own tables or tailgate. Prizes. For more info contact A. Schwartz, 7817 20th Ave., Brooklyn, NY 11214.

New York: The Long Island Mobile ARC will sponsor ARRL Hamfest '80 Sept. 21 at the Slip Speedway, Long Island, located off Exit 43, Southern State Parkway, one block south to entrance. 350 exhibitors will be on hand. No reservations needed. Admission is \$2, exhibitor space \$3. Food and refreshments at the track. Awards. For info call (evenings) Sid Wolin, K2LJH, 516-379-2861; Nick Bellmann, KA2CAC, 516-223-1076; or Hank Wener, WB2ALW, 516-484-4322. Heavy rain date, Sept. 28.

New York: The Yonkers ARC is holding Westchester's fourth annual Flea Market and Hamfest on October 5 from 9 A.M. to 5 P.M. at Redmond Field, Yonkers. Giant auction starts at 3 P.M. Plenty of free parking, refreshments available. Picnic tables, ballfields, swings — bring entire family. Admission is \$1.50 per person, children under 12 admitted free. Sellers \$3 per parking space, one person admitted with each space bought. Bring your own tables. Talk-in on 146.265-865 and 52. For advance registration or information call Otto at 914-969-1053 (after 3 P.M.) or write to: Seymour Schlitt, 49 Frum Ave., Yonkers NY 10704.

New York: The Elmira International Hamfest, sponsored by the Elmira ARA, will be held on September 27 at the Chemung County Fairgrounds, Horseheads. There will be programs, prizes and activities for all, including ARRL forums and an FCC forum. Gates open at 8 A.M. Talk-in will be on 96/36, 10/70 and 52. Advance tickets: \$2 from John Brees, WA2FJM, 340 West Ave., Horseheads, NY 14845.

Ohio: The Cincinnati ARA will hold its 44th annual Cincinnati Hamfest on September 21 at Strickers Grove on State Route 128, one mile west of Ross (Venice), Ohio. Exhibits, prizes, food and refreshments available. Activities include: flea market (radio-related products only), music, hidden-transmitter hunt and sensational air show by the Hawks. Admission and registration \$4. For further information contact: Lillian Abbott, K8C KI, 1424 Main St., Cincinnati, OH 45210.

Ohio: The Cleveland Hamfest Association presents the Cleveland Hamfest, to be held on September 28 at the Cuyahoga County Fairgrounds in Berea from 8 A.M. to 5 P.M. Admission is \$2.50 in advance (prior to August 31) and \$3 at the door. Activities include: indoor exhibits, outdoor flea market, (held from 6

A.M. to 5 P.M., space \$2, bring your own table) and ladies activities. Food service will be available. Talk-in on 146.52. For more info contact the Cleveland Hamfest Association, P. O. Box 27211, Cleveland, OH 44127.

Oregon: The Walla Walla Valley Radio Amateur Club will hold its hamfest September 20-21 at the Community Building in Milton-Freewater, Oregon. For more info contact New Blumback, 704 Pierce St., Milton-Freewater, OR 97862 or Tel. 503-938-5738.

Pennsylvania: The Mount Airy VHF Radio Club, Inc. will sponsor the Peck Rats' fourth annual Mid-Atlantic States VHF Contests October 4 at the Warrington Motor Lodge, Rte. 611, Warrington. Advance registration \$3, at the door \$4. Price includes admission to ninth annual Ham-A-Rama flea market October 5, from 8 A.M. to 4 P.M. at Bucks County Drive-in Theater, Rte. 611, Warrington. Cost for flea market alone \$2, tailgating \$2 per space. Bring your own table. Talk-in on 52. Information for both events available from Ron Whitel, WA3AXV, P. O. Box 353, Southampton, PA 18966, or Tel. 215-355-5730.

Pennsylvania: The Central Pennsylvania Repeater Association will hold its annual Electronic Swap Fest on September 21 in the Park-N-Shop Garage, 200 Block Walnut St., Harrisburg. Gates open at 8 A.M. Registration is \$3, spouses and children admitted free, \$1 charge for tailgating. Food and refreshments available. Talk-in on 145.76. For more info contact John Frye, II, WB3JFA, 7926 Eveningstar Dr., Harrisburg, PA 17112.

Pennsylvania: The Radio Association of Erie is holding its annual HAMJAM on September 28 at the Rainbow Gardens at Waldameer Beach Park, Erie. For more info contact Wayne Robinson, WA3HJC, c/o Radio Association of Erie, P. O. Box 844, Erie, PA 16512.

Pennsylvania: Skyview Radio will hold its annual Swap and Shop on September 21 from 12 to 4 P.M. at the Sokol Camp, Lower Burrell. Registration is \$1, XYLs, YIs and children free. Ample parking and lots of shade. For more info send s.a.s.a.c. to Jim Jackson, K3VRU, R. D. 1 Box 7A, Apollo, PA 15613.

South Carolina: The York County ARC will hold its 29th annual hamfest on October 5 at Joslin Park, Rock Hill. Barbeque dinner, snack bar and refreshment stand. For registration and prize info write to YCARA, P. O. Box 4141CRS, Rock Hill, SC 29730.

Texas: The Houston Hamfest/Convention will be held October 3-5 at the Houston Marriott Brookhollow Hotel. Admission is \$5 in advance and \$7 at the door. Children under 12 admitted free. Activities include: 40 commercial exhibitors, forums and technical sessions, DX satellites, WARC, microwave, family activities, banquet with speakers including Land Campbell, W1CUI, and Roy Neal, K6DUE. There will be a tour of Johnson Space Center. For additional information and reservations, contact Tom Taormina, K3RC, or Houston Hamfest/Convention, P. O. Box 79252, Houston, TX 77024, or Tel. 713-481-4586.

Virginia: The National Capitol DX Association presents DXPO 80 to be held September 27-28 at the Ramada Inn, Tysons Corner, junction of Rte. 7 and I-495. Saturday activities include Phase I, DXPO program, banquet with prizes. Sunday's activities include Phase II, DXPO program. For more info contact John Kanode, N4MM, or Stuart Meyer, W2GKH, or write Dick Vincent, K3AO, Rte. 1, Box 230, Bryantown, MD 20617.

Strays

QST congratulates . . .

— Nat and Mary Beth Frances, WB0QHN and WB0QVY, of Silsbee, Texas. The 17- and 16-year-old son and daughter of W0MBP were independently selected to participate in the Iouis International Visitation Exchange Program. Nat is spending five weeks in Huy, Belgium, and Mary Beth is visiting La Neuveville, Switzerland.

— ARRL Delta Division Vice Director O. D. Keaton, WA4GLS, of Old Hickory, Tennessee, former chief of the Tennessee Department of Water Quality Control, who has been named manager of AWARE Laboratories.

I would like to get in touch with . . .

— I pre-WW II holders of station/operator licenses at KALUS, Corregidor, Philippines. Steve Stuntz, K6FS, 164 Oak Ct., Menlo Park, CA 94025.

How's DX?



Conducted By Clarke Greene,* K1JX

Polls, Pirates and Prefixes

One year ago, a poll was published in this column. At that time, I anticipated that, if one were lucky, 150 readers would respond. In fact, that's how the "rewards" (a free *DX Callbook* to three chosen at random) were determined — everyone would have a one-in-five chance of winning. After the final counting, over 1400 questionnaires filled up the dining room, thereby completely ruining the calculated odds — and dinner for a couple of months.

The questionnaires were even read, all of them. There were two reasons for instituting the poll. The first was to find out how the typical "How's DX?" is liked, and the second was to find out what you, the readers, wanted to read. The findings were not at all what was expected. It turns out that just about half the respondents are fledgling DXers. That is, they have 100 or fewer countries confirmed. The remaining half ranged from the DXCC plateau to the Honor Roll. This doesn't sound very amazing, but it shows that everyone who is interested in DX, specifically "How's DX?," isn't on the Honor Roll. So, this was an affirmation that we must provide for a broad audience rather than a hard core.

The very concept of providing for a broad audience brought the greatest criticism. Just about half the respondents liked "How's DX?" (felt that it met their needs most of the time), while the other half expressed enough negative opinion that I considered hiring a bodyguard. A very large segment wanted Rod Newkirk back, which is certainly a tribute to the outstanding contribution made by W9BRD.

Well, the guy listed in the Yellow Pages under "Guard, Body" wanted too much money to follow my every move. Besides, it seemed rather awkward explaining to the security guard at work why this hulk, Bruno, had to escort me to the men's room. Instead changes, however subtle, were made in "How's DX?" with the fervent hope that they would be perceived as improvements.

USSR QSLs

One of the age-old questions of DXers everywhere is "How do I get cards from those Russians I worked?" Well apparently, those Russians you worked want to know, too. The following is a translation of an article that appeared in the December 1979 issue of *Radio Magazine*. It's entitled "Frank Discussion about QSL's" and is authored by N. Grigor'eva (our grateful thanks to Dex Anderson, HB9BRO/K3KWJ, for this translation).

"Recent letters to the editor complain about difficulty in getting QSL cards and in the forwarding of cards. There are complaints about the confirmation ratio and about the quality of cards. One amateur writes that the Central Radio Club of the USSR does not supply kray and oblast' radio technical schools with cards on a regular basis, and local printers don't have Latin script. The DOSAAF Printing House is supposed to print 6,000,000 cards a year, but because of a shortage of paper only 6,500,000 cards have been printed over a three-year period. Since 3,000,000 cards are necessary for exchanges with foreign amateurs alone, a total of 8 to 10,000,000 cards annually is required. Obviously, in these circumstances many

amateurs remain without cards. Lower level DOSAAF organizations, which also have a responsibility in the matter and which also receive allocations of paper, are doing nothing. Some amateurs use regular postcards, but these are more expensive and adding call letters, etc., with a rubber stamp sometimes spoils the card. Homemade QSLs are frequently of low quality. All sorts of unworthy set-ups of paper circulate in lieu of real QSL cards. Moreover, many shortwave and ultrashortwave economize on sending out QSLs not only to stations worked but also and especially to SWLs, which is a grave infraction of the amateur rules. Even operators of special-call and anniversary-call stations are guilty of this: They are reminded again that before starting such operations they must arrange for preparation of QSLs in good time and must of course see that they are sent out on time. The low confirmation ratio, which applies to some regions of the country more than others, means that in order to qualify for certain diplomas (certificates), one must work two of three times as many stations as is necessary from the locality concerned. A ham from Kislovodsk complains that at best he receives one card for every five sent out.

"There are not a few cases in which QSLs are not even sent out to foreign stations; to cite official figures of the Central Radio Club of the USSR, in 1978 foreign hams sent 52,950 QSLs to Latvian operators,

signs an exotic call like BY1A or C3PO and runs up a big pile-up. He may even use the call of some genuinely active station, like BV2A. You wait in the pile-up for your turn, get a signal report and try to QSL. Either the QSL manager doesn't know what you're talking about when you send a card, or he doesn't even exist. Oh well, it was fun while it lasted.

This frustrating experience happens more often than you might think. An example is VR0M. Where is he? The island he claims to be on was visited by some yachtsmen recently and was found to be totally deserted. Yet he is quite an active DX station. We'd like to publish a monthly list of *confirmed* bootleggers. Just because a guy sounds funny or doesn't send you a QSL doesn't mean he's a phony. But, if you have some hard facts (like a "who me?" letter from his alleged QSL manager) please let us know. These guys may be fun to work, but it's tough to count them for DXCC.

Prefixes

It seems that every time you turn around, some new prefixes appear on the air. Even our own FCC issues alphabet-soup call signs. It's very hard to keep up with all these changes. So, you ask, how does one know whether the AC5 you just worked is high on a mountain in some remote Himalayan village or in downtown Dallas?

The ITU (International Telecommunication Union) has set up a highly structured system of call-sign-prefix allocation. Fortunately, virtually every country adheres to this set-up. Therefore, if you work something you've never heard of before like, say, UIN, all you have to do is look up the UI prefix block in the ITU prefix-allocation list to find out that it's assigned to the Soviet Union. Where can you find such a list? In some editions of the *Radio Amateur's Handbook* — including the 1981 (58th) edition — the latest *ARRL Operating Manual*, along with both the Foreign and U.S. *Callbooks*.

but from the Riga RTS only 37,560 cards were sent for foreign operators, meaning that about 30% of the contacts remained unconfirmed. Elsewhere the ratio of unconfirmed contacts reaches 50% and in Yerevan and Na'Chik 70%. A complicating factor is that a part of the cards never reaches the addressee and another part is held up, sometimes for years. A letter from Kamchatka (near Japan) states that in 1979 cards were received for QSOs that took place in 1976 and 1977; not individual cards but whole packs. Often cards are sent to the wrong city or oblast' level. The volume of QSLs has reached the point where the system is beginning to break down. In their letters to the editor many amateurs suggest decentralizing the international QSL exchange system and entrusting this job to republic radio clubs or oblast' sport clubs. But very simple calculations show that this would be economically disadvantageous and organizationally very complicated. It would be more correct to talk in terms of a partial decentralization down to the call-area level. This would require the setting up in each area of a small QSL bureau, in which case cards would be sorted at the CRC only into call areas (10), significantly easing the work at this vital point. At present each employee of the QSL bureau of the CRC must sort 10,000 to 12,000 cards a day. This is often beyond the capability of even experienced workers. The worst months are from May to September.

Understaffing creates especially difficult problems: During some months instead of the 10 people authorized there are at best three. This year for example, the Shortwave Committee of the RSF of the USSR asked the amateurs of the capital to help out — unfortunately this remained a voice in the wilderness, although in fairness, three old friends of the QSL bureau of the CRC — A. Volynshchikov, UW3DH, N. Platonov UA3-170-483, and A. Kuzman, UA3-170-599, helped out as they have for many years, on a volunteer basis.

"At lower levels too, there are many problems involving failure to process incoming cards. This has given rise to an 'under-the-table' traffic in (unearned) cards for needed oblasts.

"There are three approaches toward solving the QSL problem:

1) The CRC as well as the DOSAAF Publishing House need to work more aggressively on the problem of sharply increasing the production of QSL card blanks. Oblast, kray and republic DOSAAF committees must take urgent steps to provide collective and individual stations with QSL cards; the experience of the Lithuanian and Estonian SSRs shows this can be done. Finally, radio amateurs themselves should use picture postcards, with their call signs added typographically, meaning that the appropriate organizations need to arrange to have printing organizations designated in oblast', kray and republic centers that will accept orders from amateurs.

2) A serious effort must be made to straighten out the QSL exchange system. Deficiencies in the international exchange of QSLs are especially unacceptable; the prestige of Soviet amateurs depends to a large degree on how fast their foreign colleagues receive confirmation of the contact. Nikolay Nikolayevich Stromlov, UA3BN, well known polar radioman, writes that we must do everything in our power to carry out the exchange of QSL cards much faster; time limits should be established for the passage of cards through the system. This suggestion deserves strong support.

3) The responsibility of shortwavers and ultrashortwavers for the quality and timely dispatch of their QSLs should be reflected in 'The Radio Amateur's code' which radio enthusiasts have been waiting for for a long time."



WA4MDS and his wife visited HM1PM last May. Shown from left to right are HM1FM, HM1LV and WA4MDS.

packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.c. for a prompt reply.

Claiming your QSLs

- 1) Send a 5- x 7-1/2-in. s.a.s.c. to the bureau serving your district.
- 2) Neatly print your call sign in the upper left hand corner of the envelope.
- 3) A preferred way to send envelopes is to affix a 15-cent stamp. If you expect to receive more than 1 oz. of cards, please affix postage accordingly.
- 4) When requesting *any information* from the bureau serving your district, always include a s.a.s.c. for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.c.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of 6 to 8 months, or longer, may take place before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- x 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

Do send the bureau enough postage to cover

QSL Corner

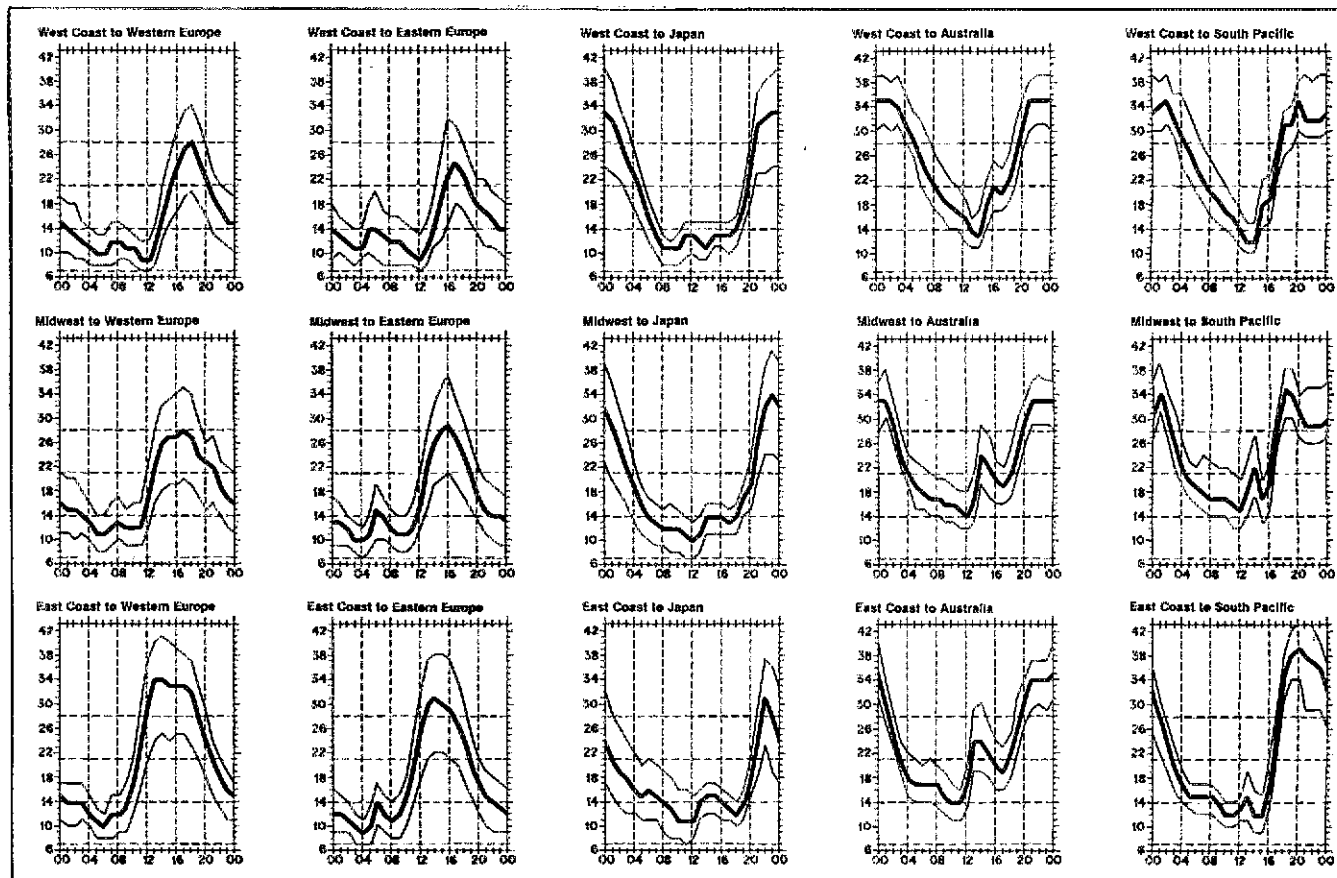
Administered By Joan Becker

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of 22 call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.

How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are



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

envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade.

Do include an s.a.s.c. with any information request to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QST Service" in this column every other month).

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

QSL MANAGER VOLUNTEERS

K4DOT
WA4KOP
AA4NC
AB4MTE

Helpful Hint from W4MB.

A QST wrapper, inside out, makes a perfect mailing wrapper for a pound of QSL cards going to the ARRL Overseas bureau. It automatically includes your required QST label. Don't forget your check, \$1 per pound.

EP21Y is back in business, having been rumored to be off the air earlier this month. But he does not want his QSL cards from the U.S. to go to him direct, for obvious reasons. Use his manager JR3WRG.

All cards for SV1C/A, SV1W/A, SV1J/A, the last Mt. Athos DXpedition, should be directed to P. O. Box 3751, Athens, Greece.

ARRL DX QSL Bureau System

First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

Third Call Area: all calls* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: all single-letter prefixes — National Capitol DX Assn., Box DX, Boyce, VA 22620.

Fifth Call Area: all two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Sixth Call Area: all calls* — ARRL W5 QSO Bureau, Box 1690, Sherman, TX 75090.

Seventh Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Eighth Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Ninth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Tenth Call Area: all calls* — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — I.P.R.A., P. O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRLE Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5HJ, 2328 Grant Rd., Regina, SK S4S 5F3.

VE6* — G. D. Hleton, VE6AGV, 4003 First St., N.W., Calgary, AB T2K 0X2.

VE7* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

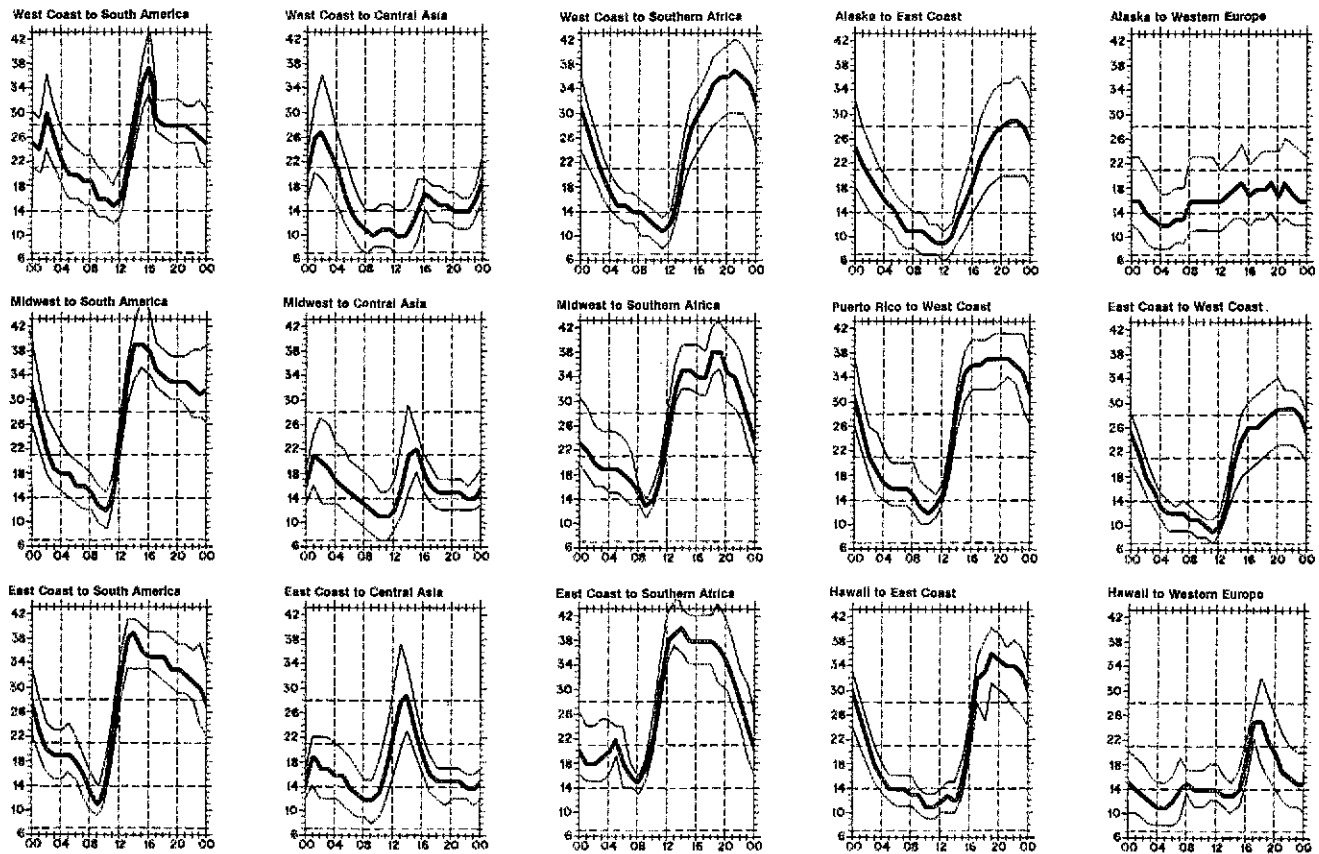
VO1, VO2 — CRRLE VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.c. to the bureau for further information.

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and therefore may not be entirely accurate.

AE0L/KH2 (K0LST)
A7XA (DJ9ZB)
CN8AK (WA3HUP)
CN8BL (F3HT)
CX7ARR (AA1U)
C5AAP (G3LZZ)
C5AJ (DL7AH)
E1SV/OD5 (E15C)
FM0FJE (F3VU)
HL9TN (WA8DHK)
H3ILR (WB3KGY)
J6LJA (VE3GWV)
KA6WW (AJ6M)
OH1CW/OH0 (OH1PA)
PJ2FR (K2TJ)

TI0BQ (I0KDB)
TU2DP (N4BZV)
VK9NM (DJ5CQ)
VK9XT (VK3OT)
VP2AJ (WB2TSL)
VP2VGE (W2FLO)
VP2KAL (WB8L.DH)
XT2AW (KN1DPS)
XT2AZ (VE2DFR)
YJ8XR (DK6XR)
3VR0NU (I0AMU)
5W1CK (5420 N. W. 196th, Portland, OR 97229)



lowest curve (optimum traffic frequency, or fof2). See January 1977 QST, page 58, September 1977 QST, page 35 and January 1979 QST, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions, for September 15 to October 15, 1980, assume a sunspot number of 142, which corresponds to a 2800-MHz solar flux of 187.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from June 1 through June 30, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

CT2CI/114	JR6EFE/254	YB#ADT/219	WA2OQM/282	N4BBY/100	K5IW/103	KB6ZL/106	WB8KSG/198	W9NUD/104
CT2CJ/120	JA8FKO/289	YU5XAF/117	WA2VEE/230	N4CMJ/108	KB5FV/102	W6NGK/102	WB8ZNM/152	W9NYW/107
CT2YB/111	OH1FS/143	9U2BO/253	WB2ELV/107	N4OI/249	K15S/103	WA6SZE/136	WB8VKL/111	W9YX/104
DF6EX/126	OZ1FAO/121	K1OSY/101	WB2QZZ/107	N4YJ/100	W5EJ/108	WD6DKG/109	WD8NVA/113	WA9QDO/205
DF8NT/139	OZ2RC/110	K3JSZ/105	AB3P/106	W4GBU/209	W5OG/103	WD6FLV/102	WD8QBP/107	WA9RCQ/109
DL4FL/104	PP5AVM/109	KA1DS/148	K3JSZ/105	WA4IGL/101	W5SG/250	A17H/149	AA9F/103	WD9AXF/104
F6CRS/100	SM2EJE/223	N1AMB/104	N3SM/101	WA4SZZ/105	W5YON/103	K7C/137	A9BL/211	WD9HWY/100
F6EVS/187	SM5BXP/170	W1PZR/108	W3IVG/113	WA4JTE/131	WA5KOS/105	KA7CRP/102	AF9H/113	WD9IPP/116
F77BP/129	SM7ASL/114	WA1YIO/104	WB3FAA/113	WA4VEK/223	WA5NUK/188	W7DNY/255	A19L/106	A19M/107
HB9AOF/110	SM7HTH/109	AJ2P/104	AA4WA/218	WA4VSL/104	WB5VH/106	W7TIR/160	K9LHA/125	K9CL/297
I2GXS/180	TF3AC/111	K2DSV/255	AB4Y/105	WA4ZGL/164	WB5YON/101	WB7OQW/185	K9CAJ/103	K9EVE/219
I3VJW/122	TF0TJ/102	K2ENT/148	K4BAM/106	WB4DWD/108	WB5YPE/106	K8BY/221	K9WTF/102	K9SUB/104
I5LIN/103	VE3CLJ/335	KA2CRN/110	K4FWR/206	WD4ARY/103	WD5EWO/102	K8GAG/108	K9AUS/135	WB9SR/107
I9NFX/105	VE3KUH/110	KA2CVM/107	K4MU/105	WD4GSG/105	K6QHE/102	K8MR/105	KA9CQM/129	WB9FAQ/103
JA1XIA/125	VE5ADA/101	KA2DOX/103	KB4GQ/175	WD4RIL/138	KB6MD/109	W8UT/113	N9IF/148	WD9CTV/100
JH1APK/254	YP2MM/105	N2ATD/200	N4AI/102	AF5V/101	KB6O/104	WA8JOC/116	W9HPG/138	WD9FIR/KL7/102
JH2JUK/121	VS5TX/118	W2JDK/101	N4BBB/128	AG5Z/104				

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CT2CI/114	JR6EFE/247	KA1HD/116	WB2NEG/104	K4CDB/252	WA4JTE/131	N6BXM/101	KB8KB/101	WB9UQY/101
CT2CJ/120	JR6GEJ/113	N1AMB/104	WB2PEL/114	K4FWR/206	WA4PPS/151	N6PV/102	N8AXY/109	WB9ZKK/132
CT2YB/111	JA8FKO/109	W1PZR/101	WB2QZZ/104	KB4GQ/169	WA4UPS/280	W6DH/171	W8UVZ/102	WD9CYT/105
DF2TG/100	OH1FS/140	WA1BYE/106	WB2SXT/100	KB4JR/108	WA4VEK/220	W6NLG/126	WB8VKL/101	WD9DFZ/123
DF6EX/112	PT2PT/101	WA1WNN/113	K3LDE/101	KB4QB/250	WA4VSL/103	WA6MHZ/103	WB8ZED/102	WD9HWY/100
DF9RB/100	SM2EJE/216	WA1ZCC/269	KA3BBSM/104	KC4M/145	WA4ZGL/160	WA6SZE/135	WB8ZNM/148	WD9IIC/148
DJ1XP/186	SM5DUP/102	WB1GYV/103	W3CM/106	N4AAQ/103	WB4DWD/103	WD6GKF/101	WB8AFK/101	WD9IPP/115
DJ0XA/100	SM7ASL/111	K2ENT/148	W3FOW/118	N4AWR/100	WB4GNT/253	A17H/149	WD8KO/100	K9CL/205
DL1HH/317	SP3HTZ/101	KA2CRN/108	W3ZE/118	N4BBB/113	WD4ARY/103	AJ7Z/120	WD8NVA/113	K9RW/256
F6EVS/138	VE3CLJ/334	KB2EI/107	N8AJN/129	N4BVP/105	K5ANB/109	K7JNB/101	K9LHA/124	KA9BSV/110
G4JWV/100	VS5TX/118	W2ATD/182	WB3JUK/102	N4OI/123	K5PID/102	W7DNY/251	K9AUS/122	KB9C/109
HB9AOF/103	YU2AAU/171	W2IBZ/214	WB3KHH/148	N4BVP/176	W5JMC/101	WB7OQW/175	KA9CQM/127	KA9VBW/115
HK3AXT/191	ZS2BD/104	W2IP/100	AA4KA/193	W4MDX/239	W5SG/232	K8BQU/102	N9IF/121	WB9DHS/109
JA1KAW/118	9J2BO/175	WA2SSU/108	K4BUH/108	W4PME/109	WB5YPE/105	K8BY/216	W9NYW/102	WB9FAQ/101
JE2MCM/109	KA1GG/115	WA2VEE/227	K4BYK/194	W4RNZ/108	K6OP/101	K8ZU/133	WB9GMC/108	WD9BKT/102

Cw

DJ4OP/114	I2GXS/120	PP5AVM/109	W3YAF/101	N4WQ/103	WA4SZZ/102	W5UJY/102	WA6IGU/111	K9CVD/128
DL3MQ/106	JH3XGD/102	VO1KO/103	WB3CAI/114	W4GBU/113	AA5CG/110	N6HC/111	WB8TUQ/105	WB9WRU/101
F77BP/126	JA6VA/138	YU7OQL/105	K54G/101	WA4IKZ/130	AF5H/142	N6VT/102	W9HPG/129	
HB9BNB/107	OZ1FAO/104	W3PN/142	N4MI/109	WA4QLL/102	W5KC/210			

5BDXCC

UP2NK	JA7GLB	W3CV	YU2CDS	K4PDV	WA4JTI	YO3CR	WA2AUB	N3UN
W4CZU	W1YG							

Endorsements

Mixed

CE6BGZ/273	JJ1KUV/175	K1VJH/261	K3HPG/322	KB4BH/260	WA4HDD/289	N5RQ/279	AA7C/227	N9EV/179
CT1GC/134	JA5PUL/283	N1AFC/153	K3KA/282	KB4QB/275	WA4JTI/305	W5AL/345	K7CVL/299	N9RR/232
DJ1XP/328	JA6VA/255	N1AOZ/157	K3TW/288	KC4B/225	WA4OBO/275	W3HTY/320	K7UT/275	W9NSC/245
DJ4OP/244	JA9AQE/250	N1APA/155	KA3BDW/147	KC4FU/202	WA4OMI/162	W5IB/225	KA7AUH/273	W9NYG/123
DJ5AI/281	KH6DL/281	N1CQ/150	W3ACE/303	KC4U/265	WA4OPV/144	W5JE/199	N7BJH/310	W9SS/320
DJ5IH/230	KL7ITG/170	N1II/154	W3GOH/296	KN4B/294	WA4QBX/273	W5SGT/153	N7MC/287	W9TX/206
DJ6DU/173	LA5YE/284	N1YL/282	W3KJ/266	KU4J/259	WA4SKE/240	W5ZPA/296	N7UT/279	WA9EKA/167
DK6FD/250	OH3BLD/227	W1BPU/120	W1M7/208	KV1I/184	WA4SKE/240	W5ZPA/296	N7UT/279	W9SS/320

DJ90V/248 DK8NG/251 DL1EV/126 DL6SW/246 DL8CM/289 EA1QF/260 EA3OD/249 EA4QR/144 EA7AAF/228 EA7AGQ/214 G3KLL/179 G3SJK/308 G3VOF/226 G3YJ/224 G4DJC/220 HP1XKZ/193 I2PQW/150 I3EVK/318	JA1FNA/293 JA1HEE/155 JA1MCU/318 JASPL/288 JH1YRQ/308 JR2TJ/174 KL7TG/169 LASHJE/336 LASYE/284 LUCBW/270 OE3WV/311 OK1MP/318 OK2YJ/174 OZ4RP/201 PY2BW/310 PY6CN/300 S8AA1/139 SM5BMD/208	K1KI/216 K1ST/246 N1AFG/138 W1BWS/143 W1JWX/329 W1NG/307 W1HSP/233 W1YQU/221 W1YRC/299 WA1KUL/242 WB1CTO/133 K2ARO/240 K2GAT/250 K2LJG/280 N2KW/285 W2HXF/280 W2NCL/269 W2QKJ/292	W3BUI/123 W3FDP/280 W3HAY/129 W3JII/149 W3JCS/258 W3KJ/266 W3NV/312 W3PN/277 W3AKCY/282 AA4VK/280 AC4B/291 AK4T/160 AK4NF/263 K4SE/274 K4URK/209 K4VAA/181 KA4C/236 KB4IT/257	W4AXR/323 W4BFR/294 W4KN/241 W4NYN/321 W4OTX/315 W4OWY/232 W4VJG/315 W4TBP/119 W4WU/243 W4WMM/140 W4YH/279 W4ZCB/261 WA4DAN/268 WA4GKR/287 WA4HDD/288 WA4HNL/223 WA4JT/300	K5LM/319 K5AC/208 N5AJW/250 N5IH/220 W5AL/233 W5AYZ/204 W5HTY/320 W5SJ/327 W5TJQ/184 W5WVX/315 W5WMC/200 W5RMR/120 W5TXP/126 K6AO/296 K6DT/310 K6EID/253 K6PU/303	W6BJ/303 W6BSY/333 W6GO/268 W6KPC/310 W6OU/188 W6PM/280 W6TSH/301 W6OET/296 W6RTA/314 W6PEF/170 W6WMC/296 AA7C/190 K7FE/273 K7QLC/180 K7UT/272 KA7AUH/271 N7BJH/306	K8PYD/315 K8TMK/250 W8LC/325 W8PCA/271 W8ZRH/229 W8AMPW/199 W8BVA/250 W8BYX/177 W8BZRL/246 W8BNEQ/244 K9GX/265 K9JF/278 K9MD/272 K9QVB/254 K9RF/307 KB9IG/167 KB9KD/242	W9FZQ/280 W9WGU/159 W9BQV/160 W9ZQA/201 W9ZCW/251 A9X/325 K9ALL/293 K9FL/280 K9IUC/290 N9AF/290 K9GX/160 N9AOP/160 K9MD/315 W9PXM/150 W9RAO/200 W9ULL/225 W9TCQ/241
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Cw DK8NG/220 DL1EV/186 DL1M/259 DL8CM/219 F8DCG/250 I3CBO/261 IT9GL/175 JA1BWA/268 JA1FNA/192	JA1IBX/272 JH1YRQ/281 KH6JWK/125 LASHJE/177 OH2BSQ/157 OK1MP/200 ON7EJ/191 PA6TA/163 PY2BW/177	SM5BHW/287 SM6CMU/220 SM6CCM/204 VE1BLX/152 VE3CVZ/199 KA1CB/128 W1FZ/129 W1NG/290 W1WLW/216	WA1FCN/128 K2BZT/244 K2QF/167 K2FD/139 N2KW/251 WA2AUB/147 K4URK/209 W3EUV/240 W3FAF/124	W3GRS/283 W3BJU/159 AA4KA/102 AA4M/228 W4KTI/220 K4PI/293 K4SE/243 K4XO/282 KU4J/127	KU4N/167 N4NX/244 N4OI/214 W4KN/250 WA4JT/220 K5KV/162 K5UR/126 N5JR/262 W5UWF/199	AD6D/140 K6DT/222 N6MU/262 W6GO/171 W6YQ/202 W6RSE/264 AA7C/194 N7UT/233 W7KVV/179	WA7RQS/152 WB7ASF/202 K8HV/181 KB8KW/180 W8UVZ/284 K9QVB/230 K9WA/200 N9RR/178	W9BW/275 W9DWO/290 W9LNV/162 W9IIC/162 N9RR/280 W9BW/270 W9RU/200 WA9VBW/126
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Honor Roll

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 310 countries of the 319 current countries on the DXCC list.

Mixed 319 DJ2BW/357 DL1HH/349 DL1JW/352 DL1KB/360 DL6EN/355 DL9OH/351 G3FKM/357 G3FXB/357 I0AMU/358 LU4DMG/355 LU5AQ/354 LU6DJX/364 OE1ER/362 OH2BH/342 OH2NB/361 OK1ADM/345 PY2CK/363 SM7ANB/348 VE5RU/352 4X4DK/358 W1KA/353 W1CKA/350 W1DQJ/344 W1FZ/358 W1HH/351 W1XJ/360 W1HZ/358 W1NU/354 W1OQ/339 K2BK/354 K2BZT/357 K2FL/356 K2LWR/354 K2PXX/344 K2TQC/347 K2LYM/340 W2AG/360 W2AGW/364 W2AO/357 W2BHM/353 W2BXA/364 W2CR/357 W2DOD/358 W2DQN/341 W2JVU/361 W2NUT/356 W2OKM/358 W2PV/342 W2QM/355 W2SSC/356 W2TP/349 W2YY/348 WA2DIG/349 WA2RAU/341 WA2RLQ/341 K3MO/353 W3AFM/353 W3CWG/356 W3GH/355 W3GR5/352 W3KT/363 W3MP/362 W3NKM/357 K4EZ/346 K4IKR/338 K4LNM/354 K4PDV/357 K4YR/356 K4YYL/340 W4AAV/360 W4AIT/363 W4DR/356 W4EX/364 W4QM/362 W4QGN/341	W4SSU/347 W5AQ/351 W5HE/341 W5KC/363 W5MMK/361 W5PQA/358 W5QK/351 K6DC/356 K6EC/354 K6KI/352 K6LGF/352 K6OJ/361 K6ZO/364 N6AV/341 N6FX/347 W6AM/365 W6BA/359 W6BZE/360 W6EE/361 W6EL/345 W6ET/352 W6EUF/339 W6FW/344 W6ISQ/347 W6KTE/342 W6KZL/356 W6PT/357 W6QNM/349 W6REH/346 W6RT/357 W6ZM/350 W7AQB/352 W7DX/348 W7GN/356 W7LDC/358 W7MB/364 W7OF/357 W7PHO/358 K8DR/351 W2GLF/352 W2HT/355 W2LV/358 W2QHH/360 W2UE/355 W3DJZ/346 W3EUV/360 K4ID/341 K4JC/344 K4RPK/347 K4SM/357 W4BFR/347 W4EEE/355 W4EO/353 W4IF/350 W4NL/334 W4QM/346 W4TM/360 W4UG/342 W4VW/351 K5FJ/352 W5GO/352 W5IO/358 W5LCL/349 W5LNU/352 W5QKZ/346 W5UN/353 K6JG/339 K6WR/345 K6YR/340 N6AR/343 W6CHF/358 W6FF/352 W6KMH/335 W6MNR/351 W6ONZ/350 W6RGG/340 W6RJ/343 W6RKP/354 W7IR/358	G3AAE/358 G3HCT/350 H89MQ/357 I1ZL/351 IT9ZGY/354 JA1BK/347 JA1BN/344 JA1BRK/342 ON4DM/356 ON4IZ/344 ON4NC/359 OZ3Y/353 PY1HX/352 PY2PA/340 PY2PE/340 FT7YV/349 SM3BIJ/356 SM6AJU/351 VE2NV/357 G2KQM/362 XE1AE/348 Y5IO/353 YV5ANF/344 ZL1HY/363 ZL3IS/352 4X4JU/354 K1YZW/337 W1BIH/362 W1DK/358 W1GKK/365 W1JNW/354 W1JR/356 W1M/356 K2FB/347 W2BMK/351 W2BOK/356 W2FZY/352 W2GC/353 W2GLF/352 W2HT/355 W2LV/358 W2QHH/360 W2UE/355 W3DJZ/346 W3EUV/360 K4ID/341 K4JC/344 K4RPK/347 K4SM/357 W4BFR/347 W4EEE/355 W4EO/353 W4IF/350 W4NL/334 W4QM/346 W4TM/360 W4UG/342 W4VW/351 K5FJ/352 W5GO/352 W5IO/358 W5LCL/349 W5LNU/352 W5QKZ/346 W5UN/353 K6JG/339 K6WR/345 K6YR/340 N6AR/343 W6CHF/358 W6FF/352 W6KMH/335 W6MNR/351 W6ONZ/350 W6RGG/340 W6RJ/343 W6RKP/354 W7IR/358	W7KH/362 K8EJ/338 K8ONV/348 W8QY/352 W8ZCQ/353 W9GLD/340 W9RCJ/351 W9TKD/348 W9AX/358 W9SYK/357 317 DJ5DA/339 DJ0KQ/339 DL3RK/356 DL7AP/351 F3AT/349 F9RM/348 G2BVN/356 I2KMG/338 I8KDB/351 JA1MCU/335 JA1WJ/349 JA4ZA/340 K4PRA/348 LA1KI/337 OH2QV/351 OH2QV/343 OH4NS/338 OK1FF/356 ON4QJ/341 ON4UN/334 PY1AP/334 PY2BKO/339 SM3CX/333 SM5BHW/335 SM6AEK/337 VE3MJ/335 VE3JLJ/337 YV5AB/356 YV5AIP/347 ZS6LV/351 W1AFF/345 W1CBZ/352 W1MIJ/346 W2AX/354 W2GK/339 W2NC/339 W2PN/339 K3GL/356 K4MQG/342 K4XO/352 N4TO/338 W4BQY/361 W4ZD/348 K5AD/341 K5RC/335 K5YY/336 W5GJ/345 W5HJA/347 W5RDA/345 K6GA/347 K6KA/338 K6QH/333 K6RN/347 K6ZM/343 W6BS/355 W6HX/359 W6HYG/350 W6KG/350 W6KUT/357 W6TZD/358 W6YK/355 WA6OET/337 K8OHG/343 K8QJ/338 W9BW/342	W9GL/355 W9GU/348 W9KRU/336 W9GKL/350 316 J17CX/338 DL1BO/354 DL1CF/341 F8RU/331 G3VT/357 G13VJ/352 H89AH/333 H89DX/344 H89KB/351 H89MX/347 H89TL/353 I5ARS/342 JA1IBX/337 JA1MIN/335 JA8ADQ/337 KV4FZ/332 OK3MM/351 OZ6MI/332 PY1HQ/352 PY2CQ/338 PY2CO/338 SM6CKS/333 VE3WT/337 YU2DX/333 K1DFC/332 K1DRN/336 W1RLQ/345 W1WY/350 W1YRC/332 AA4MM/333 K2CL/333 W2AJY/356 W2CP/343 W2FXA/350 W2GKZ/339 W3LMA/359 K4CEB/332 K4DJ/335 N4EA/334 N4WW/333 W4VJU/335 W4MGN/345 W4VPD/354 W4BOSS/331 K5DX/354 W5FFW/353 W5IR/332 W5LZZ/335 W5MMD/356 W5MB/347 W5SJ/333 W6CAE/356 W6FET/335 W6ID/356 W6UQG/349 W6YO/335 K7ABV/335 W7ADV/355 W7JYZ/345 W8GMK/331 W8KPL/354 K9BGM/337 K9MM/332 W9FC/356 W9QA/337 W9ZR/330 W9AIH/352 W9BN/342	G2FYT/348 G3JEC/334 G3NLY/335 GM3ITN/344 H89PL/346 IV3PRK/331 JA2AAQ/332 JA8JL/333 OH3SR/331 OZ1LO/334 SM6AFH/332 SM6CWF/334 SP7HT/333 UB5WF/349 VE3GNT/331 VE3NE/333 YU1BCD/338 YV5BZ/344 K1RM/332 W1SD/343 K2AGZ/333 K2LE/337 K2LGL/335 W2GT/355 K3R1/350 K3IS/328 K4IE/342 K4KQ/338 K4KQ/354 K4MPE/336 K4RA/325 N4XO/342 W4ML/356 W4NNH/349 W5RR/331 W6TO/335 W7JFC/330 K8IFF/330 W8CNL/330 W8DAW/359 W8JBI/344 W8YA/328 W8ZD/342 K9RA/329 K9RJ/333 N9ZL/340 W9BM/346 W9RK/352 W9ZT/342 WA9NUQ/333 W9BT/347 W9MYN/329 WA9OAH/330	W2MVFV/335 W2PPG/332 W2TQC/349 WB2HXD/336 W3GG/328 WA3ATP/331 AE4X/348 K4CIA/337 K4DY/333 K4FJ/338 K4HJE/330 N4MM/331 N4WF/330 SP7HT/333 UB5WF/349 VE3GNT/331 VE3NE/333 YU1BCD/338 YV5BZ/344 K1RM/332 W1SD/343 K2AGZ/333 K2LE/337 K2LGL/335 W2GT/355 K3R1/350 K3IS/328 K4IE/342 K4KQ/338 K4KQ/354 K4MPE/336 K4RA/325 N4XO/342 W4ML/356 W4NNH/349 W5RR/331 W6TO/335 W7JFC/330 K8IFF/330 W8CNL/330 W8DAW/359 W8JBI/344 W8YA/328 W8ZD/342 K9RA/329 K9RJ/333 N9ZL/340 W9BM/346 W9RK/352 W9ZT/342 WA9NUQ/333 W9BT/347 W9MYN/329 WA9OAH/330	W1JZ/329 W1NG/327 W1UJ/341 K2BT/329 K2SHZ/345 K3ZR/327 W3CGS/353 W3KA/339 W3PVZ/332 WA3IKK/329 K4BBF/329 K4SMK/323 W4ID/325 W4QO/345 K5JW/329 N5DX/333 W5DQZ/314 W5MQ/329 K6EY/336 N6UC/328 W6BSY/350 W6KY/332 W6QL/333 W6YMV/340 W6YHT/327 W7CMO/344 W8DA/342 K8MFO/330 W8DCF/327 W8EWS/358 W8ILC/331 W8PR/336 W8YGR/339 W8EUN/327 K9AWK/331 W9HLY/341 W9NN/341 WA9LO/327 K9BR/331 W9BK/343 W9GNX/329	W1JZ/329 W1NG/327 W1UJ/341 K2BT/329 K2SHZ/345 K3ZR/327 W3CGS/353 W3KA/339 W3PVZ/332 WA3IKK/329 K4BBF/329 K4SMK/323 W4ID/325 W4QO/345 K5JW/329 N5DX/333 W5DQZ/314 W5MQ/329 K6EY/336 N6UC/328 W6BSY/350 W6KY/332 W6QL/333 W6YMV/340 W6YHT/327 W7CMO/344 W8DA/342 K8MFO/330 W8DCF/327 W8EWS/358 W8ILC/331 W8PR/336 W8YGR/339 W8EUN/327 K9AWK/331 W9HLY/341 W9NN/341 WA9LO/327 K9BR/331 W9BK/343 W9GNX/329	312 DJ4AX/332 DL1DC/346 G5RP/335 G13OQR/337 I3EVA/330 IA5U/347 JA7AD/343 LA5HE/344 ON5KD/326 PY3CB/329 PY5ATL/324 VE1KG/328 VE4OX/335 VE6LU/344 YU3EY/327 W2JB/318 K2JMY/336 K2OF/328 W2LNE/337 W2LPE/350 W2XN/347 K4AUL/329 JA1JRK/328 JA1OCA/328 JA1UQP/329 JA9BJ/329 OH2BC/335 OZ3PO/335 PY2DFR/329 UA1CK/339 UA9VB/341 UB5WE/323 YV5BBU/332 ZS6RM/348 ZS6YQ/343	K6DT/336 K6LU/339 N6CV/331 W6ABA/335 W6AE/326 W6GPB/354 W6TWZ/340 K7KG/328 W7RV/330 W7ABK/326 K8VUR/333 IA5J/336 K9GM/327 W9KB/327 311 DJ1XP/328 DJ2AA/340 DJ15A/334 DK3PO/327 I2DEZ/327 JA1ADN/339 JA1DFQ/330 JA7MA/328 OE1UJ/330 OK1MP/337 ON4S/345 OZ8BZ/325 PY2ELV/326 UR2AR/342 VE3BX/332 VE3GCQ/332 VE3HD/346 VE7HG/328 XE1KS/327 YV5AHR/334 K1BW/323 W1FJ/335 K2UUV/343 W2FP/327 W2HZ/329 W2QK/336 W2SAP/349 WB2YQH/326 W3GE/335 W3LB/325 W3A3HUP/327 N4KG/328 N4SA/323 WA4VY/343 W4BBB/339 W4OEL/331 K5OS/325 K6XW/334 N6ET/327 W6CF/332 W6EJ/330 W6EPZ/353 W6GC/323 N7NG/331 N7RO/322 W7CSW/338 W7ETZ/323 W7LFA/327 W8RSW/334 W8TA/325 W9AZP/337 W9GB/341 W9JH/342 W9KQD/330 W9LT/339 W9RF/326 N9RR/321 W9BL/328 W9NVZ/344 WA9KDI/327
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310 DJ1CG/326 DL7BK/341 F2IU/331 JA1AG/344 JA1EOD/326 JA2AN/326	JABAA/339 JASMS/323 LA9CE/328 OH2BCV/323 OH8SR/322 OZ5DX/329	SM5DQC/322 SM6AOU/336 SM6CVX/325 VE3BWVY/345 ZE4JS/329 K2UR/333	W2EQS/342 W2MJ/342 W2ZZ/327 W3ZNN/325 AA4A/321 AB4H/322	K4AIM/342 KE4I/325 N4XX/324 W4MCM/342 W4WG/324 WA4DRU/323 K5LM/323	W5FT/348 W5GC/340 W5HDS/347 W5ZWX/324 K6LQA/324 N6AW/324 N6DX/338	W6GMF/339 W6MI/330 W6SQP/347 W7BGH/343 W7LLC/342 W7ORH/324	K8LJG/320 WBKJ/323 W8LBM/325 W8RCM/327 K9PPY/324 K9RF/321 K9SM/335	W9HZ/338 K0BS/324 K9IEA/320 W9AUB/339 W9DEI/342 W9TJ/349
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Radiotelephone

319 DJ2BW/350 DL6EN/352 DL9OH/351 G3FKM/353 I0AMV/358 I0ZV/347 LU4DMG/355 ON4DH/355 PY2CK/362 VE5RU/351 4X4DK/358 W1DGG/344 W2BXN/362 W2QKM/356 W2PV/342 W2TP/346 W2YY/343 W42RAU/341 W3CWG/354 W3GH/349 W3KT/354 W3NKM/356 K4HEF/359 W4DR/352 W4EX/362 W5LZM/347 W6AM/363 W6ELU/338 W6GVM/361 W6REH/342 W6ZM/345 W7DN/344 W7GN/346 K8DY/340 W8AH/356 W8BF/361 W8GZ/363 W9NZM/344	W9ZM/351 W9BW/355 W9CM/357	W9GAA/342	317 CT18H/330 DJ7ZG/339 F9RM/348 I8AA/336 I8KDB/351 ON4UN/334 SM5CZY/341 VE3MJ/337 VE3MR/341 VE3QA/353 VK5MS/357 YV5AB/356 YV5AIP/347 ZL1HY/361 Z56LW/350 W1AFF/345 K2BZT/348 W3AZD/341 W4LWX/349 W4OM/354 W4UWC/340 K5YJ/335 W5PGA/352 W5SZ/336 K6LGF/341 W6FW/341 W6KNH/334 W6RGG/337 W8MPW/347 W9KRU/336 W9JT/337 W9QLD/334 W9RNX/353 W9GKL/349	316 DL1KB/349 DL7FT/338 DL7HU/344 EA4JL/332 G5VT/357 HB9TL/352 JA1BK/343 OK1ADM/337 OZ3SK/342 OZ3Y/344 PY2PC/335 SM3BI/353 SM6CKS/333 VE3CLJ/334 YS10/345 YV5AXQ/339 K1DRN/336 W1FXD/332 W2FGD/338 W2GQN/338 W2LV/347 W42EQG/337 W3JK/336 AA4MM/333 K4MQG/337 W4SKO/351 K5DX/349 W5LZZ/335 K6JG/334 K6YRA/338 W6CHV/350 W6KTE/339 W7ADS/350 W7JYZ/345 K8DR/335 W8JT/332 W9DC/332	W9MLY/349 W9PGI/343 W9QGI/343	315 DL8NU/332 EA2HX/340 F8RU/330 G3JEC/334 GI3IVJ/349 HB9AAA/331 JA1MIN/333 JA4ZA/335 KPA4L/338 OH3SF/329 PY4KL/343 UB5WF/332 VE3CTX/330 YV1KZ/329 YV5AJK/342 W1FZ/347 W1HX/347 W3RX/330 W43ATP/330 K4HJE/330 N4WF/330 W4PDS/329 W4QAW/330 W4ZR/340 K6GA/330 W6ARJ/330 W6PT/340 W7JFO/330 W8KST/333 W8VHY/330 K9LKA/331 W9BW/333 WA9NUQ/333 W9MYN/329	314 EA4LH/330 EA8JJ/328 F2MO/338 F511/330 F9IE/330 G3TJW/327 I2KMKG/335 I0JX/330 JA1IBX/333 JA1MIN/333 JA4ZA/335 KPA4L/338 OH3SF/329 PY4KL/343 UB5WF/332 VE3CTX/330 YV1KZ/329 YV5AJK/342 W1FZ/347 W1HX/347 W3RX/330 W43ATP/330 K4HJE/330 N4WF/330 W4PDS/329 W4QAW/330 W4ZR/340 K6GA/330 W6ARJ/330 W6PT/340 W7JFO/330 W8KST/333 W8VHY/330 K9LKA/331 W9BW/333 WA9NUQ/333 W9MYN/329	313 DJ9ZB/324 EA7GF/339 I2LAG/329 I7HH/326 IT9GA/330 JA2JW/335 KH6BB/333 OE2EGL/330 SM6AEK/329 YV5BBU/332 ZL1KG/349 6W8DY/328 W1ICU/330 W1MMV/350 K4BHF/329 K4SM/344 W4BRE/331 K5UR/326 W5KGX/346 W6MQ/329 W6SXP/329 K6EC/331 W6BAF/342 W6YMV/339 W6ZKM/331 K9MM/329 W9HB/346 WA9OAH/329	KP4CK/335 KV4FZ/326 PY3BXW/327 UB5WE/322 VE3NE/329 W1GKK/341 W2GKZ/334 W3GG/324 WA3IKK/328 K4PDV/336 WA4WIP/332 N6UC/327 W6CCB/325 W6KUT/337 WA6AHF/327 W9BEK/336 K9BUR/330	K5OVC/326 K5UC/349 W5JWM/343 N6AR/330 W6HFL/338 W6ISQ/333 W7PA/333 W7FLA/327 W8GMF/336 W9LW/338 W9SFU/331	310 DL7AA/339 F5VU/322 IT9GY/334 JA1ADN/331 JA7MA/327 ON8XA/327 PA0HBO/347 G3UML/331 G5AFA/325 K6EC/331 HB9AHL/326 H5FLN/324 JA8ADQ/328 JA9BJ/327 PY3CB/327 UA1CK/337 YV5AHR/334 XELKS/327 Z56RM/340 Z56YQ/340 K2JMY/335 W2GK/333 W62HXD/333 W3EVW/340 W3FWD/338 W4EEU/331 W4EPZ/330
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CW

306 W9KNI/310	302 N4WW/306	K9MM/303
304 K6GA/307	301 K2TQC/302	299 ON5NT/301

298 DL6EN/300	294 K3FN/296 W8AH/296 W9ZM/296	293 W3KT/295
297 N4RJ/299		

DXCC Notes

By recommendation of the DX Advisory Committee, the ARRL Awards Committee has taken the following action:

APPROVED the deletion of Okino Torishima, JD17J, as a separate DXCC country, effective December 1, 1980. Contacts after that date will be credited to Ogasawara, JD1.

REJECTED separate country status for all the South African "homelands" (presently include Transkei, Boputhatswana and Venda). Credit for contacts with stations in the South African "Homelands" will be given for the Republic of South Africa, ZS.

The DXAC has again REJECTED granting contact credit to a participant of a DXpedition for that DX-
pedition when an actual contact has not taken place.

REMINDER: Those wanting to update their DXCC totals for the December 1980 QST DXCC listing must submit confirmation during the month of September. They must reach Headquarters on or before September 30, 1980 to be listed. You must comply with DXCC rule 5 including the once-a-year exception to update the listing.

Strays

HAMFESTERS AWARD

The Hamfesters Radio Club, W9AA, will be operating on 28.600 to 28.700 MHz (phone), 28.050 to 28.090 MHz (cw) and 28.100 to 28.120 MHz (cw) from 1700 UTC, September 20, until 1700 UTC, September 21, for any amateur wishing to earn the Worked All Hamfesters Members Award (WAHM). To be eligible, hams in the U.S. (but outside Illinois) must work five Hamfesters members. Amateurs in Illinois must contact 10 club members in the state. From outside the U.S., three Illinois Hamfesters must be worked. Eligible amateurs can receive WAHM awards by submitting a list of contacts containing calls, frequencies, dates and names of Hamfesters members to the club at P. O. Box 42792, Chicago IL 60642.

K4HEX OPERATION

During the week of September 22 to 28 the Lynchburg (Virginia) ARC will operate its club station, K4HEX, in celebration of Lynchburg's annual Kaleidoscope Festival. CW operation will be 50 kHz up from the bottom of each band; ssb will be 10 kHz inside the General portion of the phone band. A beautiful certificate QSL confirming contacts can be secured by sending 28-cents postage or two IRCs to K4HEX Manager, 212 Sandown Circle, Lynchburg, VA 24503. — Knight Smiley, WD4GCE, Lynchburg, Virginia



The Associated Radio Amateurs of Southern New England, W1AQ, showed what a little effort could do in obtaining Field Day publicity. Shown at the presentation of a proclamation of Amateur Radio Week in Rhode Island are (left to right) John Isidoro, K1JJ, president of the Associated Radio Amateurs of Southern New England, Inc.; Rhode Island Governor J. Joseph Garraty; Chris Ambrose, WB1GMI, publicity chairman, and Ray Ambrose, K1NQC, club secretary. Other publicity efforts included a proclamation from East Providence Mayor Langton, a photo article in the *Providence Journal*, and public service announcements on three area radio stations.

GERITOL WAS²

Tony Smaker, KL7AF, of Kodiak, Alaska, has been issued the ARRL Worked All States certificate with an endorsement for WAS two-letter calls in the Extra Class portion of the 75-meter band. Now that this final obstacle has been overcome, the Geritol group is completing WAS² — WAS with those who already have their WAS with two-letter endorsements in the Extra portion of 75. Details on the Geritol net can be found in QST, February 1978, page 81; December 1978, page 77; and October 1978, page 114. — John True, N4BA, Great Falls, Virginia

QST congratulates . . .

Harold R. Richman, W4CIZ, of Annandale, Virginia, who has been elected a director of IEEE's Northern Virginia Section.

I would like to get in touch with . . .

apartment-dwelling hams who are using mobile antennas on the hf bands. Rick W. Todd, KA8AKL, 14470 Basslake Rd., Newbury, OH 44065.

anyone interested in starting a Century 21 users net on any Novice band. Rick W. Todd, KA8AKL, 14470 Basslake Rd., Newbury, OH 44065.

hams aged 13 to 19 to form a net. Details from Mark Toif, KA8AM, 1008 Riverside Dr., Battle Creek, MI 49015. S.a.s.c., please.

Results, Third ARRL EME Competition

Moon bounce

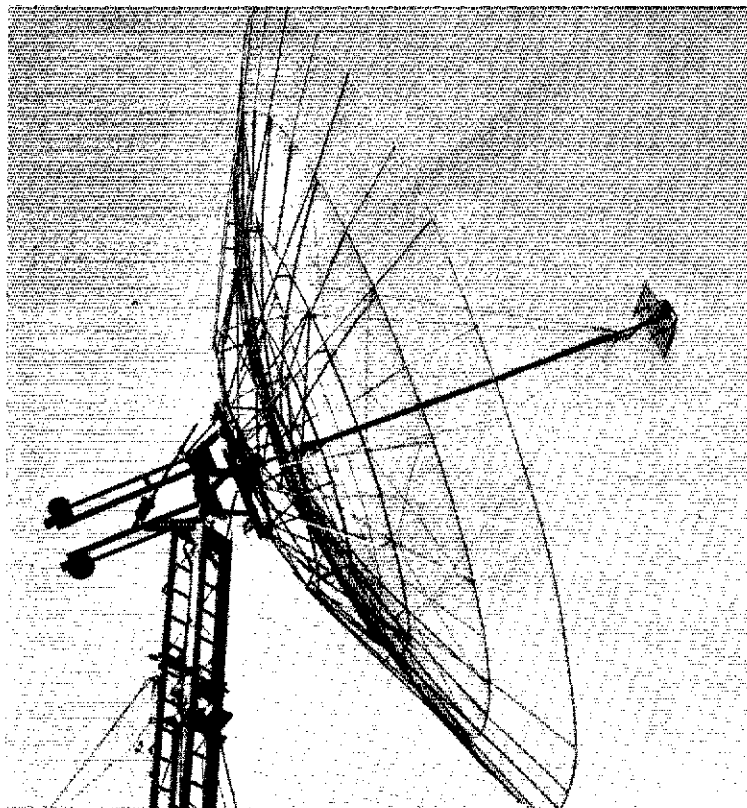
By Tom Frenaye,* K1K1

Another increase in activity highlighted the 1980 EME Competition. The logs received indicate 121 stations made successful EME QSOs, up from last year's 98. Even more encouraging was the average QSO total for single-operator stations, which jumped to 19 (13 last year and 7 the year before). On the disappointing side was the number of stations submitting entries, down slightly to 62 this year.

The equipment needed to put together a successful EME station appears to be more commercially available each year. Preamps with 1.0-dB noise figures through 432 MHz and 1.5 dB on 1296 MHz can be built with reasonably priced devices, or purchased complete. The major work involved seems to be getting the antenna(s) built and aligned, and in obtaining accuracy following the moon across the sky. The key to the whole operation is, of course, the operator, who must make the system work and understand the proper operating techniques on EME (certainly not the standard "59 Texas" type of contest exchange).

Note that only about one quarter of the stations have more than one-band capability, with 432 MHz favored overseas and 144 MHz in the USA. Both 1296 and 220 MHz showed signs of life this year, with the level of activity pleasantly surprising. Many people commented that single-band efforts should be given a little more recognition, so you will see a summary of single-band leaders elsewhere in this report.

One of the more interesting things to arrive recently was a copy of the 1979 Lunar Directory, published by the Central States VHF Society. They have undertaken the job of listing active EME stations, including equipment and telephone numbers, around the world. The 1980 version should be available soon — send an s.a.s.c. to W0VB at his Callbook



JA6CZD

address for more information, as quantities are limited.

Several people suggested that perhaps the 1981 version of the EME Competition should be held later in the year, to allow for some antenna-constructing weather. For a change, the two weekends in 1980 were blessed with positive moon declinations, giving those in the Northern hemisphere a better shot. Anyone want to suggest dates for 1981 that avoid established vhf conferences and optimize moon declinations?

*Assistant Communications Manager, ARRL

SOAPBOX

I found conditions to be extremely poor the first weekend. Libration QSB was severe the second weekend (WA3VJSJ). Good conditions the first weekend. Thanks for the event (DL9KR). May have set a new record with my 18,925-km QSO with ZL3AAD (F9FT). QRM on 432 was like on hf (PA0SSB). I think it is a mistake to spread this over two weekends, a kind of saturation point is reached when no new stations are worked (ZE5JJ). I did not expect to hear QRM on 1296! (VE7BBG). I wonder if the volcanic ash on my antenna had any adverse effect? (WA1JXN/7). Probably could have heard DK1FGA off the back of my arroy (WB4EXW). A nearsighted blackbird did not survive the collision which left the last director on one antenna badly bent

(K9XY). First time on with new az-el 42-foot homebrew dish (KA0Y). Our single 2C39 on 1296 MHz with 30 watts of rf at the feed point was enough to work LX1DB! Heard several stations on 432 using a single 20-foot long 27-el loop Yagi and 0.5-dB NF preamp (G3WDC). Hope to make it again next year (OH6NM). Happy that K2UYH and crew gave us some 220 activity (W5FF). The contest was the culmination of more than a year-long group project. Since a suitable screen for our 24 foot stressed parabola was not available, a large group effort went into weaving four-foot wide by 25-foot long strips of mesh, with solder joints every two inches! (N6GN). As many as three stations at a time answered our CQs! (W1ZX/K3NSS). Must be some kind of record to operate 45 hours in two contests and not complete a contact (W0VB)

Single-Band Leaders

	Single Operator	Multipoperator
144 MHz	GW4CQT	I2MBC
220 MHz	—	K2UYH
430 MHz	DL9KR	K2UYH
1296 MHz	VE7BBG	G3WDC

Line scores list: Call, score, stations heard, stations worked, multipliers, band (A-144 MHz, B-220 MHz, C-432 MHz, D-1296 MHz)

Single Operator

K9KFR	142,600-35-25-17-A	26-21-15-C
DL9KR	137,700-62-51-23-C	
DL7YCA	111,800-44-43-26-C	
F9FT	102,500-45-40-26-C	
JA6CZD	92,000-40-40-23-C	
PA0SSB	87,500-32-31-21-C	
SM2GGF	79,200-36-36-22-C	
F2TU	78,200-34-34-23-C	
ZE5JJ	76,000-35-35-20-C	
VE7BBG	69,600-24-24-19-C	
GW4CQT	69,500-31-30-19-A	
N7NW	52,200-33-29-18-A	
I2COR	48,600-29-27-18-C	
OK3CTP	44,200-27-26-17-C	
WA1JXN/7		
VK5MC	42,500-25-25-17-A	
K4QIF	34,000-20-19-16-C	

G5CSZ	33,000-35-22-15-A	
WB5LUA	32,300-17-10-9-A	
G3LTF	31,500-30-21-15-C	
SM7BAE	30,400-20-19-16-A	
JA6AHB	28,500-21-19-15-C	
JA9BH	26,600-25-19-14-C	
VE9MA	26,600-20-19-14-C	
WB0QMN	24,700-20-19-13-A	
YU2RGC	24,000-20-20-12-C	
WA3VJSJ	22,100-31-17-13-A	
SM3AKW	22,100-17-17-13-C	
ZL3AAD	19,500-16-15-13-C	
WB4EXW	13,000-18-13-10-A	
W6ABN	12,000-12-12-10-C	
W8IDU	9900-11-11-9-A	
DJ8QL	9000-10-10-9-C	
W5LUJ	9000-18-10-9-A	
WB6ESQ	7200-18-9-8-A	
HB95V	7000-7-0-0-A	
K1FO	4800-12-8-6-A	
K1MNS	4500-9-9-5-A	

K9XY	3000-15-6-5-A
K41GT	3000-10-6-5-A
F9MD	2400-6-6-4-A
K0KE	1600-16-4-4-A
JA6DR	1600-5-4-4-A
WA9ACI	1600-4-4-4-A
KA0Y	900-2-2-2-A
WB8PAT	400-9-2-2-A
W7CI	400-2-2-2-A
W8RWH	400-2-2-2-C
W8RAP	100-10-1-1-C
WA0LPK/L	100-1-1-1-A

Multipoperator

K2UYH(+KB2AH,WA2LTM, W3HQT,W,WA3JUF,NFV)	187,200-6-5-4-A
I5MSH(+I5s CTE TDJ)	100,000-42-40-25-C
G3WDC(+G3VGF,C6CNV,GBRHI)	54,000-8-8-19-C

I2MBC(12s FUM SVA SXZ ZFN,14EAT,opr)	20,400-32-17-12-A
W2AV(+WB2KAQ)	4800-8-8-6-A
OH6NM(+OH6NUJ)	1800-29-6-3-A
W5FF(+K5FF)	1600-1-1-1-B
WA4OYH(+WA4YWK)	600-6-3-2-A
N6GN(+K6RFT,W6SFH,WA6ARE,WB6KDF,W6CJF)	100-15-1-1-C

Other Active Stations

DK1KO,DK1BM,DF3RU, DJ9DL,DK1FGA,DK5LA, DL6WU,F9TU, F6GIS, G4EZN,G4DZU,G3ZSS, GW3XYW,HB9AYX,HB9BPQ, JA6GQ,JC6CIS,LX1DB, LU3AAT,OC4DY,OZ2FM, SM4DHN,SM5BFK, SM6CKU,SM6EEH,VK3BK, XE1RY,YV5Z,Z59ZY,AD1C, W1JR,K1WBS,W1XP,WA2FLZ, K3VXG,K4GL,WA4GM, WA4NJP,WA4JQ,K4PKV,W4WD, K5BMG,WA6IE,K5JL,K5UGM, WA6HX,W6PD,W6VTK, WA7BBM,W7FN,W7FU,W7GBI, WA7JU,W7VE, WA9KRT,WB9VEM,W9VWV, W9HHE,K9VXM,VE7BQH
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Non-Amateur Equipment	
K3NSS(W1ZX,W3PJM, K3AGR,opr)	27,500-25-25-19-C
SWL	
W0VB (9 stations - 144 MHz)	
K1ZZ(+W1VD)	(11 stations - 144 MHz)

Results, June VHF QSO Party

Double your pleasure, double your score — with double-hop E-skip, you'll be begging for more.

By Tom Frenaye,* K1KI

Everybody has been asking why contest weekends always seem to coincide with mediocre propagation, at least until recently. Last September saw one of the best tropo openings of recent years, which satisfied many 144-, 220- and 432-MHz operators. More elusive has been the wide open sporadic E opening on 6 meters, with several disappointing contest weekends during the sunspot maximum. Well, the June Contest put an end to the long string of low scores with a very good opening. The action wasn't just on 6 meters either, as the lower Mississippi River valley experienced a good 2-meter opening to top everything off.

One of the more interesting bits of information culled from the 506 entries is that a full 25% of the entries were from multioperator stations, up from 20% last year. Those 506 logs show a total of 1142 operators, slightly more than in 1979. Many DX stations were noted in the logs, with C6ACY finding his way into the logs of most who were on 6 meters. Other DXCC countries noted were KG4, KP4, KV4, (all counting as the ARRL West Indies section), FM7, HH, HI, HP, KH6, PJ2, T1, VP5, YP9 and XE. One 1U was heard but not worked.

It's always tough to point out the best efforts in a vhf contest because propagation and differing population densities play such an important part in determining the final scores. This year the outstanding 6-meter propagation allowed WB4OSN and WA4LOX to really build up their scores, with 6 meters staying open past 2 A.M.! WB4OSN did edge out WA4LOX in South Florida, but who would have guessed that 780 QSOs and 71 multipliers (all states but Alaska) were possible in a 6-meter-only entry? Farther to the west, the group at K5LZO set a new West Gulf Division record with outstanding 6- and 2-meter multipliers (65 and 18, respectively).

In the far west, those at WA7LYI caught 50 multipliers on 6 meters and WAIJXN/7 caught 13 on 2 meters from Montana. K6ZMW managed a 340-mile QSO on 1296 (and was heard in New Mexico, 525 miles away), and despite poorer Es conditions in the northern states, W7WKR found 262 stations in 34 sections to work from Idaho.

The traditional battle of big guns in the northeast saw three scores in the 200k-plus category, with the W1FC multi-multi leading the pack, again putting to good use their expertise in microwaves. The single-operator battle for number one was won by N6NB/1, putting to good use his mountaintop QTH in Vermont

Division Leaders

Single Operator

Call	Score
K3SXA	39,216
W9IP*	38,304
KØVXM*	29,127
WB4JGG*	36,936
WD8CTX	21,952
WB2WIH	22,444
WBØTEM*	30,304
N6NB/1*	86,254
K7KOT	10,791
N6CT	28,270
N4CD	39,732
ADØR	15,582
WB4OSN*	55,380
WB6NMT	15,433
WA5VJB	32,235
VE1ASJ*	26,277
T12NA*	1460

*New Record

Division

Atlantic
Central
Dakota
Delta
Great Lakes
Hudson
Midwest
New England
Northwestern
Pacific
Roanoke
Rocky Mountain
Southeastern
Southwestern
West Gulf
Canadian
DX

Multioperator

Call	Score
W3BBS	214,336
WØOHU/9*	60,639
WØSD	54,201
WB4LHD/5	72,800
WA8ONQ*	111,111
K2XR*	186,538
ABØI	27,832
W1FC*	250,194
N7NW	29,600
WA6EJO	43,452
K3LNZ/8	52,965
WA7ADK	11,178
WA4OYH*	85,500
W6XJ	60,138
K5LZO*	92,106
VE3AEA	9717
VP5AA*	29,526

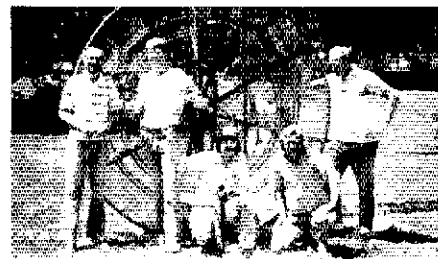
Top Ten

Single Operator

Call	Score
N6NB/1	86,254
K1FO	74,550
WA1MAO	63,578
WB4OSN	55,380
WA4LOX	49,956
N4CD	39,732
K3SXA	39,216
W9IP	38,304
WB4JGG	36,936
K1FJM/4	35,620

Multioperator

Call	Score
W1FC	250,194
W3BBS	214,336
W2S7/1	206,398
W3CCX/3	189,630
K2XR	186,538
WA2SNA	141,132
W2YX	118,553
WA8ONQ	111,111
WA2TIF	94,656
K5LZO	92,106



Family portrait of the WA8ONQ crew, with (l to r) W9OEH, WA8OGS, WA3OJX, WA8NJR, K8VVV. Well, half the family anyhow.



K2CX, WB2WIK and K2JWE, of the up and coming K2XR multioperator station.

*Assistant Communications Manager, ARRL

Multiplier Leaders

Single Operator

50 MHz	144 MHz	220 MHz	432 MHz	1296 MHz
K1TOL - 47	K1ZZ - 22	K1FO - 16	K1PXE - 19	K1FO - 10
WA2CWA - 42	K2LNS - 21	N6NB/1	K2RIW - 25	W2VC - 9
K2OVS (three) - 41	K3SXA - 21	W2CNS - 9	K3SXA - 18	WD5FZM - 1
WB4OSN - 71	WA4IPI - 20	K3SXA - 15	WA4SBC - 13	K6ZMW - 6
N5TX - 58	KB5MG - 20	K4LHB - 8	WD5FZM - 10	N6CA
N6CT - 45	WB6NMT - 15	(five) - 1	WB6NMT - 11	W7TYR - 1
WA7KYM - 41	WA1JXN/7 - 13	K4JSU/6 - 7	(four) - 3	WB7DTI
WB8BGY - 42	WD8CTX - 18	WA7TDU - 3	K8WW - 19	WB8PAT - 1
K8GQB	N9AZC - 21	WD8CTX - 5	W9IP - 13	WB9SNR - 2
W9IP - 47	WØRT - 17	K9RO - 5	WBØTEM - 9	VE2BBK - 1
WBØTEM - 57	WØRWH	WBØTEM - 4	KØVXM	VE3CRU
VE1ASJ - 46	VE2DFO - 20	VE2DFO - 4	VE2DFO - 11	
TI2NA - 20	VE3FGU	VE3CRU	VE3FN	

Multioperator

50 MHz	144 MHz	220 MHz	432 MHz	1296 MHz
W1FC - 51	W2SZ/1 - 24	W2SZ/1 - 18	W2SZ/1 - 23	W2SZ/1 - 11
K2XR - 57	W2YX - 23	WA2SNA - 17	WA2SNA - 21	K2XR - 9
W3CCX - 51	(three) - 23	W3BBS - 21	W3CCX - 23	W3BBS - 14
WA4OYH - 66	WD4CXU - 18	WA4WZQ - 6	K4WO - 16	WA6EJO - 6
WB4LHD/5 - 65	WB4LHD/5 - 18	WD5GNW - 1	WB4LHD/5 - 8	N7NW - 2
K5LZO	K5LZO	WA6EJO - 9	WA6EJO - 9	WA8ONQ - 2
W6XJ - 45	W6XJ - 15	WA7LYI - 5	N7AKB - 6	W8DJY
WA7LYI - 50	WA7LYI - 8	K3LNZ/8 - 13	K3LNZ/8 - 19	WB9NTL - 1
W8DJY - 64	WA8ONQ - 26	WØOHU/9 - 7	WØOHU/9 - 11	WØOHU/9
WØOHU/9 - 54	WØOHU/9 - 14	VE7ASM - 1	VE3AEA - 8	
VE3AEA - 19	VE3AEA - 14			
VE7ASM				
VP5AA - 57				



Despite many successful contest efforts from the East Coast, N6NB still keeps the camera handy to assure the competition he's really just a tourist.

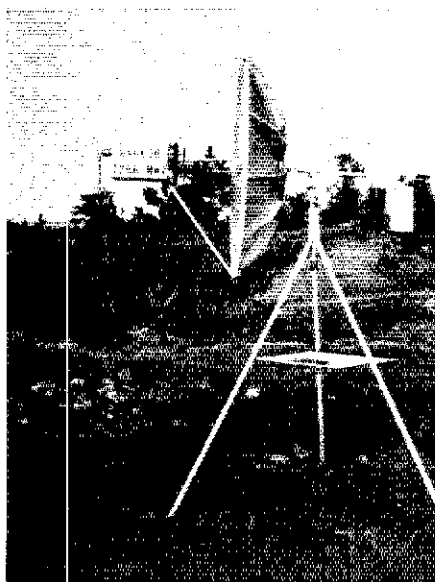
to edge out K1FO. Not too far behind was WA1MAO, making a steady climb toward the top. N6NB claims this will be his last try from the East Coast for a while — after all he now holds the national scoring records in both the June and September contests, among too many Division titles to list.

Not to be outdone, the upper midwest had its share of big scores. W9IP and KØVXM grabbed new single-operator Division records, while the WØOHU caravan invaded Wisconsin to establish a third Division record.

Since the scores do vary so much, as mentioned before, the listing of Division leaders probably gives the best indication of the top operators across the country. A total of 14 records were set this year, with the biggest improvements turned in by WA4OYH (multiop Southeastern Division) and WB4JGG (single operator Delta Division).

Wouldn't it be nice to see a big Es opening happen at the same time as a big tropo opening, or are the two mutually exclusive? Don't forget the September VHF QSO Party — the weekend of September 13-14!

P. S. Many thanks to those of you who are sending in computerized dupe sheets — sure makes it easier for us.



The stunted pine trees in the background attest to the height of the WA6EJO Mount Pinos QTH. Best 1296-MHz QSO was better than 250 miles, to the San Francisco Bay area.

SOAPBOX

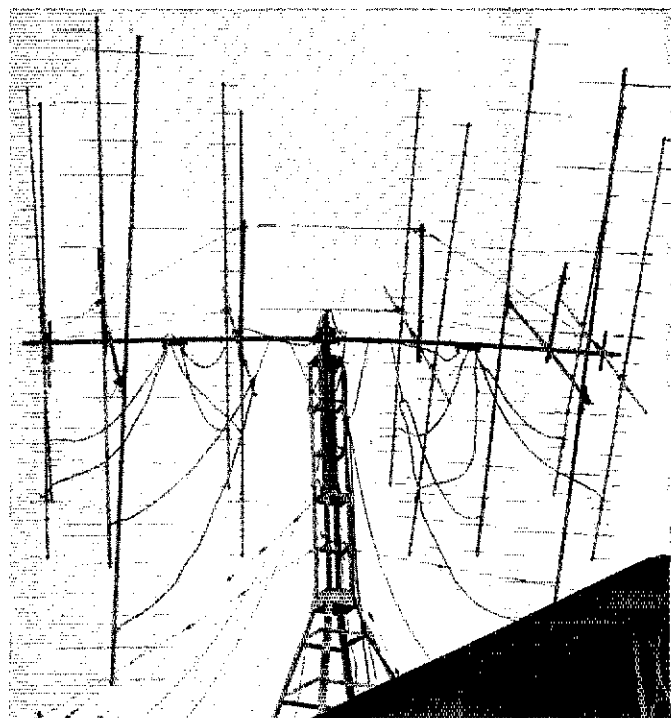
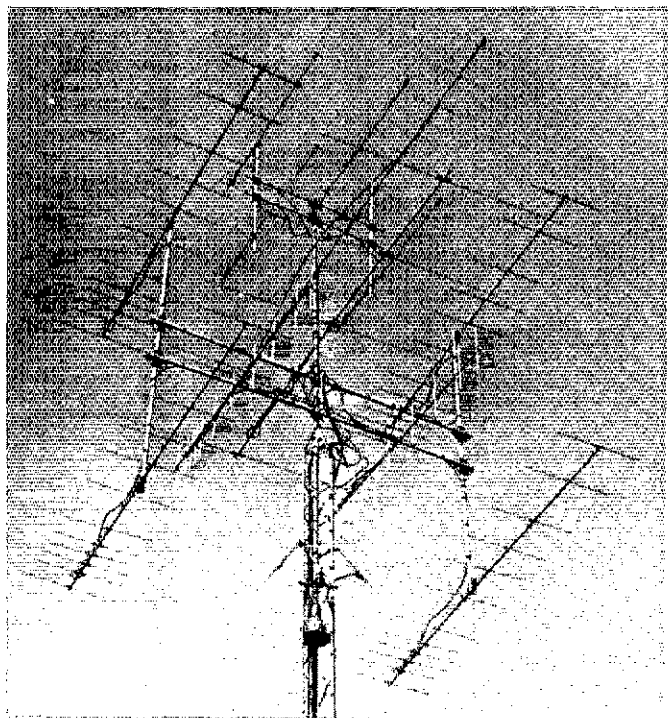
Almost lost the 1296 tower and dish in a windstorm on Sunday night. Got so we could make a "pit stop" on the generator in five minutes (W3BBS). For this contest, we ventured into Wisconsin to an excellent hilltop site, and think that we might have come away with a new Division Record. If so, it would be the third Division in which we hold the June QSO Party record (K9AKS/WØOHU). Meteor scatter was worth three extra sections on 144 MHz. Viva the daytime Perseids (W6XJ). The best contacts of the contest to me were the multi-hop to Hawaii on 6 meters and the Oklahoma QSO on 432 (WA4OYH). Six meters was "bleeping" outstanding (WB2RJL/4). The Saturday of this year's June 'test was Flag Day. In honor of the event, I flew Old Glory from atop Mount Equinox, in Vermont, some 3848 feet above sea level (KB2M/1). Late on Sunday afternoon, 6 meters went wide open. I was keeping a rate of 80 QSOs per hour when my wife reminded me that we had to go to our natural childbirth classes. When we got home, three hours later, the band was still open. . . . So far, I'm the only contester on 220 — sure hope the others don't find out! (WA5V1B). Would anyone like to buy a contest station? (WA8ONQ). One of our "secret weapons" is a "bucket truck" or cherry-picker. Not only was this machine invaluable for antenna installation, but it also came in handy for getting the microwave gear above the trees (KJKA/W1FC). Some of the worst signals heard in recent years were on in this contest. Between the cranked-up speech processors, overdriven amplifiers and key clicks, things sounded mighty poor at times on 2 meters (ACIT). Would like to see a single-band, 6- or 2-meter contest someday — like the

10- or 160-meter contests (K7IDX). Watch out "Funky Chicken" we're gonna get you next year (H1) (KA1FG). Judging from all the "noise" that I've listened to in the last two vhf contests, Anchorage, Alaska, will hereafter be known as the focal point of the black hole (KL7WE). We didn't go out for beer, just had a lot of fun (W6GGV). Well, it finally happened, after all these years — a MONSTER band opening on 2 meters! (WB5AOX). Some reports of "muffled audio" from K7MM/7 were probably correct due to the fact that I was wearing a "dust mask." The drying volcanic ash falling from the evergreen trees made breathing difficult. There was one inch of hard-packed volcanic-ash concrete atop Idaho's Mis-

sion Mountain (K7MM). That Sunday opening was an unstable creature, with the band opening to Florida, then to Alabama and Mississippi, then shifting back to Florida and repeating this behavior several times before shifting on west to Louisiana, Texas, New Mexico and Arizona, as is the case normally. Also some brief short hops to Kansas and Missouri, but they were too busy working to the northeast and we never had a chance to push through. . . . Finally, those K and W calls (which were in the minority) really played havoc with my checksheet! (KC0W). The reduction in time allowed on 223.5 MHz fm was a good idea (WA6EJO). My first contest with 220 MHz

gear, used a converted FM-76 for cw keying, an old Cushcraft Yagi and a new Advanced Receiver Research converter (N4CD). Well, the weather gives and it takes away. An advancing frontal system created some fine tropo from my QTH in central Illinois to S. Texas, Oklahoma and Kansas. . . . The front which created the opening almost cost me the contest, too. There was some very heavy rain and some incredibly strong gusts of wind, and my antenna mast folded like a drinking straw. Lost several hours on Sunday trying to repair the damage (W9IP).

Disqualifications: WB6KBZ(+ K6KLY, W6YKM, WA6HCl)



Successful contest efforts on vhf and uhf aren't usually launched from river-bottom locations. K1FO's secret weapons include 5 elements on 50 MHz, 48 on 144 MHz, 17 and 22 on 220 MHz, 52 on 432 MHz and 28 on 1296.

WB6NMT's call-area-leading 15 sections on 2 meters and 11 sections on 432 MHz were made with this 44-element 144-MHz and 152-element 432-MHz array.

Scores are listed in order, single-operator stations first within each section. From left to right: call, score, QSOs, multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2.3 GHz, G-3.4 GHz, H-5.7 GHz, I-10 GHz).

DX	Score	QSOs	Multipliers	Bands
Costa Rica				
TI2NA	1460	73	20-A	
Turks & Caicos Islands				
VP5AA(WD4s AUU IYS,opr)	29,526	518	57-A	
W/W/E				
1				
Connecticut				
K1FG	74,550	560	105-ABCDEF	
WA1MAO	53,578	702	83-ABCD	
K1PXE	31,752	286	81-ABCD	
WA1DQC	29,920	396	86-ABCD	
K1EM	25,870	364	68-ABD	
WA1VUW	10,350	203	46-ABDE	
WA1ZNT	7568	176	43-AB	
W1WHI	6162	135	39-A	
KA1GT	5805	98	37-ABDE	
WA1GVN	5400	131	40-ABC	
K1ZZ	4510	205	22-B	
KA1BXB	4320	108	40-AB	
K1BU	2508	132	19-B	
K1PAI	2508	132	19-B	
K1VMI	2176	136	16-B	
WA1LOU	1022	73	14-B	
WA1ETP	808	35	23-AB	
WB1CZX	720	60	12-B	
W6KDR/1	432	26	16-ABD	
WB1FVS(+KA1BRD,AK4LI)	59,885	695	88-ABCD	
W1VD(+WA1STO)	9408	224	42-AB	
W1AW(W1EH,GBLCK,opr)	1699	97	11-BU	
Eastern Massachusetts				
W1JF	27,066	229	78-ABCDEF	
WB1FUB	15,985	232	55-ABD	
WB1FKF	13,144	214	53-ABCDEF	
K1PWF	11,662	204	49-ABD	
K1DAT	9348	228	41-AB	
W1GXT	6834	148	34-BCDE	
W1LUZ	6798	206	33-AB	
W1AYS	5112	142	36-AB	
W1GHE	2988	100	27-AC	
N1AIS	2430	135	18-B	
N1AFQ	429	33	13-AB	
W1ANT	159	53	3-B	
W1A	28	14	2-D	
W1KMGAGIE,K1MK,W1KG,				
W1ZEO,W1ZTTG,N6BYK,opr)	59,878	550	91-ABCD	
K1TRI(+N1ABX,WA1S OZI,PBU				
QWF,VFJ,39,845-536-65-ABCD	27,645	395	57-ABCD	
WB1TPY(+K1BA,K1ALS CGP,HG,				
WB1DHW E Z T)	5040	106	24-BO	
K1RW(+K2JT,WB2NRG)				
3640	106	24-BO		
Maine				
K2QE/1	1460	73	10-B	
K1TOL(+WB1DPO)				
75,950	440	59-AB		
K1RQG(+WA1NGO)	513	57	9-B	
New Hampshire				
WB1CJT	21,762	323	62-ABCD	
W1EJ	11,564	196	49-ABCDEF	
AC1J	10,148	212	43-ABCD	
WA1GDR	750	70	25-AB	
W1ICU	724	23	8-B	
W1FC(+A1RIA,AT,KT,KLS DXJ,GW				
KA,KCC,LL,PEK,POD,RX,WHS,				
N1S,AP,AG,ALO,BC,RC,W1S				
DUW,FJA,HNZ,KXL,LLB,LMZ				
ZBI,WA1S,HON,HIR,MZC,NVC				
N1M,W1M,ZPA,ZSP,AD8V,				
W9PW)	250,194	1592	13B	
W0ZD/1(+WA1S YIA YPQ)				
11,685	285	41-AB		
WB1CAG(N1ARR,W1BDC,WA1MGC,				
WB1S FGV,FGW,HJD,opr)	3694	126	29-AB	
Rhode Island				
WA1PBR	12,300	179	60-ABCD	
W1AJR	7140	170	42-AB	
W1UHE	1156	34	17-CD	
Vermont				
N6NR/1	86,254	740	101-ABCD	
K1LPS	11,229	166	57-ABCD	
KB2M/1	6580	174	35-ABCD	
W1AIM	6336	120	48-ABD	
W1MAG(+KA1CKD,WA1S JEX				
NBU,TV,WB1IH)	16,335	228	55-ABCD	
W1ICW(+KA1EYB,WB2J5J				
16,224	333	48-AB		
Western Massachusetts				
W1AZM	11,427	293	39-AB	
AC1T	10,028	206	46-ABD	
W1JJP	5987	151	37-AB	
K1SF	5544	124	44-ABC	
N1PF	4960	138	32-ABD	
WB1ABF	4235	121	35-AB	
WA1WRM	3267	131	27-AB	
WB1DNM	2640	132	20-AB	
K1JX	1530	102	15-B	
WA1VCU	1425	95	15-B	
W1WLE	1157	89	13-B	
K1UR/M	715	65	11-B	
K1YOU	207	23	9-B	
W2SZ/1(K1DH,WA1S RKS UGF UGF				
WB1S BTJ,CBH,K2S MM TR UF,WA2S				
WABUSA,opr)	206,398	1375	126	
WB1S BTJ,CBH,K2S MM TR UF,WA2S				
WABUSA,opr)	206,398	1375	126	
ABCDEF GHI				
AAU GPP SPL,WB2S CPP PKO,				
WABUSA,opr)	206,398	1375	126	
ABCDEF GHI				
W1TKZ(K1S OGF,YK UR,KA1HU,				
W1OOPN IAT,WA1S RGY,WJK				
YOU,ZLQ,WB1SUM,N2AW3)	43,873	540	73-ABCDEF	
2				
Eastern New York				
WA2FEO	20,160	264	64-ABCDEF	
WA2ANZ	3920	129	28-ABCDI	
AF2C	610	51	10-AB	
W2IP	528	48	11-B	
N2BFG	392	56	7-B	
N2BHP	387	23	9-AB	
W2YK(+K2E EK OY,N2NT,W2YV,				
WA2QVE)	118,553	1082	103-ABCD	
WA2TIF(+AB2E I,J,K2DNR,W2S AWX				
KB1 PVS,WA2S AHE,ENM,NKB,				
WB2S DVV,NH,SH)	94,856	869	96-ABCDEF	
K2CBA(+AG2X,KA2CGF,WA2S PFP				
OUS,VA,X,WB2S ONE,FC,FPL)	46,778	462	88-ABCDEF	
KD2P(+WA2HZM)	268	36	8-B	
New York City - L.I.				
K2OVS	27,149	292	69-ABD	
WA2FJZ	21,000	223	70-ABCDEF	
WA2YWB	5280	132	45-ABC	
WA2SLY	6460	170	38-AB	
K2RIW	5850	117	25-D	
WA2WZV	2340	108	30-AB	
WA2PRW	2880	180	16-B	
K2AEV	2958	99	38-AB	
KA2DI	7669	157	17-B	
WA2EUS	1040	57	16-BD	
Northern New Jersey				
WB2WHI	22,444	104	82-ABCD	
WA2CWA	20,690	350	59-AB	
WB2QQQ	18,349	276	59-ABCD	
WB2TFH	12,650	205	55-ABD	
WA2ZVH	9540	188	53-ABD	
WA2AYG	6240	202	30-ABD	
W2VC	5760	37	38-AB	
WB2NCF	5439	243	21-BD	
WB2CUT	4260	213	20-AB	
WA2JUT	4216	124	34-AB	
K4BNG/2	3914	103	38-AB	
K2LNS	3780	180	21-B	
N2A1Z	960	64	15-B	
AJ6T/2	308	22	7-D	
K2XRI(+K2S JWF,OWR,KC2X,				
WB2WIK)186,538	1350	122	ABCD	
WA2SNA(AG2N,K2S BJG,LPG,KA2S				
AVA,COQ,EPL,FXA,KB2DN,N2AAJ,				

W2S IHM LVT NPT WA2S EKM JSW
JUC WPO STO QPK WFF WB2S
ARS JCP LHG QEA RFB WLW YMW,
WD2S AAI 141,000-114-ABCD
K29E (K2E KF MS PG YSR, KA2S
BCS CYZ FQG JBH, K29S PE MT W2S
AZL TTN WT A CHL FFK NKK
OJH SAJ, W29S ANM NXK ONA SNN
UYX, K29E, W29G, (prps)
87,308-803-92-ABCD
K2NJ+K2O GD PM, KA2HOA, KB2HZ,
N2S BBA QW, W29S PNF VFN, WB2S
KPE LVC NGV VBN, (prps)
53,701-542-83-ABCD

KB2AH(+N2AI)
WB2EW(+K2D, LB2EF, N2GA,
W2EKU, WA2S HMO MIS OCN
ORN, (prps) 7668-212-36-ABD
N2BOW(+N2BMP)
2252-196-37-AB
4473-213-21-B

Southern New Jersey
WB2YEH 14,905-257-59-ABC
WA2KCK 14,942-348-14-ABCD
N2RIM 10,142-243-44-AB
W2HRW 7567-161-47-AB
K2JF 6642-141-41-ABC
WB2CU/2 6480-37-35-BCDE
W29YE 1369-72-37-ABC
K2BWR(+K2ZJR)
32,040-295-90-ABCD

Western New York
W2CNS 32,745-341-85-ABCD
WB2BG 16,448-348-14-ABCD
WA2WVL 12,012-219-52-ABE
WA2AWX 10,340-220-47-AB
K2OS 4120-206-20-AB
WA2TMC 3120-104-30-AB
K2GK 3120-104-30-AB
W2AV 1920-96-20-AB
WB2GL 936-52-18-B
W2FA 728-44-14-AB
W2AFW 385-35-11-B
K2QR 361-19-19-AB
WA2PFA 288-24-12-AB
N2JY(+WB2S HND K2J)
1176-397-72-ABCD
WA2GBG(+K2GIE, N2AU)
29,488-387-73-ABC
WB2YIK(+N2HR, WA2S IVD
YFB, WB2S FR, N2M, R2A, W2
21,970-309-53-ABCD
K2OEG(+WA2S YRG YTM,
WB2IE, SM6CZ)
21,970-309-53-ABCD
WB2PSI(W2AV, K2S RJ SP,
KA2CF, K2ZS, AJX AJJ,
WA2ZK, (prps)
19,288-287-64-ABCD
WA2ZIF(K2J, RJK, RW,
WA2RQC, WB2S MYZ NFB,
prps) 17,680-266-54-ABCD
W2DUC(+N2AF, WB2RIP
4186-316-26-AB
WA2CBT(AFKZ, N2TW, WA2S
CSU HVT) 820-83-10-B

Delaware
K3SVA 39,216-377-86-ABCD
KACHE/3 23,940-318-70-ABCD
WB2LSP/3 4956-109-42-ABD
AC3T 1328-77-16-BC

Eastern Pennsylvania
AE3T 13,970-254-55-AB
K3IWK 10,918-198-53-ABD
W3ETB 3162-88-31-ABC
W3ET 123-12-12-ABC
W3AW 351-19-13-BC
W3JDU 291-25-10-A
WB2BS(+K3RYL, KA3AFJ,
N3AX, W3GPN, W3A HUGP,
W3S ACG E, FFI VJH HTK
JYY ZJE) 21,936-1220-136-
ABCDEFGHI
W3CXY 314,936-1220-136-
ABCDEFGHI
K3S MWY N3X, N3AH MW,
W3HQT, WA3S AKV JUJ NUF
W3S VUE, (prps)
189,630-1252-126-
ABCDEFGHI
W3ACG(+WA2IKO, K3S MKZ
IAE, N3AVC, W3S WBS, WB3S
LLY IWZ) 21,640-653-93-ABCD
W3E K/3(+K3FME, N3ANK,
W3LQ, WA3S INE ZJ, (HOH)
29,040-509-55-ABC
WB3LNZ(+K3HE, N3AN, WB3S
FXJ GZE) 21,655-373-57-ABC
W3E W/3(+K3E E, E, G, G,
N3JAM, W3S WBS, WB3S
23,498-328-62-ABCD
K3YTL(WA3YON, WB3S CAI
FAA FKQ EYT, (prps)
21,147-451-57-ABC
W3LPIW3S GFN JUJ UH, WA3CUQ,
(prps) 24,300-775-82-ABC
W3GDIW3S GFN, KA3ATH,
WB3S EWA GRE, (prps)
1955-85-23-AB

Maryland - D.C.
K3HCE 26,980-343-71-ABD
K3AKR 7544-157-46-ABCD
W4NVW/3 7154-134-49-ABCD
W3H 5043-123-41-ABD
W3HU 5043-123-41-ABD
N3API 2548-91-28-A
N3AFM 1060-53-20-A
W3HAK 948-75-13-B
W3JPT 832-52-16-AB
W3BQU 280-40-7-B
W3IP(+W3FG, WA3IH)
WB3E(+K3E, W3E, W3E, W3E,
WB3E, W3E) 47,717-48-87-ABCD
K9TVZ/3(+K3S MRL, SL,
WB3MDQ) 23,800-310-70-ABD
W3CA(+K3E E, E, G, G,
K3CVC, N3S AID IT, W3S JDI, VRO,
WA3S FHV HZJ, WB3BIT, (prps)
14,763-216-57-ABCD
AC3F(+AC3P, WB3E, W3E)
1134-43-21-AB

Western Pennsylvania
W3LS 5134-151-34-AB
W3RWU 4590-135-34-AB
K3QMX 3220-115-26-A
W3HHD 1426-62-23-A
W3GNR(+K3S PS FT, KA3S RWL
DWR, FHV WA3S BUJ FCG QU
JBV, WB3S 45,730-482-83-ABCD
W3KWH(W3S IOH PDK SVJ ZR,

K3S RYA TP, WA3F VJ, WB3S
BRY EML, (prps)
34,991-431-73-ABD
W3PIE(KA3EBU, WA3S DJG
WAW, WB3S C6E JHC JNR, (prps)
30,690-461-66-ABD
K3HKK(+K3S CM EZS BR,
KA3DST, W3BBI, WA3S EBL IFC,
ZPW, W3BBI, W3V3AW,
LA1SP, LA4LN)
12,400-239-50-AB

Alabama
WA4CCQ 26,696-350-72-ABD
WA4EWA 12,545-183-65-ABD
KA4AOK(+KA4CFZ)
16,872-296-57-A

Georgia
N4QH 22,374-339-66-AB
W4MRCO 11,911-231-51-AB
WA1SS 1672-31-8-B
W4WTA 232-29-8-B
WA4QYH(+AA4GA, KA4CS,
WB4NMA, WA4S)
85,500-815-100-ABCD
N4SJ(+K4WG, WA4MZN,
WB4NNW, WD4S DXD DXG PAF,
R5O) 248-62-4-B

Kentucky
KC4EG(WB4NXY, (prps)
13,035-227-55-ABCD
WA4IP 9176-190-37-BCD
K4JUK 812-58-14-B
W4SU 224-31-7-BD
WA4KMG(+WA4S CBK KY5 OHG,
WD4S EKA GSM)
9881-233-41-ABCD

North Carolina
WA4ZIA 16,492-241-62-ABCD
WA4AAV 4284-123-34-ABD
WD4QDS 3900-100-39-AB
K4ROM 3366-102-33-ABC
WA4WZ(+W4B, W4DQJ, KA4HKK,
WA4WZ, WB4HIE, WD4QJ, (prps)
42,744-503-78-ABCD
K4WQ(+WA4S DOX GPM,
W4Y1R) 33,864-371-83-ABD

North Florida
WB2R JL/4
24,532-390-62-ABCD
WB4BSZ 24,490-390-62-ABD
W5HIU/4 23,729-389-61-AB
W4NVV 19,836-340-58-ABD
W4C5S 18,180-302-60-ABD

South Carolina
N4DT 27,122-374-71-ABCD
WA4LDU 18,525-275-65-ABD
N4JK 11,286-198-57-AB
K4LD 4186-316-26-AB
WD4NBE 7912-172-46-AB
WB4NBK 1436-68-22-AB
AJAN(+K4J, WA4SSJ, WB4S
L27 QHF) 8536-178-54-ABCD
N4CLZ(+K4CAQ, WA4WOC
KA4LB, WD4S HID KTI MHK)
6972-249-28-AB
W4DCHS(+W4S CFI Z CHR,
WDROXE) 3078-156-19-ABC

Southern Florida
WB4OSN 55,380-780-71-A
WA4LOX 49,956-722-69-A
K1E IM/4 55,670-846-69-ABD
K4KUL 25,368-453-56-A
K9ZBV/4 17,646-346-51-AB
WB2PMP/4
14,892-292-51-AB
WA4HEF 4144-112-37-A
W4HR/4 1989-71-29-A
K4KCF 90-30-3-B
W4KGY 9-3-3-B

Tennessee
WB4JGI 36,936-441-81-ABD
WA4GYK 8742-179-47-ABD
N4VC 2667-71-37-A
W4F LW 902-41-22-AB
W4GCV 9552-358-48-ABD
WB4TUO 54,036-620-79-ABCD
W4SJI(+W4S AFI LQE ZXE,
W4AIRG) 12,690-254-47-ABCD
K54J(+K4VKK)
1921-39-39-AB

Virginia
N4CD 39,732-429-84-ABCD
WD4AG 22,800-293-75-ABD
WB4DBB 17,016-290-58-ABCD
W4S 16,836-236-61-ABCD
K4LHB 10,047-184-51-ABC
W4AMCP 8648-184-47-AB
N4BDM 4185-139-31-A
KX4V 3150-90-35-A
WD4AGO 2822-83-34-AB
N4MM 1089-33-33-AB
N44I(+H4B, K4N, K4S, HOC
N2O ODR, WA4S GBO IVE, WB4S
WIC YJC) 43,665-613-71-ABD
W4AT(+CA4O, WA4S BPI EKF,
WB4S TGD) 16,254-276-54-ABD
WD4CXU(+WB4YFK)
8888-190-44-ABD

Louisiana
K5HMG 20,286-296-71-AB
WB4SQA 12,700-264-50-A
N5JM 309-110-3-B
W5UKQ 352-22-8-D

Mississippi
N4JS/5 34,036-501-67-ABD
W5XX 20,358-377-54-AB
W5UCY 7998-186-43-AB

Arkansas
WB5JAR 21,184-331-64-AB
WB4LHD(+H4K, KA4V, WA4NV, M,
WB4VJ, W4S GKI KWF,
N5A Y, W4S BHS UMP,
W4S FBK) 72,800-770-91-ABD
NSDL(+K4SST, WA4S JEG ODE,
WB5JBY, WD4S ANP)
52,660-507-95-ABCD

Wisconsin
W9TC 1364-62-22-A
WB5G 695-24-15-AB
WB9KY 480-37-14-AB
N9AZC 441-21-21-B
K9UNM 187-17-11-B
WBNTL(+K9JA, KA9AZK,
NS9C, WD9AH5)
20,178-321-59-ABCD

Wisconsin
K9XY 4902-114-43-AB
W9YT(W9U, (prps)
175-69-25-AB
WB9OD 1320-60-22-A
WB9ACY 576-64-9-B
N9TD 558-62-9-B
WA9LZM 492-41-12-AB
KA9BZH 392-49-8-B
W9HR 90-18-5-B
WB9WFJ 48-16-3-B
WB9DU(+AE9M, K9S AKS CHZ,
W9H, WB9QI, AK9P)
80,639-632-87-ABCD
K9IM(W9U, N9P, WA9S ACI,
ETW KQJ21, 280-354-56-ABCD

Wisconsin
K9Y 4902-114-43-AB
W9YT(W9U, (prps)
175-69-25-AB
WB9OD 1320-60-22-A
WB9ACY 576-64-9-B
N9TD 558-62-9-B
WA9LZM 492-41-12-AB
KA9BZH 392-49-8-B
W9HR 90-18-5-B
WB9WFJ 48-16-3-B
WB9DU(+AE9M, K9S AKS CHZ,
W9H, WB9QI, AK9P)
80,639-632-87-ABCD
K9IM(W9U, N9P, WA9S ACI,
ETW KQJ21, 280-354-56-ABCD

WASMOE 861-41-21-A
WASWUX(+K5RDN, WD5HLD)
14,728-263-56-AB
WB5MFK(+WA4AW, WD4EPN)
5280-160-33-ABC

New Mexico
WSFF 11,685-204-57-ABC
K5MAT 8560-196-40-ABC
W5TRB 8281-169-49-AB
WB5CAG 3154-83-38-A
W5K5 5311-47-47-ABD
W5X5 1144-50-22-ABC
WB5AOX 770-77-10-B
W5SGNW(+W5ZYF)
105-34-3-BC

Northern Texas
WA5VJB 32,235-444-65-ABCD
W5DFSM 30,056-392-68-ABDE
K5DHU 6580-136-47-ABD
K5S 5311-47-47-ABD
KF5N 4247-137-31-AB
K5SFP 825-75-11-B
WB5KTC(+AD5I)
24,614-386-62-ABD

Oklahoma
WB5DS 17,278-326-53-A
KB5XG 126-21-6-B
N5KK(+N5K, WB5S SVY THA)
49,410-593-81-ABD

Southern Texas
N5TX 31,850-476-65-ABD
WA5IYX 18,480-330-56-AB
W5SHYU 6016-121-47-ABD
W5K 846-47-18-A
K5LZO(+K5BAW, N5J)
92,106-162-85-ABD
K5A5AW(+N5FO, WD5HSP)
32,000-489-64-ABD
W5UWB(+W5TBE)
17,604-312-54-ABD
K5SONV(+W5BYP)
16-4-4-B

East Bay
N6AMG 11,362-229-46-ABD
W6B8B 810-76-9-ABD
WA6LHD 477-39-10-BC
K6XO 330-11-3-B
WB6NMV(+W6S VPH ZJF,
WB6MXY) 26,676-413-57-ABDE

Los Angeles
K4J5I/6 10,471-244-37-ABC
W6ABW 3930-307-10-BC
KA6GV 1510-103-10-BC
K6LMM 1200-200-6-B
N6AVW 32,000-53-10-BC
N6CCY 510-102-5-B
WB6TDE 432-27-16-AB
K6ZMW 198-11-6-E
N6CA 162-9-6-E
W6NXB 16-4-4-C
WB6AA(+N6CA, W6XD,
W6RIL, WB6S HJO JCD MEV,
PZJ) 36,888-550-58-ABCD
K6BPC(W6BXD, WB6S AXZ,
LYZ VPI) 10,164-229-33-ABCD
W6GGV(+W6BPKA)
5265-111-39-ABCD
W6TRW(K6S AWG GWC,
W6BEVS, (prps)
663-133-5-B

Orange
WB6FTW 1992-83-24-AB
W6B6T 1235-58-19-ABC
K6SARU 404-101-4-B

Santa Barbara
K6MEP(N6AFI, KA6DVA,
W6GFP, WB6GNS, (prps)
311-41-ABCD
K6BXG(+W6WZ, KA6LYM)
9074-304-26-ABC

Santa Clara Valley
W6BGT 10,049-179-49-AB
W6GVD 9552-358-48-ABD
WB6CKT 7245-181-45-AB
W6PGB 4360-109-40-A
W6XN 1900-58-19-BCDE
W6AMZ(+K6AFO)
1650-126-11-ABD

San Diego
WB6NMT 15,433-192-61-ABCD
N6BFG 765-158-44-ABCD
WB6KB 60-12-2-C
W6XK(+K6S JYU, W6GDF,
N6NR, W6NGN, W6S IMV GKKI,
60,138-661-78-ABCD

San Francisco
N6CT 28,270-514-55-AB
WA6LUO(+K6S W, WB6EJ, (prps)
5460-287-20-BCD
WB6WML(+WD6HK)
4020-134-30-AB

San Joaquin Valley
K6JKQ 2375-69-25-ABCD
W6DDP 1377-85-27-ABCD
KA6EVN 300-60-6-B
W6EJ(+K6HX, W6GAL,
W6BOYS, WB6S UNH YGN,
WB6S UNH YGN, (prps)
43,452-503-68-
ABCD

Arizona
WB7FDQ 6623-179-37-A
K6S 671-131-34-A
WA7LYI(+K7JO, WA7JM,
WB7LW) 27,812-386-68-ABD
W7LUX(+N7FU, WA7NXL, WB7S,
CDO EVX) 5040-129-35-ABCD

WA6IJZ(+K6S ELQ VMN)
5040-134-35-ABCD

Idaho
W7WKR 8908-262-34-4
K7MM 88-22-4-B

Montana
W7KNT 6272-224-28-AB
K7D 4587-139-33-AB
WA7PDC 2066-27-25-ABC
WA1JXN/7 377-29-13-B
K7CPC 4-2-2-A

Nevada
KA7DVR 2632-94-28-A
W7ABX 846-47-18-A
N7AKB(+KA7S BCW CVV,
KB7B, K7S ICP, WN7BPA,
WA7JUO) 16,722-279-52-ABCD

Oregon
W7AGCS 3624-136-24-ABCD
W77YR 3151-112-23-ABCD
K7H5J 3087-122-21-ABCD
WA7TDU 3042-112-26-ABCD
K7D 4587-139-33-AB
N7DB(+WA1GFM, N7BCS,
W7UDM, WA7S BAC EY,
WB7PMP) 13,330-286-43-
27,785-344-67-ABCD
KA7DHU(+WB7RFA)
88-44-2-B

Utah
WA7ADK(+WB7QVZ)
11,178-241-46-ABCD

Washington
K7KOT 10,791-295-33-ABCD
WB7DTI 9540-280-30-ABCD
W7E 4002-174-23-A
WB7LUP 1928-114-14-ABCD
K7D 4587-139-33-AB
W7IDZ 484-22-22-ABD
N7NW(+K7S ND WTG, W7YOZ,
WA7NAN) 29,600-637-40-ABCD

Wyoming
WA7KYM 7544-184-41-AB
W7XF 5184-162-32-A
W2BN/7(Multiop)
2755-95-29-A

Alaska
KL7WF 177-50-3-ABD
WB4WXE/KL/ 1-1-1-A

Michigan
WB8BGY 20,692-381-52-ABD
W8S 1578-44-14-ABD
WD8DSV 12,604-291-44-AB
W8KAY 5425-175-31-A
K8BWS 1188-66-18-A
W8BAX 785-44-8-B
K8BGG 396-44-9-B
KA8DDQ 360-48-8-B
W8QJ 72-9-2-A
W8S(W8WCS, KA8CQM, W8S)
MFL MGO GBB ULG VXE, W8S,
PGK WXS, WD8EJ, (prps)
6206-191-29-ABCD
WB8SBO(+KA8JIB)
720-80-9-AB

Ohio
WB8CTX 21,952-331-64-ABC
W7EKI/8 15,444-262-54-ABCD
WB8PAT 11,342-186-53-ABDE
K8NKX 10,878-208-49-ABD
K8QGB 8568-204-42-A
N8AXA 4515-120-37-ABD
K8WY 4191-112-35-ABD
K8DZ 3750-107-30-ABD
K8WV 2660-70-19-D
KA8DJD 2920-110-23-AB
W8S 1578-44-14-ABD
W8RJR 8065-39-10-ABC
W8LJC 720-60-12-B
K8ASX 290-29-10-AB
K8MT 229-15-15-BC
N8S 1528-30-10-ABC
W8ONQ(+WA3OJX, N8AMG,
K8S MN VVV, N8BPS, W8S NJR
OBS, WB8JY, WB8EOT)
911-891-11-ABCD
WB8JY(+AJ8D, N8TM, WB8LC,
WB8LX, WB8LNO, NFO, NFJ YTT)
83,293-774-97-ABCD
WB8YK(+K8D3S, K8S AL ZWF, K8S
BDZ DFX DGC DUJ EBU GLO,
N8BZO, W8S LRR PR, W8H, H,
W8S DCF, W8S TRK TS, W8S A
AHV LLD, (prps)
60,836-600-94-ABCD
W8ARE(+W8RUT, WB8CJW,
GA4AB) 3540-114-30-ABC

West Virginia
WRUT 60-6-5-D
K3LNZ(BK3ICH, W3S IY XO,
WA3S EQL NZL OYV, WA3S J,
prps) 22,965-461-99-ABCD
W9BHL(+WA8M, WB8LUCD,
W9BHL) 36,038-487-74-AB
WB8JPP(+WB8ZJ, W8S IYM JYN)
2852-119-23-ABCD

Illinois
W9IP 39,304-418-84-ABCD
GW3NJY/W 27,633-413-61-ABD
K9RO 26,384-363-68-ABCD
WB9SJR 5967-164-27-BCDE
W8B 4794-141-34-A
K9MBX 3383-178-17-BD
WB9WM 1198-92-13-B
WB9DBA 352-22-16-A
WB9PF 216-22-8-BCD
W9BHL 121-6-8-B
K9BQL 96-16-8-B

Indiana
WD9ME 8272-171-47-ABD
KA9ASH 8064-167-42-ABCD
K9CZM 6811-149-49-AB
K9DZ 4917-149-33-AB
W3EP/9 2240-112-20-B
K9DZS 2220-74-30-AB
WB9FNR 1520-82-16-BD

Indiana
WD9ME 8272-171-47-ABD
KA9ASH 8064-167-42-ABCD
K9CZM 6811-149-49-AB
K9DZ 4917-149-33-AB
W3EP/9 2240-112-20-B
K9DZS 2220-74-30-AB
WB9FNR 1520-82-16-BD

Wisconsin
K9XY 4902-114-43-AB
W9YT(W9U, (prps)
175-69-25-AB
WB9OD 1320-60-22-A
WB9ACY 576-64-9-B
N9TD 558-62-9-B
WA9LZM 492-41-12-AB
KA9BZH 392-49-8-B
W9HR 90-18-5-B
WB9WFJ 48-16-3-B
WB9DU(+AE9M, K9S AKS CHZ,
W9H, WB9QI, AK9P)
80,639-632-87-ABCD
K9IM(W9U, N9P, WA9S ACI,
ETW KQJ21, 280-354-56-ABCD

Colorado
AD9R 15,582-318-49-AB
WB9IKJ 7590-165-46-AB
WB9TT 2600-100-26-AB
W9BZA 300-19-10-ABC

Iowa
WB9TEM 30,304-358-81-ABCD
WD9FOY 1566-56-27-ABC
WB9SOW 1014-78-13-B
WB9RWM(+WB9N)
6952-158-44-AB

Kansas
N9LL 14,136-248-57-AB
WB9ISW 5184-123-35-ABCD
WBRT 4475-153-25-BCD
WB9WAC 4032-126-36-ABD
K9OBY 1053-65-13-BC
W9QQA 648-50-12-BC
WB9NRV(+W9MJJ, WD9EYR)
23,785-344-67-ABD
WB9QDK(+KA9CEL)
6162-158-39-AB

Minnesota
K9CJ 3672-95-34-ABD
WB9VB(+K4ESQ, K9IN SE TS,
WB9JLN, W8S BOC B5S,
WA9ULE, WB9U, WD9S EOI,
GCP HEB, KA9CRO, K9S ITHY LU,
S, K9S A P Z)
33,799-412-73-ABCD
WB9ANH(+K9GJX, WB8SBJ)
9310-190-49-AB

Missouri
WA9NOK 11,928-207-56-ABC
K9ISW 5184-123-35-ABCD
N9ALV 7790-205-38-AB
K9CB 6888-107-44-ABCD
WB9WQ 9075-145-35-A
WB9WAC 4032-126-36-ABD
W9JRP 3038-98-31-AB
WB9RW 2057-121-17-B
W9RC 1776-74-24-AB
K9L 4191-112-35-ABD
WB9TNX 1780-47-20-ABCD
AB9I(+K9TLM, KA9AQ, WB9S
DRJ PKN) 27,832-379-71-ABCD

Nebraska
K9NG 10,080-173-56-ABCD

North Dakota
K9ALL 5612-114-46-ABD
WB9CSL 1919-101-19-AB
K9W(+WB9YJG)
3422-118-29-AB

Simulated Emergency Test Announcement

NTS to activate four cycles on October 18 and 19.

By Robert Halprin,* K1XA

Hundreds of communities across the U.S. and Canada will be beset with tornadoes, blizzards, hurricanes and other simulated (we hope) disasters in October. The purpose? To simulate realistic emergency conditions under which Amateur Radio operators can provide valuable emergency communications. The SET will be authored by ARRL Emergency Coordinators and Net Managers, among others, who create scenarios and write scripts for the Amateur Radio Emergency Service and other interested amateurs. The National Traffic System (NTS) will activate an expanded schedule (more about this later) to provide the ARES with facilities for medium- and long-haul formal message handling.

If your interest has been sparked, then you may be wondering "How do I participate?" Here's how. Most local activity will center on 2 meters. If you have a 2-meter fm transceiver, you're golden. You should contact your local or District ARRL Emergency Coordinator and tell him you would like to participate in SET. If the identity of this individual is unknown to you, the next step is to contact your SEC (see next page) or your SCM (see page 8). These League Officials coordinate SET activities in your ARRL section and will be able to fill you in on the details.

Many ARES groups work closely with government civil preparedness, RACES, Red Cross, Salvation Army, REACT and other agencies. There should be enough assignments for everyone. If your locality does not have an emergency coordinator, perhaps you or another local ham could volunteer. Let your SEC/SCM know.

Those more low-band oriented can get in on the SET action by helping out on your local or section National Traffic System net. Most every ARRL section has at least one section net on 75/80 meters, while most local nets are on whf. We suggest you familiarize yourself with traffic handling procedures; the *ARRL Net Directory*¹ is one of many good sources of information on trafficking. In an emergency, it is imperative that all stations go about handling communications and traffic in a standard format. If possible, report into net sessions before SET to get to know the procedures. Extra

*Assistant Communications Manager, ARRL

¹Available from ARRL hq. for a 9" x 12-inch addressed envelope with 41 cents U.S. postage.

scheduling will be conducted on October 18 and 19 to deal with the expected traffic overload. Net managers will be looking for your help. The NTS schedule that will be observed on October 18 and 19 is reproduced in Table 1. A block diagram of the schedule appears in Fig. 1. It should be emphasized that, unlike region and area nets, which require representation, section (and local) nets depend in large measure on coverage and maximum QNI. Some flexibility in section meeting times relative to the nominal times suggested by the NTS schedule will probably be needed and there is no problem with this. However, these nets should meet at times appropriate for liaison to the next level of the System.

The schedule that appears in table format was recommended by the NTS Inter-Area Staff (see April QST, pages 94-95). The effectiveness of the plan will be judged by its performance in October. The Inter-Area Staff was composed of top-notch traffic handlers representing each

of the three NTS areas. They gathered in Newington in November to address important issues concerning the integration of the daytime and evening cycles of NTS, especially with regard to daytime net sequencing and FCC relationships, and the enhancement of the System's response to emergency/overload crisis conditions. The Inter-Area Staff recommended this symmetrical, four-cycle NTS flow pattern for overload situations, which can be activated on three-hour shifts. Two cycles of this schedule occur on a routine, daily basis.

Cycle 4, of course, is the basic NTS evening schedule of long standing. Cycle 2 was activated on June 1, 1980, as the revamped NTS daytime schedule, although at this writing, it has not been fully implemented in all areas. Cycles 1 and 3 are on standby, to be plugged in specifically for high-volume situations (like SET). Thus, the four-cycle program will serve as the 1980 SET schedule, to help all concerned judge the effectiveness of the Inter-Area Staff

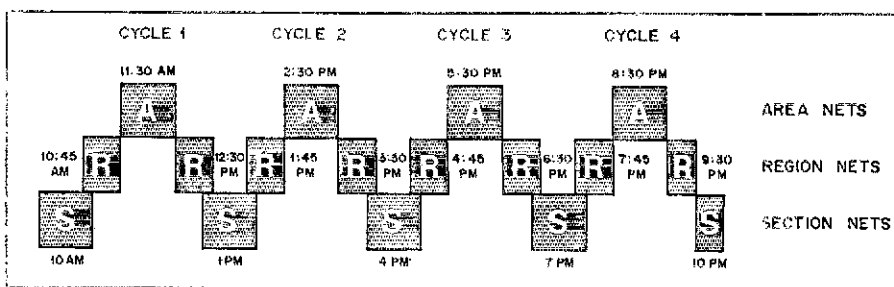


Fig. 1 — Block diagram of NTS four-cycle activation. Note that as of June 1, 1980, Cycles 2 and 4 form the basic, daily NTS operating schedule.

Table 1
NTS Schedule During SET, October 18-19*

Cycle ONE	Cycle TWO	Cycle THREE	Cycle FOUR
10:00 A.M. Section	1:00 P.M. Section	4:00 P.M. Section	7:00 P.M. Section
10:45 A.M. Region	1:45 P.M. Region	4:45 P.M. Region	7:45 P.M. Region
11:30 A.M. AREA	2:30 P.M. AREA	5:30 P.M. AREA	8:30 P.M. AREA
12:30 P.M. Region	3:30 P.M. Region	6:30 P.M. Region	9:30 P.M. Region
			10 P.M. Section

Cycles 2 and 4 are the standard NTS daily schedule; cycles 1 and 3 are backup for emergency/overload circumstances. All four cycles will be activated during SET to test the emergency response of the System.

*per the Inter-Area Staff Plan.

recommendation. We hope that by the time this issue hits the streets, Cycle 2 will be fully implemented; in this way, the extra cycles will dovetail nicely into the overall program.

Since this particular structure is still relatively new on the NTS scene, here is some background on the Inter-Area plan (with most of the terminology supplied by K2K1R). In essence, the Inter-Area plan paves the way for NTS to truly be one, unified system, not separate-but-equal daytime and evening communities. The primary function of TCC (Transcontinental Corps) is to link, rather than isolate, the two cycles. For example, prior to June 1, evening TCC bypassed the daytime cycle, thereby causing unnecessary delays in traffic delivery.

As evidenced by the schedule, the Inter-Area plan calls for each area net (PAN, CAN, EAN) to hold one session per day at 2:30 P.M. local time, the same concept as in the evening cycle, where each net meets at 8:30 P.M. local time. Area nets then have a minimum of 60 minutes allotted to them, daytime or evening, and all 60 minutes are available for the clearing of inter-area (TCC) traffic. The system is symmetric, regular and repeatable. This means first, that the structure of the net sequencing is consistent from area to area, and second, that a net session occurring at a given local time in the Eastern area should subsequently occur at the corresponding local times in the Central and Pacific areas.

Modifications to the System schedule for emergencies and emergency-preparedness exercises, such as SET, augment the basic cycles and are replications of the basic cycles. More importantly, normal daily sessions of nets at all levels of the System (ideally) remain intact during emergency operations. Expansion of the System during overloads is simple, involving a duplicate of the existing schedule, slid over three hours. Therefore, in addition to the normal area net sessions at 2:30 P.M. (Cycle 2) and 8:30 P.M. (Cycle 4), potential new area net sessions at 11:30 A.M. (Cycle 1) and 5:30 P.M. (Cycle 3) can be held (see Table 1 and Fig. 1), along with their associated region and section nets. Again, Cycles 2 and 4 serve as the basic daily NTS schedule.

Traffic from EAN to CAN in either the daytime or evening cycle is handled by direct QNI into CAN by the TCC operator. All other TCC functions are out-of-net schedules, allowing optimum choice of bands and mode to fit the varying propagation conditions. The time between the end of the daytime PAN session and the start of the evening EAN session allows for an out-of-net TCC sked followed by direct section net QNI on the east coast, to improve delivery service. TCC skeds are from one cycle to the same cycle for westbound traffic, or from one cycle to the next immediate cycle for eastbound traffic. That is to say, TCC functions which bring traffic from the West Coast to the East Coast, for example, connect the daytime PAN session with evening nets in the east, for the evening PAN session with the next daytime EAN sequence. The significance of this concept is that it combines the discipline and training of a predetermined schedule with the spontaneous determination of the level of activity required for any specific emergency exercise.

The goals of the Inter-Area Plan, which is being implemented on a one-year trial, are as follows:

1) Make daytime and evening NTS actually part of a single, unified system.

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Arkansas: Nelson E. Bailey, K5TML, 141 W. Mill St., Malvern 72104
California:
East Bay: William D. Meyer, WB6KQU, 4747 Plover St., Fremont 94538
Los Angeles: J. David Tucker, WB6FAK, 14419 Collins St., Van Nuys 91401
Orange: Joe H. Brown, W6LJBQ, 5444 La Sierra Ave., Riverside 92505
Sacramento Valley: Ross W. Forbes, WB6GFJ, 1205 E. 22nd St., Apt. 204, Marysville 95901
San Diego: Arthur Smith, W6INI, 4515 Melisa Way, San Diego 92117
San Francisco: Frederick W. Bray, WB6ZRK, 2551 Greenwich, Apt. 2, San Francisco 94123
San Joaquin Valley: Leland Rhow, WA6YAB, 4817 N. Crystal, Fresno 93705
Santa Barbara: Robert N. Dyruff, W6POU, * 1188 Summit Rd., Santa Barbara 93108
Santa Clara Valley: Edward Gribi, WB6IZF, 51280 Pine Canyon Rd., King City 93930
Colorado: Lawrence E. Stempel, W0ACD, 1750 Roslyn St., Denver 80220
Connecticut: Robert Warzocha, W1SY, 12 Wooding Rd., Yalesville 06492
Delaware: David Elzey, W3PQ, 513 Woodmere Rd., Millford 19363
Florida:
Northern Florida: Billy F. Williams, Jr., N4UF, * 911 Rio St. Johns Drive, Jacksonville 32211
Southern Florida: William Johnson, AA4WJ, 1119 Lady Elaine Dr., Valrico 33594
Georgia: W. Douglas McDowell, K4SWJ, 4533 Chamblee-Tucker Rd., Tucker 30084
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Maine: Phil E. Kern, WA4UJJ/1, 52 Summer St., Lisbon Falls 04252
Maryland-DC: Thomas J. Abernethy, WA3TAL, 1133 Apple Valley Rd., Accokeek 20607
Massachusetts:
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Western Massachusetts: William J. Hall, W1JJP, Prospect Hill Rd., Brimfield 01010
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Nebraska: Stephen May, WA0ASM, 2830 S. 42nd St., Lincoln 68506
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New Jersey:
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Southern New Jersey: Boyd Prestwood, W2HOB, 6 Kingsley Road, Mount Holly 08060
New Mexico: R. B. Goodman, W5ALR, 2821 A Palo Verde NE, Albuquerque 87111
New York:
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New York City & Long Island: Paul Lindgren, WA2UWA, P. O. Box 1158, E. Hampton 11937
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Oregon: Stanton Nelson, K7OLN, 857 E. 39th Pl., Eugene 97405
Pennsylvania:
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Western Pennsylvania: Reed O. Krenn, WA3JBO, 3137 Hebron Dr., Pittsburgh 15235
Rhode Island: David A. Tessitore, K1DT, 20 Barnes St., Greenville 02829
South Carolina: Earle Gilliam, K4VIA, 405 Draper Street, Greenwood 29646
South Dakota: James Nance, WA0TNM, Rt. 2, Box 69, Colome 57528
Tennessee: Ed Dunn, W4NZW, 917 Mid South Dr., Knoxville 37919
Texas:
Northern Texas: Weldon Joe Blair, N5WB, 1612 Glenwick, Plano 75075
Southern Texas: Linden B. Sisk, AK5N, 12719 West Club Lane, Houston 77099
Utah: Darrell Sortor, WB7FCB, 610 W. 100 N., Smithfield 84335
Vermont: H. A. Preston, W1VSA, RFD 1, Charlotte 05445
Virginia: David C. Eanes, N4AZI, P. O. Box 3922, Martinsville 24112
Washington: Joseph Winter, Sr., WA7RWK, 819 N. Mullen St., Tacoma 98406
West Virginia: George Puzzuolo, K8QEW, 3616 Morgan Dr., Weirton 26062
Wisconsin: Gary D. Maples, W9QAK, 1006 Marquardt Rd., Wausau 54401
Wyoming: Gregg G. Wood, WB7EIN, 901 Cahill Dr., Cheyenne 82001
West Indies: Mariano Rodriguez, KP4BSQ, Box 292, Hato Rey, PR 00919

*No appointed Section Emergency Coordinator; Section Communications Manager listed

- 2) Resolve net time-conflicts between areas.
- 3) Enhance daytime/evening participation.
- 4) TCC functions will provide daytime/evening crossovers, so that traffic is delivered in the next available cycle of NTS, regardless of time of day or mode.
- 5) The System will be consistent from area to area, from cycle to cycle.
- 6) Evening participants will understand (and support) the daytime cycle, and vice versa, with no additional training.
- 7) No traffic will be compromised by irregular net sequencing.

Already we have strayed somewhat from the specific topic of SET, but it is important for readers to have the information about the normal two cycles at hand to really understand the four-cycle activation. Obviously, NTS Net Managers, particularly in the daytime, would

appreciate your help during SET, but also on a regular, routine basis. Cycle 2 offers different functions for many different operators at all levels of the System, for traffic handlers and potential traffic handlers alike. Retirees, housewives, students, handicapped operators, shiftworkers and the independently wealthy, you're invited — and you'll be welcomed.

Although October 18 and 19 is the official weekend, local groups are free to hold their SETs on any two-day period between September 1 and October 31 to coincide with the time when amateur activity, public service value and mass-media exposure can be the greatest. All SETs held within this designated period will be included in the SET results in an upcoming issue of QST. Deadline for all reports is January 31, 1981. Reporting forms are available from Hq.

A Consumer Advocate's Report: The Price of A-1

It's Catch 22. The more you covet this award, the less likely you are to obtain it. You can't apply for it. You can't buy it. You won't find it at your local flea market. You won't find it at the superette among the relishes, Worcestershire, Soy and Teriyaki... Not even green stamps or IRCs will help. Don't ask a clerk to help you.


It may take years to qualify. You may have already qualified and still not have received this award. Although deserved, it may never come.

As the Wouff Hong metes out traditional corrective punishment to those who exhibit poor operating practice, so the exclusive A-1 Operator Club recognizes only those who display exceptionally good operating form.

Julian Phelps, WB2HKZ, reminded us recently of the need to make newcomers aware of this select honor:

"I am ashamed of some of the practices on the air today and believe there has to be an incentive for good operating practice. The ARRL A-1 Operator Club has been the envy of all those who do not possess it. In fact, I still prize mine so highly that it is the only piece of 'wallpaper' in my shack. Perhaps the poor operating ethics heard on the air is just characteristic of the times and differing values of conduct. Nonetheless, I believe that a renewed awareness in the A-1 Operator award would have some positive result. It is the only award that is granted by your peers."

What started out as a cw-only achievement in the early 1930s now encompasses all phases



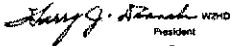
THE AMERICAN RADIO RELAY LEAGUE, INC.
COMMUNICATIONS DEPARTMENT


A-1 OPERATOR CLUB

This certifies that _____ is a member of the A.R.R.L. A-1 Operator Club and is authorized to nominate other deserving qualified radio amateurs for membership.

Membership in the A-1 Operator Club represents adherence to the several principles of good operating: (1) Careful keying and good voice operating practice; (2) Correct procedure; (3) Copying ability; (4) Judgment and courtesy.

Newington, Conn.


President


Communications Manager

of on-the-air operating. Cw character formation was important in the past. But, with the proliferation of electronic keyers, it is now the ability to control the "beast" rather than letting it control you, that is important. Having a good fist is still an important criterion. The A-1 Operator takes pride in proper cw spacing, uses proper procedure, and correctly uses Q-signals and abbreviations. On phone, standard phonetics, top notch procedure and brevity prevail, while standard procedures dictated by common sense abound on the more exotic modes.

The bottom line is to exercise good judgment and courtesy. The station that shrieks at you in the DX pile-up to get off the DX station's frequency won't qualify; nor will the DXer who always calls and never listens. The fellow who sends at 40 words per minute, but can copy only 10, can forget it; so can the road who comes on frequency unannounced to disrupt a QSO already in progress. The station who

striving for A-1 status, or heading for "Lid City," A-1 membership comes about as a spontaneous recognition by two fellow amateurs who have already made the grade. Requesting nomination may very well invite disqualification.

Patience is a virtue that ranks right up there with the ability to copy through QRM, proper use of AR and K, and use of standard phonetics. And patience it may take for your operating ability to gain proper recognition. At the risk of causing self defamations, it took this writer 26 years to finally make it. And with Julian, I share the pride of ownership of the coveted A-1 certificate.

Membership in the A-1 Operator Club beckons those willing to pay the price. The cost is not in shekels but rather operating excellence and basic consideration for others with whom we share the spectrum. Who knows, the next CQ you hear might just be from an A-1 operator anxious to nominate a deserving amateur. Why not you?

MEET YOUR SCM

Norm Waltho, VE5AE, is the Section Communications Manager for Saskatchewan. Elected SCM July 1, 1979, Norm is a special metals welder in the Canadian Armed Forces. First licensed in 1964 as VE3EXW, he was posted to Saskatchewan in 1976, where he acquired his present call sign. Shortly thereafter, he became involved in National Traffic System activities, and is responsible for building up the Saskatchewan Amateur Traffic (cw) Net. He also assisted in the implementation of the Saskatchewan Phone Net. You can often find Norm on the cw bands; he enjoys a good cw ragchew. VE5AE also can be heard on the phone bands. He also is very active in club affairs,



Norm Waltho, VE5AE

holding office in both the local club and the provincial club. Norm has also tried to harness the winds of Saskatchewan by building a wind-charger from scratch and running his rig from it — with a fair amount of success! Besides Amateur Radio, Norm's hobbies are gardening and woodwork.


SCM APPOINTMENTS

In the Iowa Section, Bob McCaffrey, K0CY, has been appointed to complete the term (until March 31, 1981) of Max R. Otto, W0LFF (resigned).

In the Eastern New York Section, Paul S. Vydareny, WB2VUK, has been appointed to complete the term (until March 31, 1982) of Guy L. Olinger, K2AV (resigned).

*Communications Manager, ARRL

WIAW NOTE

The complete WIAW summer operating schedule appears in April *QST*, page 97. A WIAW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.c. See the "Contest Corral" section of *QST* for times and dates of WIAW Code Proficiency Runs. 

Strays

ATTENTION PUBLIC RELATIONS-MINDED AMATEURS

□ Pacific, Northwest and Southwest Division PRAs, club chairpersons and other interested people meet on 7.275 MHz at 6:30 P.M. Pacific time each Monday. The group meets to disseminate information on major newsworthy events with an Amateur Radio viewpoint and welcomes check-ins from other interested people. — Scott Thompson, KB6CC, Visalia, California

HOW YOUNG IS THAT ADVANCED CLASS LICENSEE?

□ Tuhin Roy, KA6JHL, of San Francisco, California, is just another young ham — or is he? He passed the Advanced class test on May 14, at the age of 11 years, 8 months and 29 days. Tuhin wasn't as fortunate in a more recent encounter with the FCC's new Amateur Extra Class examination, but he has hopes of passing the next time. If you know any young hams whose feats match Tuhin's, we'd like to hear about them. Send details to KA2BNV at ARRL hq.

QST congratulates . . .

□ Vernon H. Hardy, W4MYL, recent recipient of the U.S. Navy's Distinguished Civilian Service Award. Secretary of the Navy Edward Hidalgo presented the award in recognition of Mr. Hardy's outstanding achievements in keeping a line of communication open during the recent unsettled period in Iran.

□ Johnny Grant, WB6MJV, who was recently honored when a Johnny Grant star was added to the Hollywood Boulevard Walk of Fame in front of Mann's Chinese Theater. The veteran TV and radio personality was saluted for his many contributions to the broadcasting industry, the community and for his work with the armed forces and the USO.



Twenty-two years ago, three brothers from Windsor, Ontario, passed their General class amateur exams, all on the same day. They quickly formed a cw net that still meets once a week. Shown here are (left to right) Frank, VE3FAO (standing); Bud, VE3BFO; Ken, VE3BGW and Ken's son, Wayne, VE3JPM. The photo was taken in the radio room of the *Queen Mary*, club station of the Long Beach ARA, during a recent trip to Los Angeles.

OSCAR Operating Schedule

OSCAR 7				OSCAR 8			
DATE (UTC)	Orbit No.	Time UTC HR MN	Eqx W. Long. Degrees	Orbit No.	Mode	Time UTC HR MN	Eqx W. Long. Degrees
1 Sept.	26,513	0025	79.0	12,700	A	0134	77.4
2 Sept.	26,526	0120	92.6	12,714	A + J	0139	78.7
3 Sept.	26,538	0019	77.5	12,727	X	0001	54.1
4 Sept.	26,551	0113	91.1	12,741	A	0006	55.3
5 Sept.	26,563	0013	75.9	12,755	A + J	0011	56.5
6 Sept.	26,576	0107	89.5	12,769	J	0015	57.8
7 Sept.	26,588	0006	74.3	12,783	J	0020	59.0
8 Sept.	26,601	0100	87.9	12,797	A	0025	60.2
9 Sept.	26,614	0155	101.5	12,811	A + J	0030	61.5
10 Sept.	26,626	0054	86.3	12,825	X	0035	62.7
11 Sept.	26,639	0148	99.9	12,839	A	0039	63.9
12 Sept.	26,651	0048	84.8	12,853	A + J	0044	65.1
13 Sept.	26,664	0142	98.4	12,867	J	0049	66.4
14 Sept.	26,676	0041	83.2	12,881	J	0054	67.6
15 Sept.	26,689	0135	96.8	12,895	A	0059	68.8
16 Sept.	26,701	0035	81.6	12,909	A + J	0104	70.0
17 Sept.	26,714	0129	95.2	12,923	X	0108	71.3
18 Sept.	26,726	0028	80.1	12,937	A	0113	72.5
19 Sept.	26,739	0122	93.7	12,951	A + J	0118	73.7
20 Sept.	26,751	0022	78.5	12,965	J	0123	75.0
21 Sept.	26,764	0116	92.1	12,979	J	0128	76.2
22 Sept.	26,776	0015	76.9	12,993	A	0132	77.4
23 Sept.	26,789	0110	90.5	13,007	A + J	0137	78.6
24 Sept.	26,801	0009	75.4	13,021	X	0142	79.9
25 Sept.	26,814	0103	89.0	13,034	A	0004	55.3
26 Sept.	26,826	0002	73.8	13,048	A + J	0008	56.5
27 Sept.	26,839	0057	87.4	13,062	J	0013	57.7
28 Sept.	26,852	0151	101.0	13,076	J	0018	59.0
29 Sept.	26,864	0050	85.8	13,090	A	0023	60.2
30 Sept.	26,877	0144	99.4	13,104	A + J	0028	61.4
1 Oct.	26,890	0043	83.7	13,118	X	0033	62.6
2 Oct.	26,904	0138	97.3	13,132	A	0038	63.8
3 Oct.	26,917	0038	82.7	13,146	A + J	0043	65.0
4 Oct.	26,931	0132	95.8	13,160	J	0048	66.2
5 Oct.	26,944	0031	80.6	13,174	J	0053	67.4
6 Oct.	26,958	0125	92.6	13,188	A	0058	68.6
7 Oct.	26,971	0024	77.5	13,202	A + J	0103	69.8

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 WIAW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 MHz on Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

Soviet RS data have been discontinued.

O 7 progresses an average of 28.7374° W. per orbit in a period of 114.9422 minutes.

O 8 progresses an average of 25.8023° W. in a period of 103.2026 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

Mode AJ is simultaneous operation of both transponders.

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A x = uplink frequency - 116.450 MHz ± Doppler shift

Mode B x = uplink frequency - 578.100 MHz ± Doppler shift

OSCAR 8

Mode A x = uplink frequency - 116.458 MHz ± Doppler shift

Mode J x = uplink frequency - 581.108 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.

Traffic Pipeline

Recent columns under this heading, namely "Net Managers — Air Traffic Controllers," in May QST, and "Handling Instructions — Who Needs 'Em?'," in last month's issue, are good prerequisites for this continuing inquiry into what it means to be in the National Traffic System. NTS is not synonymous with good; in fact, the purposes of many nets are often better served by independent status. These columns are meant to clarify the role of nets already claiming NTS affiliation (sometimes vigorously). All too frequently though, net participants and coordinators have only a hazy idea about what constitutes proper NTS principles.

It is said by many traffic handlers that the only purpose of any net or any system is to get the traffic to its destination as quickly as possible. While it is true that traffic delivery is the ultimate objective, the importance of traffic handled on the amateur bands, generally speaking, is not so great that all other considerations must be sacrificed to effect it. Really important traffic should be handled on commercial, paid circuits; we can't compete with them. While amateur traffic can quite often be handled more quickly by some special effort or attention on the part of one or more of the handling stations than by following a set system, what we are striving for is something a little more comprehensive than the disposition of this or that particular message. We are interested in setting up a workable System by means of which all messages put into the System are handled with a maximum of dispatch, a System which has overall teamwork as its basis, rather than the whims or ambitions of some individual.

For "special effort or attention," read *out-of-section check-in*, May's column succinctly listed the criteria for NTS affiliation at the section or local level (much of it appropriate for higher levels as well): maintain proper liaison with the System, meet at certain times (usually with considerable leeway), conduct disciplined sessions and redirect out-of-section check-ins to their appropriate section net.

Unfortunately, a clear understanding of the

role of nets in the National Traffic System is often lacking. NTS is a means for systematizing amateur traffic-handling facilities by making available a structure for an integrated traffic facility designed to achieve the utmost in two principal objectives: (1) rapid movement of traffic from origin to destination, and (2) training of amateur operators in handling written traffic and participating in directed nets. So these objectives, as stated in the ARRL *Public Service Communications Manual*, are of equal import.

Yes, the instant gratification one feels from having a message delivered by an out-of-section check-in is tantalizing, but generally it has a negative effect on the operation of the system. Failure to use normal routings will starve the nets up the line. Without traffic, there is no interest. Without interest, there is no training. The *PSCM* tells us that it is in the interest of efficiency, organization, system, training and conservation of skilled personnel to use the NTS structure as it is intended to be used . . . one of the most important features of NTS is the *System concept*. No NTS net is an independent entity which can conduct its activities without concern for or consideration of other NTS nets. Each net performs its function and *only* its function in the overall organization. To whatever extent nets fail to perform functions, or perform functions intended for other nets, to this extent is the overall System adversely affected. Further research into this subject eventuated in page 40 of the new *ARRL Operating Manual*:

"NTS detractors are fond of saying that the many relays necessitated by following the System only invite message garbling. This is true to some extent, and it is also true that many messages going through the System are garbled, but these are human errors, not System defects — efforts which only training and experience can minimize, never eliminate, in NTS or any other traffic system. It is also true that for this or that single message or group of messages it may indeed be faster to transmit them directly to their destination locality — provided a station willing, capable

and responsible can be found to receive them. NTS is geared to systematic handling of message traffic, all traffic handled in accordance with its precedence. It relies not on any single station, nor does it require daily effort on the part of anyone. This is the measure of its success throughout the years and as long as amateurs are permitted to offer this public service." Furthermore, your out-of-section friend, as formidable as he/she may seem, still can't compete with Ma Bell, which as we mentioned last month, is the appropriate channel for instantaneous delivery, in a non-emergency context of course.

It is certainly not too much to ask that avowed-NTS nets follow the aforementioned guidelines (which are expanded upon in the *PSCM*) of the System they represent. For those who have taken the opportunity to reflect upon the System concept, accepting the challenge of positive steps in System operation poses no problem. Poor operating procedures and renegade routings should not be glorified by the NTS Net Manager. Net participants normally look to the manager for guidance; the NM sets the example and provides the direction within the System concept. The System's pipes get clogged, to the detriment of all the hard-working NTS operators and Officials throughout the ARRL Field Organization, when NTS procedures and traditional training responsibilities are eschewed.

But W2WSS said it best, in the pages of the *ESS Bulletin* (ESS is an independent net, incidentally): "Unless you are willing to work to develop at least a minimum competence in the area of ham activity you have chosen to participate in, you will not get much enjoyment from it, and, perhaps more importantly, you will substantially diminish the pleasure of other participants. This is as true of the check-in who does not have even the rudimentary of understanding of net procedure that a few minutes of preparatory monitoring would have taught him, as it is of the purported DXer who calls ceaselessly on the JY's frequency, or the ragchewer whose conversational horizon does not extend beyond his rig and the weather."

ARRL SECTION EMERGENCY COORDINATOR REPORTS

□ For June, 36 SEC reports were received, denoting a total ARES membership of 17,452. Sections reporting were Ala, Alta, Ariz, Ark, Colo, Del, EBay, EMass, EPa, Ill, Ind, Iowa, Kans, Ky, La, Mar/NFld, Mich, Minn, Miss, Mo, NFla, Ohio, Ont, Org, SV, SDgo, SIV, SCV, Sask, SC, SFla, SNI, Va, Wa, WVa, WMass.

□ The half-year summary of SEC reports, including late reports, follows: 233 reports were received from 49 different sections. During the first half of last year, 204 reports from 50 sections had been received. At press time, the following sections have a 100-percent reporting record: Ala, Alta, Ariz, Del, EMass, Ind, Kans, La, Mar/NFld, Mich, Minn, Mo, NFla, Ohio, SV, SDgo, SIV, SCV, SFla, SNI, Va, Wa, WVa, WMass.

*Assistant Communications Manager, ARRL

NATIONAL TRAFFIC SYSTEM

June Reports

Area Nets

	1	2	3	4	5	6	7
EAN	60	2437	40.6	.831	91.7		
CAN	90	1252	13.9	.402	99.2		
PAN	59	1354	22.9	.690	97.6		

Region Nets

1RN*	60	549	9.2	480	95.0	91.7
2RN	127	705	5.6	404	66.4	91.7
3RN	120	614	5.1	354	92.9	95.0
4RN	120	1189	9.9	378	83.8	88.3
RN5	88	807	9.2	328	89.2	98.9
RN6	122	823	6.7	293	85.6	98.9
RN7*	50	652	10.9	840	100.0	97.8
8RN	110	415	3.8	350	59.4	85.0
9RN	119	729	6.1	330	94.0	98.9
TRN	88	377	4.3	213	56.5	98.9

ECN	90	310	3.4	.321	77.4	98.3
TWN	89	524	5.9	.242	90.0	97.8

TCC

TCC Eastern	144 ¹	884
TCC Central	135 ¹	540
TCC Pacific	92 ¹	579

Sections*	5858	24,690	4.2
Summary	7260	39,430	5.4
Record	6641	35,659	15.9

¹incomplete report

¹TCC functions not counted as net sessions.
²Section and local nets reporting (198): AEND AENM AENS AENU (ALL), APN ARN MBN OZK (ARI), ATEN HARC (AZ), NON NCTN SCN SCNV (CA), CN CWN HNN (CAWY), CN CPN NVTN RASON WESCON (CT), APFN EAST FMTN FPON FPTN GCTN GN MEN NFFN PEN OFN OFNS SBEN SPARC SWFFN TPTN (FL), CGVN CVEN GERIN GSN GSSBN GTFPCN (GA), I75MN TLON (IA), IMN (ID/MT), ILN (IL), ION ITN QIN (IN), KPN KSNB KWN (KS), ADARES 5DARES KNTN KRN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), EM2N EMRI EMRIPN EMRIS HHTN NEEPN RIEM WMPN WMN WMTN (MA/RI), MEPPN MMN MTN WRIN (MB), DEPN DTN MDD MEPPN (MD), ACN CMEN MSB OXCORACES PTN SGN (ME), MACS MITN MNN QMN

UPN (MI), MNAMWXN MSN MSPN MSSN (MN), ACE MEOW (MO), APN (MR/NF), MTN (MS), CMN CNCTN JFK M2MEN NCSBPN PCTN RARS THEN (NC), CN CNN (NC/SC), GSFM (NH), JSARS MCN NJN NJPN NJSN NJVN OBTN UCETN (NJ), NSN (NV), BAVTN CDN CNYTN HVN NLI NLIPLN NLIUHF NYS OCTEN SDN STAR WDN (NY), OSN (OH), OAN OFN OLZ OPEN OTWN STN (OK), CMN LN BUN LN OPN OSN ION), BSN JCARES OARES OSN PDXAARES PTTN (OR), EPA EPAEPTN NWPATMTN PTTN WPA WPA2MTN WPAPTN (PA), WQV/UHF (PO), SCSSBN (SC), NJQ SDEN SDMN SDN (SD), RARA SATN SPN (SI), TN TNVHFN TPN TSN TTMN WTWN (TN), DFW TEX TSN TTN (TX), BUN (UT), VLN VN VNTN VSN VSN (VA), WINS (WE/IN), BEN BWN NWTN WIN WSNB (WI), WVMDN WVN WVNN WVPN (WV).

1 - NET	5 - RATE
2 - SESSIONS	6 - % REP.
3 - TRAFFIC	7 - % REP. TO AREA NET
4 - AVERAGE	

	Weather Emergency	Criminal Activity	Vehicular Emergency	Public Safety Events Search and Rescue	Fire	Power Failures	Drift/Alerts	Total
K9XA	1							1
WB9NCT				1				1
WR9ADU	1							1
WR9ALO	2							2
WB0SBH	1					1		2
WR0ACD	1							1
WR0AET	1							1
WR0AEX	3							3
WR0AEZ	4					1	1	6
WR0AFT	1							1
VE4WPG							1	1
VE5KE							1	1
Simplex							8	2
Total	22	1	4	116	8	2	31	203

Subcontinental Corps

Annual TCC-C (evening) certificates went to N4MD, W4ZY, W5RB, N5RB, N5TC, K5GM, W5SBE, W9CXY, W9DND, N9TN, W9NXG, W0AM, W0HI, K0CW.

	1	2	3	4	5
TCC Eastern	180	80.0	1795	884	
TCC Central	150	90.0	867	540	
TCC Pacific	120	76.7	1170	579	
Summary	450	82.2	3832	2003	

1 - AREA	4 - TRAFFIC
2 - FUNCTIONS	5 - OUT-OF-NET TRAFFIC
3 - % SUCCESSFUL	

TCC Roster

The TCC Roster (June): Eastern Area (N2YL/W4SOQ, Directors) - W1s KX NJM OD QYY, WA1ZAZ, K1s BA EIR GN S5H XA, W2s CS OQB EFU FR GKZ MTA RQ ZDJ, K2s NY PL, N2YL, WA2s ICB SPL SYR, AJ3R, W3s FAF PQ, WA3WQP, K3s KW NGN, N3SJ, W4s JK MEE SOQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, KB4N, KB6FR/3, W6PMS, WB8WTS, K8s AAZ KMQ OZ, KC8C, VE3s GWA GOL JIR SB, Central Area (W5GHP/W9JUJ, Directors) - W4ZY, WD4HIF, K4YZ, WN4KKN, N4MD, W5s KLV RB SBE, WA5s BHF INJ RKU, W5s NKC NKD YDD, WD5HHK, KA5BSN, K5s AJM GM KJN MC PE TL, N5s RB TC, W9s CXY DND HOT JUJ NXG, N9TN, WB9WGD, W0s AM HI, WA0TMM, K0s CW EZ, Pacific Area (W5KH, Director) - N5NG, W5KH, N6GW, W6s EOT OA SX YZT, WB6PVH, W7s DZX EP GHT LYA VSE, K7s HLR KSA MC, WA7GYQ, K0DJ, VE7ZK.

REPEATER LOG

According to reports received between June 21 and July 21, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Vehicular Emergency	Public Safety Events Search and Rescue	Fire	Power Failures	Drift/Alerts	Total
N1ADE			1					1
WR1ADP				1				1
W1LCJ				1				1
K2KLN			1					1
N2MD				2				2
WH2ACH					1			1
WR2ADJ				1				1
WR2AOC			31	4	1			36
WR3EUR			6	1				7
WA4LZR					1			1
WR4ACY			1	25	1			27
WR4ATL						1		1
WR4BCP			1					1
K5HCJ				1				1
N5AAY			1					1
WA5FYI				2				2
WR5ABA				8				8
WR7ABI				5				5
WR5ABY			1	3				4
WR5AJG				3				3
WR5APK				2				2
WR5APN				3				3
WR6ACB						1		1
WR6AEN			2	1				3
WR6AFV						1		1
WR6AOX							1	1
K7CC			20	2	2			24
W7WGW			1	1				2
WR7AEL			1					1
WR8UIN						2		2
WR8ADP				1				1
WR8AES						3		3
WR8AJL						2		2
K9POP			1					1
K9UXP			1					1

Independent Nets (June 1980)

	1	2	3	4
Amateur Radio Telegraph Society	30	1054	367	
Central Gulf Coast Hurricane	30	130	1924	
Early Bird	30	782	366	
Empire Slow Speed	27	48	317	
Hit and Bounce	30	294	458	
Hit and Bounce Slow	30	90	253	
IMRA	25	348	959	
Mission Trail	30	329	1633	
New England Novice	30	83	183	
New England Teleprint	13	32	46	
Picconet All Day Watch	115	234	1827	
West Coast Slow Speed	27	64	268	
75-Meter ISSB	30	541	921	
7290 Traffic	46	461	2469	

1 - NET	3 - TRAFFIC
2 - SESSIONS	4 - CHECK-INS

Public Service Honor Roll June 1980

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/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.

	10,000	KA4BQK	WB5NKC	KB4OZ
K0KKV	116			W7GHT
K4SCL	104			
2025	AF00			94
K0JFN	WA3PXA			N5TC
1930	115			W1RWG
N0AJQ	AJ3R			W1TN
	WA7MEL			W5DTR
279	114			WB4WYG
KA9CPA	WB2IQJ			102
166	113			N8AWH
WB7W0W	WA2MVO			WB4FVW
142	W0YH			93
W7VSE	112			K8OZ
WD4COL	WA5RVT			W4CCKS
138	WA2MFV			92
WA4PFK	111			VE3DPO
135	WA4JDH			W5HMR
WB3GZU	WA4CCK			W4JJK
129	W2AET			AJ3R
WD4HIF	KA4FZI			WD4HIF
128	110			35
WB3FEH	N8ABA			113
126	WA3NAZ			13
N4CCT	109			26
KA1CC	W2TCA			18
KB2HM	W4CGG			32
W4MEE	W6NTN			34
122	WB2BNY			11
WA4CNY	108			45
120	AF2L			0
K2GCE	W9JUJ			1000
VE3GOL	K7GXZ			124
W2ZDJ	W4NWM			105
107	WB6DXL			103
118	96			102
WB2PJW	K1BSO			102
KB7JU	KA1HG			147
KY4K	WA3WQP			
117	WD9IUX			
KA1BJY	105			
VE3CWA	W2UEZ			

WD5EUF	78	N3EE	62
86	K4ZN	N6ANL	K0JCF
KA2CTU	W9DM	WFEOF	KAGA
KB4N	WA2SPL	W2KD	KB4OW
VE3KK	77	W8GGX	N4LE
WB0HOX	WA1IOG	W9XD	VE3DUK
WB4VVL	76	K6SI	W4FMN
WB5NKG	K2HD	K8BFC	WA1MJE
WB9WGD	KB2GT	KC0T	W83MT
85	75	VE5WM	WD5FLM
AA4WJ	AF1L	W0HXB	WD5VD
K9PNG	K7JV	WD9GXW	61
N5BT	VE3HTL	67	W0HZU
W5IOV	WA2CJUV	KA1KD	WA0EMX
W5KLV	WA2PIP	N8CW	WA4ZPZ
W5VMP	WB7TQF	VE5HG	WB3CAI
84	74	W6INH	WB5CIT
K4EV	AA3S	W6JJK	60
KB5TC	KA2CNN	WA2HEB	WD0BMR
N3AJU	N3AKC	WDSGKH	56
N4AZI	N4AXN	66	WD4ITO/N
W9NXG	VE3GT	N2CR	54
WB6PVH	W4ANK	W8UE	N2BDW/T
83	WA5EIC	WA2EQW	N2BOP/T
KA1FE	WA5QFD	WB1CPF	52
WD4CNO	73	WB8YTD	KA2GTE/T
WD5DQR	K3JSZ	65	49
82	W7FJZ	KA1KP	WB1EZT/T
WBVPW	72	KB5UL	48
WBZTOM	K6INK	VE3LL	KA1CGP/T
81	N5RB	W4LXB	46
K0EZ	W1TM	WB5LAT	45
K1JHC	WA4EYU	WD8DYW	WA2WJUL/T
KA0BCB	W7IHS	64	45
KA1EO	71	KF4U	KA3DXP/T
WB3JYZ	KC0Z	W5VMY	WB2RMJ/T
WB8SYA	N9AUG	W7LNE	WD8PMT/T
80	W2GJ	W9HOT	43
W0QTF	70	WB2PKG	KA4IKH/N
WB1BYR	K7NTG	WB5TAV	WB7CFH/T
WD4CNR	KB5NX	WB6QBZ	41
79	K8BMX	WD8KZK	KA1CMX/N
AJ5F	N6RD	63	40
N3BEJ	W3EGJ	K4VHT	KA2BGX/N
WA2KOJ	WD5JYI	N6GW	KA4EWD
WABLVO	69	WA2MFU	WD4CFZ/T
WB5MMI	AK5N	WD4CFZ/T	WB4JJK/N

Brass Pounders League June 1980

BPL Medallions (see April 1979 QST, page 77) have been awarded to the following amateurs since last month's listing: W1WP, N4BBY, WB7TQF and KB6IP.

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	779	821	1202	58	2860	
N0BQP	0	1054	231	594	1879	
WA0HJZ	24	643	21	643	1331	
WA4JDH	1	590	546	5	1142	
W0VYX	39	504	239	265	1047	
WA3WQP	6	444	438	7	895	
W9JUJ	1	378	394	2	775	
KA9CAP	34	419	81	225	759	
WA4PFK	116	292	308	37	753	
WB5NKC	83	229	404	22	738	
W7VSE	22	374	290	46	732	
KB7JW	221	132	314	31	695	
KA4FZI	48	278	352	10	688	
WB3GZU	43	284	300	34	661	
W4MEE	1	347	290	20	658	
W7DZX	23	313	307	3	646	
WA4CCK	1	301	310	10	627	
W3VR	180	144	219	14	557	
WA1TBY	41	231	253	19	544	
N6ANL	12	248	260	0	520	
WA4CNY	13	269	195	42	519	
W4JK	2	242	270	5	519	
AJ3R	4	221	279	9	513	
WD4HIF	35	212	232	33	512	
WB6EIG	113	141	141	113	508	
K4TH	13	230	175	63	501	
W6DXL (May)	26	378	350	28	782	
WA4CNY (May)	53					

Contest Corral

A Roundup of Upcoming Operating Events



Conducted By Tom Frenaye,* K1KI

SEPTEMBER

1

RTTY Art Contest, August *QST*, page 77.

3

West Coast Qualifying Run, (W6OWP prime, W6ZR alternate), 10-35 wpm at 0400Z September 4 (9 P.M. PDT September 3). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large self-addressed envelope will help expedite your award/endorsements.

6-7

I/Z DX Contest, August *QST*, page 77.

North American Sprint, sponsored by the National Contest Journal, from 0100Z until 0500Z September 7. Single operator, cw, 80-40-20 meters only. Suggested frequencies: 3530-3550, 7030-7050, 14,030-14,050. Stations outside of North America work NA stations only. Stations may be worked once per band. Exchange his call, your call, serial number, your name, state (or VE province) or country. Proper logging requires the time for each QSO. Serial numbers start with 001 and must be consecutive. An operator may only use one call sign during the contest. Multiply total valid QSOs by the sum of states, VE provinces and other North American countries to get final score. USA and Canada don't count as countries. KH6 not counted as state or country. VE multipliers are Maritime (VE1, VO1, VO2) and VE2 through VE8. Non-North American countries do not count as multipliers. Special QSY rule: If any station solicits a call by sending CQ, QRZ?, QRZ, etc., he is permitted to work only one station in response to that solicitation. He must then move at least 1 kHz before working another station, or at least 5 kHz before soliciting other calls. Team competition: Each team has a maximum of 10 members. To qualify as a team, the name, call sign of each operator, and call sign of the station operated should the operator be a guest at a station other than his own, must be registered with N6SF. The team information may be contained in a letter, which must be received before the start of the Sprint, or be contained in a Western Union Mailgram dated at least 24 hours before the start of the Sprint. No distance/meeting requirements for a team entry. Disqualifications may be made for illegibility, incorrectness, or illegal or unethical operation. Awards. Entries should be mailed in time to reach N6SF no later than October 7. 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, N6SF, 235 Montgomery St., Suite 2600, San Francisco, CA 94104.

ERC 50th Anniversary QSO Party, August *QST*, page 77.

8

W1AW Qualifying Run, 10-35 wpm at 0200Z September 9 (10 P.M. EDT September 8). Transmitted simultaneously on 1,835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. The complete W1AW schedule, which appears on page 97 of April *QST*, is also available for an s.a.s.c. to ARRL. Other details are the same as for the September 3 listing.

10-12

YL Howdy Days, August *QST*, page 77.

13

ARRL FMT, August *QST*, page 77.

13-14

ARRL VHF Contest, August *QST*, page 76.

European DX Contest (WAE), phone, July *QST*, page 78.

10 Meter Portable Contest, August *QST*, page 77.

CAN-AM Contest, phone, August *QST*, page 77.

Pennsylvania QSO Party, August *QST*, page 78.

Washington State QSO Party, August *QST*, page 78.

*Assistant Communications Manager, ARRL

20-21

Scandinavian Activity Contest, phone, sponsored by the SSA, from 1500Z September 20 until 1800Z September 21 (cw on September 27-28). Work stations in Norway (LA/LB/LG/LJ), Svalbard and Bear Is. (JW), Jan Mayen (JX), Finland (OY/OG/OE/OI), Aland Is. (OH), Market Reef (OJ), Greenland (OX), Faeroe Is. (OY), Denmark (OZ), Sweden (SJ/SK/SL/SM) and Iceland (TF) on 3.5 to 28 MHz. Single operator-all band, multioperator-single transmitter (stay on band at least 10 minutes at a time) and multi-multi (includes club stations) categories. All tx and rx, including spotting equipment must be located within a 320-meter diameter circle. Exchange signal report and serial number. Multiops use separate serial numbers on each band. Non-European stations count one point per QSO on 14-21-28 MHz and three points per QSO on 3.5-7 MHz. Multiply QSO points by sum of number of call areas worked per band (LA1=LB1 and SM3=SK3=SL3, etc.) for final score. Two-way QSO is valid for multiplier credit if complete contest exchange is sent and at least signal report is received. If serial number not received, QSO counts for zero points. Suggested frequencies: CW — 3505-3575, 7005-7040, 14,010-14,075, 21,010-21,120, 28,010-28,125; phone — 3600-3650, above 3795, 7050-7200, 14,150-14,300, 21,300-21,350, 28,400-28,700. Original logs (or photocopies) must be submitted. Logs with more than one percent duplicates will be disqualified. Plaques for continental leaders. Mail entry by October 15 to SSA Contest Manager, Peter Arninge, SM0GMZ, Gianovagen 20, S 15164, Södertälje, Sweden.

Maryland-District of Columbia QSO Party, sponsored by the Maydale ARS, from 1900Z September 20 until 1900Z September 21. Exchange signal report, serial number and QTH (county for MDC stations except independent cities of Baltimore and Washington; ARRL section or country for others). MDC stations count two points per QSO, multiply by number of ARRL sections and countries worked on each band and then the scores on each band multiplied together. Others count two points per QSO multiplied by number of MDC counties plus independent cities (max. 26) then score on each band multiplied together. Suggested frequencies: CW — 75 kHz from low end; phone — 25 kHz from high end. Mail entry by October 15 to Maydale ARS, C. E. Andersen, W3XE, 14601 Claude La., Silver Spring, MD 20904.

24

W1AW Qualifying Run, 10-35 wpm at 1300Z (9 A.M. EDT). See September 8 listing for more details.

27-28

Scandinavian Activity Contest, cw, see September 20-21 listing.

CAN-AM Contest, cw, August *QST*, page 77.

Delta QSO Party, sponsored by the Delta Division of the ARRL, from 1800Z September 27 until 2400Z September 28. Work stations in AR-LA-MS-TN. Exchange signal report, serial number and QTH (ARRL section for non-Delta Division; state and country if in Delta Division). Delta Division stations multiply QSOs by total ARRL sections worked (maximum 74). DX stations count for QSO credit only. Others multiply QSOs by Delta Division counties worked (max. 316). Suggested frequencies: Phone — 3990, 7290, 14,290, 21,390, 28,590; cw — 50 kHz from low end; Novices — 25 kHz from low end. Achievement award for working five stations in each state (AR-LA-MS-TN). Mail entry by October 21 to Malcolm P. Keown, W5XX, 213 Moonmist, Vicksburg, MS 39180.

Classic Radio Exchange, sponsored by the Southeast ARC, from 2000Z September 28 until 0300Z September 29. Object is to talk with those who restore, operate and enjoy older equipment. A classic radio is one built since 1945 and before 1970. Exchange name, signal report, state/province/country, receiver/transmitter type, etc. Add numbers of different transmitters, receivers and states/provinces/countries worked for each band. Multiply by total QSOs on all bands. Multiply that total by Classic multiplier — total years old of all transmitters and receivers used, three QSOs minimum per unit (transmitters multiply years old by two). Suggested frequencies: Phone 3910, 7280, 14,280, 21,380, 28,580; cw — 60 kHz from low end; Novice — 20 kHz from low end. Send logs, comments, anecdotes to Stu

Stephens, K8SJ, 1407 Hollywood Rd., [yes, Hollywood — Ed.], Sandusky, OH 44870.

30

West Coast Qualifying Run, 10-35 wpm at 0400Z October 1 (9 P.M. PDT September 30). See September 3 listing for more details.

OCTOBER

4-5

VK/ZL/Oceania DX Contest, phone, sponsored by the New Zealand Association of Radio Transmitters, from 1000Z October 4 until 0000Z October 5 (cw — October 11-12). Exchange signal report and serial number. Count two points per VK/ZL QSO and one point for other Oceania QSOs, except Oceania stations count two points per VK/ZL QSO and one point for other non-Oceania QSOs. Multiply QSO points by sum of VK/ZL call areas worked per band for final score. Mail entry so it arrives before January 31, 1981 to NZART Contest Manager, ZL2GX, 152 Lytton Rd., Gisborne, New Zealand.

California QSO Party, sponsored by the Northern California Contest Club, from 1800Z October 4 until 2359Z October 5. Single-operator stations operate only 24 hours with off times indicated. Exchange serial number and QTH (county for CA stations, state/province/country for others). Stations may be worked once per band per mode. Count two points for phone QSOs, three points for cw QSOs. CA stations multiply QSO points by states plus Canadian call areas (VY1 counts as VE8) for final score. Non-CA stations multiply CA QSO points by CA counties worked (max. 58) for final score. Suggested frequencies: Phone — 1815, 3895, 7230, 14,280, 21,355, 28,560; cw — 1805, 60 kHz from low end; Novice — 25 kHz from low end. Trophies to highest CA score, highest out-of-state score, highest CA mobile score. Mail by November 1 to NCCC, Dennis Egan, N6QW, 811 Beyerley Ave., San Jose, CA 95125.

7

W1AW Qualifying Run, 10-35 wpm at 0200Z October 8 (10 P.M. EDT October 7). See September 8 listing for more details.

11-12

ARRL CD Party, see Fall issue of *QCD* for details.

VK/ZL/Oceania DX Contest, cw, see October 4-5 listing.

21/28 MHz Contest, sponsored by the Radio Society of Great Britain, phone only, from 0700Z until 1900Z October 12. Single-operator only. Exchange signal report and serial number. Contact British stations only (G, GD, GI, GJ, GM, GU, GW); GB stations do not count for contest credit. Count three points per QSO, multiply by sum of British prefixes worked on 21 and 28 MHz. Mail entry to arrive before December 1, 1980 to RSGB HF Contests Committee, M. Harrington, 123 Clensham La., Sutton, Surrey SM1 2ND, England.

15-16

YL Anniversary Party, cw, sponsored by the Young Ladies Radio League, from 1800Z October 15 until 1800Z October 16 (phone: Nov. 5-6). For YL/YL operators only. A station may only be worked once during the contest for credit. Exchange signal report, serial number and ARRL section or country. W/VE YLs count one point for YL W/VE QSOs, two points for DX QSOs. DX YLs count two points for YL W/VE QSOs and one point for other DX YL QSOs. Multiply QSO points by sum of ARRL countries and DXCC countries worked. Stations who run less than 150 W de (300 W PEP) multiply by 1.25 for final score. Mail logs by November 20 (must be received by December 12) to Jane O'Donnell, WA2DMK, Newcomb, NY 12852.

18-19

QRP International QSO Party

Y2 (GDR) QSO Party

Jamboree on the Air (BSA)

AC-DC Contest

25-26

CQWW DX Contest, phone

Section Activities

A-1 OPR \times EC \times DXCC \times ROC \times WAS \times STM \times OES \times OTS \times NM
SCM \times ARES \times OVS \times SEC \times OBS \times TCC \times OO \times NTS \times WAC \times CP \times

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SCM & SEC. E. Roy Ellis, VE6XC, Net Mgr (APSN); VE6AF, Net Mgr (ATN); VE6RBL, Field Day reports not in yet, but we had the usual liquid sunshine weather. The reorganizing of the ARES for the Province is underway and reports are coming in. The Glacier-Waterton Hamfest is being held at Fort Macleod, Alberta July 18-20, ATN (CW) 30 sess., 111 QNI and 29 QTC. Traffic: VE6GCH 38, VE6ABC 33, VE6AMM 22, VE6ON 5, VE6XC 5, VE6VS 4, VE6VW 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — British Columbia Emergency Net, 3650 kHz at 0300, Net Manager VE7COA, Asst. Net Manager VE7CCJ. Report checkins steady, but traffic very slow. British Columbia Public Service Net 3755 kHz at 0200Z, Net Manager VE7OC, Asst. Net Manager VE7DDF. Net report: high 125, low 87, average 107. Phone patching remains high, formal messages down. Amateur Radio Communications Group officers: VE7XJ, VE7ZQ and VE7GMB, secys. Have been very active on public service events. Look for the large magnetic signs on the cars and people in orange jackets. See you in September, away traifering for two months, on the big island. Traffic: VE7ZK 84, VE7FB 17, VE7COA 16.

MANITOBA: SCM, Peter Guenther, VE4QP — Asst/SecM: VE4JP, SEC: VE4TR, STM: VE4RO, NMs: VE4S NM VJ AEJ, Lt. ARES was partly alerted when forest fires up north ran amuck. VE4BO in Flin Flon has been appointed DEC for that area and will serve all of northern Manitoba. We are sad to hear that VE4QJ is hospitalized and is missed on the nets. We wish him a speedy recovery. Field Day was well attended and looks like another good year for Manitoba. Thanks fellows. To often we forget to thank the ladies that provide the lunches for the boys, so a special thanks ladies. MERN QNI 605, QTC 32, sess 20, MTN QNI 74, QTC 24, sess 27; WRIN QNI 143, QTC 30, sess 6; MNN QNI 319, QTC 29, sess 30; Traffic: VE4PG 39, VE4AJ 34, VE4X 31, VE4TE 27, VE4TE 23, VE4AD 13, VE4JE 13, VE4ID 11, VE4LB 11, VE4CR 8, VE4DS 8, VE4FK 6, VE4NE 6, VE4DS 3, VE4GB 3, VE4CF 2, VE4AG 1, VE4JF 1, VE4NM 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF, A/SCM: VO1FG, NMs: VO1JN, VE1WF, SEC: VE1ASW. Silent Keys: VF1BL, VE1BMH, VE1FR. Condolences to all the families. FD reports received from VE1EV, VE1JO and VE1LC, what happened to the rest? Note correction to FAND sked. Meets at 1930Z on 7180 kHz Mon to Fri, 7040 kHz Sat & Sun. Packet radio repeater VE1PAC in operation in Greenwood NS area on 222-340 MHz. Ham Guild 80 Panasonic RF-4900 draw won by VE1AHW. Congrats. SEI scheduled for third weekend of Oct. VE1AYE, VE1MO and VE1PZ moving to Ont. EMO exercise held Halifax Airport with 19 amateurs participating. Class of 13 wrote amateur exams in St. Johns. VO1BSJ special call for Scout Jamboree at Grand Falls, APN 30 sess., QNI 141, QTC 47. Traffic: (June) VE1WF 271, VE1BM 20, VE1LGR 21, VE1KR 15, VE1BX 10, VF1AUL 9, VE1XF 7, VE1OC 2. (May) VE1AUL 5, VE1OC 5.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3BMG, STM: VE3GOL. After many years as NM of the Ont. Phone Net, VE3EWD has decided it's time to retire. I'm sure all join with me in thanking him for the time and dedication he devoted to the OPN and to wish him well. Taking over the net will be VE3GNW, VE3CWA Asst/STM. Special congrats to one of the section's newest amateurs, VE3MAA. He is 83, passed the exam on his first crack. Niagara Peninsula ARG sponsors an award for working 10 members of their club, info from PO Box 692, St. Catharines, Ont., L2R 6Y3. VE3HGF stepping down as editor of the Oakville ARC's interesting and informative bulletin "Hot Bananas." New officers of Ont. Trilliums are VE3EVA, COH IRS, BBO GLT and GCO. Well known DXer VE3CLJ, 334 countries, is now VE3WV and is already up to 100 countries. And VE3CXN now VE3ED in the "So." VE3JIR is VE3ATU, VE3ATG is VE3DEV. OCN certificates have been issued to VE3S CWA and HCS, OPN certificates to VE3S ISW and JFO. VE3JPP is in the South Pickering ARCS Mon net. NCS, With the new NTS restructuring, region netx now meet at 1:30, 3:30, 7:45 and 9:30 P.M. with area nets meeting at 2:30 and 8:30 P.M. All times are local. The following are the NTS nets in the Ontario Section:

Net	Freq.	Time/Day	Mgr.
OSN*	7045	2000 Dy	VE3KK
OLN	7,66/06	2230 Dy	VE3GFN
LN*	3755	2245 Dy	VE3FPI
GMN	467/06	2200 Dy	VE3AJN
OPN*	3770	2350 Dy	VE3GNW
OSN*	3667	2300 Dy	VE3ISW
OSN*	3667	0200 Dy	VE3A1U

*denotes section net, all times in UTC and subject to change in the fall. Times in local time. Traffic: (June) VE3CWA 615, VE3GOL 367, VE3ATU 383, VE3KK 301, VE3JLL 175, VE3DPO 143, VE3HTL 126, VE3GT 109, VE3CYR 90, VE3FGN 63, VE3GNW 58, VE3ABG 46, VE3DQU 39, VE3FGU 32, VE3DVE 29, VE3AWE 27, VE3JPP 20, VE3EWD 17, VE3BB 15, VE3ANJ 12, VE3AYZ 11. (May) VE3HCS 28.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA, STM: VE2FFE. Participation in Field Day was very good and all are looking forward to the final results. On June 24th the "Happy Gang" net (operated by blind ops) was 7 years old. Ex-VE2BB was in Montreal visiting friends. Felicitations aux Joyeux Copains a l'occasion de leur 7eme anniversaire. VE2EMO c'est procurer un autre 52. Traffic: (June) VE2EKC 34, VE2FX 26, VE2EC 18, VE2FWE 16, VE2AYE 16. (May) VE2APT 8.

SASKATCHEWAN: SCM, Norm Walton, VE6AE — SEC: VE6SW, STM: VE6XC, NMs: VE6IG, VE6SW, VE6DC, VE6SW, SPN 800 QNI, 30 QTC; SATN 252 QNI, 12 QTC; WPNX 304 QNI; PARR 326 QNI, 1 QTC; SKTN 2-M 300 QNI, 4 QTC. I was sorry to hear that the Battelford Hamfest was canceled due to lack of interest from all around. SARL meeting will be on the 2nd of August at Watrous. There are lots of mobiles around the province this summer, which means there is lots of activity on the repeaters. Seems there was a good turnout from Sask hams for this years Field Day, even the bands were in

good shape for the weekend. Traffic: VE5AE 19, VE5AAT 14, VE5VM 9, VE5HG 7, VE5NJ 7, VE5XS 3, VE5ACN 2, VE5HE 1.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ, STM: WA3WY, PSHR: K3JL 89, WA3WY 89, N3AKC 74, W3DKX 58. All Delaware hams were saddened by the death of KA3ESX. K3JL with other Delaware hams helped him get his ticket and a rig that he could operate in spite of his paralysis. W3QQ has a new Delta rig on the air while AC3T has his TRS-80 set up for RTTY. Net officers for the AWAR Club: KA3BAO, pres.; WB3DPU, vice pres.; WB3YHW, secy.; WA2ZMN, treas.; DEPN QNI 33, QTC 7 (3 of 4 sess reported); DTN QNI 276, QTC 45. Traffic: (June) N3AKC 79, WA3WY 57, W3QO 52, WB3DUG 38, K3JL 34, W3DKX 23, AC3T 14, WA3YTB 9, W3FEG 6, WA3RTH 6, WA3ZBI 3, W3WD 2, WB3ILX 1. (May) WA3YTB 8, AC3T 6. (April) AC3T 6.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO, STM: WB3JY, NMs: AG3R AJ3R AA3B WA3WQP, PPA QNI 587, QTC 280, 59 sess.; EPAEPTN QNI 404, QTC 189, 30 sess.; PFN QNI 248, QTC 271, 25 sess.; PTN QNI 287, QTC 106, 30 sess.; ATN(2) QNI 98, QTC 15, 9 sess.; LVN(2) QNI 34, QTC 4, 4 sess.; LVN QNI 6, QTC 1, 3 sess.; OBS reports: WB3JY 73, WA3VJ AJ3R W3VCL, CO reports: W3GOA 43, W3FEG 43, W3GGA K3JSD, PSHR reports: W3GGA WB3FEH K3JSD WB3CAI AJ3R WB3JY N3AIJ N3BEJ WA3WQP W3DP EPL; AJ3R WA3WQP, WA3JLK is now KA3A. EPAEPTN welcomes KA3SEM and K3SIO who recently upgraded to General. KA3BER leaving section for Louisiana, good luck from EPA gang, WB3CUF is sporting a new 2-m HT. W3EU reports FD full of QRM, QRN and Murphy. KA3DZD upgraded to Tech. New officers Council Rock HS ARC: WB3JYO, pres.; KA3FOQ, vice pres.; WB3FEH, secy./treas.; WB3KRW, station mgr.; KA3EEX, activities mgr.; K3JSD reports HARC FD went very well. W3IPX reports Murphy struck W3AD at FD, anyone need some nice canvas bags? WA3VIL trying new antenna. W3VW reports TAARA FD res'd, excellent. AJ3R sez summer QRM was a real bummer. N3BEJ upgraded to Advanced and now awaiting new call sign. WB3CAI K3JSD and WB3FAA made DXCC. WB3FKP made WAC and WB3CAI made WAS. WB3DXF built solar panel to power 2-m HT. New officers Mt. Airy VHF Club: W3JIT, pres.; WA3JUF, vice pres.; WA3WAS, corr. secy.; K3IGX, rec. secy.; K3IGAS, treas.; W3HOT WA2DPU K3NHX N3AHI and WA3NFV, dir. Northampton County ARES Net will start on Nazareth 1070 machine Mon 7 P.M. local time. WB3JYZ had FB time at FD and can't wait till next year. KA3JLJ and KA3FWT new Novice ops in Pike County. Welcome aboard, KA3DNT upgraded to General. K3D1D ready to put up new tower, any volunteers to dig the hole? W3JYK, welcomes new members. W3JSD and W3JSD WA3WQP will attend Williamsport College in the fall. W3FAF reports his job cutting down his operating time. WB3FKQ added a full size rotatable 40-mtr dipole in his antenna farm. WB3FEI DXing on 2-m ssb with new TR-9000. FD messages were received from W3JUU W3BN W3IPW W3SJJ K3YTL W3OK W3PM WA3UDD K3JL K3RD W3SK K3PA AA3B AG3R W3SD K3SD K3FD K3X AD3X W3DJI KA3BER and K3IEC, nice going gang. Traffic: WA3WQP 895, AJ3R 513, WB3FEH 262, WB3JY 141, AA3B 130, W3IPX 129, WB3GZV 126, AG3R 114, W3BI 99, N3BEJ 94, W3FAF 86, W3VJ 83, K3NG 62, AD3X 62, N3CD 59, W3DP 58, W3GOL 52, W3BCA 46, W3JY 45, W3DJI 45, W3ADJ KA3BER, W3CUC 33, WA3VIL 28, W3CI 21, K3JSD 19, KA3BOD 11, WA3OFD 11, K3ZBL 8, N3BH: 6, W3BNR 6, AF3Z 6, K3YD 4, K3NB 3, K3AKN 1, W3AVJ 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — WA31AI, Accokeek, MD, is our new Section Emergency Coordinator. Congrats. ECs get those reports to him. N3AFM charts sporadic E activity. QSOs 30 states, C6, KP4 and VE1 on 6 and heard an additional 10 states. PAR minutes supplied by WA4LWB. BARC new prexy WA3BPC. W3BGN helped get BARC tax exempt. KB3AP lost the 75-meter dipole when the knif broke. The winds did a job on K3JLJ's antennas as 80 meter dipole snapped, tower and beams plus the TV antenna broke and a window was blown out. W3PQ brings MDD up to date with N3AKC W3QO and W3FCA rep brass for Mar, Apr and May. WB3GZU and his XYL celebrate their 30th. W3LDD retires on July 22nd after 37 years 1 month and 1 week for uncle! W3DQI takes a whole month leave. KA3BQF is studying for that Advanced. W3UT is looking to the picnic. W3DFW is making good use of that trailer home. AK3X says wait till next time. W3OYY mows the grass when the spirit moves him. AA3S has a big garden. W3FTZ keeps us posted on the Washington County Net meeting Tues at 7 P.M. local time. WA3LNV and N3ARZ are NCS. KA3DZ reports 44 Mont. County RACI members with RA, VE3JUC and deputy WB3TA KA3DZX and WA3SMM. Good show. W3FZY gave 62 points to PVRCers in their reunion. WB3CES keeps his hand in. K3KMO is having fun with a memory keyer. WB3CII covers (are Waldorf. FD msgs from W3VPR W3DQI K3CEZ N3GR K3WD WA3AN and K3JX so far. W3FA enjoyed meeting the So. Md. ARC. WB3KYL is moving to Howard County. With the nets. Net/Mgr Sessions/TFQ: QNI average WR PONW3DFW 2128/121; MDC PONW3OY 4/6/21.5; MERNW3B3GZU 30/168/23.1; Toppers W3ADQ and WB3BKF. Others KA3ARH W3DQI and K3ONJ. CW net MDDW3PQ meets 7 and 10 P.M. daily local time on 3643 kHz. Come in and get your code speed up. Traffic: (June) WB3GZU 66, W3FA 30, W3DQI 58, AA3S 46, AK3X 45, W3FZY 26, KA3BQF 18, KA3DZX 10, W3UT 5, WB3CES 2. (May) WB3TA 70.

SOUTHERN NEW JERSEY: SCM, Bill Liebekmann, WB2LCC — SEC: W2HOB, STM: WB2GTW. Field Day was a tremendous success this year, with the bands crowded and participation very high. Many clubs took time to send me a message detailing their operation and will be awarded a 100 point bonus. More important than the message or the bonus is the emergency communications capability that Field Day helps to promote. Many

clubs and groups proved that they could, if necessary, set up a complete station independent of the rest of the world. A capability which we hope we never need, but which we strive to maintain!!! Another important milestone in June was the summer confab of New Jersey traffic handlers, held in Holmdel at Bell Labs. The main topic on the agenda was the new statewide two-meter traffic net, its operation and meeting time. Many of the issues were discussed and the final result was the establishment of a committee headed by K2UL to look into the aspects of the net. It is hoped the committee can make definite recommendations at the winter confab in December, or if they proceed hastily, at a special confab to be held in the fall. Now would be a good time to air your comments, to K2UL or your section officials. Let your voice be heard. Traffic: WB2IQJ 303, K2UL 80, WA2GJW 71, K2CA 58, AA2H 58, WB2LCC 50, KA2GTE 48, WB2HUV 43, WA2HEB 37, W2ZQ 34, WA2WVS 33, K2YBN 30, WA2WUL 29, WB2PKG 25, KB2OE 14, WA2GTJ 12, WB2GTW 11, WA2ONW 3, W2U 1.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA, SEC: W2BCH. June net reports:

Net	Freq	Time	Sess	QNI	QTC	OSP	Mgr
NYS	3677	7 P.M.	30	488	307/206		W2ZJJ
NYS	3677	10 P.M.	30	325	261/183		W2ZJJ
NYPDN	3913	5 P.M.	30	234	84/7		K2KOC
CNYTN	90/30	9:15					W2PLUJ
CTEN	24/24	30		314	101/94		WA2MVE
STAR9	99/39	7:30	30	151	7/76		WA2ZJP
WND	04/84	9:30	30	945	120/7		N2APB

First month IR above presentation. Let me know your feelings. Welcome to new OTS appointees WA2MFU and WB2QIX. WB2EOX new asst. mgr. of WDN. WB2OMZ new asst. mgr. of NYPDN. KA2BGX is now N2BZW with a new General. Corning area hams provided communications for scoring, admin and executive matters on 3 repeaters for the NYS Special Olympics at Elmira on June 14. WB2MVC and his station featured in the company newsletter. Oneida County Executive declared June 22-28 as Amateur Radio Week, & both Rome and Utica clubs set up live demonstration stations. WB2ABS 22/82 in Bingo was used for communications for the 10th Annual Vesta Cross Country Road Race June 14. K2OR WA2QEL KA2AAS WB2PGL WB2PGW WA2PHA WA2VFX KA2BDY WB2FDN WA2DIZ and WA2AFE participated. Traffic: (June) W2ZJJ 323, W2MTA 272, W2GJ 212, WA2EL 190, WA2MFV 169, WA2HSB 127, W2AET 121, WA2ZJP 112, KA2BGX 103, N2APB 95, N2BZX 95, KA2CTU 89, K2GWN 74, WA2KQJ 70, WA2AFE 65, WB2IDS 60, W2F8 53, WA2MFU 52, WB2QIX 46, WB2MVC 38, WB2EOX 30, W2TZ 29, K2GT 27, W2ROF 27, WB2OWO 26, K2ZVI 25, AF2K 23, WB2FHE 22, W2PPS 15, K2VR 7, KA2HCB 2. (May) K2GWN 74, W2PZL 72, WB2PEE 45, W2ROF 44, WB2V5J B (Apr) WB2V5J 20.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SME — A/SCM: N3FM, SEC: WA3VUP, Asst./SEC: WA3JBO, STM: N3EM, NMs: W3NEM W3KUN W3MML WA3PA WA3JDI.

Net	Sess	QNI	QTC	kHz	Time/Day
WPACW	30	327	199	3585	8:00 P/Dy
WPAPT	30	432	155	3983	6:15 P/Dy
WPA2MTN	30	627	107	146/288	8:00 P/Dy
NWPA2MTN	25	259	36	146/04/64	9:30 P/Dy
WPA RACES	3990, 5	362	Ptn	3610 kHz	3610 kHz 6:30 P/Dy

With regret I list the following Silent Keys: W3T1B W3CXX K3AM W3KRC and WA3EMD, our sympathies are extended to their families. WB3KJH is new EC for Westmoreland County. The WPA picnic will be held in Cook Forest on Sept. 14, all traffic net members and other amateurs are invited, pack your basket and join the gang for a good chance to meet a fine bunch of tic ops. W3KHQ from Fairview, PA is in Argentina with the call LU1TAB, he'll be looking for Erie area amateurs. KA3BRO is now a General. The new club in Armstrong City is the Fort Armstrong Wireless Association. Horseshoe ARC new officers are K3IOH, pres.; WB3FIA, vice pres.; WA3VUP, secy./treas.; WB3FYX, act. mgr. ARES members where active providing communications for the disaster in Armstrong County when a tornado struck. Red Cross was also helped to establish contact to Pittsburgh. Allegheny County Public Service Net operators aided in a five hour search for a retarded man. Traffic: (June) WB3GJ 254, WA3PXA 223, W3SMV 168, N3E 158, K3BDT 144, N3FM 130, AC3N 86, WB3JGD 74, WA3JUN 73, WB3JDI 61, K3SME 53, W3MML 48, N3WS 48, WA3S 33, W3RUL 30, W3UHL 26, W3KUN 25, WA3DXP 23, W3KMZ 23, WA3JBO 20, WB3WJ 19, K3CHT 18, W3TDM 13, WB3BOB 12, K3CR 12, KA3DJM 12, WB3IAB 12, W3SN 12, WA3VRE 12, W3EXC 9, N3ALL 8, N3KB 7, W3TTN 5, WB3FFI 4, AF3B 2, K3GT 2, K3QOV 2, W3LDD 1. (May) W3SGJ 354, WB3JGD 245, N3WS 33.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst/SCM: W9R9Y, SEC: W9GBH, NMs: WA9KFK and WB9JSR, Cook County EC: W9HPG.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	0030/0400 Dy	294	60
ILL Phone	3915	2130 Dy		
NCPN	3915	1200/1700 Dy	98	25
IEN	3940	1400 Su	6	4
W9VEY Mem Str		2-meter	10	5

The new officers of Tri-Town Amateur Radio Club are: K3JJC W9NIF KA9DIL W9BHK and W9QON. KA9OIL WA9TK W9BHK and W9I9V of their club have updated their licenses. The Southern Illinois Amateur Radio Society Field Day had to be postponed to the 2nd of August due to officials and utility company to coordinate emergency duties due to severe high winds and storm damage occurring during their exercise. KA9IFD is a new Novice in Fairview Heights. W5KLD reports that the CAND passed 530 messages during 60 sessions and Illinois participation was 100 percent with WHOT W9DZU W9JIJ K9UN WB9WGT and W9NXXG checking into the net. W9DNT WB9SVC W9D9PN and W9GHN were re-elected as officers of the York Radio Club for the coming year. The Lamone Emergency Amateur Radio Club is sponsoring a Worked Forgotten Award for

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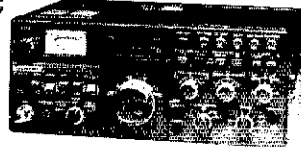
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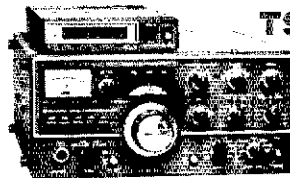
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TS-520SE



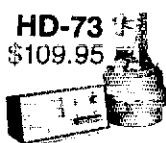
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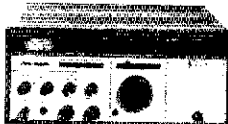
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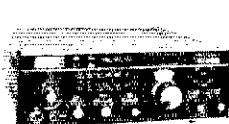
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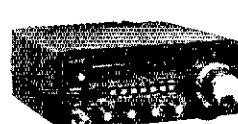
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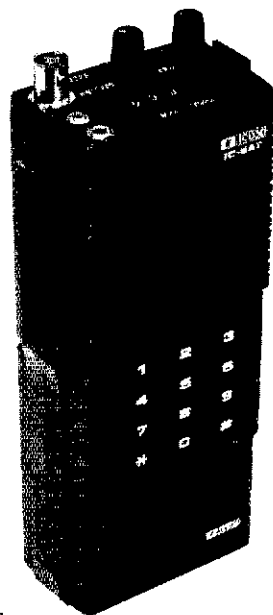
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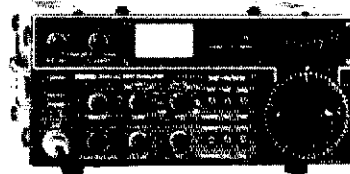
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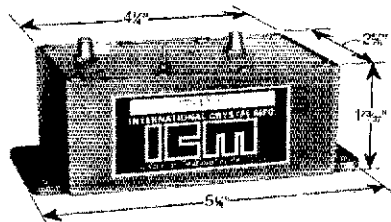
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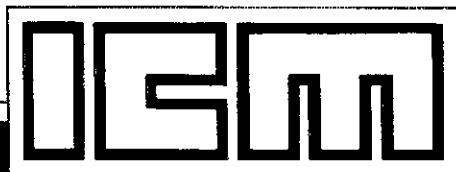
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amateurs who check into each of the sixteen counties in their area. Contact WD9GQJ for further information. KASHBZ is a new Novice graduate from the Egyptian Radio Club's class. The Starved Hook Radio Club and the Six Meter Club's hamfests were well attended despite the gas prices. From reports received on Field Day results, many new clubs are participating and final scores will be gratifying. K9TCC W9ILN and WA9HOO are back in circulation after a series of hospital stays. The Annual EXPO of the Chicago FM Club will be held September 6th and 7th at the DuPage County Fairgrounds. The Illinois State Convention sponsored by the Rockford Amateur Radio Club will be held Sunday August 31st at the Winnebago County Fairgrounds at Peoria, Illinois. W9HOT reports that the 9 RN had a traffic count of 246 messages during 59 sessions and Illinois participation was 100 percent with W9NXG W9UJJ W9WGD W9ILU W9YCE W9JF DB N9AJU K9BVF K9CXUJK and K9UN checking in. The July issue of OST listed W9MUI as a Silent Key and it should have been K9MUH of Urbana. It was reported correctly but a typographical error in my proofreading resulted. W9QLZ WD9ADC W9IMJ and WA9BK6 are vacationing in Europe. Traffic: W9NXG 268 W9H01 250 W9WGD 151. K9PNG 145 W9UJ 144 K9BVE 103 W99PUK74 100. W9UJSH 89 K9AALR 80 W9KR 74 WD9F DB 66 W9LNO 63 W9CYL 48 K9SW 46 W9YCE 42 W9YCE 36 W9ILU 33 W9PRN 34 W4I2 6. WD9FBQ 2. WD9HZL 2.

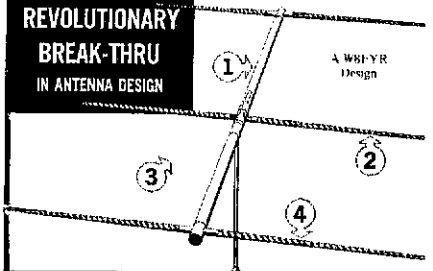
INDIANA: SCM: Bruce Woodward, W9UMH - SEC: W9UMH - CSM: W9UJ Woodcock, W9WYV - CSM: WD9GXW, IGM N9AEI, VHF W9PMT June Net reports:
Net Freq TimeUTC QNI QTC
ITN 3910 1330/2300 Dy 2332 261 60
QIN 3656 1430/1100/1400 Dy 802 366 89
IGN 3708 0014 Dy 74 38 27
IPN 3910 2130 Dy 1059 130 30
VHF nets report: QNI 2550, QTC 248, bulletins 23, time 2132 minutes for 22 nets. Indiana 100 percent TCN. CAN. CAND. D9RN. 9RN with W9UJ, W9DLF, K9CGS, W9MIK. WD9GIS, W9LRQ, WA9RSK, W9QLW reported to be active on these nets. The Washburn Valley Amateur Radio Association's newsletter, "The Handspread," reports the 1996 Hamfest a great success. I know I had a great time. Thanks to all those people mentioned in the report. The Lightning Bolts were active this month. Charter members are WA9GJZ, W9DLF and WA9URL. Serv fellows: Appointments: EG, N9AM, La Grange County, N9AJM, Marion County, W9LTA, Boone County, W9LJU, Hancock County, N9RD, Porter County, W9CGX, Vermillion County: QTS: W9URO, N9AEI, W9BKQI, WA9OKK, W9DZC, W9DLF, W9UKP, K9YH, K9KTB, W9UPI, W9GXW, OBS, K9KTB, WA9TJS, W9LGN, OO: K9LSB, W9NTO, NM: IGM, N9AEI, Endorsements: EG: K9UJK, N9GC, WD9RKA, W9ZHL, W9BHR, K9ET, K9MH, AA97, N9AHP, WD9RDZ, 99VP, QTS: W9WZ, K9GF, W9BDP, W9EUL, OBS, K9RIT, SEC: W9UMH, W9WKM has joined WA9OH in the lower 100 tower to the winds. Congrats to WA9JIS on his being named the Clark County Amateur of the year. Congrats also to K9TE, K9WG, W9DDV, N9TV, A9Y and N9AST for their awards presented by the Clark County Amateur Radio Club. Congrats to K9FW on becoming a member of the International Federation of Free Loaders. I don't know if this is good or bad. Congrats also to WA9LHP and the sewer net for their award. I thought they should have gotten an award for the best booth at the Fort Wayne Hamfest last year. Thanks to W9ZCQ for all the printing he has done lately. Buy and Net Managers should have a copy of the Local Net Certificate. I hope you plan to use them. Field Day was fun as usual. Start making your plans NOW for next year. Traffic: W9UJ 775, W9FC 243, WD9GIS 237, WD9GXW 143, W9UYU 142, W9QIW 102, W9PMT 56, WA9GCF 56, W9WRC 55, W9URO 51, N9PS 49, W9E1 48, W9HUF 44, N9AEI 37, WA9JIS 34, K9WVJ 32, W9UD 31, WA9OKK 30, W9I0H 28, K9DIY 27, W9DLF 20, K9KTB 14, W9WEI 13, K9CGS 12, WA9GJZ 12, K9RPZ 12, W9UEM 11, W9MR 10, W9UPI 8, K9FZX 8, K9TK8 8, WA9OHX 7, W9VAY 5, W9RTH 4, K9BSF 3, W9ENU 3, W9RDP 2, W9ZW 2.

WISCONSIN: SCM: Roy A. Pedersen, K9FHI - SEC: W9QAK, STM, K9UTO, NMS: W9AYK, W9EM, W9SIC, N9AUG, W9DM, K9LQU, WA9YL, now W9MCO, New Novices: Shekelander area K9DQ, K9BKN, now K9BF, New Novices: Waipara County K9IDK, K9AIEU. Effective July 1, W9SESM will be new manager of BEN. W9LEM wanted to relinquish that position. Thanks a million for all your time as past manager, we all appreciate it very much. WD9IOI has Extra. I'm very sorry to report W9RG, WD9DIT as Silent Keys. New Tech Watertown area K9CPW, New Novice Scandinavia K9IMG, K9HJW, K9DFX, now Generals: BPL to K9CPA. I'm glad to see so much activity and reports for Field Day. I hope I can see a number of Wisconsin stations in the upper part of the final tally. W9WIN had 576 QNI, 63 QTC. Again thanks to those stations who take time to participate in D9RN and CAND. B9WN had 100 percent as far as traffic offered and cleared. Green Bay 2M Net had 23 QNI, 1 QTC. K9EYH has Advanced. Watch for new call: New Novices Stevens Point area K9HZW, K9IBJ, K9IDV. I hope everyone has a safe happy summer, the cold weather will be here before we know it - not a pleasant thought. Traffic: June! K9CPA 759, W9BYPY 231, N9AZI 194, W9CXV 135, W9YCV 118, K9FHI 117, WD9UJ 111, W9IEM 106, WD9ESZ 87, WD9DHF 82, K9AKG 67, W9BYPZ 53, N9AUG 52, WD9BGM 52, W9DM 49, W9SIC 48, WD9ND 42, W9BKK 39, K9BND 36, W9LDQ 33, K9AC 38, W9FDY 33, W9IHW 33, K9UJ 33, K9E MF 32, W9G 31, W9IGI 28, WA9DXW 27, W9WNA 25, W9SOJ 24, K9FM 23, W9CJE 21, W9GKO 19, W9BRE 16, W9JSW 16, W9SESM 15, K9KSA 12, W9SH 12, K9ANV 10, A9K 10, W9UW 10, W9PAW 8, K9CPM 5, (May) K9CPM 1, (Apr.) K9CPM 24.

DAKOTA DIVISION

MINNESOTA: SCM: Helen Haynes, W9HOX - By the time you receive this, the vacation period will be over. I hope that each of you had a good summer. At this writing my visit to the Atlanta Hamfest stands out. It was a good one. K9OKW, Wilmar, MN, announces these new Novices from his class: K9IVP, K9JNG, K9BINH, K9QLEZ, all from Wilmar and K9WJQ, Arvada, K9IEP, Kandvohti. Good going guys and thanks. K9OKW. Other upgrades: Gen to Adv: K9QFTB; Tech to Gen: N9BGS; Nov to Gen: K9QGMF and K9DNH. The Dakota Div. weekend will be Sept. 26-28 in Fargo, ND. See you all there. I note that many of you took part in Field Day activities and as a result it is my belief that more of you will wish to become an EC of your county. Why not write WA9QIT and ask for information. Your county needs you and the MN Section needs you. Many

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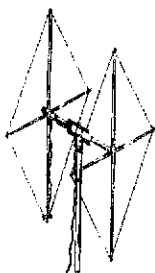
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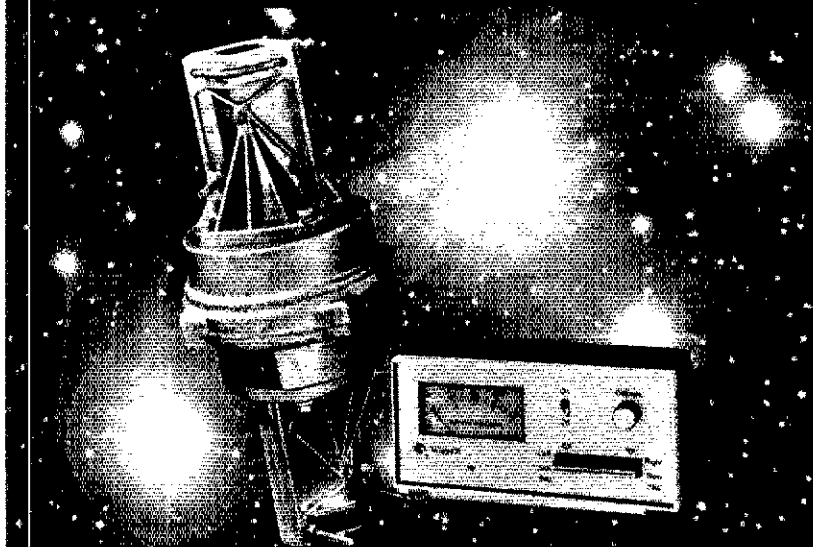
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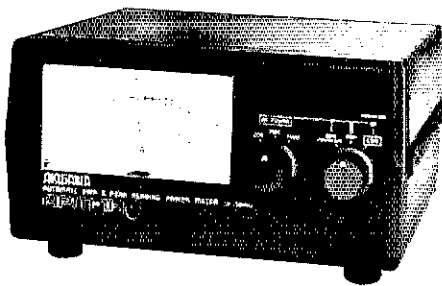
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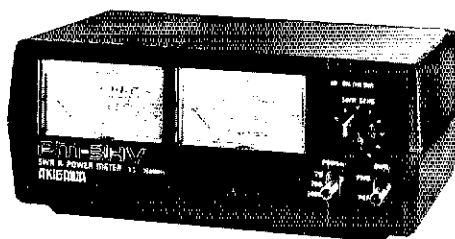
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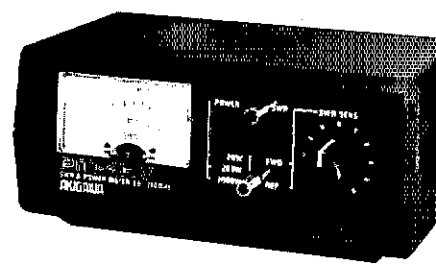
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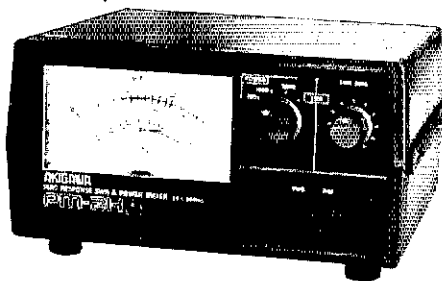
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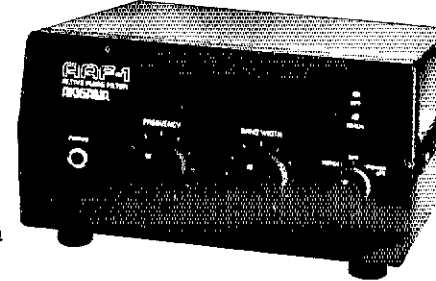
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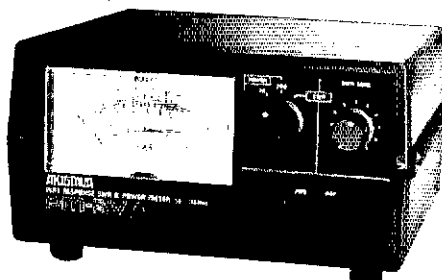
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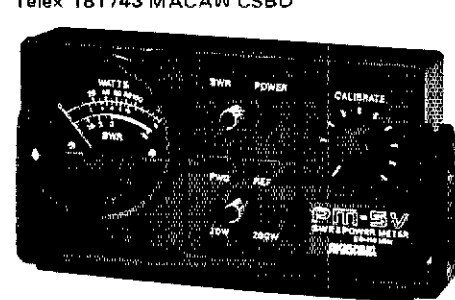
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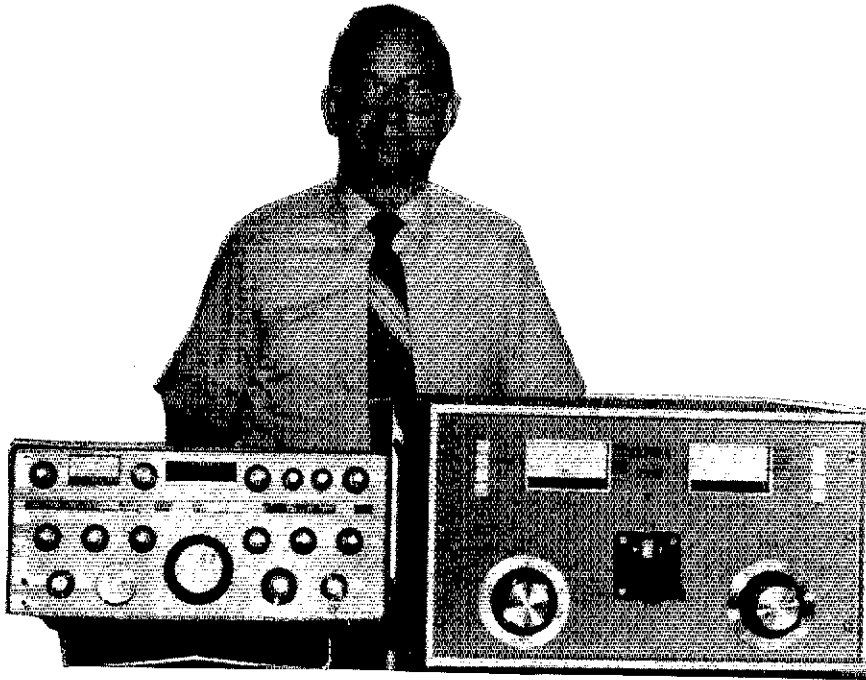
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counties DO NOT have an EC. Our sympathy goes out to the families of W0IDJ and W0ILZ. W0IDJ of Two Harbors became a Silent Key on June 21. I might mention that he was responsible for getting WA0QIT on the air. W0ILZ of Litchfield became a Silent Key on June 27th. The MN slow speed net and the MN Weather Net were closed during the months of July and August, so do not be alarmed when you do not see a report from them in the Oct. and Nov. issues of QST. STM: AF00. SEC: WA0QIT.

Net	Time	Freq	Mgr	QNI	QTC	Sess.
MSPN N	1705Z	3.945	WA0AIN	480	59	30
MSSN	2215Z	3.710	KC0T	51	9	24
MSPN E	2345Z	3.920	KC0T	701	185	30
WX NET	2315Z	3.929	WA0JUN	342	218	28
MSN 1	2330Z	3.885	AF00	—	—	30
MSN 2	0300Z	3.885	K0PIZ	114	29	29

Traffic: W0HOX 389, WA0TFC 365, W0HZU 209, AF00 111, K0PIZ 106, K6EA0 104, KC0T 94, WA0AIN 69, W0DFX 53, W0NZZB 52, W0UKI 50, KA0CLG 46, WA0NE 46, K0JCF 45, N0BRC 38, W0JW 30, KC0Z 23, W0RIO 22, WA0YVT 19, W0SCN 18, W0PX 14, K8PE0 10, K0CSF 8, K0TS 7, N0JP 5.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WA0RWM — SEC: W0TEE. OBS: W0DM. OO: W0CLD. NM: WA0CHR. Congrats to those who upgraded: KA0GWC to Tech, W0HFK and N0BQR to General. Field Day was very active even with the strong winds and rain. Thanks for the messages sent to the SCM and SEC during the event. Fargo was at Trolleywood Park, Three River at Ft. Abercrombie, Hettinger at Sirm But and Minot at Minot Boy Scout Campground. Mayville Hamfest and Auction was a success. WA0CSL won the QLE, out-stomp 15 of the area's best QLFers. June 4th, Williston Club Skywarn was busy as a total of 17 tornadoes were seen. Minot Club also had about 3. W0SHD moved from Hettinger to Bismark to be Tech Rep of Motorola. W0AUM vacationed in VY1-Land. Congrats to WA0RWK on new harmonic, WA0VGJ. WA0RWM WA0RWL are grandparents and uncle. Traffic: WA0RWM 140, N0AFP 17.

SOUTH DAKOTA: SCM, Lydia S. Johnson, W0KJZ — Asst. SCM: W0DVB. SEC: WA0TNN. NMs: W0HOJ WA0TNN W0DVB. First, congrats to new SCM, Erwin C. Hembuck, K0QTZ, who will take office October 1st! Please direct all your September Section Activity news and reports to him early, at 3212 Parkway, Rapid City, South Dakota 57701. Telephone 348-5433. Thank you, I know that it will be greatly appreciated. W0HFK new ham in Bison. FD messages received from Signal Hill ARC, K0HP; Sioux Falls, W0NRW; Huron, W0NOZ; Spink County ARC W0JBY. PSHR was earned by WA0TNN with 89 points, and W0DVB 60. All our nets doing well in spite of summer storms. Thanks to all Traffic: (June) W0DVB 244, W0DVB 86, K0FRE 79, WA0VRE 75, W0HOJ 86, W0MZI 54, WA0TNN 52, W0OMP 38, W0KJZ 35, W0IG 6, K0HP 1, W0JBY 1, W0NRW 1, W0ZVY 1.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pakorny, W5IAU — SEC: K5TML. NMs: W5LGN W5MYZ W5POH W5AZW. Nets: OZK 3.780 0000Z/dy 170 40 W5MYZ, APN 3.937 1100Z/M-S 617 41 W5POH; M-Bird 3.928 2130Z/ M-F 588 22 W5AZW; ARN 3.995 2330Z/dy 883 67 W5LGN. Our sympathy to family of W5TJJ who became a Silent Key. The NWAARC provided comm for the Devil's Den Enduro cycle races June 22nd, participants were W5VDO W5WPF W5EJH W5N2D K5BMK K5HFB. Congrats to upgraders K5GZD, Ken now N5CDJ. KA5GZK to Advanced, K5AGD to Gen. Only three FD msg rec'd, Ft Smith ARC, SCARC and NAARS. SCARC Ten-Mtr Net report 107 QNI, 5 TRC. Ur SCM was unable to make his annual Field Day trip this year. Ark trips to CAND W5QEK K5BN K5AJM. To DRN5 K5AJM. Traffic: W5OFJ 48, W5IAU 34, W5POH 23, W5EJ 12, W5BLP 4, W5I WJ 4, W5GQH 1.

LOUISIANA: SCM, Jim Giarrancho, N5IB — SEC: W5TPG. The EC for Beauregard Parish is W5HMD in De Ridder. Are you an ARES member? If you're not sure, or want to sign up, contact your SEC for details. A radiogram to him with your name, call, address, and phone will suffice to get you the info. W5FLM N5EK N5I W5JXF W5JZP and K5WOD are keeping LA well represented on DRN5. W5BYT is leaving the post of LSN manager for a good job. BRARC Field Day featured competition between groups of club members, with K5QA serving as the handicapper. SELARC planned a fish fry to go along with FD activities. WEST Side ARC, Ozona ARC, Union Parish Contesters, Thibodaux ARC, Shreveport ARA, Vernon-Beauregard ARC, Sabine Parish ARC, K5NR K5WOD and W5DDI also reported Field Day activity. KA3BER/b a new QTS, recently moved to Monroe from E. PA. Baton Rouge had a number of power outages this past month. This should remind us to check our emergency power sources.

Net/Freq	Time	QNI	QTC	Mgr
LAN 3615 kHz	7:20 P.M. Dy	213	101	N5RB
LTN 3910 kHz	6:30 P.M. Dy	397	104	N5EK
LSN 3703 kHz	7:30 P.M. M-F	95	37	W5RYHT
LRN 3587.5 kHz	8:30 P.M. Su	6	15	N5RB
LEN 3910 kHz	8:00 P.M. Su	—	—	W5TPG

Traffic: (June) W5GHP 178, N5HB 103, W5VMY 89, W5FLM 83, W5JZP 48, N5BFV 47, N5EK 43, W5EAE 39, N5IB 36, W5GDDJ 24, W5GJUB 12, W5BKI 2. (May) W5GHP 175, N5RB 147.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: W5FXA. Field Day is done and activity reported very good. Reports from Tupelo ARC, Jackson County ARC, Old Natchez ARC, Laurel ARC, Tombigbee ARC, Meridian ARC, Jackson ARC, Univ. MS ARC, MS Coast ARC. We hope the scores support the enthusiasm. Congrats to new NMs: MSBN-W5YM (many thanks to K5MK), CGCHN K5M (many thanks to AG5K). Congrats to W5FOR, upgrading from Tech to Extra in one sitting (trx MCARA) and new hams K5JAA K5JGG K5JAD K5JAC K5JAE K5JZX K5JZY K5JAB. This is your column, so send me your news. CAND (W5KLV) sess 60, QTC 530, with DRN5 rep. 100 percent by MS station N5AMK. DRN5 (W5NKD) sess 30, QTC 349, with MS rep. 96 percent by KASFT N5AMK K5BPJ W5EDT W5HAS K5BT W5JEB W5UYW, CGCHN (K5M) sess 30, QNI 1924, QTC 130, MSBN (K5MK) sess 30, QNI 1902, QTC 73, MTN (K5OA) sess 30, QNI 95, QTC 36, MSZ (K5GGG) sess 33, QNI 74, QTC 12, RAGES (N5AMK) sess 5, QNI 178, QTC 5, Gulf States LN (K5WV) sess 13, QNI 636, QTC 32. Traffic: N5AMK 169, W5EDT 100, K5OAF 88, W5SSNB 45, W5XT 29, W5RIM 14, K5F 12, W5EYM 2.

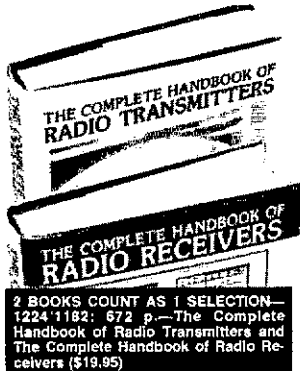
TENNESSEE: SCM, Earl Leonard, Kk4G — SEC: WANZW. STM: W4PRF. The League needs the support.

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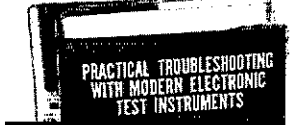
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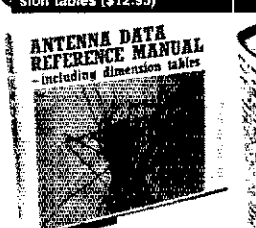


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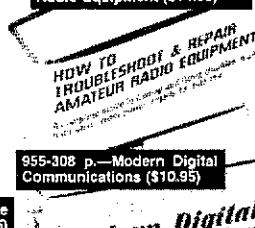
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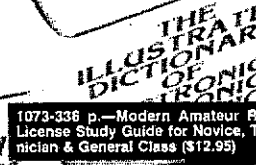
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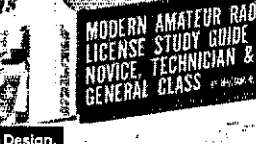
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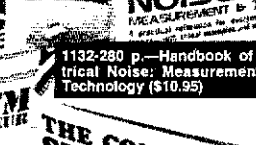
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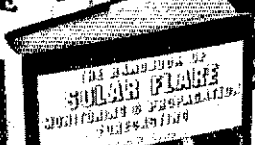
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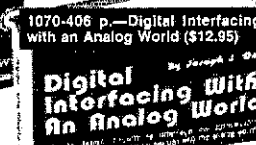
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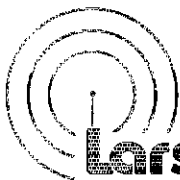
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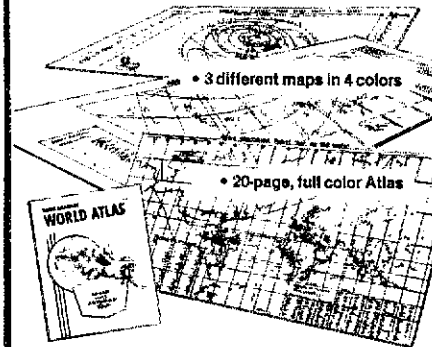
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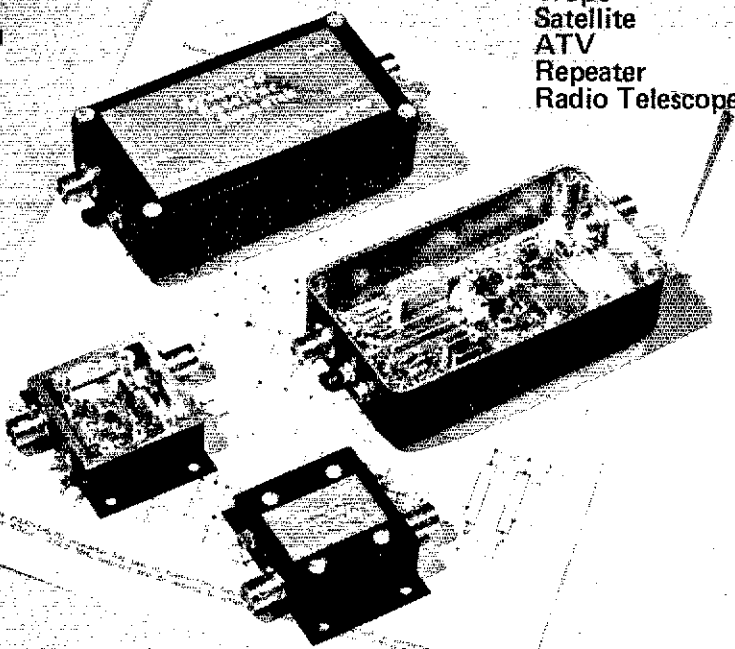
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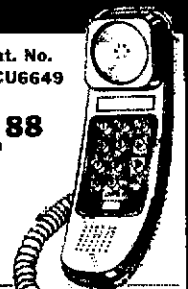
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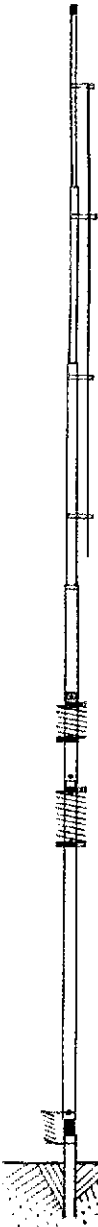
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of everyone. Each club should be affiliated with the League (it requires only 51 percent of the membership). Encourage all members to join the League and make sure your club is a League affiliate. By the time you read this you should be well into your plans for the October 18/19 SET. Let's all pitch in and make this the best emergency drill yet. Participation in the nets is on the increase and the traffic count is up. Thanks to all and a special thanks to WA4GIG and WB4ZSZ for the 100 percent representation in DRMS. Phone nets: 185 sessions: QTC 811, QNI 6199. CW: 33 sessions QTC 84, QNI 254. FN Honor Roll: WA4CNY W4DDK K4AJE WB4LEH WB4PRF W4UIO W4ZJY and WB4ZSZ. TSN Honor Roll: WA4GMS WA4CNY WB4LEH KA4ND WD4NJR WA4WMN and WB4YSN. Traffic: (June) WA4CNY 519, W4DGG 180, WB4BKF 154, WD4NJR 81, WB4ZSZ 67, WA4MR 60, W4ZJY 57, WB4LEH 52, KB4G 30, W4PFP 27, W4RUW 25, W4BT 21, W4FMO 21, K4GSS 14, WA4CGK 12, K4AM 11, W4DDK 10, K4DEC 10, W4DPO 7, W4EAL 7, W4EWR 7, W4VJW 6, WB4YPO 6, W4UIO 3. (May) K4JGW 31, WB4LEH 24.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joe Miller, K4DZM — STM: K24G. SEC: WB4ZML. DECS: WA4ZVL WA4KKV WB4FAT. Nets: Net Time Freq QNI QTC Mgr. KRN 6:30 M-F 3959 417 31 W4BEJ MKPN 8:30 Dy 3959 1028 62 WA4JTE KTN 1845 Dy 3959 950 129 WD4LXX KNTN 1900 Dy 3727 363 106 KB4OZ

KYN 2000 Dy 3600 264 115 WA4WSM KSN 2200 Dy 3600 179 43 KS4V

Net QNI QTC Net QNI QTC
P4WUN 430 45 B-ARES 76 7
CARN 184 17 4-ARES 27 7
TRIST 30 51 5-ARES 27 7
9RN-D 60% 246 CAN-D 100% 530

The Kentucky HTTY Net (KNTN) will be starting in Sept. contact K4YZU for information and to volunteer. Start making plans for the Louisville Hamfest Sept. 27/28. Traffic: K4DZM 96, KB4OZ 81, K4JLX 80, WB4APC 64, KA4AZT 54, WD4LXX 53, WD4JTO 51, K54V 48, WA4SWF 44, WD4ONV 41, WD4KDG 39, WA4AVV 38, WA4AGH 37, W4PKX 34, WA4EBN 32, K4GUFU 31, WA4JTE 30, K24G 28, WB4AUN 18, WA4YPO 18, WD4COF 15, WA4GNP 13, KA4IKH 13, K4MHL 13, W4RHZ 12, WD4BSC 9, N4OAF 8, W4TPB 8, WA4NOG 7, WD4CJQ 6, K4AVX 4, KU4A 1.

MICHIGAN: SCM, James H. Seelye, WB8MTD — Asst SCM: WA8DHB. SEC: WA8EFK. STM: WB8BYH. NMs: N8ABA, WD8BHE, WA8DHB, K8LNE, K8KMO, WD8LRT, W8PIM, AF8V, WB8YDZ, W8YIQ, K8ZJU. DECS: WB8FLK, KR8CT, W8WVY.

Net Freq. Time/Day QNI QTC Sess.
OMN* 3663 1800/2200 Dy 862 348 60
MITN* 3953 1900 Dy 588 306 30
GLETN 3932 2100 Dy 983 140 30
MACS* 3953 1100 Dy 745 136 30
UPN* 3922 1700 Dy 582 93 35
MNN* 3722 1730/2000 Dy 386 77 60
WSSBN 3935 1900Dy 493 32 30
BR 3930 1700 M/S 361 31 25
MEN 3930 0900 Su 174 10 5
MATW** 3953 1600 Su 18 0 3

VHF activity 13 reports 1162 25 117
NTS section nets: **Mich. Amateur Radio Workshop. Times EDT. Field appointments: Q1S, WB8BP, Silent Keys: WB8LMO, WB8RT, OD reports: K8AIT, K8JH, WB8QG, WB8RUQ, AG8U, K8XIX, W3GQJ, OBS report: AF8V. I frequently get asked, "How come so many NMs listed?"

All of the people listed at the head of this column hold ARRL NM appointments and contribute to the overall NTS leadership picture in Michigan. N8ABA is QMN general manager. WD8BHE runs MNN, WA8DHB, UPN, K8LNE, MACS (which stands for Michigan Amateur Communications System), WD8LRT, MITN, K8KMO and WB8YDZ, coordinate our highly developed liaison system, which gives us a better-than-most reputation for same-day delivery. W8PIM and W8YIQ are air managers for the two QMN sessions. K8ZJU is appointed to supervise emergency operations. And AF8V is VHF activity manager. In addition, we have the managers of the listed independent nets: WB8BSE, WB8VAI and W8HIN (GLETN, WSSBN, and BR/MEN) who also contribute generously to public service operating in our section. "How come so many?" They all work to keep Michigan's traffic moving and to help keep Amateur Radio in the public eye. They are the day-in/day-out leaders, and I feel you should know who they are. Next month, ARES will be featured. Traffic: WB8MTD 284, N8ABA 216, WD8ZK 197, AF8V 182, WB8YDZ 142, WD8LRT 124, WA8DHB 119, WD8RNO 117, K8RCP 107, W8PIM 107, K8DTG 102, K8RV 96, K8KMO 91, WB8BYR 85, W8UE 77, N8BK 74, WD8MJB 74, K8BX 65, K8LNE 55, W8VPW 55, W8HX 55, W8CUP 48, W8VZ 44, W8WJF 44, WD8BSE 43, WB8HPZ 43, WA8TAQ 41, W8WJ 38, WD8JRI 37, K88MX 37, WB8VAI 35, W8YIQ 33, WD8IXZ 31, WB2LZN 30, WB8WYO 30, W8PDP 29, WD8NRT 26, K88EPK 23, WB8ZIU 25, KA8AT 20, W8QAF 20, WD8OEP 19, WD8HOK 19, WB8SYA 19, N8ACL 18, WB8ITT 18, K8BYV 17, K8BD 17, WD8SE 17, K8GAX 15, WB8MOF 15, K8COP 15, WB8C 15, WD8ECT 14, WD8BY 14, W8NCD 14, K8CBT 12, W8JL 12, W8JPE 12, W8AC 10, WD8CIN 10, WB8DJS 10, K88ST 10, WB8ITA 10, N8AUL 9, K88K 9, K8ZJU 9, W8EOI 8, K88GM 8, K8JLD 8, W8LDS 7, WD8RHU 6, WB8VVF 6, K8BZ 4, W88EZ 3, W8VBF 3, WB8BXP 2, W8WV 2, W8YBP 2, N8AHZ 1, WB8LEK 1.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst SCMs: W8MOK, AF8O. SEC: K8AN, NMs: K8AAZ, WD8KBW, WB8KWD, K8OZ, WD8PUH, W88YGW. Net reports:

Net QNI QTC Sess. Time (Local) Freq.
BN 496 214 59 6:45/10 P.M. 3:577
BNR 109 81 28 6 P.M. 3:605
QNN 99 36 26 6:30 P.M. 3:708
OSN 208 104 30 5:10 P.M. 3:577
OSSBN 2345 719 90 10:30 A.M. 4:15 3:9725
9 P.M. 8:45 P.M.

Q6mN 305 34 26 9 P.M. 5:160

As this is my last column prior to your new SCM actually taking the helm, I want to publicly thank each of you for your support the past two years. We certainly didn't accomplish everything we set out to do, but then I don't think we tell on our backside. My congratulations and best wishes to AB8P on his election as our new SCM. Please give him all the support and cooperation he needs and deserves. All of you had to pass a code exam to gain your license. Many of you remained with cw as your mode of operation — I know that lots of you are equipped for phone operation but seldom utilize it. Many

RF Speech Processors for Drake TR-7, TR-4s, T-4Xs

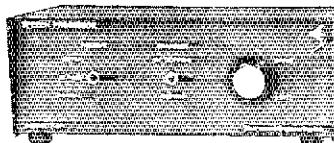
High intelligibility, unexcelled talkpower. No-compromise design. Special 8-pole IF crystal filtering, followed by highly effective active hard clipping (followed by rig filter): the keys to highest processing efficiency. TR-7 and TR-4 units feature selectable 16-pole receive, as well as automatic transmit/receive switching. TR-7 processor provides room for an extra accessory filter, allowing selection of up to six different bandwidths. All solid-state pin-diode switching. Model 7-SP for TR-7: \$265.00. Model 4-SP for T-4Xs: \$285.00. Model D-SP for TR-4s: \$295.00.

Mike Equalizer Pre-Processor

Companion to above units, but good between any mike and rig (with or without processing). Can reduce distortion, improve crispness, intelligibility. Easily adjustable single control tailors both high and low frequencies to optimize response of any microphone for varying conditions. Contains in/out, gain, equalization controls. Model SE-1: \$65.00.

European amateurs: please contact Ham-Radio, Postfach 120, CH-5702, Niederlenz, in Switzerland; and Ingompaex, Postfach 24 49, D-8070, Ingolstadt, West Germany, for the rest of the continent.

NEW! RF CLIPPERS



Sherwood Engineering Inc.

1268 South Ogden St.
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(303) 722-2257

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\$10 overseas air

Dealer Inquiries Welcome



A SWAN FOR EVERY NEED

Talk State of the art, Versatility, or Economy — SWAN'S famous "world's best" Engineering team has designed a complete line of Transceivers to suit your need.

Take a look at the three hottest new SSB Transceivers this year. They're all made in America and they're all from Swan. Whatever your dreams—from a compact fully synthesized mobile to a full-blown base station with dual PTO's—one of these will bring them to reality today. They're all solid state, all 235 Watts PEP and CW on all frequencies, and most of all they're affordable.

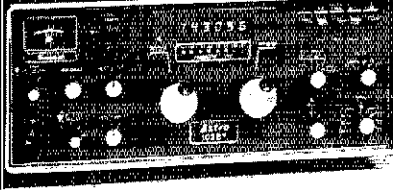
Most Advanced HF Transceiver in the World—ASTRO 150

HF SSB Transceiver featuring "VRS" a knob with a new twist, and over 100,000 fully microprocessor-controlled frequencies on present or envisioned "ham" bands.

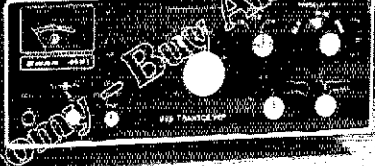
□ High Power — Full 235 Watts PEP & CW, all bands □ Truly Synthesized in accurate 100Hz steps □ Full CW Break-In with narrow XTAL Filter □ Standby Memory — ALL BANDS □ True PEP

output meter □ Model 150 — 80 thru 10 meters □ Model 151 — 160 thru 15 Meters

ASTRO 102 BX



100 MX



Most Versatile HF 160M-10M Transceiver in the World—ASTRO 102 BX

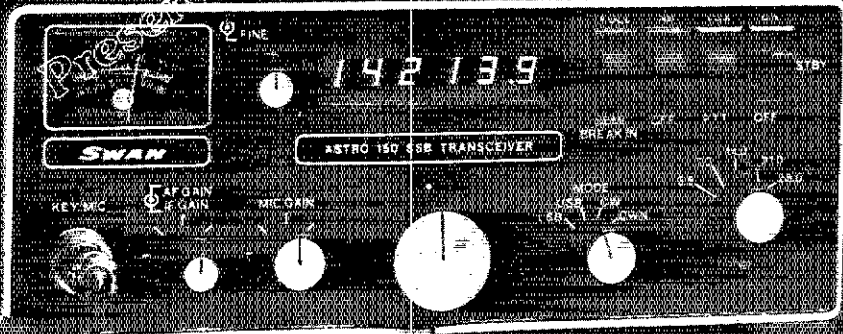
Dual PTO's, 235 Watts PEP & CW on all frequencies, IF Passband tuning, with LED position indicators and full break-in.

□ All solid state □ Modern design and styling □ Tunable notch filter □ 4 Function Meter □ Speech Processor □ VOX □ Adjustable AGC Decay □ 2 Position CW Wave Shaping □ 16 Pole IF Filter □ Crystal CW Filter □ PLL Synthesized Band Selection

Economy with top SWAN quality and mobility—100MX

235 Watts PEP & CW on all frequencies. The field-proven Rig the whole world's talking about.

□ All solid-state □ Modern design and styling □ VOX □ Noise Blanker □ Semi-CW Break-in □ RIT ±1.5KHz □ 25 KHz Calibrator, built-in □ CW side tone with adjustable pitch and level □ Internal speaker □ Jack for external counter



ASTRO 150

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A Division of Cubic Communications, Inc.

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Look to Swan for Quality Accessories . . . and Service

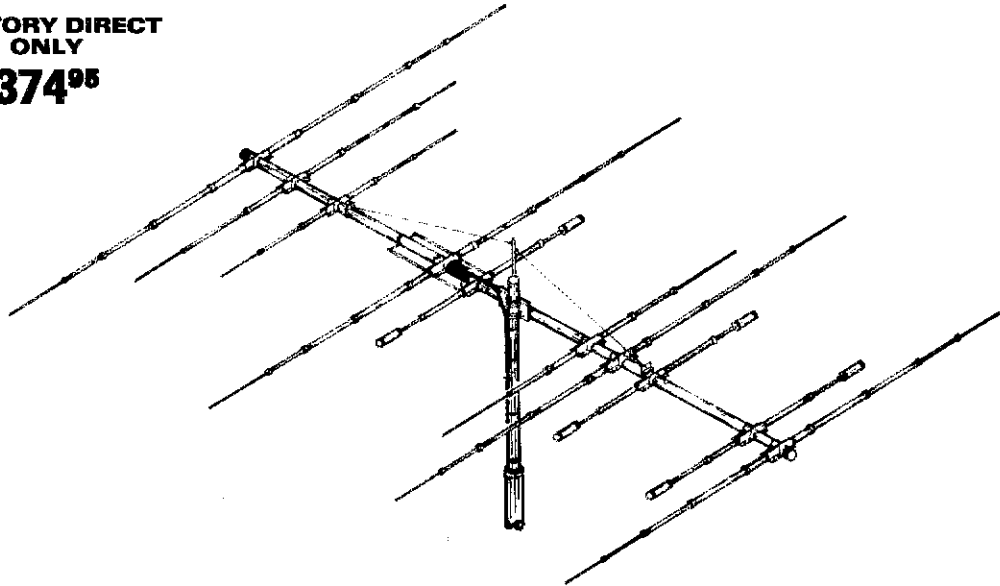


WILSON SYSTEMS, INC. PRESENTS

THE SYSTEM 40 TRIBANDER

3 MONOBAND ANTENNAS IN ONE — EACH WITH FULL MONOBAND PERFORMANCE

**FACTORY DIRECT
ONLY
\$374⁹⁵**

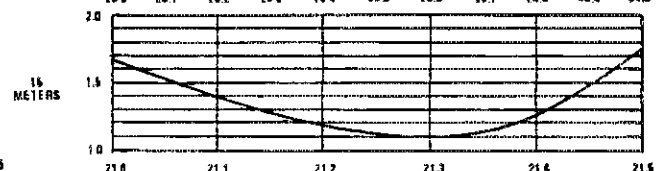
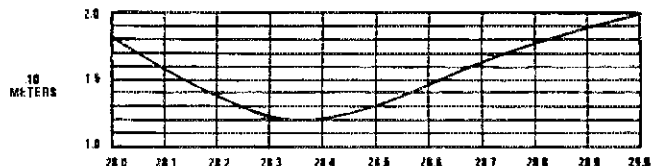
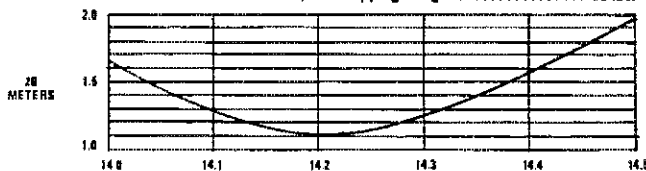


**A NEW CONCEPT IN ANTENNA DESIGN
USING A 26 FT. BOOM**

- FOR THE SERIOUS DXer WHO WANTS MONOBANDERS ON 10-15-20
- FOUR FULL SIZE 20 MTR ELEMENTS
- FOUR WIDE SPACED 15 MTR ELEMENTS
- FIVE WIDE SPACED 10 MTR ELEMENTS
- ONLY ONE FEED LINE REQUIRED
- HEAVY DUTY BALUN INCLUDED
- DESIGNED WITH NO INTERACTIONS BETWEEN ELEMENTS
- ALL DRIVEN ELEMENTS AND DIRECTOR ELEMENTS ARE INSULATED FROM BOOM
- SAME QUALITY HARDWARE AS USED IN ALL WILSON ANTENNAS

— SPECIFICATIONS —

Max. Pwr. Input	Legal Limit	Longest Element	36'
VSWR @ Res.	1.2:1	Turning Radius	22' 6"
Impedance	50 ohm	Boom	26'
Feed Method	Coax Balun Supplied	Surface Area	12.1 sq. ft.
Matching Method	Modified Beta	Wind Loading @ 80 mph	309 lbs.
F/B Ratio	Call Factory	Assem. Weight	75 lbs.
Gain	Call Factory	Shipping Weight	99 lbs.



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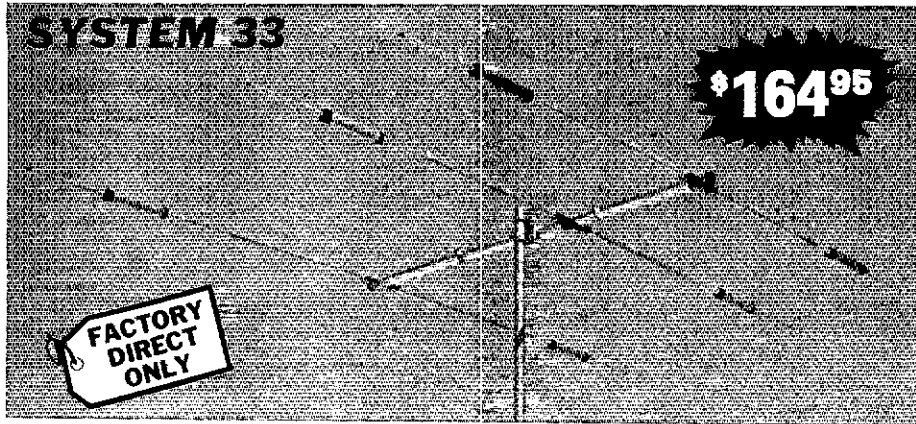


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PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

WILSON SYSTEMS INC.

SYSTEM 33



Capable of handling the Legal Limit, the **SYSTEM 33** is the finest compact tri-band available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the **SYSTEM 33**.

The boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment.

Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting.

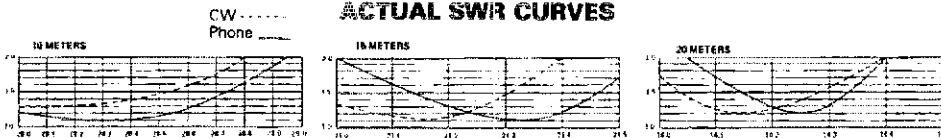
The use of large diameter High-Q Traps in the **SYSTEM 33** makes it a high performing tri-bander and at a very economical price.

A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the **SYSTEM 33** quick and simple.

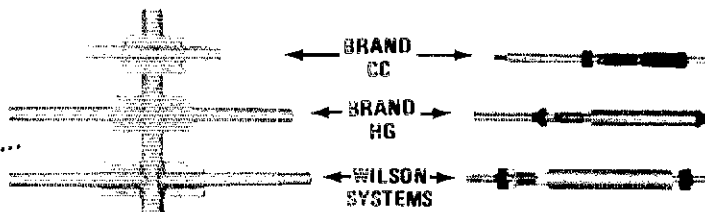
SPECIFICATIONS

Band MHz.....	14-21-28	Boom (O.D. x length) 2" x 14'4"	Wind load @ 80 mph ..	114 lbs
Max power input...	Legal limit	No. elements.....	Assembled Wt.....	37 lbs
Gain (dbd).....	Call Factory	Longest element.....	Shipping Wt.....	42 lbs
VSWR at resonance.....	1.3:1	Turning radius.....	Direct 52 ohm feed	
Impedance.....	50 ohms	Max. mast diameter... 2" O.D.	no balun required	
F/B ratio.....	Call Factory	Surface area.....	Max wind survival ...	100 mph

ACTUAL SWR CURVES



COMPARE THE SY33 WITH OTHERS...



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

ADD 40 METERS TO YOUR TRI-BAND WITH THE 33-6 MK

— IN STOCK —

\$64.95

Now you can have the capabilities of 40-meter operation on the **SYSTEM 36** and **SYSTEM 33**. Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth. The 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line.

The 33-6 MK adds approximately 15' to the driven element of your tri-bander, increasing the tuning radius by 5 to 6 feet. This addition will offer an effective rotatable dipole at the same height of your beam.

W/S I WILSON SYSTEMS, INC.

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Prices and specifications subject to change without notice.

ORDER FACTORY DIRECT
1-800-634-6898

\$64.95

WV-1A 4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

NOTE:
Radials are required for peak operation or above ground mounting. (See GR-1 below)

SPECIFICATIONS

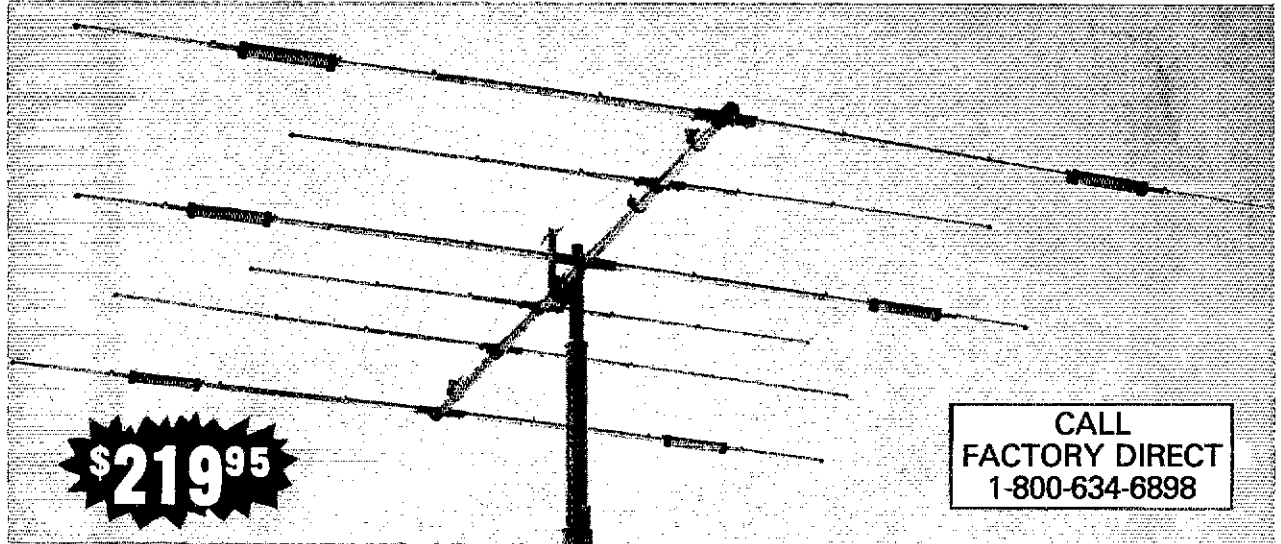
- 19' total height
- Self supporting — no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swayed aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

GR-1
GROUND RADIAL KIT
\$14.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150' of 7/14 stranded aluminum wire, heavy duty egg insulators and instructions. The GR-1 will increase the efficiency of the WV-1 by providing the correct counterpoise.

WILSON SYSTEMS, INC.

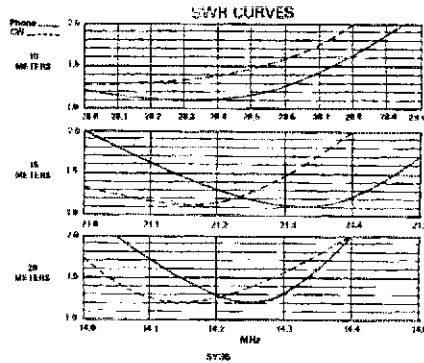
the SYSTEM 36



\$219⁹⁵

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1-800-634-6898**

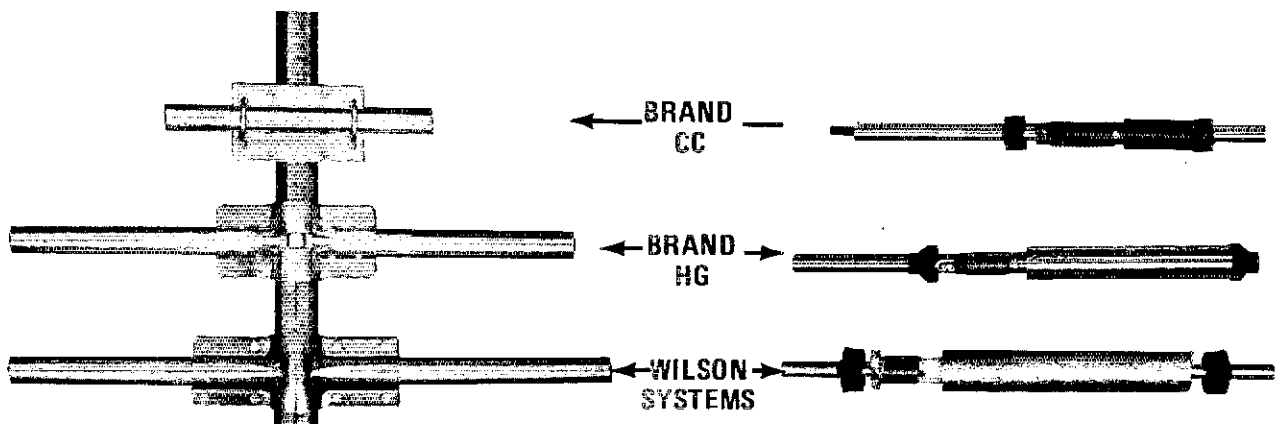
A trap loaded antenna that performs like a mono-bander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.



SPECIFICATIONS

Band MHz	14-21-28
Maximum power input	Legal Limit
Gain (dBd)	Call Factory
VSWR @ resonance	1.3:1
Impedance	50 ohm
F/B Ratio	Call Factory
Boom (O.D. x Length)	2" x 24' 2 1/4"
No. of Elements	6
Longest Element	28' 2 1/4"
Turning Radius	18' 6"
Maximum Mast Diameter	2"
Surface Area	8.6 sq. ft.
Matching Method	Beta
Wind Loading @ 80 mph	215 lbs.
Maximum Wind Survival	100 mph
Feed Method	Balun (supplied)
Assembled Weight (approx.)	53 lbs.
Shipping Weight (approx.)	82 lbs.

Compare the SY-36 with others . . .



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

**CALL
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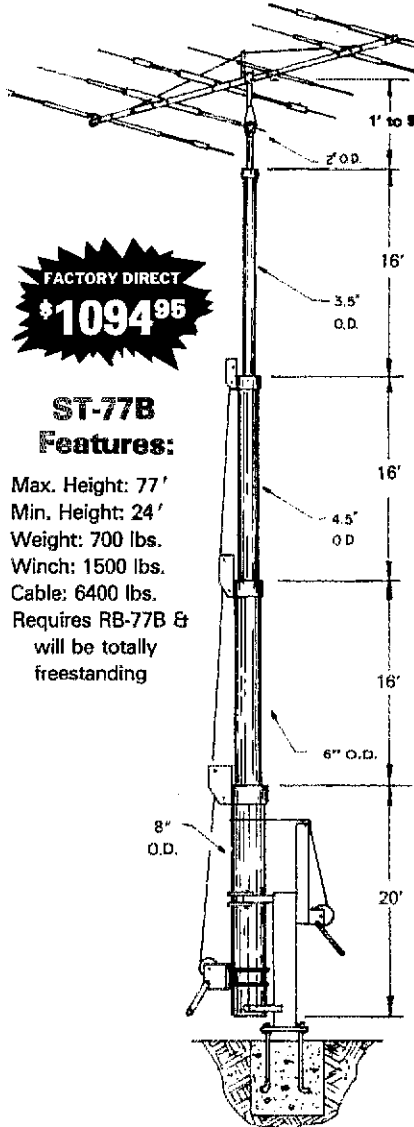
**W/S/T WILSON
SYSTEMS, INC.**

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WILSON SYSTEMS TOWERS

— FACTORY DIRECT —

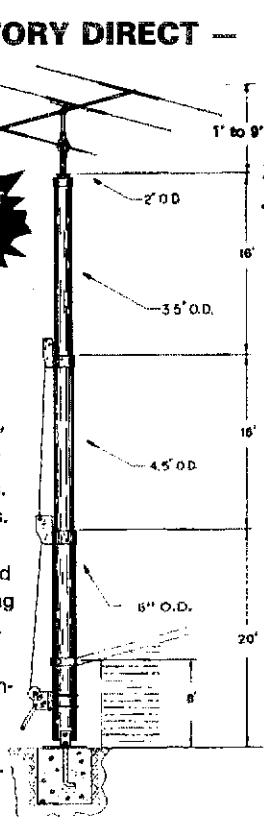


FACTORY DIRECT
\$1094⁹⁵

ST-77B Features:
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding

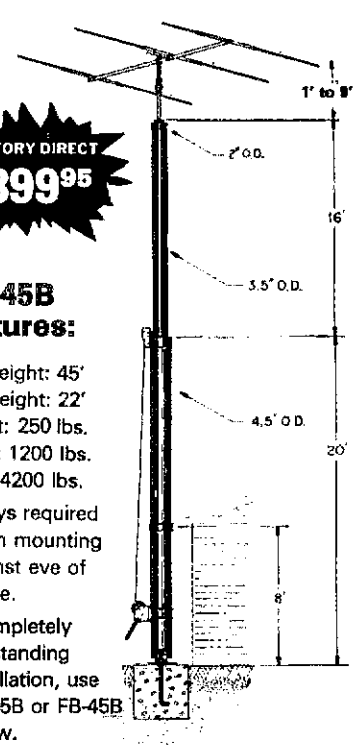
FACTORY DIRECT
\$614⁹⁵

MT-61B Features:
Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



FACTORY DIRECT
\$399⁹⁵

TT-45B Features:
Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.



NEW! Wilson Electric Winch



Now you can raise and lower your Wilson Tower electrically. The electric winch will replace the hand operated winch. Available for use on the TT-45, MT-61 and ST-77 towers.

EW-45 (TT-45)
EW-61 (MT-61)
EW-77 (ST-77)
\$249⁹⁵

WIND LOADING		
Tower	Height	Sq. Ft.
ST-77B	63	18
	77	19
MT-61B	53	18
	61	12
TT-45B	37	18
	45	12

Square Footage Based on 50 MPH Wind

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4 1/2'
RB-45B	30" x 30"	4 1/2'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5 1/2'
RB-61B	3' x 3'	5 1/2'
ST-77B	See Below	
RB-77B	3 1/2' x 3 1/2'	6'

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3 1/2"-.095; 4 1/2" & 6"-.125; 8"-.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

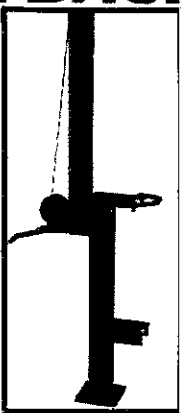
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

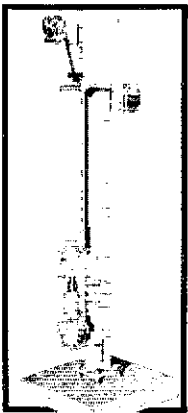
FB-45B .. 112 lbs... *189⁹⁵
FB-61B .. 169 lbs... *269⁹⁵



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B .. 144 lbs... *269⁹⁵
RB-61B .. 229 lbs... *344⁹⁵
RB-77B .. 300 lbs... *514⁹⁵



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

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WST WILSON SYSTEMS, INC.

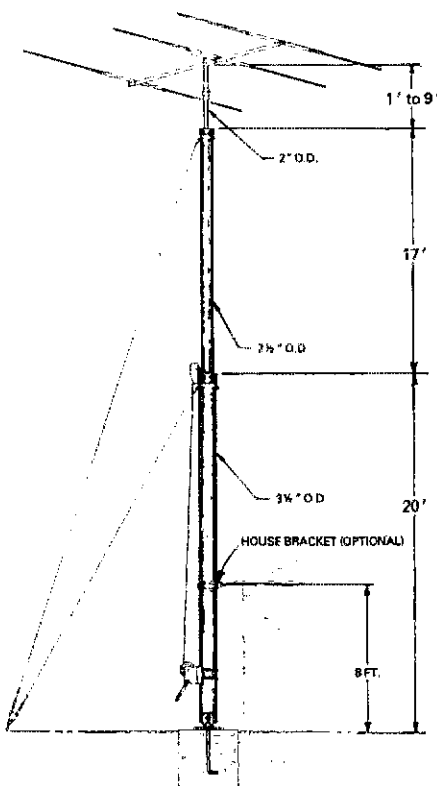
Prices Effective 9-1-80 to 9-30-80

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WILSON SYSTEMS, INC.

WILSON GUYED TOWERS

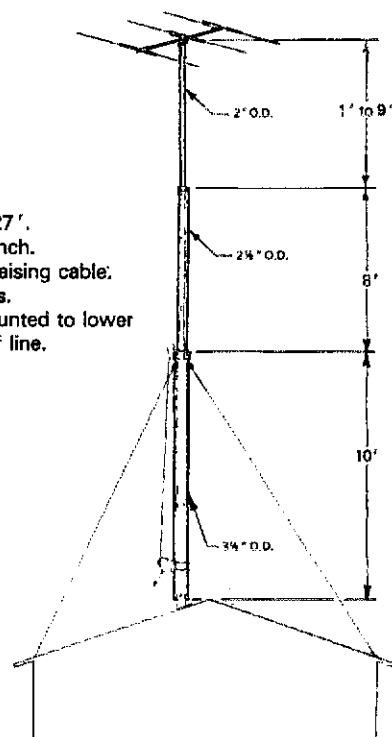
GT-46
46' GUYED TOWER **234⁹⁵**



WIND LOADING			Square Footage Based on 50 MPH Wind
Tower	Height	Sq. Ft.	
GT-46	46	0	
	41	8	
	36	10	
TT-27	27	6	
	22	8	
	18	10	

(When Properly Guyed)

TT-27
27' GUYED TOWER **159⁹⁵**



TT-27 FEATURES:

- Maximum height, 27'.
- 800 lb. capacity winch.
- 2,000 lb. capacity raising cable.
- Total weight, 84 lbs.
- Can be ground mounted to lower antenna below roof line.

GT-46 FEATURES:

- Maximum height, 46'.
- 800 lb. capacity winch.
- 2,000 lb. capacity raising cable.
- Only one cubic ft. of cement required.
- Total weight, 117 lbs.

GENERAL FEATURES

All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 9' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

WILSON SYSTEMS, INC. — 4286 S. Polaris
Las Vegas, NV 89103 — (702) 739-7401

**FACTORY DIRECT
ORDER BLANK**

Toll-Free Order Number
1-800-634-6898

Qty.	Model	Description	Shipping	Price	Qty.	Model	Description	Shipping	Price
	SY40	10 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	374.95		GT-46	46' Guyed Tower	TRUCK	234.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	219.95		TT-27	27' Guyed Tower	TRUCK	159.95
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	164.95		TT-45B	Freestanding 45' Tubular Tower	TRUCK	339.95
	33-6 MK	40 Mtr. Mod Kit for SY33 & SY36	UPS	64.95		RB-45B	Rotating Base for TT-45B w/tilt over feature	TRUCK	259.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	64.95		FB-45B	Fixed Base for TT-45B w/tilt over feature	TRUCK	189.95
	GR-1	Ground Radials for WV-1A	UPS	14.95		MT-61B	Freestanding 61' Tubular Tower	TRUCK	614.95
	M-420A	4 Elements on 20 Mtrs.	UPS	174.95		RB-61B	Rotating Base for MT-61B w/tilt over feature	TRUCK	344.95
	M-515A	5 Elements on 15 Mtrs.	UPS	139.95		FB-61B	Fixed Base for MT-61B w/tilt over feature	TRUCK	269.95
	M-415A	4 Elements on 15 Mtrs.	UPS	99.95		ST-77B	Freestanding 77' Tubular Tower	TRUCK	1094.95
	M410A	4 Elements on 10 Mtrs.	UPS	74.95		RB-77B	Rotating Base for ST-77B w/tilt over feature	TRUCK	514.95
		ACCESSORIES				GK-46	Guying Kit for GT-46	UPS-TRK	74.95
	T*X	Tail Twister Rotor	UPS	274.95		GK-45B	Guying Kit for TT-45B	UPS-TRK	69.95
	HD-73	Alliance Heavy Duty Rotor	UPS	109.95		GK-61B	Guying Kit for MT-61B	UPS-TRK	79.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.		GK-77B	Guying Kit for ST-77B	UPS-TRK	99.95
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 gage	UPS	.21/ft.		WTB-1	Thrust Bearing for Top of Rotating Towers	UPS-TRK	59.95
	EW-45	Wilson Electric Winch for TT-45B	UPS	249.95					
	EW-61	Wilson Electric Winch for MT-61	UPS	249.95					
	EW-77	Wilson Electric Winch for ST-77	UPS	249.95					

NOTE:

On Coaxial and Rotor Cable, minimum order is 100' and 50' multiples.
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Ninety (90) Day Limited Warranty—Shipping Not Included in Above

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The ROBOT Model 800 SUPER TERMINAL

Not just a keyboard,
but the first integrated specialty mode terminal.

The Model 800 Super Terminal offers a complete list of features and capabilities, including our built-in demodulator, all in one package that connects directly with your amateur station's transmitting and receiving equipment. All that's needed to have a complete operating system is the addition of a standard TV monitor.

BAUDOT/ASCII OPERATING FEATURES

DISPLAY: Full 24 line by 72 character standard TTY display.

WORD MODE: Transmits a complete word each time the space bar is depressed. Any mistakes made in the word can be edited out prior to transmission.

LINE MODE: Transmits an entire line when the carriage return line feed key is depressed. Allows editing of the entire line prior to transmission.

AUTO START: The Model 800 writes characters on the screen only after detecting the presence of an incoming RTTY or ASCII data signal. This prevents printing of unwanted random characters on the screen while tuning or during gaps in reception.

PROGRAMMABLE WRU (WHO ARE YOU) AND SELCAL FEATURES: Upon receiving a user programmed 8 character code, the Model 800 will automatically key the transmitter and transmit one of its 64 character (HERE IS) messages. Upon receipt of the user programmed 8 character SELCAL code, the Model 800 will automatically go into receive mode and store up to a full page of received information in its display memory.

HERE IS: The Model 800 has two 64 character programmable HERE IS messages.

ON SCREEN STATUS INDICATOR: A status line at the top of the screen tells the operator exactly which combination of operating modes have been selected.

ON SCREEN TUNING INDICATOR: Accurate tuning is an absolute requirement for accurate trouble-free reception during poor signal conditions. The best results are obtained when the output of the mark and space discriminator filters are equal in amplitude. The on screen tuning indicator in the Model 800 is the "plus-plus" type, which provides this information.

CURRENT LOOP KEYS FOR HARD COPY PROGRAMMABLE NARROW SHIFT ID

DEMODULATOR: The demodulator built into the Model 800 is superior in quality to any RTTY demodulator offered on the market. The key feature which makes this claim possible is the use of separate two tone active discriminator filters for demodulation of the RTTY signal.

ADDITIONAL ASCII OPERATING FEATURES: The Model 800 will send and receive ASCII at 110 baud. It has all of the transmission and editing features of the RTTY mode.

SIMPLE TO OPERATE

One of the most important features to keep in mind with the Model 800 is that all functions that are used frequently are easily accessed by the user. Many competitive units boast elaborate features which are either not used in amateur operation or that require complicated access procedures which make them inconvenient. All of the frequently used control functions in the Model 800 are either associated with a key which is labeled with the function, or have silkscreening above the key which describes the function.

MORSE CODE OPERATING FEATURES

OPERATION: The Model 800 has all of the transmission and editing modes of RTTY during Morse code operation.

MORSE AUTOTRACK: The Model 800 automatically tracks incoming code without manual speed adjustment. The speed range for transmission and reception is 3 to 99 words per minute.

SIDE TONE OSCILLATOR: The Model 800 has a built-in side tone oscillator so that the operator can listen to incoming code as it is interpreted by the computer.

MORSE CODE TRAINER: The Model 800 can be set to generate random five letter groups of characters at any preset speed for Morse code training purposes.

SPEED INDICATOR: In addition to all of the other functions, the status line in the Morse code mode indicates the speed of the incoming code.

SSTV GRAPHICS OPERATING FEATURES

The ROBOT Model 800 allows alphanumeric characters to be typed in an SSTV format, displayed on a TV monitor, and transmitted as a normal SSTV picture. This eliminates the need for "menu board" or hand-lettered SSTV pictures, thereby freeing up the slow scan camera or scan converter for other operations.

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RTTY Features:

- 4 speeds
- 2 shifts (170 & 850 hz)
- built in AFSK
- built in CWID
- built in RY generation

ASCII Features:

- 110 & 300 Baud
- 2 shifts (170 & 850 hz)

Other Features:

- Built in quick brown fox generator on all modes
- Automatic CR/LF
- 700 Character Running Buffer
- 10 recallable, user programmable message memories of 120 characters each
- CQ & DE special keys on all modes
- Keyboard control of all functions
- 4 row keyboard eliminates figures/letters shifting on RTTY
- Many more features.

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THE RADIO AMATEUR'S CONVERSATION GUIDE

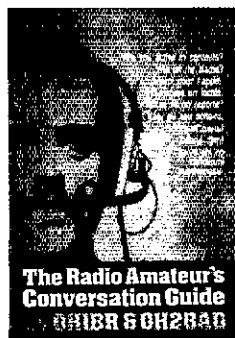
BY OH1BR & OH2BAD

A conversation guide containing numerals, phonetics, 147 phrases covering many fields of Amateur Radio; antennas, contests, DXing, equipment, personal information, QSLing and much more, plus a 450 word dictionary. Languages: English, German, French, Italian, Spanish, Portuguese, Russian, and Japanese. 91 pages.

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The Radio Amateur's Conversation Guide
OH1BR & OH2BAD

more of you chose phone as your mode of operation, yet I imagine on occasion you do work cw, or could. The makeup of today's National Traffic System is basically bi-mode (phone DNTS, cw NTS). Even within the Ohio Section it is often necessary and convenient to be able to take traffic from a phone net to a cw net (or vice versa) where a known outlet exists. I hope that more of you will explore the mysteries of the "other" mode as often as possible. Liaison between the section nets is merely an extension of NTS. A couple of prime examples which should be utilized on a regular basis: Buckeye Net late to morning QSSBN; afternoon QSSBN to Ohio Slow Net/Buckeye Net; evening QSSBN to late MN. A good outlet for cw thru traffic from afternoon QSSBN is anyone going to USN or EN. Let's not sit on the traffic — keep it moving, preferably via NTS. WBANO and his bride of 50 years were assisted in their celebration by many of his ham friends — congrats to you both. KB8LC moved up to Extra. The Wood County ARC supported Boys State via K8THH and originated 144 QTC. Appointments: OES & QTS N2NS.

Local nets	QNI	QTC	QSS
BARF	43	11	20
BRIN	245	107	30
COARES	75	30	3
FRCN	64	7	3
ICJWAOARES	272	63	21
MASER	92	10	4
TSRAC	591	98	29
WAYOUT/MIAMISBG	50	3	4

Traffic: WB8KWD 336, K8THH 294, K8OZ 294, W8PMJ 274, KBNCV 242, W8BDTG 159, W8OZK 154, W8ENI 152, W8BWTIS 130, W8RKBW 123, W8TH 116, K8AN 85, W8TP 82, W8BGM 78, W8RKFN 78, W8BJGW 71, W8SSJ 71, W8GX 64, N8JF 64, W8BSIQ 64, N8AKS 59, W8BME K 58, W8MOK 55, W8QEM 55, W8QMA 53, W8OYK 51, W8QHV 51, W8SSFC 50, W8BOFF 46, K8AAZ 45, W8BDYW 43, N8CW 42, W8BPUH 42, K8BLO 37, N2MA 36, W8BTKO 34, W8LZE 31, W8BWH 29, W8BYTD 28, W8WEG 27, W8BHW 26, W8BGM 23, W8BJU 22, K8ADJ 21, W8RML 21, W8RPMW 21, W8BYGW 21, W8AMAZ 18, A8BP 18, W8UBR 18, W8UJWD 18, W8RQAL 17, W8RG 15, N8AHK 14, W8BUMF 14, K8GKY 13, W8BEKI 13, W8DLX 12, W8BPIY 12, W8RPID 11, K8RC 11, W8DYF 10, W8BMGW 10, W8RMZ 10, W8BVL 10, K8CTC 9, W8BNHV 9, W8BZX 9, W8BVO 8, K8DL 8, W8RQU 8, K8BNL 7, W8LID 7, K8LOS 7, W8ROYO 7, W8BWNH 7, W8HVA 6, W8IM 6, W8BTRK 6, N8AJB 5, W8ATX 5, W8BYUS 5, W8OCL 4, W8OXN 4, W8BNTR 2, W8UQY 2, W8OTO 1

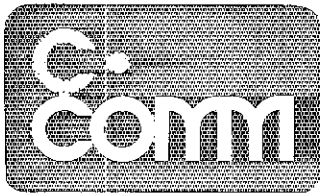
HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny WB2VUK — SEC: WB2VUK, 5TM: WA2SPL, ASCM: K2AV W2IT, NM: W2WSS, WA2HZM, N2BDW, WB2ZCM, WB2EAG. Nets: NYPON 5 P.M., 2913, ESS (slow) 6 P.M., 3500, NYSPTEN 6 P.M., 3925, NYS 7 P.M., 10 P.M., 3677, GDN (Troy) 6:30 P.M., 3494, HVN (Bearon) 7:30 P.M., M-F 3797, SDN (White Plains) 9:30 P.M., S/T/T 66105 M/W/F 615/015. The job of SCM came as a surprise. I accepted with the hope that all of you would give me the kind of support you gave to Guy and perhaps a bit more while I become accustomed to the job. I do have an excellent teacher, Guy has agreed to stay on as ASCM and will provide assistance as needed. I commend Guy on the excellent job and hope that I can do as well. His ham great working with him and I look forward to working with him in the future. Good luck, Guy, Congratulations and good luck to WA2HZM, new net manager for SDN. Many thanks to KB2JG, former net manager and the one responsible for getting SDN started. You are all wondering what happened to the Preparedness Dual results. I hope they will be available for next month's column. Congrats to Mt. Beacon on a very fine hamfest. Don't forget the SET on 17 and 18 October! If you have not gotten your reservation in for the HARC convention on the 7, 8, and 9th of November, it is immediately. This convention will be even better than the last. Hope to see you all there. June PSHR: WA2SPL, WA2AQ, WA2EOW, N2BDW Traffic: WA2SPL 148, W2AQ 90, W2EOW 85, WA2EOW 39, AA2Y 37, N2BDW 25, K2MI 16, W2IQK 11, W8ZSN 11, KB2JG 6.

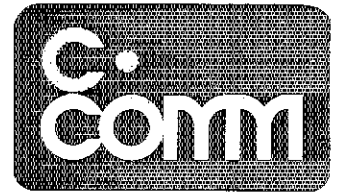
NEW YORK — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — ASCM/NM: Stephen H. Bloom, W82IDP, ASCM/NYC: Dwight Ernest, KA2GNN, 5TM: W82BNY. The following are traffic nets in and around the section. Join one today!

Net	Time/Day	Freq	NM
NLI*	1900/2200 Dy	3.630	W82BNY
NSPN*	1815 Dy	2.928	WA2SPL
BAVIN*	2030 M-F	147.915/315	KA2DRW
Clearinghouse	1100 Dy	3.925	W82EACs
MikeFarad	1300 M-S	3.925	W8LLAD
E35	1800 Dy	2.590	W2WSS
NYSPTEN	1800 Dy	2.925	K2YJR

Nets denoted with an asterisk are NTS section nets. All times local. High QNI: NLI: W82TOC, W2MLC, WA2UWA, K2HD, W82EUF, NSPN: WA2UWA, WA2SEI, W82TOC, K2GGE, W82BNY, NLI and NSPN welcome A10Q to the nets. I regret to report WA2F AK as a Silent Key. He was very active in the Larkfield ARC and the Hudson Amateur Radio Council both as a member and committee chairman. He will be missed. Lots of new Novices this month with a real special commendation to KA2JW. She is 88 years old and reports she is working hard to attain her special accomplishment and personal in everybody's book. Amateur Radio provided communications in the NYC Suburban 10,000 Meter Foot Race. Communications was provided by W82ZEX, WA2KWR, KA2CNN, KA2DBW and WA2DHF. SIARA has been very active of late with Field Day operations and membership drives among other things. They report that KA2CNN and KA2DBW gave talk on the Torch Run at their April meeting and that W8WZX gave a talk on city-talks at their May meeting. Grumman ARC reports new winners of WAG award include J6LJS, W82KCT, W2II, W4GOL, and K2DOD. They report that their Field Day results were 650 points higher than last year, W2III now in France, using reciprocal call sign, F8FV. The SCM received Field Day messages from W82ZTO, K2EJ, W2NN, WA2JAS, K2OD, W2DQ, WA2I, QO and W82WVP. If you sent a message and the SCM did not receive it, you should check it out with the station you sent it to. EC reports received from WA2SUV and WA2ZHA. Attention NYC amateurs: ARES Net meets Monday 8 P.M., 28.775 ssb and 144.950 fm simplex. Congratulations to new QTS KA2CEF and to new Extra W82FJX who is now signing KE2N. The new edition of Operating an Amateur Radio Station is now available. If you desire a copy please send a large case with at least 30 cents postage to either ARRL Hq or to W82IDP. Hope



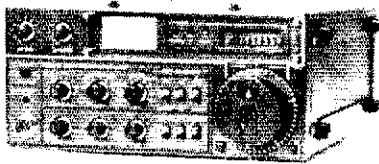
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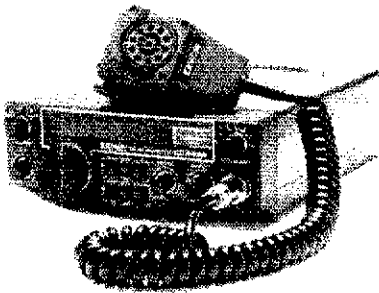
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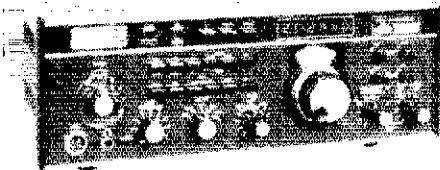
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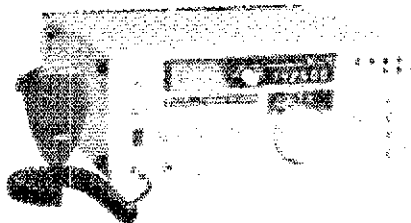
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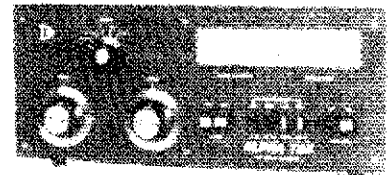
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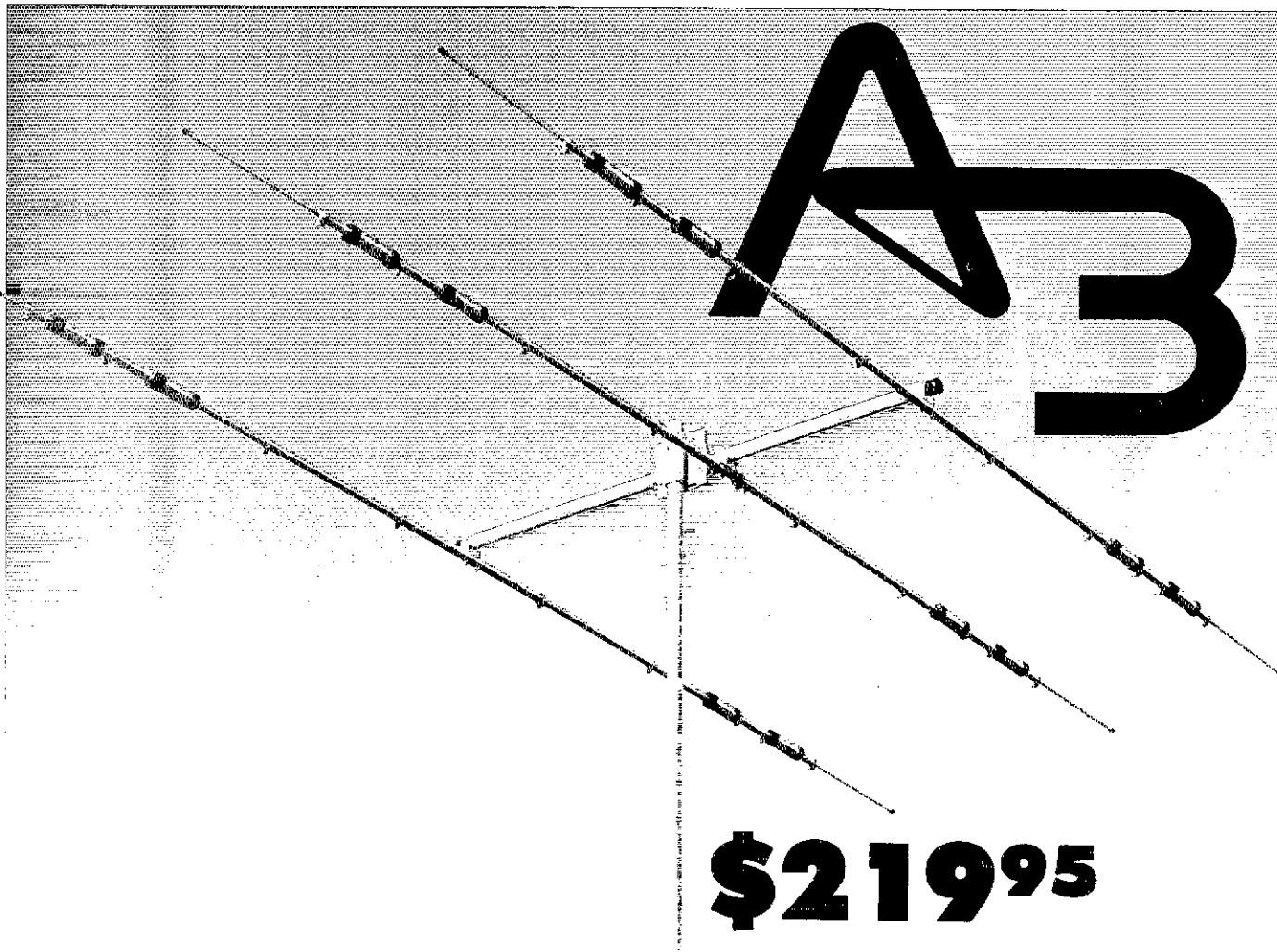
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Elements/Longest	1 1/4" - 1/2" x 27'9"
Wind Stc. area	5.6 Feet ²
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1 1/4" min. 2" max.
Material	6063-T832 Seamless aluminum
Fasteners	Zinc Plated Steel
Telescope Method	Taper tubing with full circle clamps

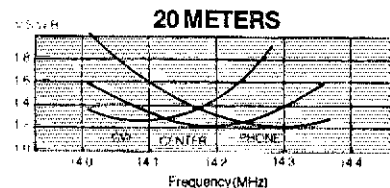
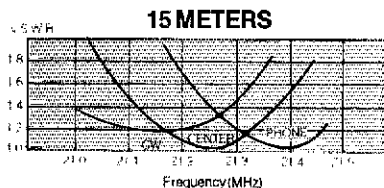
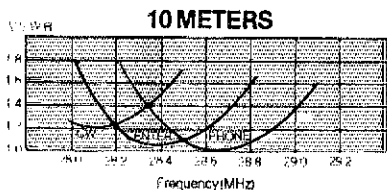
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Two Meter Boomers

Whether you have the space for the 3.2 λ 32-19 or the compact 2.2 λ models, two meter Boomers are your best choice. They offer the maximum gain available for their boom length (See NBS no. 688). They feature trigon reflectors for additional front-to-back ratio and clearer patterns. All stainless steel hardware and heavy gauge heat treated aluminum are used throughout. Whatever your choice of two meter amateur activity, the Boomer will fill your needs. For FM use the 228FB or 214FB. For CW/SSB on the low end use 32-19 or 214B, in EME, DX or just reliable QSOs Boomer will perform for you.

Six Meter Boomer

The new six meter Boomer offers more boom and more gain from its new element spacing. The six meter Boomer has Cushcraft's typical attention to detail, including T match feed with balun, and extra heavy duty mechanical construction. The key to this Boomer's super performance and relatively lightweight is special element spacing and boom length.

Specifications

Model No.	32-19	214B	214FB	228FB	617-6B
Frequency range (MHz)	144-146	144-146	144.5-148	144.5-148	50.0-51
Forward gain (dBd)					
Front to back ratio (dB)					
E-plane B/width (deg)	2x14	2x17	2x17	2x17	2x19
H-plane B/width (deg)	2x17	2x18	2x18	2x9	NA
Side lobe attenuation (dB)	>60	>60	>60	>60	>60
SWR less than (typ)	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
Impedance (ohm)	50	50	50	50	50
Recommended stacking distance					
E-plane (ft)	14	10	10	10	NA
E-plane (m)	4.27	3.05	3.05	3.05	NA
H-plane (ft)	12	10	10	10	22.5
H-plane (m)	3.66	3.05	3.05	3.05	6.86
Weight (lbs.)	12	8	8	22	26
(kg)	5.44	3.63	3.63	9.98	11.79
Length (ft)	22	16	15	15	34
(m)	6.71	4.57	4.57	4.57	10.36
Longest element (in)	40%	40%	39%	39%	113%
(cm)	102.5	102	100.3	100.3	289
Turning radius (ft)	11	7.5	7.5	9.5	17.7
(m)	3.35	2.29	2.29	2.90	5.39
Windload (sq ft)	3.5	1.7	1.7	4.0	4.8
(sq m)	.33	.16	.16	.37	.45

Stacking Kits

For stacking two Boomers, use the following coax harness and power divider kits.

32-19 = 32-SK 214B = 22-SK 617-6B = 617-SK

When stacking four Boomers, use the following complete stacking kits. They include H frame, harness, hardware and complete instructions.

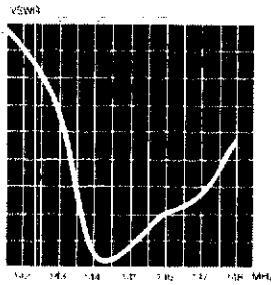
32-19 = 324-QK 214B = 224-QK

Specifications, Stacked Boomers

Antenna	2x214B	2x32-19	2x617-6B	4x214B	4x32-19
Forward gain (dBd)					
Front to back ratio (dB)					
E-H plane beamwidth (deg)					
E-plane	34°	28°	35°	17°	12°
H-plane	19°	17°	20°	19°	15°
Stacking dist Vert (ft)	10	12	34	10	12
(m)	3.05	3.66	10.36	3.05	3.66
Horiz (ft)	---	---	---	10	14
(m)	---	---	---	3.05	4.27
Wt approx (lb)	18*	26*	62*	69	97
(kg)	8.16	11.79	28.12	31.30	44.00
Turn radius (ft)	9	11	18	9	13.4*
(m)	2.74	3.35	5.49	2.74	4.06
Wind Area (Ft ²)	3.4*	7.0*	9.6*	8.3	15.2
(sq m)	.32	.65	.89	.77	1.41

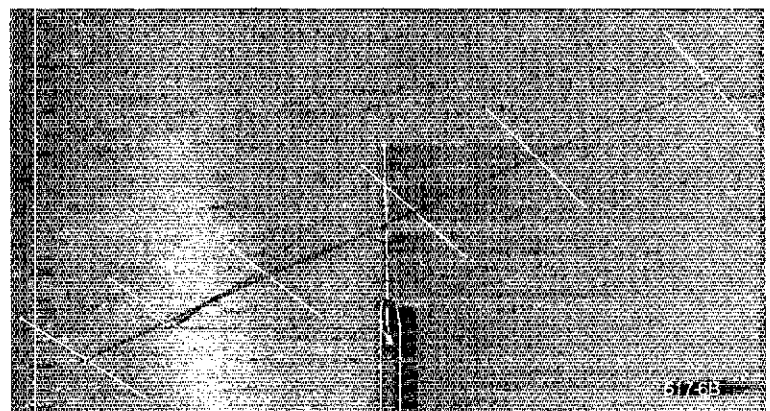
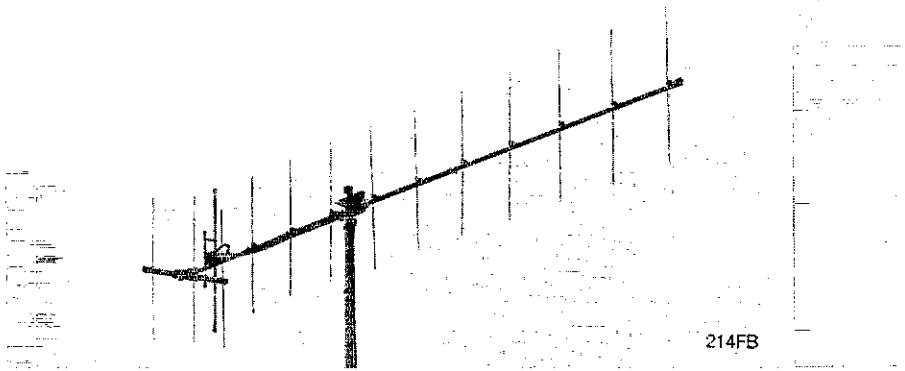
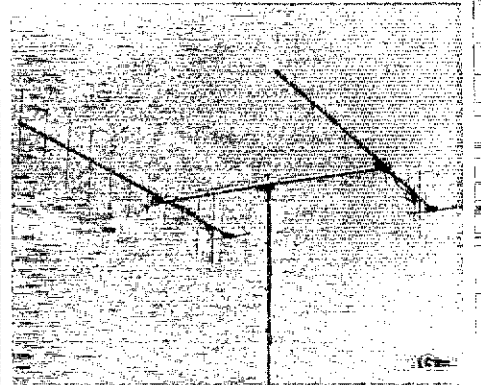
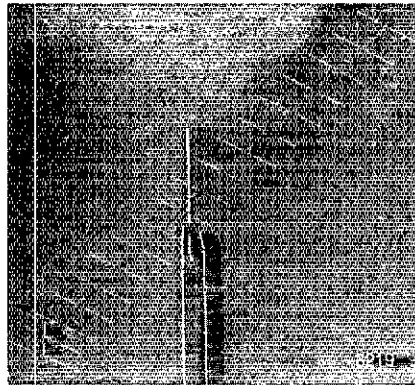
*Support mast not included

Some dimensions and weights listed are for complete



Boomer

6 and 2 meter High Performance Yagis



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everybody has a good Field day and remember to make
 your plans for the SET. Traffic: (June) WA2UWA 204,
 K2GCE 166, KA2CNN 102, W2MLC 83, K2HD 79, W2GKZ
 72, WB2TQC 63, WB2BNY 52, W2DBQ 26, N2BGR/T 22,
 WB2IDP 14, WB2KCT 11, WA2SEL 10, (May) K2LZ 5,
 WA2WBI 2, (Apr.) K2LZ 8.

NORTHERN NEW JERSEY: SCM, Robert E. Neukomm,
 WA2MVO. SEC: WB2VUF. STIM: W2XD, NMS: N2CR
 KB2HM W2PSU KA2GQQ W2TCA W2UEZ & WB2IQJ
 Net Mgr. Freq. Time/Days Sess. QNI QSP
 NJNJE W2UEZ 3695 7 P.M. Dy 30 477 146
 NJNHL W2UEZ 3695 10 P.M. Dy 30 206 133
 NJSN WB2IQJ 3738 6-8 P.M. Dy 30 227 76
 NJVN W2TCA 4949 10:30 P.M. Dy 30 297 115
 NJPN N2CR 3950 6 P.M. Dy 35 558 197
 UCETN KA2GQQ 085/685 7:30 P.M. Dy 28 228 36
 OBTTN KB2HM 7212 8 P.M. Dy 30 450 117
 NJRTTY W2PSU 147.51 Autost Dy 30

KA2GQQ now NM of UCETN. N2BOP now asst NM of
 OBTTN. May OBTTN statistics: sess. 31, QNI 455, QSP
 105. To Extra: WB2GTW and WB2TOM; To Advanced:
 K2DVJ N2ADV WA2EUP and WA2HLP; To General:
 WA2VNG KA2AMG and KA2GTU. New calls: KA2HWP
 now N2BUQ, KA2HCQ now N2BSI. The following sent
 me FD messages: K2KR WA2UPH N2VM K2YNT K2BLA
 W2BLO W2JEF K2GQ and K2ZST. June Club
 results: statewide vhf net committee chmn now K2UL
 NJNHL to remain! NTS talk by W2RO. Resumes given by
 each NM. NJSN has inaugurated formal message train-
 ing with several out-of-state amateurs being very active.
 Net certifs to be awarded by WB2IQJ when formal train-
 ing is completed. K2KR reports working his OM, W1DDZ,
 on 80 and 2. Metroplex picnic was a resounding suc-
 cess. The Splitrock ARA had excellent FD coverage in
 the Bergen Record. Don't forget the Sussex County
 Hamfest Sept 6th. Northwest NJ VHF Net had 4 sess,
 QNI 33, GSP & W2LV had an interesting DX article in
 their "OSG". Cleanings on the Ramapo Forty Niner;
 WA2AHD moved to camp Tamarack. The club was given
 a 100 foot tower and the following moved to get in touch
 WA2JUO KA2EPM K2BJG KB2DN N2BGS WA2EKM
 WA2WFF AG2N K2VAC. The annual "Spring Fling" a
 huge success. The club was active in the VHF and FD
 contests and they are getting big in minicomputers and
 RTTY! Welcome to K2RRV in Wyckoff who is quite a
 teacher of prospective and upgrading hams. TCRA news
 reports some rather scary problems with the township
 of Winslow, NJ and WB2S7K - TVI problems that
 resulted in a fine and the township adopting a new or-
 dinance - let's keep in touch with that one as it goes
 to appear in Federal Court! DO reports from W2TPJ and
 WA2QZD. W2CVW got his 5-Band DXCC plaque. N2BNB
 got a new TR-2400. KA2FXA would like to get in touch
 with K2IEZ. WB2KNS & YXL have a son. WB2MGB made
 DXCC after 17 years, all done under 200 watts to a ver-
 tical at 22 feet! The Morris County CD had an unan-
 nounced "simulated" drill with the NJ State Police send-
 ing a helicopter to evacuate the "victims" to various
 assigned hospital - the drill was a success. Traffic:
 (June) W2CQB 171, WB2TOM 157, W2TCA 137, AF2L 119,
 W2UEZ 117, AG2R 112, K2VX 109, WA2PIP 100, KB2HM
 91, WA2MVO 83, N2BOP/T 64, W2XD 60, N2CR 58,
 WB2KLF 53, WB2RMJ/T 41, WA2LPH/T 41, W2C32 N2XJ
 28, N2BC 20, W5DTR 20, N2BNB 12, N2SU 12, KA2GQQ
 9, WA2SPO 8, K2WMM 4, (May) N2BC 181, W2CVW 16.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto - W0LFF - SEC: W0IYW.
 DEC: W0AVW K0CY G0VYG. Iowa had a successful
 Field Day. Reports received from W0JV AE0R K0YH
 W0LHD W0GO W0EJO N0SM W0VYV K0XW W0SH
 W0HA N0BNW KA0AOR W0GN W0WJDJ W0JUI K0GP
 W0BRKO W0UL and W0RCW. W0URA top in Iowa and
 9th National in ORP-ARC Contest and W0ZKG (AK0P
 KA0CLO) received AHRL award for 1st 1980
 Multiprotocol VHF Sweepstakes. Ft. Dodge Balloon
 races got an assist from KA0RA. W0LAR W0DAXA
 W0CWB N0GR W0BEE N0B1 W0JUN KA0HC
 KA0CSI W0NY W0YKJ W0WIT W0B2JW W0B2XA
 W0YWW. At Burlington, W0ENR KA0CJY W0NB and
 W0SNL helped bicycle races and N0BAR at Waterloo
 was giving an Iowa welcome to the Powder Puff
 transcontinental pilots. New gear. WA0AVW TS-120,
 W0JAO IC-211, W0ENR HBX-56 tower, W0VHB Apple
 II and N0AOE Omn. B. Congrats to W0BLA W0ZLA
 KA0BBY and N0AFS to Advanced. W0YWP lost 160-M
 antenna in thunderstorm. Cedar Valley fox found in 50
 minutes by W0TXL and W0TXV. KA0HQI is new in Ft.
 Dodge and KA0AIP is new in Mason City. Happy Labor
 Day.
 Net Freq. Time/Day QNI QTC Sess. Mgr.
 Iowa 75M 3970 1730 M-S 1168 89 25 W0AVW
 Iowa 75M 3970 2300 M-S 798 66 25 W0AVW
 TLCN 3560 2330 Dy 283 97 50 W0YLS
 0300

TLCN (May) 315 114 62 W0YLS
 Traffic: (June) WA0AUX 496, K0CY 155, W0SS 126, K0GP
 100, W0YLS 95, KA0X 94, AE0R 70, W0LFF 37, W0BUP
 33, W0BW 13, W0AVW 10, (May) WA0AUX 244.

KANSAS: SCM, Robert M. Summers. K0BXP - SEC:
 W0KL. NMS: cw W0FT phone W0OYH vhf WA0SZS. The
 summer has hit Kansas hard, the hottest in years and it
 sure tells when you tally up the net activity, etc. Of
 course the harvest season might play a part in the
 slowness of activity. GSTN reports for May QNI 1442,
 QTC 84, (June) QNI 1296, QTC 26, KSNB QNI 1023,
 QTC 94, KPN QNI 309, QTC 26, KWN QNI 758, QTC 478.
 We have not had a net report for several months now for
 the CKSSS - guess the NM has been swamped and/or
 flew the coop, we'll have to check into this. If by chance
 we need a new net manager for the slow speed net ac-
 tivity, it would not hurt to let your preference be known.
 It just might help in making the right decision. Received
 only 5 Field Day reports as of this writing. If your club
 station sent a msg. why not run a check on it and find
 out the route it went and the place it might have stop-
 ped. W0KL reports that the district organization of the
 EC zones about to become past history. A lot of new
 changes in the EC spots will promote a fun article.
 Traffic: W0OYH 144, W0FIR 84, WA0LEB 80, W0BAGG
 58, K0EZ 60, W0OYLP 45, K0FCP 44, W0CHJ 37, W0APY
 30, K0BXP 24, W0KL 23, W0PB 18, W0RBO 18, W0AM 13,
 W0FDJ 12, W0RT 10, WA0WJX 5.

MISSOURI: SCM, L. G. Wilson K0RWL - Asst. SCM: Joe
 Flowers, W0OTF. SEC: W00FKY. The big news for last
 month has to be Field Day. Messages were received
 from W0RR N0SS W0DHTC and K0BM. Rumors are fly-
 ing about some outstanding scores to be turned in from
 Missouri stations. It seems that K0FA had the Ozark AR
 Society psyched up for Field Day but, sorry, K0FA, I
 think HARC did it to you again. W0OCFM W0DQNT

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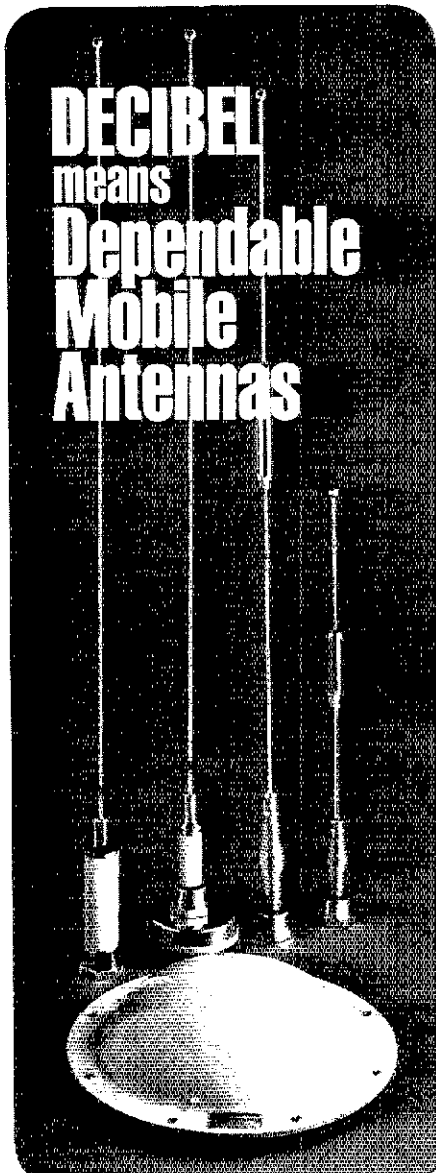
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	346	24	MOSSBN	546	36

It appears that the 1981 ARRL Convention which was to be held in Kansas City has been cancelled due to inflation and lack of adequate facilities. Alternate locations are being discussed and when anything new is passed on to me, I'll let you know. Our deepest sympathy to the families and friends of WB0TW W0GJ W0EJU and W0GNX who have all joined the ranks of the Silent Keys. Traffic: K0ONK 482, W0BMA 254, W0OLD 232, W0BY 116, K0SI 94, W0TF 78, KA0E 49, WA0EM 42, KA0P 12, K0RWL 10.

NEBRASKA: SCM, Rex P. Greenwell, K0KP — SEC: WA0ASM. There has been a lot of "hashing out" the Grand Island tornado tragedy. SEC WA0ASM reports the efforts were successful and all involved are to be congratulated for a job well done! He reports that we've learned a lot and several new features to our state emergency plan are to be implemented. NE hams are ready, willing and able to serve their communities when disaster strikes! Congrats to the following new NE amateurs who graduated from the Tri City ARC Novice course: KA0NO KA0IME KA0IIG KA0IOM KA0IHE KA0ICP KA0INI KA0INE KA0IOJ. W0KX reports DX conditions are on the upswing. The crowd at Victoria Springs had a wonderful time this year! Thanks to Central ARC for another wonderful time! Interested in joining a group that can save lives in time of disaster? Check with your area FCC about the ARES program; we would love to have you join!

Net	NM	QNI	QTC
Western Nebr.	W0NIK	430	28
Sunrhusker	W0GMO	831	58
ARES 75-Mtr	W0IRZ	213	45
Nebr. Storm	WA0LOY	847	245
Pawnee ARC 2-Mtr	W0MKD	119	0
OCWA		46	0
Platte Valley-2 Mtr	KA0BCB	68	0
Morning Phone	W0GWR	1176	41

Traffic: K0KVV 2,000, K0JFN 405, N0AJQ 386, W00BG 177, KA0BCB 119, K0AIE 108, W0FQB 88, W0HTA 35, KA0AND 30, WA0OX 30, W0HCP 10, W0ZTA 28, WA0OX 23, W0GMO 21, W0GWR 17, W0EIT 11, W0BOZ 9, W0FNV 6, K0DF 6, W0NIK 5, WA0LOY 4, W0WKP 4, W0YER 4, WA0RCG 3, W0CBK 2, K0SFA 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzempa, WA1LOU — SEC: W1SY. STM: WB1AIU.

Net-NM
CN-K1EIR 3640 1900 F 2200 59 194 255
CPN-WB2OSY 3985 1800/1000 Su 30 108 257
NENN-WB1CPP 3720 1815 30 83 183
Nutmeg-WA1ELA 2898 2130 30 90 220
RASON-WA1ESH 1373 2100 MWF 13 15 98
WESCON-WB2RUJ 7818 2030 31 83 463
H-QNI CN: WB1ESJ WB2PJJ CPN: KA1KD WB2JU
Nutmeg: W1EFW K1EIVP9 DXpeditioning September 25 thru October 8; look for him on 10, 15 and 20 meters. Ace traffic handler WB1ACZ has donned Navy blues. KA1BJ publicizes our hobby in the Meriden press; he reports that there are 12 new Novices in the Silver City as a result of local club training. The Free Connecticut Repeater Directory is available from your SCM; send a self-addressed business-size envelope for your copy. Tri-City ARC informal net meets on the hour on 3.895 MHz (best times are 2000, 2100 and 2200 EDT). WA1POL and Francis building a repeater for 223.24/224.86 MHz. W1VH busy gardening (planting an antenna farm!). Shoreline ARC repeater, W1BGG or 146.175/775 MHz, is a primary Civil Preparedness communications link for eastern Long Island Sound communities with W1BDN serving as local communications officer. KA1KD = WB1FZX. KA1KPS = WA1ZXT. KA1CS = KA1AXM. PVRA = Pioneer Valley Radio Assn. Have you checked into a net today? Representing ARRL Foundation. W1QV national conventioning in Seattle. New appointees: DECS: WA1DCCR WB1DHZ WB1DXZ WA1EMI KA1KD WA1RAX; EGS: WB1HCA KA1KP. And W1DFT is sweating out the slow, hot summer traffic (June) WB2JU WB1CPP K1G 158, W1EFW 174, WA1LOU 68, KA1KD 52, W1GWT 51, WB1ESJ 50, K1AQE 46, W1BDN 45, W1DPH 40, K1EJU 36, KA1CM 34, W1DFT 30, KA1KP 27, WB1CRH 26, KA1DE 15, W1KV 13, W1CIJH 6, WA1WQG 6, W1QV 5, W1GCF 3, K1XA 1. (Apr.) W1BDN 80.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD

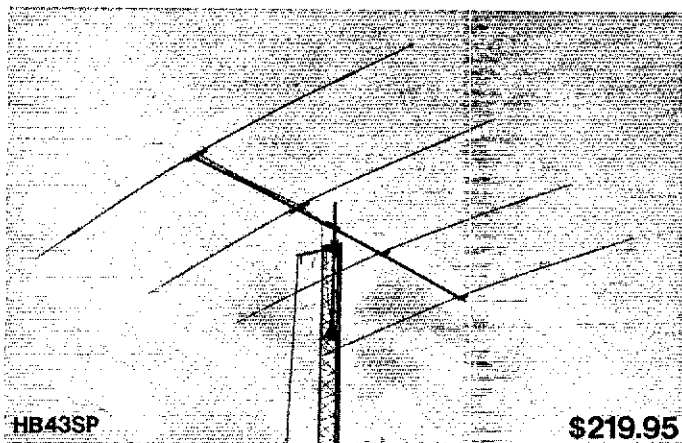
— STM: WA1TBV. SEC: WA1BLG. ASCM: WA9NEW.
Net
Mbr. Freq. Time loc/Dy QNI QTC
EMRI NTOG 3 658 19/2200/Dy 423 257
EMRIPN W1FJI 3 898 1730/Dy 287 111
EM2MN WA1IFE 9030 2000/MWF 74 28
EM2MN WA1IFE 145 8 2000/1TH —
NEEPN K1BZD 3 945 0830/Su 75 72
HHTN K1BSS 0404 2700/Dy 75 178
RAIN NTAMF 0161 1800/Dy 261 157
RAIN5 NTAMF 0161 1800/Dy 279 205
EMRISS KA1BJY 3 715 2030/Dy 79 44

Field Day brought out the following clubs: Acton/Boxboro, Billerica, Chelmsford, Hanscom AFB MARS; Colonial Wireless, Milre/Bedford, Quannapowitt; Whitman, Massachusetts; Falmouth; Gapeway; Boat Anchor Group; Algonquin; Framingham; Greater Lawrence; Sharon; Middlesex; Wellesley; Bellingham; Digital Equipment; Sturdy Memorial and more I don't know about. I visited most of them and was disappointed that it was impossible to get to all. The level of activity was very high and hope you all had as good a time as I did. Thanks to all who sent radiograms and to W1EKO for relaying them home as I was trying to get the traffic while mobile. The New England Convention is right around the corner, so put aside the weekend of October 4, 5 to attend. It will be at the Sheraton in Boxborough where the parking will be improved and the flea market covered in case of rain. plan to have an informal hospitality suite, so feel free to stop by and meet your eastern Mass. friends. The last issue of our section newsletter, The Crossbander, had questionnaire on the new 30-meter band. It was sent to a League members in EMAS and the results are a power 60 percent wanted support for banning contests and award endorsements was split 50/50; there was general agreement that the band should be opened up to all hams regardless of license class — no sub-bands. These comments were documented and sent to WAWHN, chmn of a committee which will recommend t

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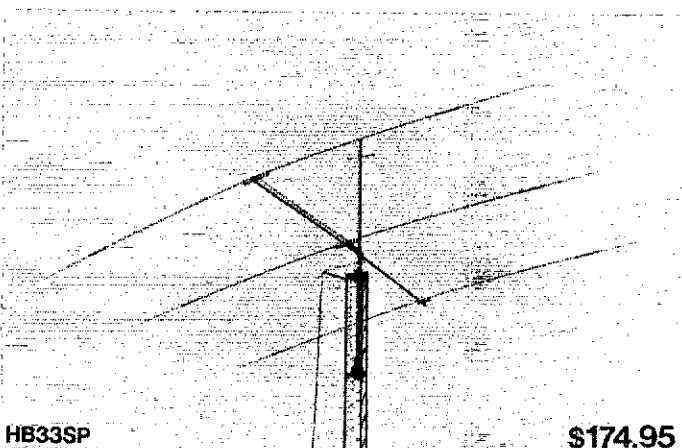
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HB43SP	14/21/28	4	4	2KW	BELOW 1.5	50 Ohm	27'	19' 8"	16' 9"	6.62 sq.ft.	131.3 lb.	2"	1 1/2"-2"	38 lb.
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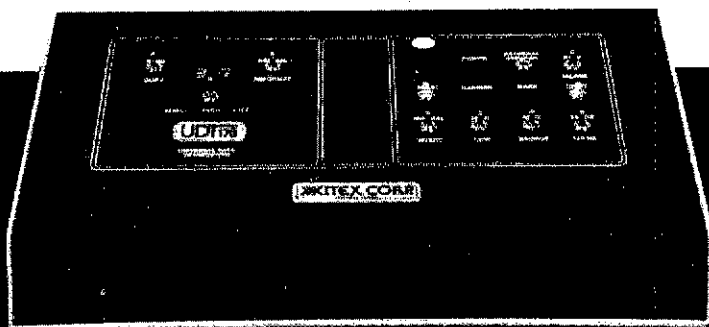


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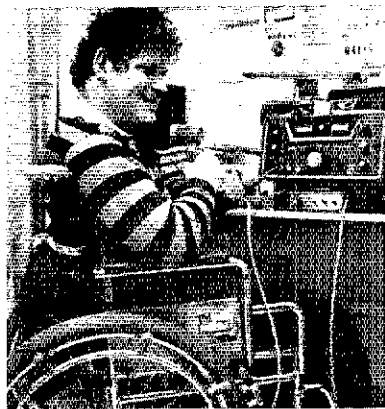


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the FCC via the League what to do with the band. The response from EMAS was about as large (300) as the rest of the country combined, so we should have our say. KA8UEU/1 now KA1KF Traffic: (June) WA1TB 544, KA1BJ 194, WB1GWE 141, K4YX 139, KA1GC 137, KA1HG 101, K1GN 96, K1BSO 91, WB1DXR 85, KA1CGP 43, WB1ZT 40, K1BZD 28, WB7TPY 25, WA1DA 25, KA1JB 24, AJ1R 22, W1PL 18, W1DMH 15, K9H1 4, W1LE 4, K1UR 1, WB1GEX 1. (May) KA1HG 30.

MAINE: SCM, Cliff Lavery, W1RWG — An ex new SCM, I seek ur help in making Maine Section the kind of operation u want. I urge u to get ur reports in by 5th of the month. The new SCM is W1KX. Congrats to Yankee RC for successful Hamfest 60 drawing over 700 people. Tnx to the hams led by SCM in providing conns for the wardens in successful search for 2 lost children in dense forest of northern Oxford Civ. PSHR. W1RWG KA1EO AF11 WB1BYR Sessions/QNH/QTC. MSN 13/63/9: PTN 30/284/97: SGN 25/919/101: AEN 4/57/0 Field Day reports from SeaCoast Wireless, Ellsworth Am Wireless, K1OMN, Whitman ARC. Traffic: WB1BYH 123, W1RWG 78, W1BJ 59, W1KX 58, WA1JZP 40, AF11 43, W1HDC 39, KA1EO 29, WA1MUX 27, N5YX/1 26, WB1MX 16, KA1DOL 16, W1GKJ 16, W1AHM 15, K1GUP 14, W1NRO 14, W1JLH 13, KA1EKT 9, WA1H-CM 7, KA1ONG 6, WA1ZJL 5, WA1YNZ 4.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — SEC: K1RSC 31M; W1TN NMs: N1NH WB1HF1. This report from the Kancamagus Highway, our vacation spot. Club FD messages received from W1QC WB1CAG W1TF K1HI W1WQM & AF11. The GSFNN had 476 checkins & 94 traffic. KA1BXA N1AHN & WB1DKZ now Advanced. K1WHS spoke on antennas at the GBARA. Seen on Hways & Bways: W1LOO W1NGS K1AAC K1RIZ & WA1EZE. KANE awards to WA1LAD & WB1HF1. Son of K1RIZ is WB1GXQ. WB1BS back from Florida. The GSPN had 344 checkins & 41 traffic. W1RVW will in-struct Nashua Club fall classes. WB1ASy now KA1JA. AF11 reports much double hop 50 MHz activity. K1POV retired from Post Office. W1QX now KA1FNN. W1TN has some tower wind speed reduction indicator. Our thanks to retiring EC WA1SRU for his work. W1HWF, from Portland, playing accordion in next camp site for our dinner music. Don't forget the King Ridge Auction-fest on Sept 28. Get ready for fall activities. Traffic: (June) W1TN 130, WB1HF1 50, K1OSM 41, KA1B 37, N1ALM 34, W1ALE 21, WB1DSW 19, WB1HGG 16, KA1BBI 13, K1GOX 8, W1NH 7, WA1PEL 5. (May) WB1HF1 85, KA1BJ 65, WB1HJO 44, WB1HGO 30, WB1ALS 29, W1ALE 22, WB1DSW 20, N1ALM 18.

RHODE ISLAND: SCM, J. Titterton, W1E0F — SEC: K1DI 31M. N1RI. Visited many of the sites chosen for Field Day and every one was very well done and impressive. Each year Field Day is a bigger and better thing. At Hope Valley, their husband & wife team of treasurer & secretary had to resign for personal reasons — names WA1VIL & WA1YV. They were voted a special certificate of merit for their long service. New treasurer is KA1GDW & new secretary N1AGG. Wed. AHS net is rolling on and doing well. WA1OSL, acting mgr. of RIEM 2-Mtr Tlc Net reports sess 20. QNI 186. TFC 38. Check in at 6:30 P.M. Mon. thru Fri. on the Newport repeater. We still have lot of appointments waiting to be filled. Autumn is on us and better conds for ham radio — how about making an application? Traffic: KA1BTU 132, W1E0F 67, KA1E 57, N1RI 14, AE1S 8.

VERMONT: SCM, Bob Scott, W1RNA — Several ham groups op'd FD — some reporting. N1VT Rutland area with 3 stns & a Novice stn; W1PP, BARC, Burlington area, 1 stn and a Novice stn; W1BU, CVARC, Montpelier area, 3 ops; Groups from Brattleboro, Colchester and other areas known. Others no doubt did, but no into rec. Our nets have been getting quite a bit of malicious interference of late. It is being dealt with & by this time hope received just results. VT REF 4/60/8; VPN 4/50/6; VBN 25/346/78; GMN 25/448/52; Garner 24/449/37. BARC Hamfest, Charlotte, Aug. 9 & 10. See you there. Traffic: K1BQB 80, N1ARI 30, W1RNA 13.

WESTERN MASSACHUSETTS: SCM, Art Zavaralla, W1KK — ASCMs: WB1VR K1BE SIM; W1TM, SEC; W1JP, NMs: W1UPH W1UD WA1MJE. ARES activities lively with 415 QNI, 37 QTC, all counties well represented, especially Worcester due to efforts of W1DOY. Radio coverage YMCA marathon in Leominster, EC, W1JL, WA1KPK, K1ZDX W1UD, K1GJNC, C. Green and best wishes to Lind ops W1OPN WB1FKJ studying for Field Day. Field Day groups unusually active. WB1GSO pres. LMARA from W1BIM1 Spencer. W1U with Montachusset ARC enjoying 40-meter and dipole/WB1FKJ from W1GZ/Westminster; WA1ORF from New Brantree; most of Hampden County and Mt. Tor clubs in joint-venture at Camp Barber. PSHR: K1JH W1TM WA1MJE. Traffic: W1TM 237, WA1MJE 21, W1UD 206, K1SSH 127, WB1HH 60, K1JHC 47, W1KK 4, WA1OPN 42, K1JW 39, W1JP 37, W1UPH 32, W1EFC 2, W1BVR 23, WA1YYW 21.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred Wegner, KL7HFM — We regretfully accept KL7AG's resignation as ASCM. He cites business pressures in AZ. AL7AC has been appointed Fairbanks ASCM. AL70 is new SIM. You can catch him on the Bush Net daily. ALTAW is Anc ARC Chief Elmer and needs to add to his list of helpers. KL7GNP, AK QSO Bureau Mgr. needs to hear from all who have new call or addresses. Moosehorn ARC and MARR had a successful FD. Anc ARC was rained out. All Brass Pounder are invited to join the Alaska Code Net on 7061 at 0430 daily. Congenial cods, speeches and mix with raucous chews. A7R is NM and looking for NCS help, so polish your brass and check in. Anc ARC: flea Market will be Sept 27 & 28. No boat anchors this year??? \$2000 in raffle prizes. Traffic: KL7IYX 50.

IDAHO: SCM, Lem Allen, W7JMH — Pocatello Club had Field Day at Scout Mountain — they had a ball! They are setting up antennas and equipment for the CIV Defense. Hope to try them during SET. The Kootenai Club's ham meet was a great success. Thanks to all who worked hard to make it so. Most of the Kootenai Club members were actively involved in welfare and other traffic, phone patches and many hours of operating during the first stages of the Mt. St. Helens disaster. Amateur Radio really pulled the Northwest together. Congrats to all who helped! Impore County Club (MI) has new office. KA7EKR, pres. KA7CKN, vice pres. WB7RRR, secy/treas. WB7OYU taking a trip to WYO & NE. The Payette/Ontario/Weiser Club had a smashing hamfest. Seminars, demonstration equipment for swap, new gear, bunny hunts, etc. W7KWZ won the TS-520! Congrats to Novices KA7HC

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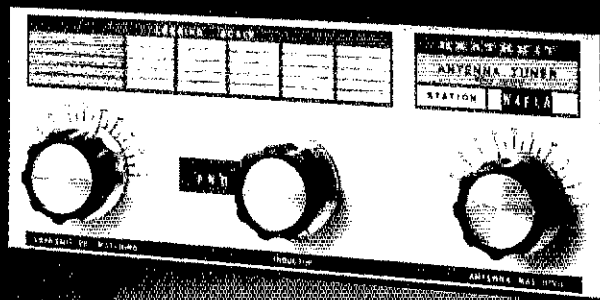


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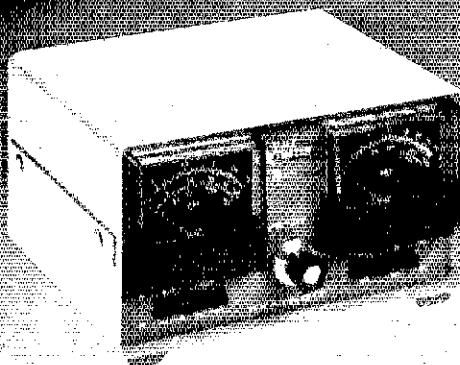
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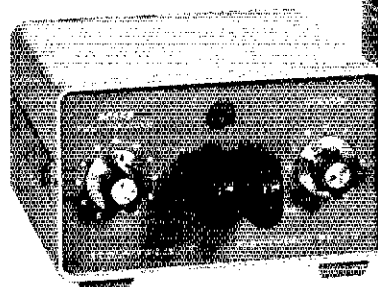


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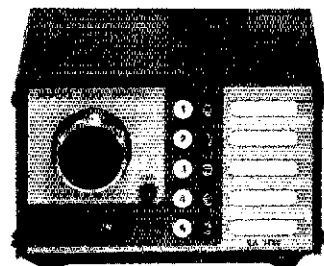


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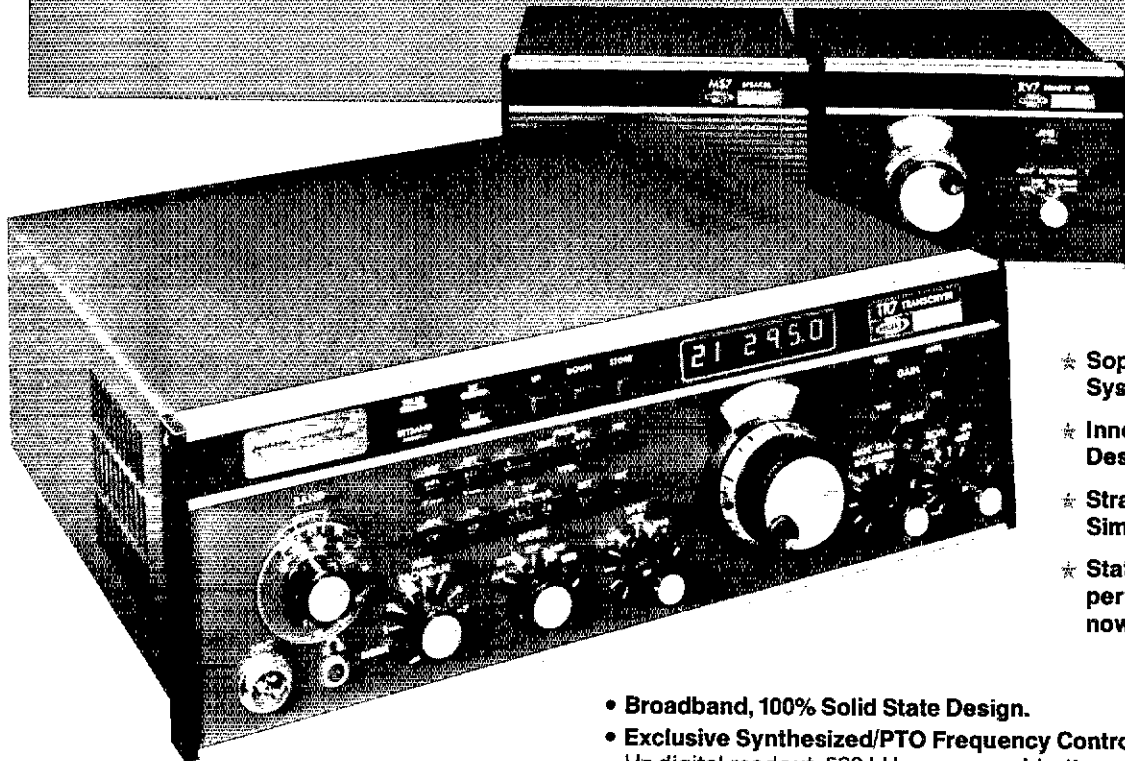
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CD	3990 ssb	8:10 A.M. M-F	22	571	8
IMN	3635 cw	9 P.M. M-F	20	175	71

Get your gear ready for the SET! Traffic: W7GHT 203, W7JMH 80, AC7P 53, WA7CTS 48, K7JV 38.

MONTANA: SCM, Robert Leo, W7LR — Lots of Field Day activity. WA7GVT says 15 in Glendive; Libby ARC 6 wags; Hardin used 2B class; Bozeman & Butte each 2A. It was a close race between Bozeman & Butte — outcome not known yet. IMN QTC 71, QNI 175. Montana 2-meter repeater updates: 01/61 WB7RIS/R Red Lodge; WB7CXR Havre 01/61; 16/76 WB7FFW Billings; 28/88 W7OM: Miles City; 34/94 K7EFA Red Lodge; 37/97 WB7VTS Saco; KA7CTZ General, Heligade ARC active in Field Day. Gallatin HRC operated Bannack Ghost Town DXpedition over July 4. 200 QSOs. WA7IIO now KB7P. KA7CBV now KA7M. WA7UTJ net May: QNI 239, QTC 22. W7TYN active on RTTY. KB7Q reports many June 6-meter QSOs, including NP4A West Indies. C6ACY Bahamas, 275 QSOs on June 18th! KA7DLG Qdn. W7LR enjoyed Wolf Pt Hamfest — FB job WB7QXR. WB7PAQ new Advanced Traffic: (June) W7NEG 18, W7DB 4, W7LR 4 (May) W7TYN 22.

OREGON: SCM, Dale T. Justice, K7WWR — SEC: K7OLN, STM: W7VSE. Section nets:

Net	Time/Days	Freq.	QNI	QTC	Mgr.
BSN	0045Z Dy	3908	577	22	W7PQU
OSN	0130Z Dy	3587			K5ZJW
ProxAARES	0230Z Dy	1432	603	55	K7WWR
PTT	0200Z Dy	14876	608	131	W7LRB
OARES	0130Z Dy	39935	378	73	W7HFL
JGARES	0215Z Th-Sa	14706	152	27	W7VSE

All expeditions into the Mt. St. Helens controlled area requires an amateur be along. TERAC (Tektronix) is providing support with base stations W7GWH WA7SYI and travelling WA7JQH also helping. Constant monitoring of whereabouts is the objective. Field Day messages were received from W7XU7 OTVARG, K7AUJ07 TERAC, WB7NNA7, WA7QD7 EARS, W7SAJ7 Salem ARC, WB6NXX7 TORA (San Jose), W7OEK7 RVARC, A3AK7 LIVARC, W7SO7 Mid-Willamette APC, K7TO7 COR. New Novices in Roseburg are KA7IAW KA7IAH. W7LT copied the Armed Forces Day Messages from NPG. KB7JW teaches General and Advanced classes at Clackamas CC. Salem ARC helped AG7J put up new antennas. A current Northwest US and BC 2-meter repeater list is available from K7WWR, address p. 8. Traffic: (June) W7VSE 732, KB7JW 698, K7NTS 211, W7WPG 143, WA7IHS 97, W7LNE 25, W7LT 23, K7WWR 22, K7SGU 18, W7DAN 2, WB7DSK 2 (May) W7FDU 18.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RHW, STM: W7DZX. Nets reporting for June:

Net	Time	Freq.	QNI	QTC	Mgr.
NTN	11:30 A.M.	3970	2470	87	W7PFD
WARTS	8:00 P.M.	3970	2790	148	W7EQY
NWSSBN	6:30 P.M.	3945	647	36	K7AJT
WSN	8:45/9:45 P.M.	3990	589	144	K7GKZ
PSTS	5:30/10:15 P.M.	14533	107	76	W7IEU
OGARES	5:30 P.M. Tues	14718	27	4	W7ERH

Other volcanic eruptions could occur at any time and PS agencies will again be calling on us for communications. We did a good job the last time, but as always there is room for improvement. If you don't belong to ARES now please contact your EC and get signed up. We are not perfect, but the training we have done proved a valuable asset when we were called upon. Some of the Whatcom City amateurs monitoring the 7540-meter emergency frequencies are: WB7CAO K8EYU W7LR K7IWX WA7QQN WB7POS W7JVV WB7PMV K7VW WB7PMS. Clark City amateurs have started a memorial scholarship fund for KA7AMF, contact WB7DM for details. W7EHO W7LJK joined the ranks of 5K. Despite the conflict with F.D. the Tri-Cities Hamfest was a success. Plan to attend next year on another weekend. Washington Section Amateur Radio Week is September 7 through 14, with the QSO party sponsored by BEARS on 13 and 14. Look for W7IEU from Jefferson County during the party on cw. North Seattle ARC viewed the new film, "The World of Amateur Radio." To all editors of club papers, if there is an item you want all the section to read, please underline or mark it so I'll know you want it printed. Director Thurston reminds us again in his newsletter that input is needed from you by the committee. W7UJ airs the Westlink news on 3970 at 8:45. K7ER has received a pair of frequencies for his 450 MHz rpt through the coordination of the W7WRA. New leadership appointments are: W7OBF, EC for Walla Walla City; W7WGW, EC for Kittitas City; WA7CBN, NM for Tri-Cities 04/64 Rotr Traffic Net. W7AIK entertained West Seattle ARC with a program, "Noise, its source and methods of elimination." My thanks to the BEARS for the use of their rpt for PSTS during our recent jammer problems and for accepting us as a regular user of the repeater. WB7QWC activities down due to taking treatments. W7JIE new house bldg has curtailed his 1W and OQ activities. W7BCS operated HW7 during Field Day. W7DZX 646, WB7WOW 297, K7GKZ 148, W7IEU 117, W7TGF 110, W7FJZ 94, WA7BDD 76, N7AJ 65, N7AFZ 61, WB7CFH 61, WB7EBP 41, W7GB 40, K7CTP 36, WA7PHD 32, W7BUN 25, W7APS 15, N7AFY 8, W7AFY 8, W7ERH 3, WB7QWC 2.

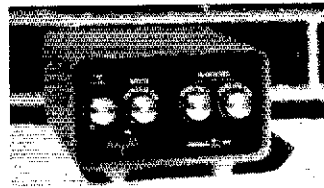
PACIFIC DIVISION

EAST BAY: SCM, Bob Vallo, W6RGG — Asst. SCMs: K6UWR W6ZF VE2AQVW6. SEC W6B6QU. Spoke at SBARA on emergency communications and had 100 percent turnout of ARES groups on FD. W6JXK will be ICG when he gets his #35% & beam back up. N6IE enroute to Europe via NYC in early July. W6ODA ORL with school but had time for FD with LARK. WB6UMT active on N6N/VHF and MTV. KA6ERF active on N6N/VHF and N6EN. Congrats to LARK'S Novice class's first license recipients: KA6KZU and KA6KZV; four more are expected soon. WB6DXP is their latest "klutz of the month." SBARA members upgrading to Adv are: WD6FZF KA6BJB KA6IMN now KD6DX WD6GKL now KD6DQ. N6BDE moved up to Tech. Their new officers include WD6GKN, pres.; KA6BJB, vice pres.; W6IMU, secy.; WD6BZO, treas.; AASL, act mgr. MDARC mourns the loss of WA6ODA. A resolution by their BD resulted in the mayor of the City of Concord proclaiming June 23-29 as Amateur Radio Week. Traffic: (June) W6JXK 293, K6UGS 44, W6OA 34, WB6UMT 32, WB6UZK 30, KA6ERF 21, N6NE 4. (May) W6OA 124, N6NE 2.

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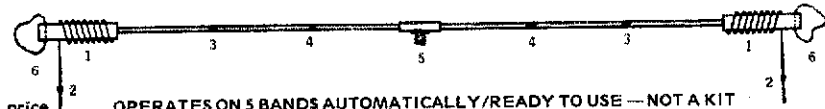
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- **FULL-BAND SCAN:** All channels may be scanned in either "busy" or "vacant" mode. This is especially useful for locating repeater frequencies in an unfamiliar area. **AUTO RESUME. COMPARE!**
- **INSTANT MEMORY-1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be recalled for immediate use.
- **MIC-CONTROLLED VOLUME AND SQUELCH:** Volume and squelch can be adjusted from the microphone for convenience in mobile operation.
- **ADDITIONAL OFFSETS:** Provides three additional offset values: +0.4 MHz, +1 MHz and +1.6 MHz. Other offsets may also be obtained.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-distance commun-

- ication.
- **DIGITAL S/R/F METER:** LEDs indicate signal strength and power output. No more mechanical meter movements to fall apart!
- **LARGE 1/2-INCH LED DISPLAY:** Easy-to-read frequency display minimizes "eyes-off-the-road" time.
- **PUSHBUTTON FREQUENCY CONTROL FROM MIC OR FRONT PANEL:** Any frequency may be selected by pressing a microphone or front-panel switch.
- **SUPERIOR RECEIVER SENSITIVITY:** 0.28 uV for 20-dB quieting. The squelch sensitivity is superb requiring less than 0.1 uV to open. The receiver radio circuits are designed and built to exacting specifications resulting in unsurpassed received-signal intelligibility.
- **TRUE FM, NOT PHASE MODULATION:** Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuit offer intelligibility second to none.
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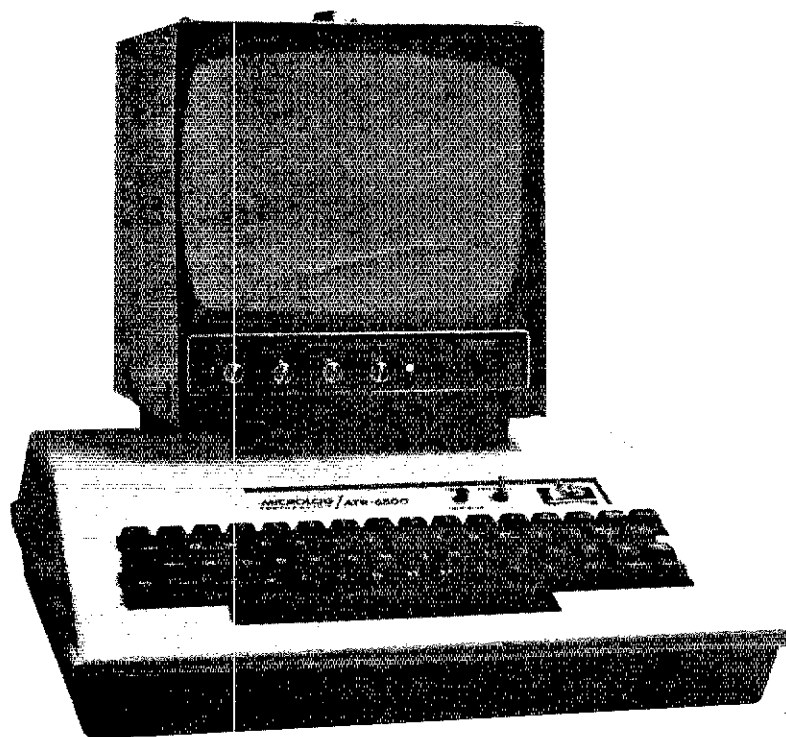
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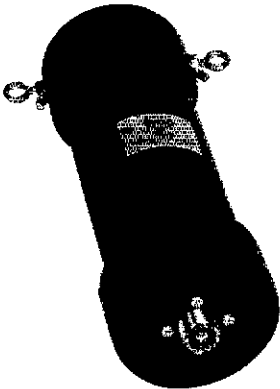
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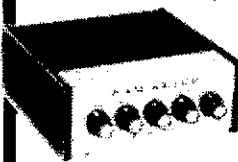
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SEC: WB6GFJ, ASCM: A16T. New officers for the River City ARCS are: K6AGAD, pres.; K6EF act mgr.; WB6YLC, vice pres.; W6CFFB, secy; Marie Martin, treas.; WA6YRL, WB6HYO, WB6NFC, WB6RO5, WB6YKJ, dir. SEC: WB6GFJ, gave a presentation on emergency communications to the El Dorado Co. ARC. The Nevada Co ARC provided communications for the Gold Country Marathon. W6GO and K6HHD have a new 100 foot chunk of Rohn 25G to hang their antennas from. WB6WVW and KA6EZF now have their Advanced tickets and KA6OBE made Tech. K6SG's YL is not KA6KKA. W6ZRJ and W6VZT presented their antenna show at the North Hills RC meeting. Survivors of Field Day include The North Hill RC from near Somerset, Yuba/Sutter at Smartville, and River City south of Mather AFB. Traffic: W6SX 62, W6DEF 9, W6RSP 1.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK, STM: K6TF. Congrats to new Advanced K6EB (formerly W6BIAJ), N6CVM (formerly KA6JHL), General K6GKJ and Novice KA6LSY. Ukiah and Willits hams active in providing communications for run. Amateurs from Mendocino County assisted sheriff in search and rescue mission. Field Day activity reported by Sonoma County Radio Amateurs, Humboldt ARC, Redwood County Contest Club and San Francisco RC, while W6VV took refuge at KH6WO. Santa Rosa News Herald published time article boosting ham radio written by WA6LLV, with photos by W6CYM. WA6UHN a Silent Key. Traffic: W6RNL 226, W6NL 159, K6TP 73, K6JFY 34, W6IPL 25, WA6OXV 1.

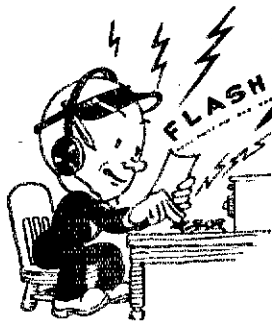
SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB, Asst SCMs, WA6YAK, W6TRP, WA6HIN. All amateurs should register for the ARES with their EC. New officers of the Fresno ARC are W6DPD, pres.; WA6BUH, vice pres.; KA6RIF, secy; WB6IVZ, treas. K6OEJ is a Silent Key. KA6KJ now Tech. KA6LTH now Novice. KA6GCA, KA6JIM, Generals. W6D6RS operated from KLJ. N6AM has a K1V 350 and KT34 beam. W6DPD has a MA25B, WB6TIA, W6DPD and WA6IPF have FT720RUs. WA6YAB has WAC. WA6OI is KD6DN. Don't forget Cal QSO Party on October 3 & 4 and SET on October 17-18. W6R6ACU now W6TOR, W6JPU traveled to Europe. Only 8 months remain until the 1981 ARRL Pacific Division Convention and 39th Fresno Hamfest on May 15-16-17. Roy Neal, K6DUE, will be the featured speaker at the banquet. See you there. Traffic: N6AWH 110, WA6YAB 26, W6DPD 21, K9YBM 18, N6AM 10, W6D6RS 6.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: W6GIZF. Following are new appointments for ARES: DECs: K6FS San Mateo County, K6LZF Monterey, San Benito and Santa Cruz Counties, WB6LVD Santa Clara County; EC: KD6BD and W6BPU. The SEC is putting together an excellent emergency network! W6ZJ is back on the air and with more time, he ran code prof. run. W6AUC busy with nets and skeds with brothers W6BEU and W6JAO and nephew K7JID. W6PRI, ex K8KQV, is busy with N6C. W6C1 rpt's handling tic with a boat sailing to Hawaii. W6OII busy with nets and tic. W6KZJ has 2-mtr capabilities. W6GIZF gave talk on ARES before SCCARA. Silent Key is W6CEO. K6BJR is back on the air and working better than ever reports SCCARC. KA6JIT is a new LERA ARC rpt. Silent Key K6YX, WA6X spoke on "The History and Development of Wireless at LERA." New officers of FARS: W6DFMG, pres.; AG6D, vice pres.; W6BKI, secy; WA6EAA, treas. Their picnic was held at QTH of WA6SH; and new members are WA6PVM and K7SRA. N6IA has moved to AZ. W6SEK has organized a Novice net for his class grads on Wed, 7 P.M. on 28.150 MHz. WA6H4 and WA2IRM organized Diabetes Society's Bkathon with 400 riders and 25 communicators. K6UAL spoke on RTTY before the SCVRS meeting. SLVRC will install a UHF rpt on Eagle Rock and have acquired a solid state rpt for the site. K6FTU has a slide show available for clubs on "Hamming Down Under in the Land of the Kiwi". He and his XYL spent some time traveling throughout New Zealand this year. Traffic: W6YBV 189, W6KZJ 87, W6AUC 54, W6RFF 32, W6OII 13, W6CF 6, W6PRI 6, W6ZJ 2.

ROANOKE DIVISION

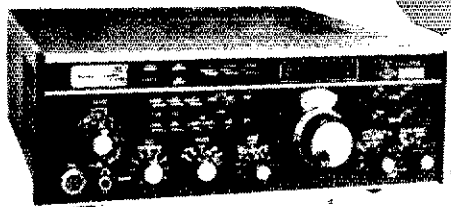
NORTH CAROLINA: SCM, Bill Parris, AA4R — Asst SCM: NA4E, STM: K4VHT, SEC: WA4BFT, NMs: JFK, WD4PDU, CN, AB4S, THEN WD4CNR. Field Day participation reached an all time high this year as 18 clubs/groups sent messages to the SCM announcing the activities. Congrats to WD4CNR who was appointed Asst N6 for DARN. got the luck. KA4CPY, daughter of WD4CNR & CNQ, now getting active on the Novice bands. Cabarrus ARS has a club information net on the Concord 6.655 rpt on Mon at 1900 local; the club also provided communications for the recent Towel City Fun Run. KA4NOR was big winner of the color TV raffled off by the Brightleaf ARC to raise money for their repeater. BARC also got the mayor of Greenville to proclaim Amateur Radio Week during Field Day week. lots of activity around Greenville these days. Western Carolina ARS now records their newsletter on cassettes and mails them to sight-impaired hams in the Asheville area. Congrats to K4MCG, the first IIS amateur to qualify for the 3-Band Worked All Zones Award. Come accomplishment. Recent upgrades include WD4JFF to General and N4CJJ & KA4LUO to Advanced. Clubs are reminded to expand your PR efforts by sending copies of your club newsletters to the FCC office in Norfolk. they want to hear of our activities. Hurricane season is coming. Is your ARES group organized? Traffic: (June) WD8NYN 243, WD4CNR 220, AB4S 170, WD4WII 167, WA4BFT 112, K4FTB 108, K4VHT 108, N4AFT 102, W4EAT 81, WB4VVL 78, WB4MXG 66, WA4OBR 60, WA4SRD 57, K4NLK 54, K4VHO 52, WD4CFZ 51, WD4CNR 51, AA4R 45, WB4CYN 42, W4FMN 41, WD4AIE 40, WB4JJK 38, KC4AM 38, WA4UTC 36, KA4NDL 33, W4CJZ 31, WA4OJ 32, KF4R 29, K74A 27, WA4VT 27, WB4TOP 27, WB4CAC 22, K4UW 24, K4PK 23, WD4SCH 20, WA4CUD 17, WB4PDU 17, N4BYV 14, N4UE 10, WD4NAO 8, W4EHF 7, WA4IHG 5, WD4ENB 2 (May) WB4PDU 52, K4MC 50, KF4R 45, WB6OTS 18.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: W4LUDK, SEC: K4VIA, STM: WA4NK. Congrats to new SEC, K4VIA, for a fine job. Congrats to new Novices and up-grades: KA4PLT, KA4PLX, KA4PLV, KA4PLW, KA4PLX, KA4PLY, KA4POX, KA4POX, KC4LA, WD4PKZ, KA4FTO, Congrats to KA4YQE, WD4BYY, KB4FF, K4LNU, K4ICL, HH2MC & HH2YL & other Columbia hams for providing 20-meter phone communications to help a Haiti missionary from Colombia, SC who had been injured in a truck wreck. Out of 5 passengers, she was the only survivor. All medical and logistic arrangements were handled via Amateur Radio. A good

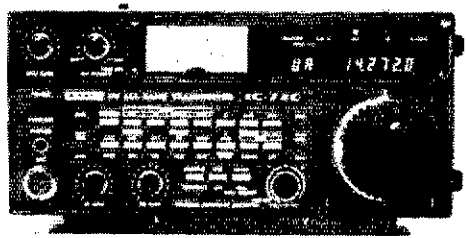


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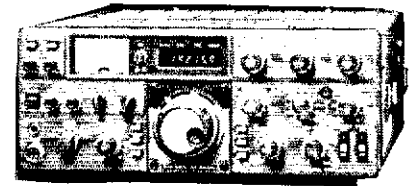
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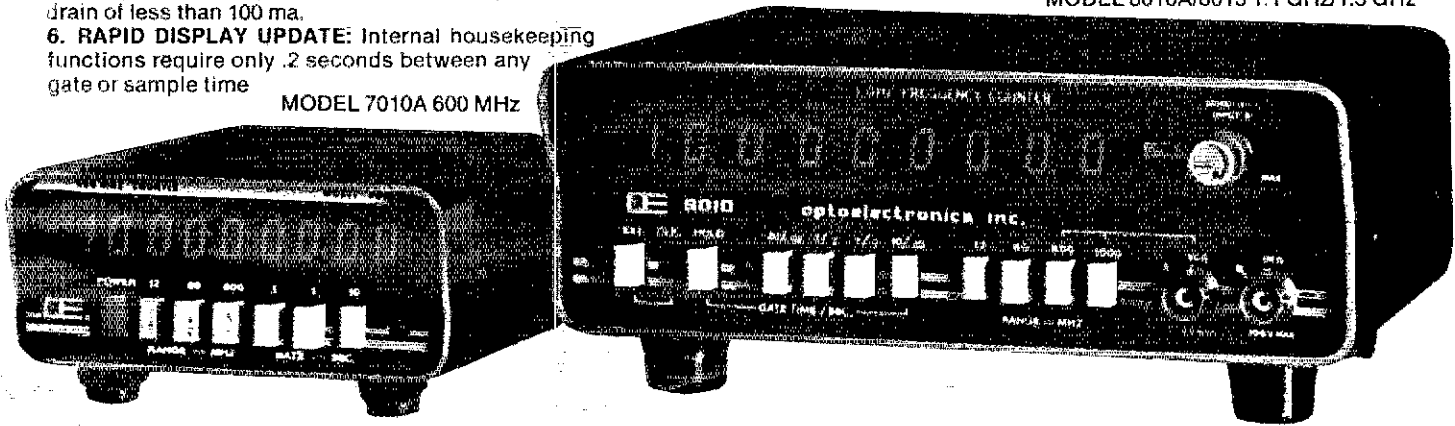
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- 3. ALL METAL CASES:** Not only are the heavy gauge aluminum cases rugged and attractive, they provide the RF shielding and minimize RFI so necessary in many user environments.
- 4. EXTERNAL CLOCK INPUT/OUTPUT:** Standard on the 8010/8013 series and optional on the 7010 series is a buffered 10 MHz clock time base input/output port on the rear panel. Numerous uses include phase comparison of counter time base with WWVB (U.S. National Bureau of Standards). Standardize calibration of all counters at a facility with a common 10 MHz external clock signal, calibrate scopes and other test equipment with the output from precision time base in counter, etc., etc.
- 5. ACCURACY:** A choice of precision to ultra precision time base oscillators. Our ± 1 PPM TCXO (temperature compensated xtal oscillator) and ± 0.1 PPM TCXO are sealed units tested over 20-40°C. They contain voltage regulation circuitry for immunity to power variations in main instrument power supply, a 10 turn (50 PPM) calibration adjustment for easy, accurate setability and a heavily buffered output prevents circuit loads from affecting oscillator. Available in the 8010 and 8013 series is our new ultra precision micro power proportional oven oscillator. With $\pm .05$ PPM typical stability over 10-45°C, this new time base incorporates all of the advantages of our TCXO's and virtually none of the disadvantages of the traditional ovenized oscillator: Requires less than 4 minutes warm-up time, small physical size and has a peak current drain of less than 100 ma.
- 6. RAPID DISPLAY UPDATE:** Internal housekeeping functions require only .2 seconds between any gate or sample time

- period. At a 1 second gate time the counter will display a new count every 1.2 seconds, on a 10 second gate time a new count is displayed every 10.2 seconds. (10.2 seconds is the maximum time required between display updates for any resolution on any model listed).
- 7. PORTABILITY:** All models are delivered with a 115 VAC adapter, a 12 VDC cord with plug and may be equipped with an optional ni-cad rechargeable battery pack installed within its case. The optional Ni-Cad pack may be recharged with 12 VDC or the AC adapter provided.
- 8. COMPACT SIZES:** State-of-the-Art circuitry and external AC adapters allowed design of compact easy to use and transport instruments.
Series 8010/8013: 3" H x 7-1/2" W x 6-1/2" D
Series 7010: 1-3/4" H x 4-1/4" W x 5-1/4" D
- 9. MADE IN U.S.A.:** All models are designed and manufactured at our modern 13,000 square foot facility at Ft. Lauderdale, Florida.
- 10. CERTIFIED CALIBRATION:** All models meet FCC specs for frequency measurement and provided with each model is a certificate of NBS traceable calibration.
- 11. LIFE TIME GUARANTEE:** Using the latest State-of-the-Art LSI circuitry, parts count is kept to a minimum and internal case temperature is only a few degrees above ambient resulting in long component life and reliable operation. (No custom IC's are used.) To demonstrate our confidence in these designs, all parts (excluding batteries) and service labor are 100% guaranteed for life to the original purchaser. (Transportation expense not covered).
- 12. PRICE:** Whether you choose a series 7010 600 MHz counter or a series 8013 1.3 GHz instrument it will compete at twice its price for comparable quality and performance.

MODEL 8010A/8013 1.1 GHz/1.3 GHz

MODEL 7010A 600 MHz



MODEL	RANGE (From 10 Hz)	10 MHz TIME BASE		AVG SENSITIVITY		GATE TIMES	RESOLUTION		EXT. CLOCK INPUT/OUTPUT	SENSITIVITY CONTROL	NI-CAD BATTERY PACK	
		STABILITY	AGING	DESIGN	30 Hz to 500 MHz		500 MHz to 1.1 GHz	12 MHz to 50 MHz				Max. Freq.
7010A	600 MHz	± 1 PPM	-1 PPM/YR	TCXO*	15 mV	N/A	1 Hz	1 Hz	10 Hz	YES	NO	YES
7010.1A	600 MHz	± 0.1 PPM					1 Hz	1 Hz	100 MHz	OPTIONAL		OPTIONAL
8010A	1.1 GHz	± 1 PPM	-1 PPM/YR	TCXO*	15 mV	30 mV	1 Hz	1 Hz	10 Hz	YES	YES	YES
8010.1A	1.1 GHz	± 0.1 PPM					1 Hz	1 Hz	1.1 GHz	STANDARD		OPTIONAL
8010.0A	1.1 GHz	$\pm .05$ PPM		OCXO**								
8013.1	1.3 GHz	± 0.1 PPM	-1 PPM/YR	TCXO*	15 mV	30 mV	1 Hz	1 Hz	10 Hz	YES	YES	YES
8013.05	1.3 GHz	$\pm .05$ PPM		OCXO**					1.3 GHz	STANDARD		OPTIONAL

*TCXO = Temperature Compensated Xtal Oscillator

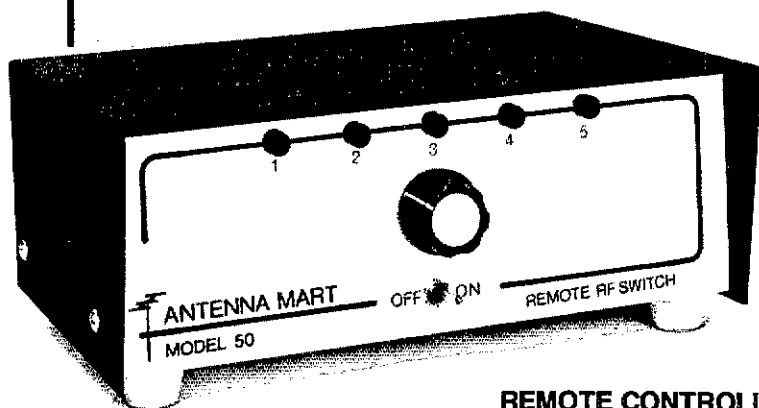
**OCXO = Proportional Oven Controlled Xtal Oscillator

SERIES 7010A			SERIES 8010A/8013			ACCESSORIES		
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7010.1A	600 MHz Counter - 0.1 PPM TCXO	\$249.95	#8010.1A	1.1 GHz Counter - 0.1 PPM TCXO	\$450.00	#P-100	Probe, 50 Ohm, 1X	\$13.95
OPTIONS:			#8010.15A	1.3 GHz Counter - .05 PPM Overt	\$499.00	#P-101	Probe, Lo-Pass	\$16.95
7010H	Handle/Till Bail (not shown)	\$2.95	#8013.1	1.3 GHz Counter - 0.1 PPM TCXO	\$550.00	#P-102	Probe, Hi-Z	\$16.95
7010B	Ni-Cad-701 Ni-Cad Battery Pack & Charging Circuitry Installed Inside Unit	\$19.95	#8013.05	1.3 GHz Counter - .05 PPM Oven	\$599.00	#LFM-111U	Low Frequency Multiplier X 10, X 100, X1000	\$119.95
7010C	External Clock Input/Output	\$35.00	OPTIONS				For High Resolution of Audio Freq.	
7010D	Carry Case - Padded Black Vinyl	\$9.95	#Ni-Cad-801 Ni-Cad Battery Pack & Charging Circuitry Installed Inside Unit		\$49.95			
			#CC-801 Carry Case - Padded Black Vinyl		\$ 9.95			

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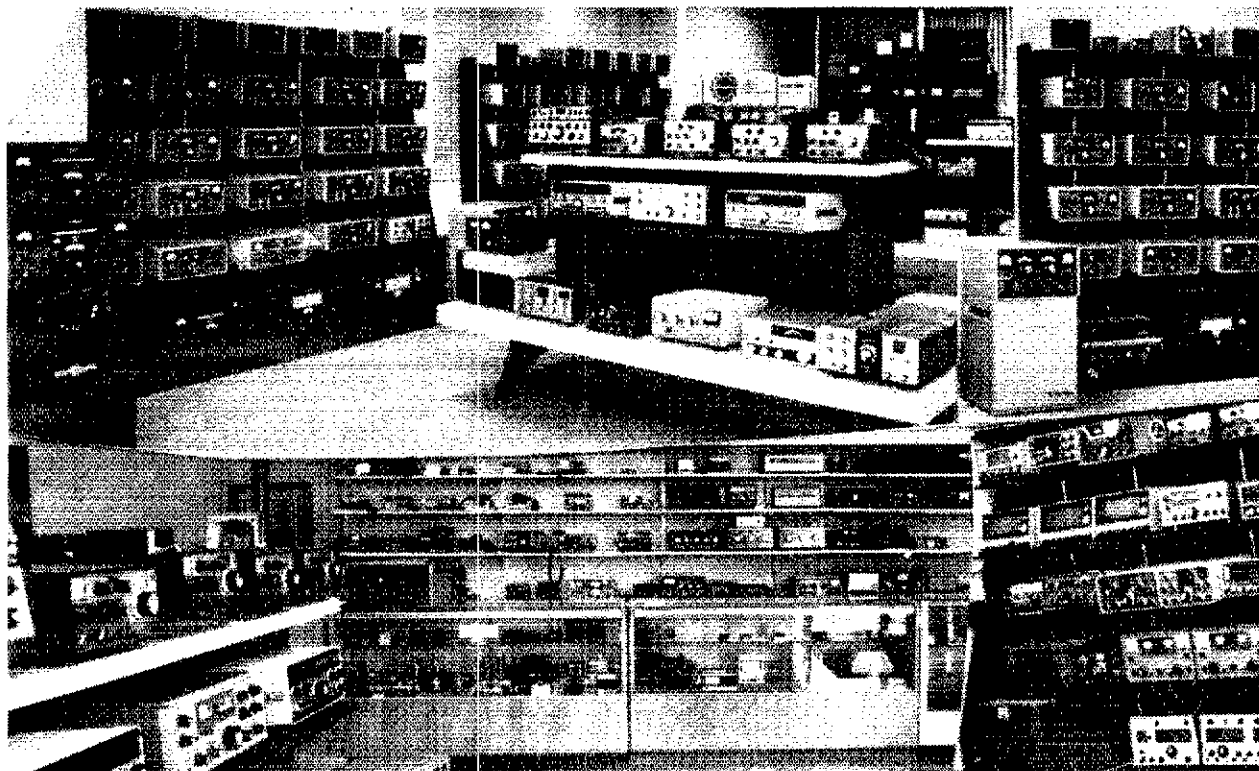
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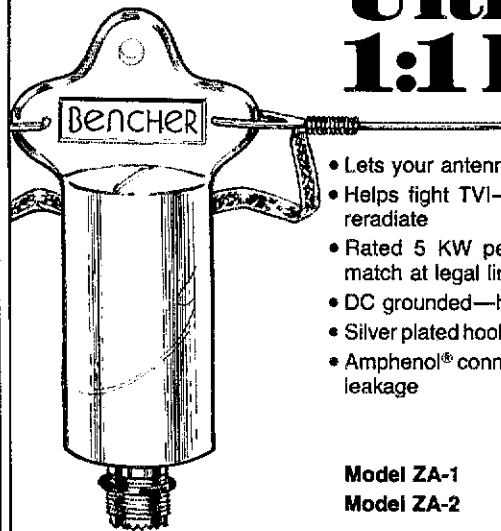
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VIRGINIA: SCM, Rick Genter, K4BKX, ASCMs, Buddy Smith, WAYE & Bill Farris, N4NK, SFC, N4AZI, STM, WA4STO, Chief OQ: W4HU, Chief OVS: N4CD.

Net kHz Time Sess QTC Mgr.
YSBN 3947 6:00 30 241 KYAK
VSN 3680 6:30 29 138 WB4KSG
VN 3690 7 & 10 58 334 KB4N
VLN 3947 10-15 30 158 WA4YIU
VNTN 3907 Noon 29 113 N4LE

The STM reports K0JH will be operating maritime mobile until Sept. N4NK had a good PD from Mobjack Bay in 2C category. WA4STO would like to see more comments filed with monthly activity reports for inclusion in this column. W4KFC owes to Arizona and contacted 230 hams through 80 repeaters and attended the Massas and Huntington WV Hamfests as well as AFCEA amateur luncheon in Washington, DC. W4KXE is on a west coast vacation. N4DCL received final approval for installation of 2-meter station in local fire, rescue and safety center to be used for ARES and provided comm. for giant safety jamboree by local scouts. KB4OF participated in PD with Ole VA Hams ARC. KM4X reports that six Smith Co. hams and three visiting from Washington Co. participated in PD with Murphy along to "wreck" two generators. All Net Controls are reminded that stations checking into a net as liaisons to/from ARES/local nets should be recognized as such, and should be included in the net reports as such. Each Net Manager, then, has the responsibility of making sure that the monthly reports to the STM and to the Virginia Ham include ARES/local net liaison functions. INX to WA4STO for the above info. Starting next month, this column will be split between WA4STO (STM) & N4AZI (SFC). Traffic: WA4CCK 622, W4JK 519, WA4STO 412, WB4PNY 362, KB4N 286, K4KNP 259, W4SQO 246, WA4JI 242, W3BBN 188, K4ABQK 185, W4UQ 161, KY4K 109, AA4CK 94, W4SUS 94, K4JM 90, W4NWM 78, N4AZI 73, N4RF 66, N4YQ 66, WA4YIU 58, WB4LI 57, W3BBQ 51, N4CIR 51, K4GR 51, W4OKN 40, KB4J 34, K4EJ 33, K4AGBL 33, W4YVC 29, KB4OF 29, W44FTK 27, WA4RTS 27, W4CQWC 26, WB4UHC 26, N4NK 25, N4BJW 22, W4BDQZ 22, N4LE 22, W4JAZ 18, W4LXB 17, K4YVK 15, W4CEU 14, W4DONR 14, W4YE 13, W4CFV 12, WB4MAE 12, K44ETG 10, K4AHLI 10, W4VRL 10, WB4ODZ 9, WB4ZTJ 9, W4K1T 8, KM4X 8, W4KFC 7, W4KFE 6, W4DRDF 6, W4RWY 6, WB4SHK 6, W4WVW 6, WB4FNW 5, W4DJUU 4, W4PVA 4, W4BZN 4, K4AHN 3, K4JRT 3, W4ANEI 3, KB4OB 3, W4ISA 2, W4KUK 2, N4BHI 1, W4DM 1, N4OT 1, W4TZC 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — STM, KC8C, SEC, K8QEW, NMS: W8FZP, K8MHR, K8BG, W8BLY. State Radio Convention at Jackson's Mill, was a huge success. K8QEW named Outstanding Amateur of the Year. Prize winners were W8JH, W8VU, WA8ACB and WA2A. Certificates of merit were awarded to W8JYM and K8LC. W8JM received 52 years continuous licensed and 50 year Golden Award from OCWA. KFC ARA's repeater on 145.47 is providing outstanding coverage. K8AHT and W8BVHZ are new ECs.

Net	Freq.	Time(Z)	Ch-in	TFC	Sess.
Hillbilly	14290	1700 Su	151	36	9
CW	3567	2300 Dv	139	34	29
Midday	3990	1600 Dv	185	20	29
Phone	3990	2200 Dv	441	67	25
Novice	3730	2215 Dv	78	26	12

Traffic: K8BG 65, W8HZ 45, W8BLY 37, N8AJC 24, K8MHR 22, W8ATJN 22, W8CAL 20, W8FZP 17, K8K1 16, A8J 13, KC8C 10, W8BUDY 10, K8QEW 8, K8BX 7, W8JM 6, K8ZDY 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, K0DJ — SEC: W0ACD, STM: W0MCL, NM: W0AIT, K0CNV, W0HE, W0HXB, K80Z. Several clubs active in this year's Field Day event. Much talk about a competition between clubs in the section with an appropriate award for class winners next year. W0GW spent much time handling health and welfare traffic for Grand Island, NE tornado. W0ZON new call is N0CQ. W0WVX enjoying vacation.

SEC, W0ACB reporting an increase in ARES activity and is working out a Skywarn plan with NWS officials. N0BO heading up an ARES RTTY net on 147.570 MHz the first and third Wednesdays of each month at 2100 local time. Non-RTTY stations may QNI using fm. W0FQK received a section net certificate for CWN. Pike's Peak area amateurs received letters of commendation for their work in the rain shortened Walk for Mankind. Columbine 25 sess, QNI 839, QTC 101, informals 155, QNF 980, CWN 31 sess, QNI 238, QTC 164, QNF 926; Hi-Nong 30 sess, QNI 1425, QTC 160, informals 194, QNF 1227. Traffic: N8BOP 1679, W0HJZ 1331, W0WVX 1047, W0LAE 144, W0AIT 84, K0D1 82, K8BZ 82, W0PKH 52, W0BDE 50, W0GO 41, W0NFW 35, W0RE 31, W0VLA 16, W0HXB 14, W0BUWE 13, W0GW 12, K0C1 5.

NEW MEXICO: SCM, Joe T. Knight, W5PDU — SEC: W5ALR, NMS: W5SAHH & K5LSL, Southwest Net (SWN) meets daily on 3583 kHz, at 1930 local and handled 154 msgs with 161 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 193 msgs with 906 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 96 msgs with 626 checkins. Yucca 2-Mtr Net handled 10 with 630 checkins. Nice ltr from Pecos Valley ARC. Good newsletters from SWN, SARA and Gila ARC. Sorry to report W5XR's heart attack but he is making a good recovery. Many msgs from Field Day groups over the state with best participation in memory. Much good PR on radio, TV, and newspapers. Traffic: W5DA 454, K5L 210, W5ENI 125, N5NG 114, W5UH 104, AG5S 96, W5JOV 68, K5DDW 43, W5MIY 8.

UTAH: SCM, Royce Henningson, K7QEQ — SEC: W87FCB, STM: W7OCK. A number of stations and groups were active for Field Day. Five messages were received by SCM from UARC, K87JE, Borderline ARC, N7DF, Rainbow Canyon ARC, N7AVJ, groups KB7FZ, WA7LF, W7CAV, and several using W7QEE, W4NVO reports that Weber ARES Net on 2282 had 4 sess.

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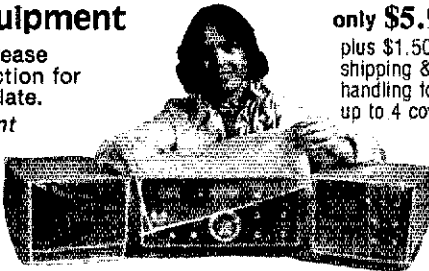
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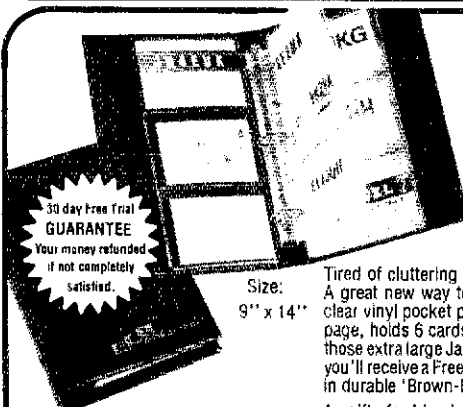


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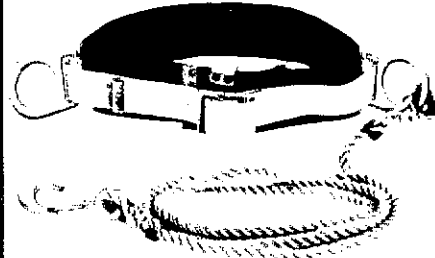
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The Santec HT-1200 4W SYNTHESIZER RADIO MODULE

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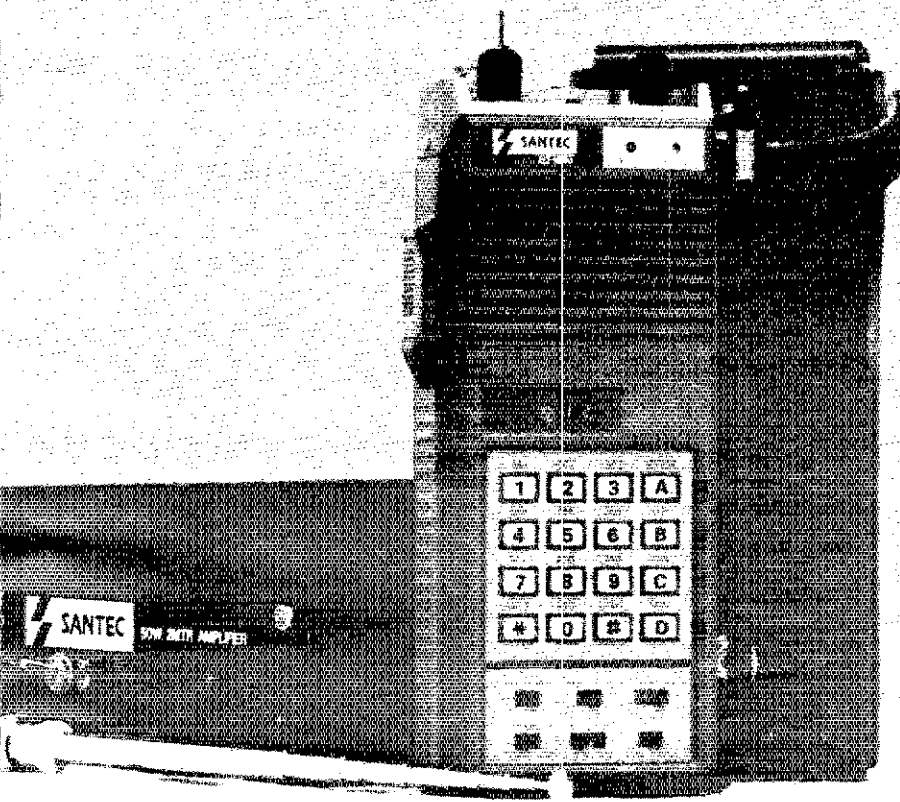
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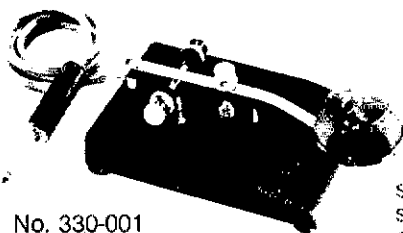
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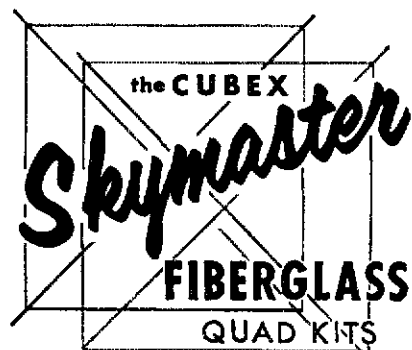


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P-4	C-4	4	P-305		30, 35
P-5	C-5	5	P-354		35, 40
P-68	C-68	6, 7, 8			
P-91	C-91	9, 10, 11			
P-10	C-10	10			
4P-12	4C-12	12, 13, 14			
P-14	C-14	14			
DP-16	DC-16	15, 18, 20			
P-22	C-22	22			



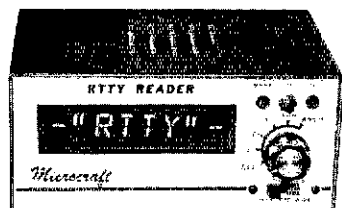
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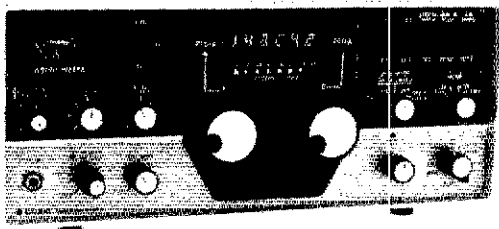
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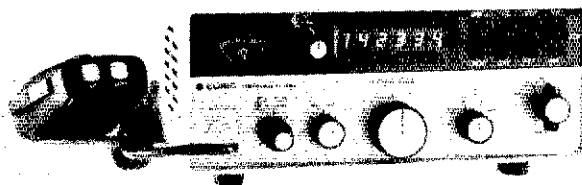
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GOOD TIMES AT THE PINES

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SPONSORED BY THE HUDSON AMATEUR RADIO COUNCIL, INC.

NOVEMBER 7, 8 & 9, 1980



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talk in on 146.25/85, 34/94, .52



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Hotel rates are based on double occupancy, per person, per night and include all meals, hotel activities and tips for the dining room and maid service. Indoor Tennis and golf require an additional fee. Skate rental is available. Other local hotels close to the Pines will handle late registrations.

Room rates range from \$38.50 to \$49.50 per person, per day, based on 2 day stay. Ask for special children's rates. Additional adults in room are \$31.50 per day up to 2. Check the coupon for the hotel reservation information.

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THE CONVENTION WILL FEATURE AN EXHIBIT HALL, INDOOR FLEA MARKET (CONTACT—MIKE EVANS WB2RDD, BOX 143, WHITE SULPHUR SPRINGS, NY 12787 OR CALL AT NIGHT 914-292-8630), AND A FULL RANGE OF FORUMS IS PLANNED. FOR THOSE WHO PLAN TO COME UP FOR THE DAY THERE WILL BE AMPLE PARKING. FOOD AT POPULAR PRICES WILL BE AVAILABLE AT THE COFFEE SHOP.

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PLEASE SEND ME _____ ADMISSION TICKETS @ \$5.00 EACH, TOTAL \$_____
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CHECK HERE FOR HOTEL INFORMATION _____

NAME _____ CALL _____ ADDRESS _____
CITY _____ STATE _____ ZIP _____ TELE. _____

NAMES & CALL SIGNS OF THE OTHERS I AM ORDERING TICKETS FOR ARE ATTACHED.
ALL LICENSED AMATEURS ARE EXPECTED TO PURCHASE A TICKET.
GENERAL CHAIRMAN, JOE BOYD K2TY
PRESIDENT HENRY WENER WB2ALW, 53 SHERRARD STREET EAST HILLS NY 11577

70 QNL and the Utah VHF. Society Net 5 sess., 271 QNL. KA7DLH earned a net certificate for participation in the Beehive Utah Net UDXA is active. QXJ 147.6 N04HA has gone on Christian mission to St. Louis. Traffic: WA7KHE 82, WA7MEL 70, WA7JRC 32, W7OCX 18, W7RO 12.

WYOMING: SCM, Chester Stanwaly, W7SDA — SCM on vacation, assistant SCM, Lynn Knapp, K7IKO reporting. Murphy must have slipped up. Field Day weather was great. FD operation reports received from Cedar Mt ARC, Casper ARC, and Sheridan ARC. Congrats to WA7BPO on upgrading to Advanced. WB7NAK reports Wyoming Cowboy Net with QNL 553, QTC 18, and 21 sess. Traffic: WA7GYO 160, K7KSA 94, WA7NHR 50.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, KAUMD — SEC: W4IBU. The state was saddened to learn of the passing of WA4FYO, he was EC of Laurence County. If we have an amateur who lives in Laurence County, we could use you as EC. Correction for May report, HARC officers: W4IBU, pres.; WD4FVC, vice pres. Field Day was a great success this year, all clubs participated, such as Montgomery TBRC, Wilsonville ARC, Tuscaloosa ARC, Andalusia ARC, Birmingham ARC, Clark County ARC, Mobile ARC, Wiregrass ARC, Chattahoochee ARC, Lake Martin ARC, Winterville ARC, Fort Payne ARC, Athens ARC, and many more. The weather was wet in some areas and real HOT in all — everyone did a good job. AENB reports 29 sess, QNL 209, QTC 66, OTR 591 min. DRN5 reported 349 messages in 30 sess. Alabama 96.6 percent by W4CKs WA4RAJ, AEND 126 QNL, 30 sess with 54 QTC. AENM reports 2318 QNL, 203 messages. New members to AENM are KA4HBY, WA4GOL, N4GNX, W4NPZ. Don't forget SET coming up in October, let's all participate and make it a great success — let's be prepared — hurricane season is upon us. We do need ECs and DFCs, in your area, we could use you. PSRR: WA4JDH N4CCT and W4CKs, All 3 went over hundred messages. Report your public service no matter how little you did. Remember hamfest in Sept. in Montgomery, it's always a good time. See you there. Traffic: WA4JUD 1142, W4CKs 156, N4CCT 182, K4AOZ 98, KA4HXJ 19, WA4HRV 19, AA4J 16, WA4ZPZ 16, KA4EWD 14, WA4RMP 13, KC4GS 12, W4IBU 12, WB4TVY 8.

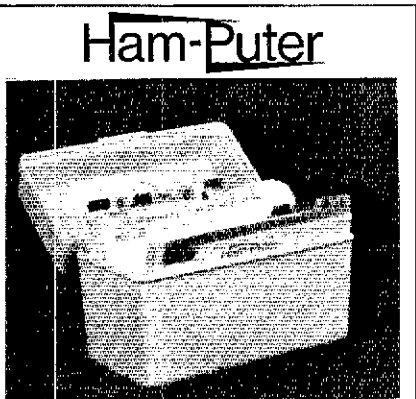
GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: KA4VHC, SEC: K4SWJ, ASEC: WB4HXE, STIM: WA3NAZ/4. Net Freq. Time (EDST) Mgr. GGN 3995 0700 Dy 0800 Su K4DMK GSN 3585 1900 & 2200 Dy W4WXA GTN 7118 1815 Dy Vacant GSSBN 3975 1930 Dy WB4ZVX ARES 3975 1700 Su WD4ADV GA TFC "A" 7243 1200 Dy W4GH GA TFC "B" 3957 1830 Dy W4GH SFRN (RTTY) 3620 2030 Fri Vacant

Congrats to KA4BWB & WD4ASU winners of the KA4EJ & W4IO Memorial Scholarship awarded by the Atlanta RC. Each will receive \$500.00 to aid in their college tuition. The chmn & members of the Atlanta RC need a pal on the back for another successful hamfestival. K4BYK passed Extra & wants to thank all who worked him on cw so he could get that code speed up. Nothing but praise to the hams who helped with communications during Georgia's Annual State Bike Event. The live day ride from Savannah to Columbus was never without hams in the areas. FB, WA4PUO continues her novice classes in Newnan resulting in six new hams for the area. All clubs having elections please report them to your RC and let us know. WA4YR & Colquitt County HRS KB4JZ to fill the vacant presidents seats. Wish to thank all who took time in Atlanta to take in the many forums that were on the agenda. Now is the time to prepare that ham radio booth for local fair. I want to thank WA4ZHC for starting GERN & getting interest up. QCWA dinner during the Hamfestival very well attended. The big surprise was the many ARRL officials present and the FB talk by W1RU. This is one of the highlights of the Atlanta Chapter. Traffic: W4WXA 150, W4GH 82, WA3NAZ/4 82, K4AZM 67, K4EV 63, WD4ADV 60, W4FIZ 36, AK4T 30, W4HON 28, W4BIA 25, N4UJZ 24, W4JNL 16, WA4YR 12, WA4LHT 7, AA4E1 6, W4ISS 4, K4PIK 4, K4BAJ 3.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — Net Freq. Time/Days Mgr. NFPN 3950 kHz 2230 Dy N4BZH QFN-E 3651 kHz 2300 Dy WA4PFK QFN-L 3651 kHz 0200Z Dy WA4PFK FMTN 7247 kHz 1600 Dy WB4AID TPTN 7270 kHz 2100Z Dy WD4AWN QFNS 3715 kHz 0000Z Dy WD4DNC

Stim: NAWA. I'm looking forward to working with all members of the NFL Section. Asst SCMs appointed are: WB4QBB-Pensacola, WD4ASW-Gainesville, W4BSP-Maitland/Seminole Co., WA4CRI-Volusia Co., W4FZX-Orlando. New appts: KB4LD-OES, WD4DNC-NM. Despite bad condx, several good scores during FD FFARA, N0FARS, and Hogtown Hammers along with LMARL report high scores. GCARC active with "Pot Luck Dinner" hosted by KC4CP. Yuliusa Skywarn Net alerted first time May 25 with WD4OSS NCS and 20 str participating. Halifax QCWA doing well after only 3 months. Hernando Co. ARL had program on hurricanes and tornadoes. BARS ran 2A in FD and had nice feature on TV news. Group now meets in Neptune Beach City Council Chambers on 4th Thurs. K4BT gave OPARC a 2500W generator and now has over 70 members. WD5HOV now Extra. Pensacola area DXers use 146.55 simplex. FFARA will hold Ham-A-Rama Sun Aug. 31st. New officers of TARS are N4WA pres., KA4KYM, vice pres.; K4AFI, secy; KA4DCF, treas; all and very hams helped with canoe race. WA4WR held install 20 foot telephone pole antenna support at Orlando NWS. K4JU was in Alaska recently and visited with a group of KL7 hams. FMTN meeting 7 days per week on 7.247 kHz as part of NTS. Traffic: (June) WD4HIF 512, N4PL 220, WA4CRI 191, WB4TZR 161, K74U 99, N4BZH 98, WD4IO 98, WA4EYU 79, WD4DNC 76, W4MGO 75, WB4FYJ 51, WB4DTS 38, WA4STZ 35, N4AXN 31, WB4WOO 13, N4BBY 11, K4RNS 8, WA4ZTS 7, K4TTO 6 (May) WB4QBB 28.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KJG, SEC: AA4WJ, Stim: K4IH. New appointments: WD4AWN OCS and NM, AFPN was abolished July 1st with FMTN assuming responsibility for providing Florida representation at the Region level in DNTS. Our thanks to those dedicated traffic handlers who made the AFPN work so smoothly for about 18 months. Lack of general support by the membership led to the AFPN demise. We wish FMTN best of luck with



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NEW MEMORY KIT, 1056 bit memory expandable to 4224 bits. 1 2102 supplied. Additional chips \$1.25 each. Led indicator. Adaptable to other keyers. Uses 5VDC. Only \$21.95

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600 MHz Prescaler Kit, Includes PC Board, Diodes, Resistors, Capacitors, 11C90 & Instructions. \$29.95

SEVEN DIGIT PORTABLE FREQUENCY COUNTER KIT 55 Mv @ 1 MHz to 12 Mv @ 135 MHz. Reads typically to 148 MHz. Requires 5VDC, uses 4 AA NiCads, has charger input. Accuracy ± 0.0002%. Gate times switchable 1 or .1 seconds. Board measures 2-7/8" x 4". Easy to assemble (case & batteries not included.) Uses 1 calculator type readout. PC board, parts & instructions. Only \$49.95 Add 6% for Shipping. Min. Order \$10.00. Out of USA send Certified Check or Money Order. Include Postage.

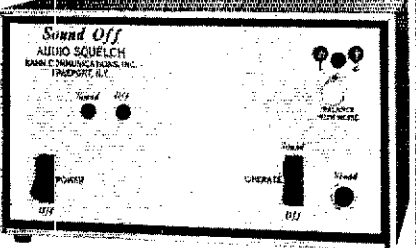


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MODELS SO-1 and SO-1-X



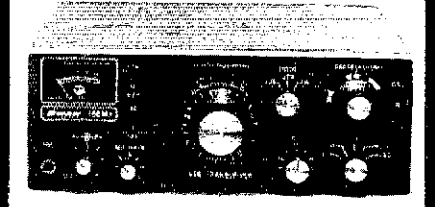
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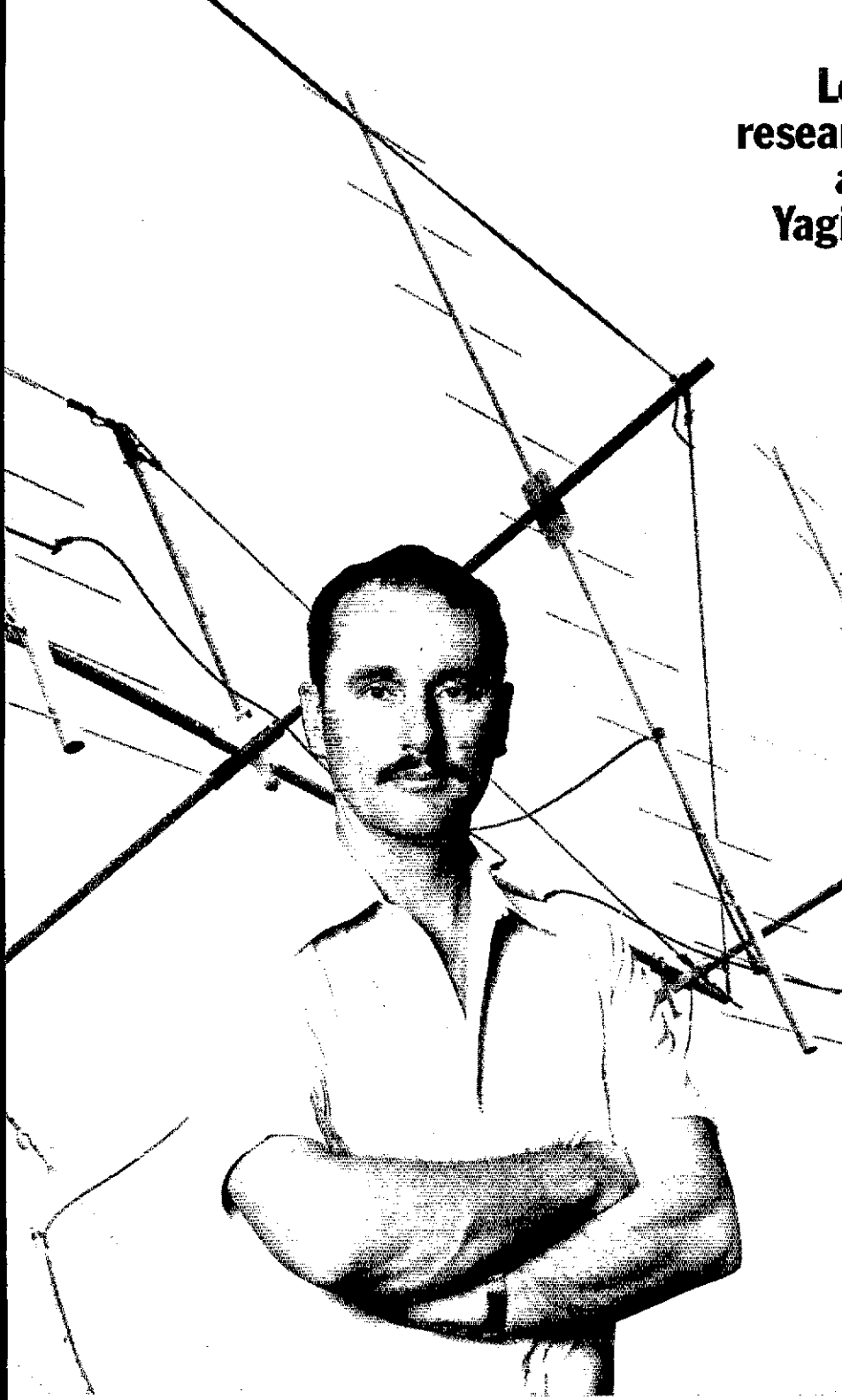
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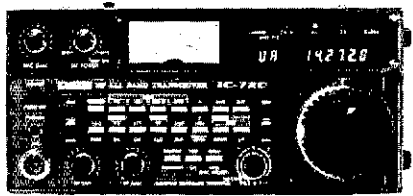
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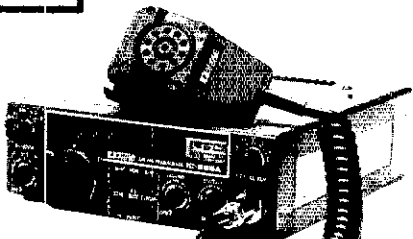
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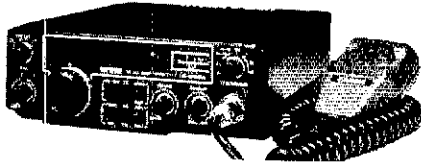


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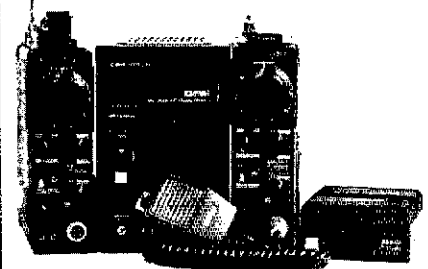


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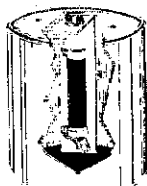
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their new responsibilities. Received a nice note from N4CSF now active as an Advanced after 15 years. GRT Working 15 meter ssh he completed both WAS and DXCC on June 4th. Nice going. He also reports new radio club starting up in Ruskin with 28 people showing up for organizational meeting. Heard Sun City Center Club radio equipment on 2 meters checking out suggestions and looking for Watch nets, clearing up for hurricane season. WB4CKV sent a nice note up on the Hollywood ARC repeater. WB4TONIR 146 385/146 985, dedicated to public service health and welfare covering a large area, about everything in Florida south of Lake Okechobee. Thanks to their high tower location in Miami. Received report from K1PLR, newly appointed QVS reporting band openings on 2 and 6 meters. Congrats on working 111 and Ind. on 2. This is the first QVS report received in over a year, so expect to cancel other QVS appointments which are in force. None of them responded to my letter of March 30. Looks like the QVS program is just about dead. The PSHR program continues to be quite popular with about 15 stations qualifying in the section each month. Quite a few stations have qualified for the PSHR Certificate, but there is a holdup at Headquarters in getting them out. My apology to WD4COL and KA4I ZI for inadvertently omitting them from the April PSHR report for the section. Since it was my goof and not theirs, I expect to get them credit for April. However, if an individual station fails to make his PSHR report in a timely manner, he might as well forget it. There is nothing that can be done to get that traffic. (June W3CJ) 380 WA4PFK 753 KA4Z1 648 WAMEE 658 W3WH 557 K4IH 501 K4SGI 421 WB4FVY 416 WD4AWN 336 WD4COL 273 WA4X 252 WA4NFK 208 K4ZK 169 WA4RA 153 K4LJK 108 WB4WYQ 106 WA4L 93 W4W 87 W4W 87 W4W 87 WA4LIG 54 K44NA 82 WB4PIB 57 W3TLV 46 WA4LIG 54 K44W 40 WB4CGK 37 WA4HXU 30 WB4SNX 29 WA4UCD 14 KA4ABA 11 WASMK 7 NA4PE 6 NA4JJO 3 (May) WA4ZJ 15 W4MML 7.

SOUTHWESTERN DIVISION

ARIZONA: SCM, W. L. Haskell AC70 - SEC: N7EH CTM, W7EP ARRI is sponsoring both incoming and outgoing QSL Bureau service for US & Can hams. They are reliable and can save you a bundle of change! KA7HEI, a new ham, now on 40 Meter s.w. with 50 watts and DX7 WB7NZ spent the summer in AZ. Let me know how you get a ham radio to you. W7KAX, EC for Mohave City, rpt the successful search for a seven year old boy who was lost off of highway 66 mile marker 117 in Yavapai Co. Amateur Radio was the only reliable means of communications. However, some CB was used by truckers and members of Search and Rescue. Participating were: WB7BVV WB7AZ KB7AG WA7YXC WB7BWO WB7RYO KA7ETA KA7ESZ K7JUY W7SOM WA7YPO and WA7JIG. N7EU is now TC for Coconino Co. The Tucson Public Ser. Net meets Mon at 7 P.M. on 3494. Net Mgr KB7KZ, Asst. Mgr. KA7GUL. WB7EAV used his Red Cross first aid training during a snake bite Apache Lake. Stop the bleeding on an injured person and his ham radio to summon to U.P.S. helicopter for transporting the injured. Good show. If your ARC is looking for a good speaker or someone to make an interesting presentation I have it from a reliable source that K7QWR, Phoenix, does an outstanding job! During the month of May, his lectures were on Field Day HF Linears, A-10 Net, QNI 1108, QTC 172, W4N, QNI 161, QTC 154, SWN meets at 01:30 thru Oct on 3683 kHz. K65L, Mgr. Thanks to all for Field Day messages!! Traffic: W7EP 123, K7MC 93, K7NIG 86, WA7KQE 62, W7OIF 49, K7JKM 32, W7DRR 15, N7FH 12, K7NMG 12, K4SDW 11, WA7NXL 8, WA7JCK 5, W7LWB 4, K7GLA 3, N7AUX 1.

LOS ANGELES: SCM, Stan Brock, N2YO - I'm glad to be back in SoCal and happy to have my SCM. I wish to assure all present appointees will remain appointed. I have appointed N6UK, John Walsh, ASOM. Additionally, W6INH is STM and WB6AF is SEC. Three new appointees have been made: KA6CTI OIS; AK6Y OES; and Associated Radio Amateurs of Long Beach, W6RO, OES, who has as their station location the Queen Mary in Long Beach Harbor. The Southwestern Division Convention will be held in Los Angeles at the Marriott Hotel Sept 5, 6, 7. W6GC is convention chairman and with the help of many amateurs in the area plans an exciting time for all. W6AWB is program chairman and has a special treat. W6AIP, president of Sams Radio Hams Camping Club will be a camper at a travel village in Yuma on Aug. 1, 2 and 3. The club meets monthly and travels all over the USA on outings. W6INH has all mono band antennas up and working. His Hy-Gain 205BA works well. I received 4 Field Day messages, two of which were handled by W6VIO. 775 for this month hope to have more next month. Traffic: W6INH 262, K6INK 126, WA6LVO 80, W6BR6 40, KA6CTI 17, N2YO 4.

ORANGE: SCM, Fred Heyn, WA6WZO - ASOM WA6WZN STM K6X1 SEC: W6UBO DECS: K6GGS W6LKN WA6LIE WB6ZYZ NMS WB6AKH W6CPB WA6QCA New ECS, WB6VMR WA6HFE N6ANL WB6HD WA6AE WA6ZYS W6PZD N6BXY W6RL W6TD WB6NOA now OBS 4. QVS: W6WIO now OBS (RTTY) QDS: WA6IQI W6TIO A660I N6P - we need more QDS - contact SCM and invite them. Future World Seal Beach has set up an ARS station. The Coast Guard Auxiliary hams, contact Flouilla Staff Officer WB6LULI if interested. Congrats to W6DXL for HPL 9+ straight months and PSRR for 15 months! W6DXL operates ASCII - anyone interested in starting a local ASCII net? Asst CA QSL Bureau Mgr. K6HY has many unclaimed 6-meter DX cards. ED was a huge success! Much PR gained by line news coverage with many cities declaring AR Week. W6BAM continues his OBS sked at 8:30 P.M. 7075 kHz. Sun Mon, Wed, Fri. EC, WA6WJM reports more drish and emergencies with outstanding help from W6S JBO, K1J NLR, K6CS, K2B W6RS, K2M, K6H GMW, W6BPI R, W6BIO I, K6G AF6, D211 FHS, K6F New officers of the So Cal ATV Club are: WB6OFG pres.; WARSVI vice pres.; WA6WMD secy; HRS; K6ZG reports Golden Bear Net of P.M. 3975 kHz div officers: K6OJJ, pres.; W6G6FN, vice pres.; W6BQAK secy; HRS; K6KVN, NM. N6BVU completed a 2-mtr repeater list while W6BGC I updated Thru list. NM W6BKR reports repeater 222.92224.42 has auto patch. MWRA - repeater now on Santiago peak - elected officers: W6NQA, pres.; W6AOP, vice pres.; W6BHCB secy. WA6LGF, Iregis K6SMM reports a new repeater by the Tahachapi ARC on 147.667 U6. WA6HEF reported W6WIO provided emergency communications to W6YCW on his troubled voyage to Hawaii. Don't miss SW Div. Conv. Sept. 5-7 - Intro to

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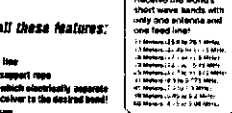


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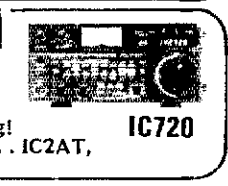


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ALDA 103 80-20m Xcvr \$279	MM-2700 Matcher 219	RF-4800 SW Rcvr 289
ATLAS 350XL Xcvr \$549	RN-7 Remote VFO 139	RF-8000 SW Rcvr 999
350XL/DD6 Digital 599	TR-22 2m FM Xcvr 99	RFE
350XL/DD6/305 649	TR-22C 2m FM Xcvr 125	RFE-100 Dig disp \$ 89
350PS AC supply 149	AC-10 AC ps 29	REGENCY
210X/NB Xcvr 399	ALCXY R-530 SW Rcvr \$599	HR-2MS 2m FM Xcvr \$ 99
210X/LE Xcvr 449	GENAVE SIX-200 2m FM (Clev) \$ 99	HR-212 2m FM Xcvr 99
215X/NB Xcvr 399	GONSET	P-104 Power supply 29
200PS Port ps 69	711A AC supply \$ 79	EC-175 Counter 129
220CS Cons ps 99	HALLCRAFTERS	ROBOT
MT-1 Transmitter 19	HI-44 Transmitter \$159	80A Camera \$229
VX-5M VOX 49	PS-150-120 PS 69	SBE
110L Xcvr (RX+TX) 249	SR-400 Cyclone II 349	SB-34 Xcvr \$199
PS-110H 12v ps 69	SR-400A Cyclone III 399	SB2-VOX VOX 15
Astron 200A Xcvr \$479	P-500AC AC ps 99	SB2-XI Xtal cal 9
CLEGG/SUIRES-SANDERS	HA-1 Keyer 49	DD-1K Dig display \$ 79
22'er FM series 25 \$ 99	HEATHKIT	SC-30 Counter 79
FM-27B 2m FM Xcvr 149	HR-1680 Ham Rcvr \$199	SC-250 Counter 79
011 AC ps 39	IR-1100 Counter 79	STANDARD
031 AC ps 49	IM-4100 Counter 79	G-6500 SW Rcvr \$189
COLLINS	HY-GAIN	SWAN
753-1 Ham Rcvr \$299	3750 Xcvr \$699	P-1215 AC supply \$ 49
753-3 Ham Rcvr 399	ICOM	SS-200 Xcvr 299
753-3CW filter 450	IC-701 Xcvr/ps \$899	SS-200A/SS-16 389
753-3B Ham Rcvr 499	IC-551 6m Xcvr 299	PS-20 AC supply 95
753-3B Ham Rcvr 499	IC-21A 2m FM Xcvr 149	160X 160m Xcvr 299
753-3B Rcvr (round) 449	IC-22S 2m FM Xcvr 179	260 Xcvr 289
515-1 SW Rcvr 995	IC-202 2m SSB Xcvr 175	270 Xcvr 309
515-1 Rcvr (round) 1295	IC-211 2m Xcvr 449	350 Xcvr 229
325-1 Transmitter 295	IC-215 2m FM port 149	500 Xcvr 289
325-1 Transmitter 450	IC-230 2m FM Xcvr 169	500CX Xcvr 399
40L-1 linear 399	IC-245 2m FM Xcvr 269	500CX/SS-16 399
312B-4 Console 199	IC-245/SSB 2m Xcvr 329	700CX Xcvr 399
RWM-2 Xcvr 575	IC-280 2m FM Xcvr 219	HF-700S Xcvr 379
351D-2 Mobile mt 49	IC-300A 450 FM Xcvr 279	117C AC ps 65
516F-2 AC supply 199	IC-3PA AC supply 49	117X AC ps 65
516E-1 RWM-1 DC ps 69	IC-3PS/IC-20L 99	117XC AC supply/spkr 99
MP-1 DC supply 49	JOHNSON	230CX 110/220 ps 95
DENTRON	Kw matchbox/SWR \$149	FSU-3 AC ps 109
160-V 160m Xvtr \$119	KLM	PSU-3A AC ps 119
160-10AT Tuner 99	Force 5 Xcvr/ps \$895	14X DC module 49
160-10AT-3kw Tuner 119	2-140B 2m FM amp 149	14C DC module 49
MT-3000A Tuner 289	4-80BL 2m amp 159	14-117 DC ps 99
160-10L Linear 399	10-40BL 2m amp 99	100MX Speaker 199
MLA-1000 ac ps 249	10-70B 2m FM amp 99	PSU-5 AC ps 129
GLA-1000 Linear 239	15-80BL 2m amp 149	102BX Xcvr 788
AF-1A Audio proc 99	15-160BL 2m amp 169	PSU-6 AC ps 139
DRAKE	KENWOOD	405X Xtal osc 34
2B Ham Rcvr \$179	R-899 Ham Rcvr \$249	510X Xtal osc 39
2C Spkr/Q-mult 29	R-599D Ham Rcvr 349	508 Ext VFO 148
2D Ham Rcvr 189	S-599 Speaker 15	6001 Transmitter 325
2Q Spkr/Q-mult 29	T-599D Transmitter 375	600R Custom/SS-16 349
R-4 Ham Rcvr 259	IS-120S Xcvr 499	MKII Linear 575
R-4A Ham Rcvr 279	IS-520 Xcvr 499	1500Z Linear 399
R-4B Ham Rcvr 329	DG-5 Dig disp 139	250 6m Xcvr 199
R-4C Ham Rcvr 399	IS-820S Xcvr 799	250C 6m Xcvr 269
HL-500 Filter 35	SP-820 Spkr 49	NS-1 Silencer 39
MS-4 Speaker 19	A1-200 Tuner 39	FP-1 Patch 39
ESR-1 SW Rcvr 249	IV-502 2m Xvtr 189	FP-4 Patch 49
SPR-4 SW Rcvr 349	IV-502S 2m Xvtr 199	ST-2A Tuner 175
IS-4 Synthesizer 175	IS-700A 2m Xcvr 429	DD-76 Dig disp 119
SC-2 2m rev conv 69	SP-70 Spkr 15	TPL
SC-1 Conv outside 39	VOX-3 VOX 12	JUZ 2m 10/70w amp \$ 99
RV-3 Xcvr 299	IR-2200A 2m FM 139	802B 2m 1/60w amp 149
IR-3 Remote VFO 69	IR-2200A/1525EM 149	1202 2m 5/80 amp 139
IR-4 Xcvr 349	IR-7400A 2m FM Xcvr 289	3A13AD 12v ps 59
IR-4/NB Xcvr 389	IR-7525 2m FM Xcvr 249	TEMPO
IR-4C Xcvr 399	RM-76 Programmer 89	2020 Xcvr \$499
IR-4CW Xcvr 450	PS-6 Power supply 49	Tempo One Xcvr 289
IR-4CW/HI Xcvr 489	LUNAR	AC One AC ps 99
34PNB Blanker 75	2m 10-80w amp \$139	VHF-One 2m FM Xcvr 149
FF-1 Xtal adapt 29	MIDLAND	GEN-TEC
IR-6 6m Xcvr 529	1-3-510 2m FM Xcvr \$249	505 Argonaut \$229
IR-6/NB 6m Xcvr 579	NDI	210 AC ps 129
1-4X transmitter 299	HC-1400 2m FM Xcvr \$239	251 9A ps 49
1-4XB transmitter 349	PACE	Iriton II Xcvr 349
1-4XC transmitter 399	Comin II 2m FM Xcvr \$739	262 AC supply 39
AC-3 AC supply 65	PANASONIC	262M AC supply 99
AC-4 AC supply 89	RF-2200 SW Rcvr \$119	540 Xcvr 399
MM-7 Matcher 129	RF-2900 SW Rcvr 179	544 Dig Xcvr 449

Omni-D Ser B Xcvr 669	FI-101F/fan/filt 679	FI-221R 2m Xcvr 279
252M/O AC ps 99	FI-101Z Dig Xcvr 629	YG-221 Dig display 79
Century 21 Xcvr 249	FI-301S 20w PEP Xcvr 399	FI-224 2m FM Xcvr 99
Century 21 dig 799	FI-301DIG Xcvr 599	FI-227R 2m FM Xcvr 219
276 Calibrator 19	FP-301 AC ps 99	FI-227RB 2m FM Xcvr 269
645 Keiver 59	SP-120 Speaker 19	FI-620B 6m Xcvr 299
WILSON	EV-301 Remote VFO 89	FI-625RD 6m Xcvr 499
Mk 2: half 2m HI \$139	YO-301 Scope 179	FI-627BA 6m FM Xcvr 279
WE-800 2m FM Xcvr 279	FC-301 500w PEP tuner 99	1PU-2500RK 2m FM 319
YAESU	FI-AB Xcvr 479	FI-207R 2m FM HI 279
FDX-401 Xcvr \$399	FI-901DM Xcvr 899	FRG-7 SW Rcvr 239
FDX-560 Xcvr 399	FI-901D Xcvr 699	YP-150 Dummy/meter 49
FDX-570 Xcvr 449	EV-901DM Ext VFO 299	YG-3550 Counter 169
FI-101D/all options 599	FI-107M/DMS Xcvr 875	YG-500-J Counter 149
FI-101 Transmitter 349	SP-107P Spkr/patch 55	7-24-80
FI-101B Xcvr 499	EV-107 Remote VFO 119	
FI-101E Xcvr 599	200R 2m FM Xcvr 99	

(1) This list was prepared from an inventory taken on the date shown. The quantities vary. In some cases there are several of one item, others, only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. But, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment specials, closeouts, etc. shown on this page.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Must Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Visa (BankAmericard); no trades.

ALDA 103 80-20m Xcvr/ab/cal/mic \$573 349	reg. NOW	1-7 linear with tubes limited qty of old price 1294 1099
ALLIANCE HD-73 Rotor \$154 109	reg. NOW	RP-500 Receiver protector 90 69
AMECO BIU Bridge indicator unit \$ 21 5	reg. NOW	AN-5 Shortwave ant 8 5
ATLAS DMK/XL Mobile mt \$ 65 39	reg. NOW	MN 7 Tuner 175 149
215XS/NB (LE) Xcvr/blanker 810 399	reg. NOW	MMK-3 MI for IR-4 10 8
RX-110 Rcvr+TX-110L Xmtr 438 299	reg. NOW	707Z Hand mic 14 9
RX-110+IX-110H/PS-110H 636 399	reg. NOW	1525EM Encoder mic 49 35
CDI AM filter for FI-101 \$ 39 29	reg. NOW	CC-1 Converter console 49 45
CES 800-YS Scannet, HI-227R \$99 79	reg. NOW	UV-3 3-band DEMO 995 899
DENTRON Astro 200 Xcvr \$995 495	reg. NOW	76A Linear 1695 1339
Astro 200/CW filter 1045 545	reg. NOW	76A w/lightweight Xmr 1860 1499
Astro 200A Xcvr 1095 595	reg. NOW	76A Linear 1995 1585
BPS-200 AC supply 135 125	reg. NOW	76CA Linear w/light Xmr 2195 1695
SPR-200 Speaker 30 24	reg. NOW	374A Linear 2195 1995
SPS-200 AC ps/speaker 165 149	reg. NOW	78 Linear 2895 2295
SQC-200 Sfm console 295 195	reg. NOW	77DX Linear 4495 4495
MIC-STA Desk mic 38 29	reg. NOW	Vomax Speech processor 145 179
COLLINS 312B-2 Speaker 3992 3393	reg. NOW	Vomax AC supply 15 15
KWM-2A Xcvr 768 599	reg. NOW	Note: Above ETO prices apply to limited quantity of units in existing inventory, which were purchased at old prices.
PM-7 Portable supply 4673 3172	reg. NOW	EDGECOM 3000A 2m Xcvr \$549 299
32S-3A Transmitter 467 396	reg. NOW	ELECTROVOICE 641 Microphone 39
516F-2 Power supply 732 499	reg. NOW	400 Stand 14 7
312B-4 Station console 557 399	reg. NOW	600E Mobile microphone 28 15
302C-3 Wattmeter 305 199	reg. NOW	HY-GAIN TH6DX 6 el truck \$229 249
DL-1 Dummy load 297 192	reg. NOW	TH5DX 5 el tri-band truck 269 199
GC-2 Carrying case 297 199	reg. NOW	TH3MK3 3 el tri-band truck 279 169
GC-3 Carrying case 297 199	reg. NOW	TH3R 3 el tri-band, 600W 169 129
CUSHCRAFT A14-3 3 el 20m beam Truck \$169 99	reg. NOW	TH2MK3 2 el tri-band 149 119
A28-3 3 el 10m beam 69 49	reg. NOW	Hy-Duad 2 el quad 214 209
DENTRON HF-200A Xcvr \$699 450	reg. NOW	402BA 40m 2 el beam truck 239 189
HF-ACS 12v 10A supply 129 49	reg. NOW	205BA 20m 5 el beam truck 329 249
160-A1 160m ant tuner 59 29	reg. NOW	204BA 20m 4 el beam truck 249 189
80-10AT 80-10m tuner 59 39	reg. NOW	203BA 20m 3 el beam truck 139 99
PS-10 VOM/wattmeter 49 29	reg. NOW	155HA 15m 5 el beam 189 149
PS-20 VOM/wattmeter 69 39	reg. NOW	153BA 15m 3 el beam 89 79
F-1 FS meter 19 15	reg. NOW	105BA 10m 5 el beam 129 99
W-2 Wattmeter 129 99	reg. NOW	103BA 10m 3 el beam 74 59
W-2 PEP Wattmeter 159 99	reg. NOW	Hy-Tower 80-10m vert truck 659 279
AF-1A Speech processor 199 129	reg. NOW	18AVQ/WB 80-10m vertical 105 84
GLA-100D Linear 379 279	reg. NOW	14AVQ/WB 40-10m vertical 62 54
GLA-1000B Linear 399 339	reg. NOW	12AVQ 20-10m vertical 49 37
Clipperton L Linear 699 549	reg. NOW	28BD 80-40m trap doublet 59 49
MLA-250QB Linear 1299 749	reg. NOW	58DQ 80-10m trap doublet 109 89
HTR-200UL Amp Air Freight 1329 999	reg. NOW	38U7 Nicad for 3806 34 19
Jr. Monitor Tuner 79 49	reg. NOW	1106 Wall cert for 3806 9 5
Super Tuner Plus Tuner 149 129	reg. NOW	ICOM IC-701 Xcvr/ps/mic 1375 999
MT-3000A Tuner 399 339	reg. NOW	IC-245 2m FM Xcvr 579 279
RF-3000 Tuner 239 269	reg. NOW	IC-245/SSB 2m Xcvr 699 349
A1-1K Tuner 149 129	reg. NOW	IC-255A 2m FM Xcvr 389 329
AF-3K Tuner 259 229	reg. NOW	IC-3PA Power supply/spkr 99 99
BL-1 Balun for AI-1K/3K 49 45	reg. NOW	IC-502A 6m SSB port 229 199
Big Dummy Dummy load 39 35	reg. NOW	IC-211 2m Xcvr 899 599
DRAKE DSR-2 SW Rcvr 3400 2400	reg. NOW	IC-202 2m SSB port DEMO 289 189
	reg. NOW	IC-30A 450 FM Xcvr 449 375

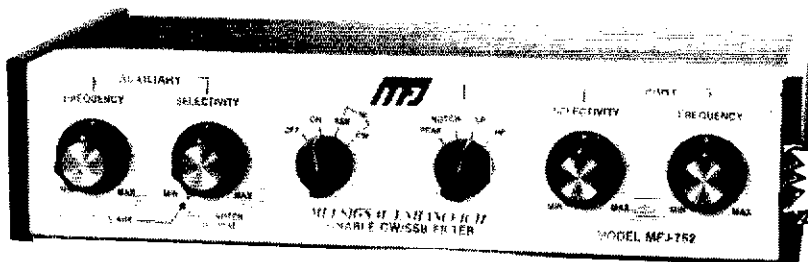
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Most Versatile Filter



BRAND
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The MFJ-752 Signal Enhancer is a dual tunable SSB/CW active filter system that gives you signal processing performance and flexibility that others can't match.

For example, you can select the optimum Primary Filter mode for an SSB signal, zero in with the frequency control and adjust the bandwidth for best response. Then with the Auxiliary Filter notch out an interfering heterodyne... or peak the desired signal.

For CW, peak both Primary and Auxiliary Filters for narrow bandwidth to give skirt selectivity that others can't touch. Or use Auxiliary Filter to notch out a nearby QSO.

The Primary Filter lets you peak, notch, low-pass, or highpass signals with double tuned filter for extra steep skirts. The Auxiliary Filter lets you notch a signal to 70 db. Or peak one with a bandwidth down to 40 Hz.

Tune both Primary and Auxiliary Filters from

300 to 3000 Hz. Vary the bandwidth from 40 Hz to almost flat. Notch depth to 70 db.

MFJ has solved problems that plague other tunable filters to give you a constant output as a bandwidth is varied. And a linear frequency control. And a notch filter that is tighter and smoother for a more effective notch.

Works with any rig. Plugs into phone jack. 2 watts for speaker. Inputs for 2 rigs.

Switchable noise limiter for impulse noise; trough clipper removes background noise.

Simulated stereo feature for CW lets ears and brain reject ORM. Yet off frequency calls can be heard.

Speaker and phone jacks. Speaker is disabled by phones. OFF bypasses filter. 110 VAC or 9 to 18 VDC, 300 ma. 10x2x6 inches.

Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

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Specials, Closeouts & Overstock equipment, etc. continued from opposite page.

KLM	reg.	NOW	NYE	reg.	NOW	TPL	reg.	NOW	VHF ENGINEERING	reg.	NOW
661 6m Xcvr	\$695	499	250-25-3 500w tuner/relay	\$212	88	1202B 2m FM 1-4/80-100w	\$269	169	FS-15C Kit 12v 10A supply	\$ 99	79
FDM-148 Desk microphone	29	19	250-25-4 500w tuner	202	88	401 220 FM 5-15/30-45w	139	99	PS-25C Kit 12v 20A supply	139	119
2R-30-4 4 el 10m beam	129	99	PALOMAR	reg.	NOW	350 450 FM 5-15/25-40w	179	129	WILSON	reg.	NOW
144-148-9 9 el 2m beam	33	24	Kachina 6 & 10m Xcvr	\$689	289	TEMPO	reg.	NOW	1402 2m FM 2w HI	\$254	149
144-148-14 14 el 2m beam	65	45	REGENCY	reg.	NOW	DM-20 Desk microphone	\$ 39	29	1402/TTP 2w HI w/touch tone	316	179
219-226-11 11 el 220 beam	32	27	DPS-5K Selector for Whamo	\$199	49	VHF/One 2m FM Xcvr	495	195	1405 2m FM 5w HT	329	199
1500HD Hvy duty rotor Truck	795	495	EC-175 175 MHz coupler	449	149	S-2 220 FM HT	349	315	The following model 2m HT's are without the high/low pwr. switch & batt. LED.		
KENWOOD	reg.	NOW	AK-2 2m amplifier	119	89	S-2T 220 FM HT w/TTP	399	359	Mk II HT/batt/wall cgr/IPT	332	189
I-599D Transmitter	\$499	399	HR-440 440 FM Xcvr	349	249	TEN-TEC	reg.	NOW	M-320 3 el 20m beam	149	99
S-599 Speaker	25	19	MT-15S 15w VHF marine Xcvr	349	175	545 Omni-A Series B Xcvr	\$949	649	WV-1 40-10m vert, radials	79	59
PS-5 5A 12v ps w/clock	79	59	MA-8 Small speaker	16	9	Urion IV/digital DEMO	869	569	WM-62 6/2m mobile ant	29	14
TR-7600 10w 2m FM Xcvr	375	289	ROBOT	reg.	NOW	540 Xcvr	699	499	YAESU	reg.	NOW
FR-7675 25w 2m FM Xcvr	425	329	400 SSTV scan converter	\$795	599	544 Digital Xcvr	869	599	FI-107M Xcvr	1045	899
MIDLAND	reg.	NOW	SEI	reg.	NOW	252M 12v 18A supply	139	125	FP-107 Internal ps	139	125
13-510A 2m FM synth Xcvr	\$399	329	SPS-8 12v 8A power supply	\$ 59	29	252M/E 115/230v ps w/VOX	166	149	FP-107E External ps	145	129
18-940 2m tnk/roof ant	31	15	SPS-10 12v 10A power supply	79	49	240 160m converter	110	99	FT-101Z Xcvr	749	599
18-941 2m magnet ant	37	25	SPS-10M 10A ps w/meter	99	69	241 Xtal oscillator	35	29	FT-101ZD Digital Xcvr	942	749
18-950 220 tnk/roof ant	31	15	SPS-20 12v 20A power supply	109	79	509 Argonaut Xcvr	389	319	FT-1017D (WARC)	942	799
18-951 220 magnet ant	37	19	SPS-30 12v 30A power supply	129	99	251M 10A 12v ps w/ammeter	95	79	FT-7B Xcvr	675	575
MIRAGE	reg.	NOW	SMA-100 2m 5-15/70-80w	149	99	KR-1A Keyer paddle only	35	25	FP-301 12v supply	157	139
B-108 5-15/80w 2m amp	\$169	149	SMA-101 2m 1-5/70-80w amp	179	179	KR-2A Keyer paddle only	17	9	SP-10TB Speaker	25	22
B-1016 5-15/160w 2m amp	279	249	SPA-101 1-5/70-80 amp, ps	329	199	KR-50 AC/DC keyer	110	89	YD-101 Monitor scope	320	199
B-3016 15-45/160w 2m amp	239	209	SPECTRONICS	reg.	NOW	TRI-EX	reg.	NOW	FTV-250 2m transverter	275	225
MOSLEY	reg.	NOW	SC-30 30 MHz counter	\$169	59	W-51 Tower/base/winch	1023	767	FR-101S Receiver	699	349
1A-33 Jr 3 el trband Truck	\$197	137	SC-250 250 MHz counter	219	89	RCB-51 Extra base for W-51	160	120	FR-101 Transmitter	649	399
CL-33 3 el trbander Truck	304	213	STANDARD	reg.	NOW	CO-3 Coax standoff kit for W-51	38	28	11-301 Phone patch	49	45
CL-36 6 el trbander Truck	392	274	G-118 2m FM HT/batt/cgr	\$313	149	LM-354 Tower/base/winch	1863	1397	YP-150 Dummy/wattmeter	86	79
CL-203 3 el 20m beam Truck	290	203	G-118/TTP 2m FM HT/TTP	373	189	RCB-54LT Extra base, LM-354	210	157	XF-31C CW filter for FT-401	45	35
RV-40 40-10m vertical	82	57	SWAN	reg.	NOW	TA-54L Tilt-over base, LM-354	437	327	QR-24 World clock	35	29
RKV-345 Vert rof mt kit	14	9	10DMX Xcvr	\$699	499	MG-50 Motor kit, LM-354	442	331	FT-625RD 6m Xcvr	895	649
DIV-80 1 band dipole kit	18	12	HF-700S Xcvr/PSU-3A ps	878	599	CO-3 Coax standoff, LM-354	38	28	FI-277RA 2m FM Xcvr	399	299
SWV-7 49-11m SWL vertical	90	63	WM-6200 6 & 2m wattmeter	87	59	AD-100 2" x 10' mast	56	42	FI-227RB 2m FM Xcvr	380	329
DI-2 2m Diplomat gnd plane	36	25	WM-1500 Wattmeter	74	59	AD-150 2" x 15' mast	78	58	CPU-2500R 2m FM Xcvr	569	359
DI-2A Deluxe 2m Diplomat	57	39	PS-20 12v 20A supply	179	119	Note: Milwaukee has the above limited stock of Tri-Ex products, which are all shipped via truck, freight collect. If you live closer to Milwaukee than to the factory in California you will SAVE FREIGHT!			FI-207R 2m FM HT	467	399
DI-220 220 Diplomat gnd plane	23	16	FC-76 40 MHz counter	169	79						
DI-430 430 Diplomat gnd plane	21	14	ST-1 Antenna tuner	189	129						
			742 75-20m mobile ant	109	79						

7-24-80

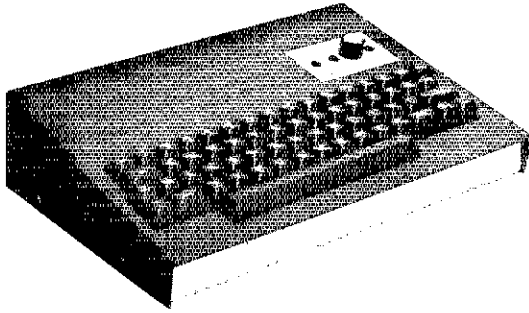
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Amateur Radio" Friday night. OCCARO thanks SOARA pres WD6EDP for great OC Fair booth as well as the 50 plus hams that helped including KA6L5B and KA6L5C. (DJ)WVR who put in over 80 hrs duty

Net From Time/Dy ONI GTC NM
SCN1 FAS1 598 kHz 0200Z 319 154 N5YH
SCN2 SLOW 399 kHz 0430Z 277 107 K6YD
SCN1VH 14 045645 0900Z 376 223 WA6QCA
SCN1RTTY 363/kHz 0400Z 30 4 W5F1KI
Traffic: June: N6ANL 520, WB6EIG 508, WB6G1Z 201, W6HE 161, W6DXL 56, A16L 51, KA6A 43, WA6QCA 37, K6ZCE 28, WA6WZO 23, W6CPB 8, DJ0WR/WV6 6, WA6WZ2 5, K6GGS 4, W6IKN 4. (May) W6DXL 28

SAN DIEGO: SCM, Arthur R Smith W6INI - 51M; N6GW SEC; W6INI Asst SEC; N6RD, Field Day messages have been received from: WA6BUS AR6H K6HAI N6JF N6KW W6NWG N6OU K6QHQ and K6ZH. At reunion of charter members of Palomar ARC, first pres. ex-W6DHV was greeted by current pres. WB6JZ. K7ZDG came all the way from Alaska and KH6CZ phoned the gathering from Hawaii. Credits to historical committee: W6BLI, K6HAY, WA6K7N. Upgraded to Extra WA6SUA now K6HR. W6BLI got new KM6S. Novices interested in message handling should call National Novice Net at 1600 PDT, Sundays, 21-21.5 MHz. Call "CC" for destination of your message. WA6JF Y's new motor home has a 35 kW generator. New CP for ARES? WB7SUA is active on SCN with an HW 16. New ARES members: N6CUX, KA6FDW, WD6FFW, KM6H, KM6S, WA6GDL has new vertical for 20-15-10 meters. Poway ARC is planning increased support of ARES. KM6I made Field Day with South Bay ARES. Traffic reports and PSHR reports must be in my hands no later than 15th of month. Traffic: June: WB6PVH 249, N6AT 110, N6GW 100, KM6I 74, N6RD 28, WB7SUA 21, WA6GDL 2, WA6JF Y 1 (May) WA6JF Y 1

SANTA BARBARA: SCM, Robert Dyrull, W6POU - Send fax to N6MA for Ares dedicated svcs as SCM. Paul has new relay. Kelly assisted by WD6EJL did state. Bunker-Hamro: WB6ORC; Poinsettia: WA6MBH; Cambria: K6FJ; Coahuila: W6HL; SBAKC: K6IZ; Satellite: W6AB; Siquoc: N6GL; Sierra: WA6K; San Gil: W6PN; Smt: Stellers: K6KI (now aftl club); I U saw A1V, satellite solar, pedal pwr Q5G. Congrats 60th anniv. SBAK, A 250 members - WA6VNN new pres. W6KPS WB6UEU wkg on rpts for data handling. NM K6DZT. See. Net on 7235 Sun 10:00 & 3985 MWF 1930 PT. ARES Ventura - life saved! SBAR lost boy search. WA6MBZ eye bank transfer. K6BPK new ARES Coord. PSHR: WA6MBZ 59, K6YD 51, N6WP 47, WA6JF B 36, WA6HJ 16, K6JZ 15, W1UUG 8. Traffic: WA6MBZ 190, W6ZRR 120, N6WP 84, K6YD 58, WB6TRP 35

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC - Asst SCM; ARES: 51M; W5VMP, NMs: AA5J, AF5I, N5BT, W5HMR. Due to business commitments, N5WB must give up his post as SEC. Are there any lakos for the post? There is travel, a fair amount of paperwork, and a lot of on-the-air activity required; with the League picking up the tab for travel and mail expense. The ideal applicant should be an avid traffic person, and be active on all the section nets. Let me know if interested in more detailed info. EGS - please report directly to me until further notice. We are in the process of developing a district system in the ARES, with a District LC in charge of each. WA5GYP and W5CBT have been appointed DEC for districts 1 and 2 respectively. The folks in the panhandle have developed a model ARES network that we are all proud of! My apologies to W5HMR who is the ITN Net Mgr for the belated NM appointment. My fault. Our feature club of the month is the AMATEUR RADIO CLUB OF CARROLLTON, right here in the ballas area. The club is very public service oriented, participating in many activities. There is a fine license class, with 7 General Class students graduating soon. Most of the membership is Skywarn trained and function of both local and statewide weather spotting duties. The newly elected officers are: WB5ONG, pres; W5GVB, vice pres; KA5HCC, secy; WB5JFS, treas; WA5BHQ, dir of ent. The club operates a 450 MHz repeater, linked to 2 meters on 146.54 simplex. The club meets the second Thurs of each month at 7:30 at the Carrollton Recreation Center. K5XO reports the EOC in the Hamilton Hosp. Olney, is in full operation, with sins installed on 2, 40, and 75 mtrs. The EOC was almost immediately pressed into service on May 27, when the city was totally isolated by flood waters. Manning the station was K5XO, K5JHG, W5HMR and W5JGV, who had to be rescued from high water on the way into the city. W5 mts was led into the city via the HWY by the ARES units in Wichita and Young Co's. PSHR for June: W5JYI, W5JUE, WA5GD, W5VSD, K5UL, N5BT, A5JF, W5VMP, W5SLAT & W5HMR, Texas Slow Net (NSN) for June: ONI 716, GTC 43, in 30 sess. Traffic: N5BT 162, W5JUE 105, K5QKM 75, WB5BKM 56, WA5INJ 54, W5JYI 47, AA5J 42, W5PIL 39, W5HMR 38, W5SLAT 38, W5FRI 36, WA5QD 35, K5UL 33, W5VSD 32, K5PC 28, W5VMP 27, WA5E2I 24, AE5I 23, KA5AYO 16, W5G1Z 13, A5JF 12, N5BOG 11, W5YK 4, W5P16M 2

OKLAHOMA: SCM, Leonard Heiler, WA5FSN - Asst SCM; W4RFC; SFC; WA5MI; NMs: K5CAY, W5IRB, W5NND, WA5OUY, W5STU, W5UJH. They will appreciate your help very much in the various nets. Summer doldrums and band conditions are hurting operations and reports are down 25-35%. W5 1300. All regular reports from nets reflect the summer trend, but not had 4 local nets report good activity. Does the later evening hour help? OK continues to hold its 100 percent representation in DRN 5 and CAND. FB: W5JFS back in hospital. WA5OUQ lost tower and beams in break storm. W5BLW honored by Ardmore Club for long and outstanding service. W5IRB, W5STU, W5UJH now NMs. W5RR stepping down after many years at the helm of OZ. He will be missed. 13 reports from ED stations indicate good participation, with fuel the biggest problem. W5STU had an excellent report on 2-m SSR activity and with the "skip" seen and heard since, should be a better report next month. K15A's bulletins on Sun AM, are appreciated by all. Over and all over the Hamarama next big events for OK. CU: IHLR, 727 174c, W5NKC 738, K5JGZ 203, W5H17 174c, K5DWK 140, W5IRB 118, K5CXP 117, WA5FSN 78, WA5OIV 64, K5T Y 53, W5DRB 55, W5GLO 46, K5CAY 44, W5UJH 41, W5VXU 41, W5SFR 39, W5UG 36, WA5HSU 29, W5VLW 28, W5HEC 25, W5VOR 23, W5ELG 22, K5MGD 22, W5EAY 18, W5FKL 18, W5IRB 13, WA5SFC 12, W5HGH 4.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN - Asst SCM; M1M, N5TC, SEC: AK5N. Thanks to all stations



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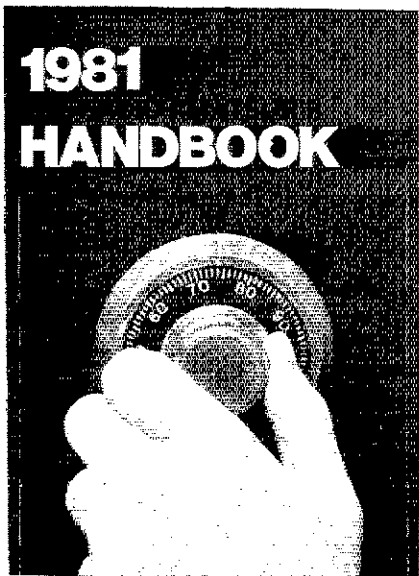
reporting. Even with a heat wave and the summer QTC doldrums, 25 5ms reported traffic and 11 made PSHR. AK5N reports that he and WB5PI H built and installed a new 7540-mtr trapped dipole at DPS hq in Houston. WB5TAY continues to update station with the addition of an Accumemory II Keyer. KB5NX is now NCS on the Central Gulf Coast Hurricane Net, and is now Asst NM of same. KC5M is now NM for CGCHN. K5RG is preparing for meeting of the Central Area Staff July 26-27. Congrats to the following new appointees in the SIX Section: AK5N WD5DQR as OIS, WD5AAH is now LC for Southern Brazoria City and OES; W5CKL is now DFC for Harris City, with K5HGB as Asst. DFC; W5SPD AB5X KB5TC K5SCR K5BY are now LC in Harris City. Field Day has come and gone again. Here's hoping it was enjoyable for all. AC5K operated with K5SCR group on battery power and had 8 QSO directly off solar coils (QRP). Received a copy of the Brenham ARC newsletter — very nice and chock full of info. WD5FGY has new J Pole drawn 2 Mtr beam (home brew) WD5JJS is sporting a new LC-551 6 Mtr rig. N5RA is still publishing an informative bulletin for the San Antonio ARC. There's lots of beam activity in the Valley reported by W4KH WD5CJD N5BJV and W5YMU. Traffic: W5KLV 488, WB5YDD 345, K5HZR 232, N5TC 166, WB5MMI 114, KB5TC 95, W4BGE 84, WB54RV 74, KC5M 65, W5SBE 64, WB5TAY 48, KA5BSN 43, WD5GKH 41, AK5N 35, K5RG 31, N5FN 29, WA5RVT 29, WD5DQR 19, KB5NX 19, WB5GIT 18, AK5M 10, WH5LJ 6, KA5DHL 4, WB5UYV 4, KD5AO 3.

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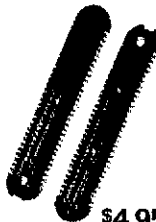
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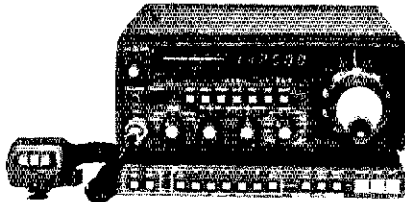
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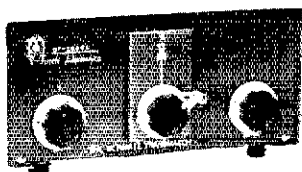
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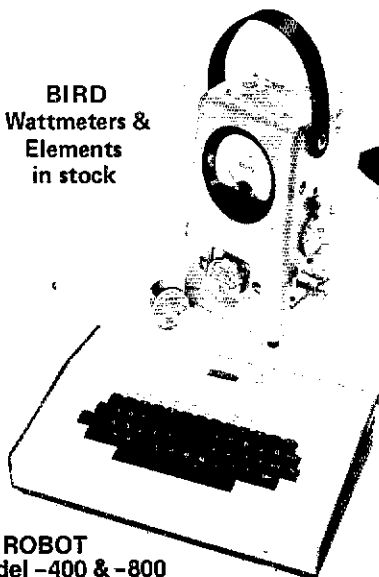


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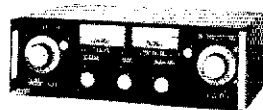
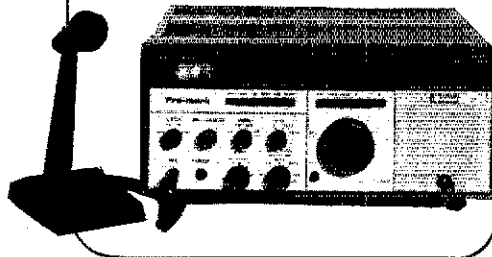
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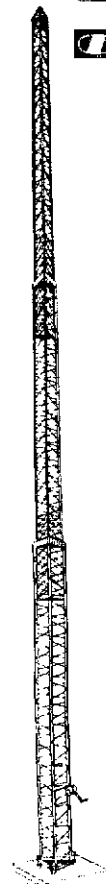
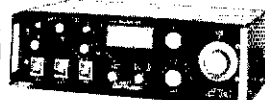
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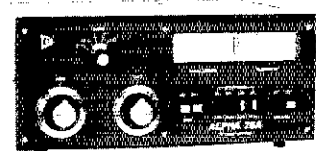
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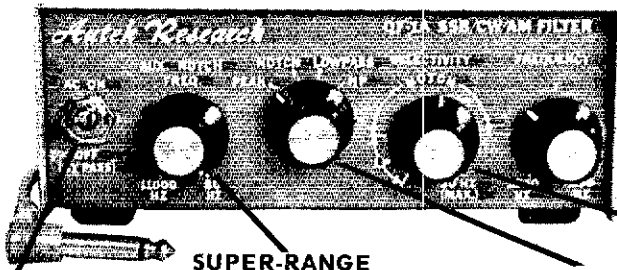
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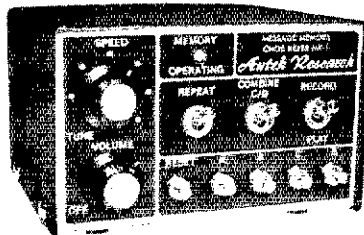
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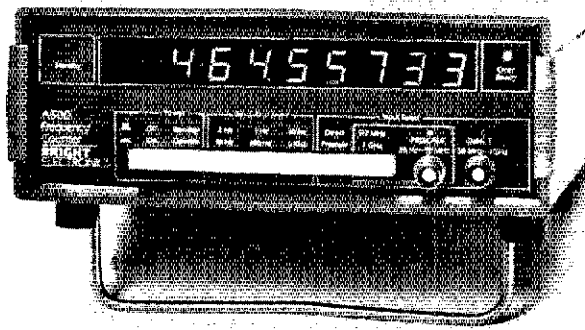
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- [7] Built in U.S.A.
- [8] First Quality Components
- [9] Useful Options
- [10] Factory Assembled and Tested

OPTIMUM PERFORMANCE from your fine quality receivers and transmitters is assured when you are precisely on frequency with a carefully built BRIGHT COUNTER. BRIGHT COUNTERS have become well known to commercial two-way radio users for their ruggedness and reliability. Now for the first time BRIGHT introduces two new models, the A500 and the A500E, built with the same care as our commercial models but at budget prices. Aren't you glad you waited till now to buy your frequency counter?

*1 YEAR LIMITED PARTS AND LABOR

NEW



BRIGHT'S new frequency counters feature RFI shielding, easy-to-read green LED's and professional styling that make the A500 and A500E compatible with the equipment in your shack. The A500 is not just another "pretty face." It is a highly, reliable accurate counter that will put you precisely on frequency every time. It will even show you the input that is selected!

PARAMETER	A500	A500E (Extended Range)
Frequency Range	50Hz-500MHz	50Hz-1100 MHz
Dynamic Range (Typical)	35Dbm@50Ω	35Dbm@50Ω
Resolution 50Hz-50MHz	1Hz	1Hz
(not available	50MHz-500MHz	10Hz
quizzes vary)	500MHz-1100MHz	100Hz
Accuracy over Temperature	.1 PPM	.1 PPM
	17°C - 30°C.	17°C - 30°C.
Sensitivity 50Hz-50MHz	1-10MV	1-10MV
50MHz-500MHz	10-50MV	10-50MV
500MHz-1100MHz	NA	50-100MV
Time Base Description	10MHz Proportional Oven	10MHz Proportional Oven
Size and Number of Digits	9@ 5"	9@ 5"
Price incl. antenna & AC supply	\$185.95	\$215.95

FULL 1-YEAR LIMITED WARRANTY

Available options: Nicad Battery Pack (\$29.95)

TO ORDER, CALL TOLL FREE 800-241-3939, GA. RESIDENTS CALL COLLECT 404-257-1494

BRIGHT ELECTRONICS

TERMS: We gladly accept MC, VISA, AMEX, and COD. All orders over \$100 add \$7.50 shipping, handling, and insurance. Export orders add \$17.50 for air mail. Delivery dates given when order is placed.
P.O. Box 76972 • Atlanta, Georgia 30328

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November QST.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable to frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6LS, 2814 Empire, Burbank, CA 91504.

HAMBURG, NY — HAM-O-RAMA '80 — 9th annual hamfest. Exhibits, tech programs, awards, flea markets. Plenty of free parking, free RV hookups. Erie County Fairgrounds, Sept. 12 and 13. Advance tickets \$3. Contact Ron Brudowski KC2P, 260 Hilltop Drive, Elma, NY 14059 716-652-6753. Please send s.a.s.e.

PENNSAUKEN NJ: The Greater Delaware Valley Hamfest by MSWW A.R.C. on October 19, 1980 at Nashville East Cottillon Ballroom, Rt. 73 about 5 miles from Tacony Bridge. 8 A.M. to 5 P.M. set-up begins at 2 A.M. Reserved indoor tables \$5/atable. Commercial displays, seminars, VL activities and outdoor flea market. Admission \$2.50 at gate and \$2 in advance (s.a.s.e.) Talk in 2282 and 5252. RV parking. Write or call GDV-80 Hamfest, 15 East Camden Avenue, Moorestown, NJ 08057 Ph.: 609-234-3926.

ELMIRA, New York International Hamfest September 27, 1980. Chemung County Fairgrounds. Numerous programs, awards, and activities; gates open at 8. Contact John Breese, 340 West Avenue, Horseheads, NY 14845.

VIRGINIA State ARRL Convention — The Fifth Annual Tidewater Hamfest and ARRL Virginia State Convention will be in the great new Virginia Beach, Virginia Arts and Conference Center October 4 and 5, 1980. ARRL Traffic, DX Forums, XYL free bingo and lounge. Admission \$3.50 Advance admission okay. Award will be a Kenwood FM transceiver. Flea market spaces \$3. day. Ticket and information — TRC, P. O. Box 7101, Portsmouth, VA 23707 s.a.s.e.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2ANI) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

BERGEN Amateur Radio Association is having a ham and computer swap & sell on October 11, 1980, Saturday, to be held at the Bergen Community College, Paramus Road, Paramus, NJ. Tailgating only, bring your own tables, sellers \$3. Buyers free. S.a.s.e. brings flyer. Any questions, contact Vic, WB2PYE, 201-445-2855/ 201-664-0155 or Jim, KB2EL, 201-445-2855, 325 Wilson Avenue, Westwood, NJ 07675.

CINCINNATI Hamfest: 44th Annual — Sunday September 21, 1980 at Strickers Grove on State Route 128, one mile west of Ross (Venice) Ohio. Exhibits, awards food and refreshments available, flea market (radio related products only) music, good fellowship, hidden transmitter hunt and sensational air show. Admission and registration \$4. For further information: Lillian Abbott, KBCKI, 1424 Main St., Cincinnati, OH 45210.

desk & hand microphones



These mics are a luxury that you deserve

AMB 77

AMM 46

Serious amateurs deserve the very best equipment they can afford and one person's luxury may be another's necessity. These mics are a little like that. If you deserve a microphone with extra high output, a frequency response carefully tailored to the voice range, and made of high quality materials, then here are three new desk mics and three new hand mics from which to choose. The desk mics are heavy die cast metal with an attractive black, textured finish and a lock lever on the push-to-talk bar for VOX operation. The hand mics are high impact resistant Cyclocac® with extra long, high quality, neoprene coil cords. Most models are dual impedance.

ELEMENT TYPE	DESK MICROPHONES			HAND MICROPHONES		
	AMB 75	AMB 76	AMB 77	AMH 45	AMH 46	AMH 47
POLAR PATTERN	OMNI	CARDIOID	DYNAMIC (AMPLIFIED)	OMNI	NOISE CANG.	OMNI
IMPEDANCE (HIGH Z)	50K ohms	50K ohms	4000 ohms	50K ohms	50K ohms	200 ohms
IMPEDANCE (LOW Z)	200 ohms	200 ohms	ADJUSTABLE TO 20 ohms	470 ohms	470 ohms	200 ohms
OUTPUT LEVEL (HIGH Z)	55 dB	54 dB	ADJUSTABLE TO 20 dB	54 dB	54 dB	54 dB
OUTPUT LEVEL (LOW Z)	75 dB	68 dB		75 dB	75 dB	45 dB
FREQUENCY RESPONSE	200-8000 Hz	100-13000 Hz	150-5000 Hz	200-4000 Hz	200-4000 Hz	200-5000 Hz
CABLE	5 cond. 1 shield	5 cond. 1 shield	5 cond. 1 shield	6 cond. 1 shield	6 cond. 1 shield	5 cond. 1 shield
POWER SOURCE			BATTERY PROVIDED			EXTERNAL DC

OUTPUT LEVEL MEASURED (0 dB = 1 Volt Per Microbar)

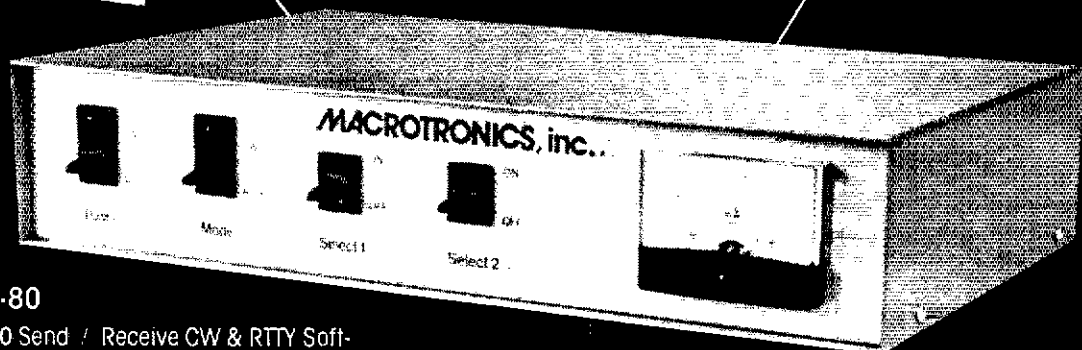
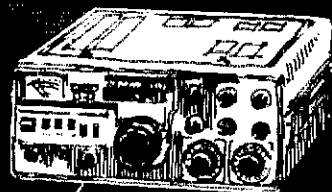
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hy-gain

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Europe: 22, rue de la Légion-d'Honneur, 93200 St. Denis, France.

TRS-80, PET, APPLE, SORCERER Ham Interface Systems



TRS-80

- M80 Send / Receive CW & RTTY Software, Interface PC Board, Manual \$149.
- CM80 Same as M80-in cabinet \$279.
- TM80 Complete! Includes Software, computer interface, active filter RTTY demodulator, AFSK in attractive cabinet with RTTY tuning meter. EASY HOOKUP! EASY OPERATION! \$499.
- M800 adds advanced RTTY (split screen) to M80 / CM80 / TM80 \$99.*

*only \$75 with CM80 order \$50 with TM80 order

PET

- M65 Send / Receive RTTY & CW Software, Interface PC Board, Manual \$129.
- M650 Advanced RTTY (split screen) & CW in cabinet \$210.
- TM650 Adds active filter RTTY demodulator and AFSK to M650. \$499.

APPLE

- CA650 Advanced RTTY & CW (split screen) in cabinet \$259.
- TA650 Adds active filter RTTY demodulator and AFSK to CA650 \$499.
- A6500 Adds Disk Based RTTY to CA650 / TA650 \$50.

SORCERER

- S80 Send / Receive CW & RTTY Software, Interface PC Board, Manual \$149.
- CS80 Same as S80-in cabinet \$279.
- TS80 Adds active filter RTTY demod. & AFSK \$499.

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 - Leave a message in a mailbox (on disk)
 - Playback any message from disk
 - Echo a message
 - Play the system instructions
 - List current calls in mailbox
 - And much much more!

★ Customized with your Name & Callsign
ONLY \$150

(\$100 with M800 "Trade-in")
Write or call for ordering information. Requires M80, CM80 or TM80 plus 32K TRS80 Disk System.

SEPT. 21st. LIMARC Sponsors ARRL Hamfair '80 at the Islip Speedway, Islip Ave., (Rte 111) Exit 43, Southern State Pkwy. Over 350 Exhibitors at the last show in June, no reservations needed. Info call at night, Sid Wolin, K2LJH, 516-379-2861, Nick Bellmann, KA2CAO 516-223-1076, Hank Wener, WB2ALW, 516-484-4322. Heavy Rain date, Sept. 28th.

LIMA OH — Northwest Ohio Amateur Radio Club Annual Hamfest October 12 — Doors open 7 A.M. Dealer tables available — talk-in 52/52 07/67 Allen County Fairgrounds — Rte 309E — 1 mile off I-75. For info, write N.O.A.R.C. P. O. Box 211 Lima, OH 45802.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynant-skill NY 12188.

DELUXE QSLs, Samples 25c Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin TX 78766.

\$2.95 per hundred (1000 price). Fast service. Quality QSLs since 1934. Satisfaction guaranteed or money back. Send 30c postage for catalogue. VPSQED Press, Box 1523, Boca Raton, FL 33432.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

QSLs, Catalog 45c N & S Print, P. O. Box 11184 Phoenix AZ 85061.

QSLs with class! Unbeatable quality, reasonable price. Samples, 50c refundable. QSLs Unlimited, P. O. Box 27553, Atlanta, Georgia 30327

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSLs — Variety, value, quality, custom, samples and catalog 45c. Alkanprint, Box 3494, Scottsdale AZ 85257.

QSLs — The KØAAB collection plus many new custom designs. Send No. 10, 28c, s.a.s.e. for free samples and prices. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

BE SURPRISED — Get a variety of cards — 100 for \$7.00 or 200 for \$11.00. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

QSLs by W7HUL, Samples 50c. 8511 19th Ave. N.W., Seattle, WA 98117.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

QSLs samples and catalog 50c. Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

CLUB Call pins: 3 lines, 1-14, \$1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner 2041 Linden St., Ridgewood NY 11227.

QSLs — handcrafted one or two color, several designs available. Samples 35c, postage stamps accepted. Old Craftsmen Print Shop, 111 Hoffman St., Torrington, CT 06790.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From \$213 for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, N.Y. 11778 516-744-6260.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples Ham Graphics, Box 244Q, Camden, NY 13316.

QSL cards by reliable company with 15 years experience. Amateur QSL cards (standard designs and design your own). Also available are our own designed State Cards. Top quality, reasonable prices. Free catalog and samples. Write Mail Order Express, Inc., Dept. M, Box 703, Lexington, NC 27292.

FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

QSL ECONOMY: 1000 for \$14, s.a.s.e. for samples. W4TG, Drawer F, Gray, GA 31032.

CALL-LETTERS. 2x8 desk plate — red, black, walnut. \$2.50 K2KJ Engravomatic, 37 Zeek road, Morris Plains, NJ 07950.

LOW-COST QSLs. Samples s.a.s.e. Koepke, 6 Katherine Road, Albany, NY 12205.

THE colorful QSL printer is back. Many styles and colors to choose from. Specialty Printing, Box 361, Duquesne, PA 15110. Samples 50c.

PICTURE QSL cards of your shack, etc. from your

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HG-52SS Self-Supporting Crank-Up Tower

The Hy-Gain Model HG-52SS is a 52 foot self-supporting crank-up tower designed for antenna loads of up to 9.0 square feet in winds up to 50 mph. This all steel constructed tower is hot dip galvanized after fabrication to ASTM specifications. Features include extra-strength diamond web bracing and an improved guide system for the telescoping sections, which provides rigid, close tolerance structural support while leaving the tube ends open for complete surface galvanizing and unrestricted moisture drainage. Rotators, including the Hy-Gain 300 and CDE Tailtwister, can be mounted inside the top section on the rotor mounting plate included with the tower. The HG-52SS is easily raised and lowered by manual or optional electric winch system. A thrust bearing is available which bolts to the top section and accommodates masts up to 2 inches in diameter. The HG-52SS is easily erected on a limited area site, and can be readily retracted to a 21 foot height for service of the antenna. Hy-Gain manufactures a complete line of Crank-Up towers from 33 to 70 feet. Write for complete details today.

Antenna shown
is Hy-Gain
TH6DX
Tri-Band Beam



Hy-Gain
Diamond Web
Bracing for the
ultimate in
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strength.

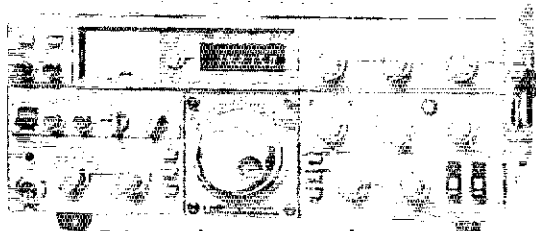
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New from Kenwood,
The TS-830-S
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The latest release
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The FT-707 has the new WARC bands



The FT-707

List Price \$810.00.

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THE TS-180S SPECIAL:
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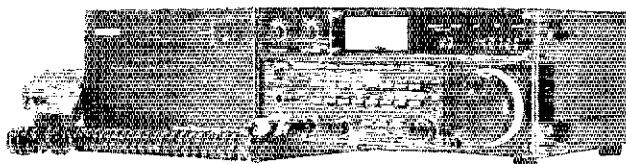


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CONLEY RADIO SUPPLY OFFERS YOU
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THE NUMBER ONE OUTLET
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Introducing the new ICOM, IC-720
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photograph or black ink art work; 500/\$18; 1000/\$26.50. Also unusual non-picture designs. Generous sample pack, 75c; half-pound of samples, \$1.25. Customized cards, send specifications for estimate. Raum's, 4154 Fifth Street, Philadelphia, PA 19140 phone 1-215-BA8-5460.

General

WANTED: Various QST, CQ for collection, buy/px Datong FL1, Write GW3MHW, QTH, often 21-280 12.00 GMT.

TELETYPE Model 33KSR with modem and model 33ASR with stand. Spectrum Analyzer plug-in, Tektronix 1L20. 10 to 4200 MHz. \$990. Tektronix 555 oscilloscope with dual time base generators, delaying sweep and 2-30 MHz L plug-in amplifiers \$800. HP-606A generator 50kc-50 MHz. \$800. HP-608C generator 10-480 MHz. \$700. Steve, 4977 Victoria, Montreal, Quebec. H3W 2N2 1-514-483-1983.

SPIDERS for boomless quads. Helium welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick, WA 99336.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310 W4NYF. Buy parts, late machines.

SERVICE by W9YKA. Professional grade lab, FCC 1st class license. Amateur and industrial ssb-lm equipment. Repairs, calibration, modifications, consultation. Reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 6 issues \$2. Ham Trader Yellow Sheets, Wheaton, IL 60187.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1 Eighth Street, Pelham NY 10803.

ARCOS — Amateur Radio Component Service. VHF/UHF high power amplifier kits, parts and accessories. High voltage power supplies. Proven performance in world-wide use. Dowkey, Eimac, Bird, KLM. Sase for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

MANUALS for most ham-gear made 1937/1970. Send 25c coin for 16 page "Manual Catalog" postpaid. H. I. Inc., Box Q864, Council Bluffs, IA 51502.

COLLINS repair and alignment, \$75. Former Collins engineer, First Radiotelephone, Extra, calibration laboratory, K1MAN 207-495-2215.

TRANSFORMERS rewound. Jess Price, W4CJLJ, 507 Raehn, Orlando, FL 32806.

WANTED: Ham/crafters receivers, transmitters, parts, accessories, manuals for private collection. Chuck Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

FREE-Fascinating Electronics Idea Book — hundreds of unusual parts & surplus items unavailable in stores or catalogs anywhere. Bargain prices on everything. Write today for latest issue. ETCO Electronics, Dept. 132, Box 762, Plattsburgh, NY 12901.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. Now more than ever where you buy is as important as what you buy! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Collins, Wilson, Ten-Tec, ICOM, Dentron, MFJ, Tempo, Regency, Hy-Gain, Mossley, Alpha, Cushcraft, Swan and many more. Write or call us today for our low quote and try our personal and friendly Hoosier service. Hoosier Electronics, P. O. Box 2001, Terre Haute, IN 47802. 812-238-1456.

HOSS-Trader "Ed," says we refuse to be undersold: Big Sale, shop around for the best price then telephone the Hoss last. Phone for cash quotes on new ICOM equipment. New display Drake TR-7 transceiver \$1249. New Rohm 50' foldover tower prepaid, \$649. New HyGain TH6DX Beam, \$229 Used Ham-4 rotor, \$129. Display Swan 102BX transceiver, split VFO, regular \$1195, cash \$969. New Alpha 76A linear, \$1299. Specials: New Dentron Cliperton-L linears, 2000 watts, \$539. New Dentron MLA-2500B linears, \$739. Alliance HD-73 ham rotors, cash \$31.95 New Swan display 100MX transceiver, regular \$699, cash \$498. Used Kenwood 520-SE, \$519. New HyGain TH3MK3 tri-bander beam, \$169. New Display Kenwood 120-S, \$589. Moory Electronics Company, P. O. Box 506, DeWitt, Ark., 72042 tel.: 501-946-2820.

HAM RADIO Repair — Professional lab, personal service. "Grid Gridley, W4GJO. April thru October: Rt. 2, Box 138B, Rising Fawn, Georgia 30738, 404-657-7841. November thru March: 212 Martin Drive, Brooksville, FL 33512, 904-799-2769.

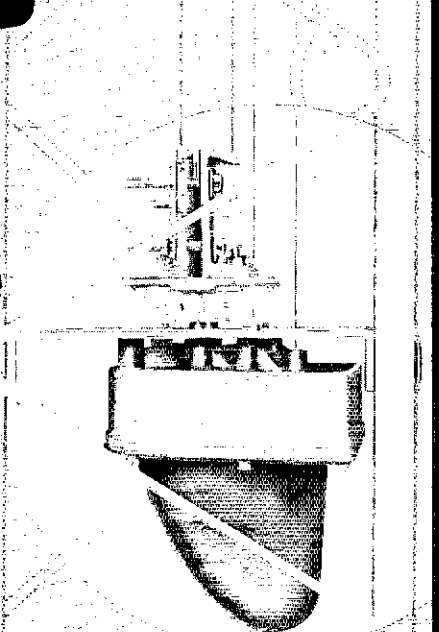
DRAKE R-4/T-4X Solid Tubes directly replace vacuum tubes to give better performance! Pre-mixer and mixers R-45EJ7/6HS6/6BE6-C plus T-4X 5EJ7/6HS6/6AU6/12BA6 \$17.50 each, ppd. R-4 B/C Improvement kits, \$20.60, ppd. Sartori Associates, W5DA, Box 2085, Richardson, TX 75080, 214-494-3093.

STANDBY Power Alternators 1,300 watts to 7,000 watts

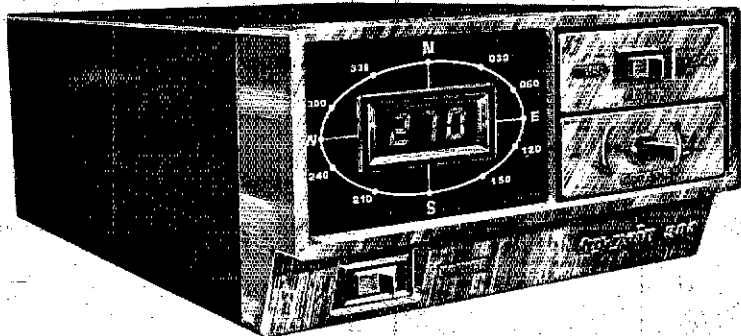
hy-gain

The Beauty and the Beast

Model HDR300 Antenna Rotator



The model HDR300 matches a rugged, heavy-duty rotator with a good-looking, digital-readout control console. This is a military/industrial grade rotator that is priced to be practical for amateur use. The model HDR300 easily handles up to 25 square feet of antenna area with an additional 1.5 safety margin - even in high winds! This new rotator has muscle to spare, with a stall torque of 5000 in-lbs. (567 N·m) - higher than any Amateur Antenna Rotator currently on the market. It also features a brake-holding torque of 7500 in-lbs. (850 N·m) and a mechanical travel of 390°. The HDR300 will support 500 lbs. (227 kg.) and accept masts of 1 1/4" (44.4 mm) to 3" (76.2 mm) O.D. and uses a 24 Vac motor for safe, reliable operation.



This "state-of-the-art" control console features a digital azimuth readout that is accurate to ±1°. Brake is automatically engaged when you turn the rotator off. Furthermore, the brake release and rotation functions are separate, assuring complete brake control and extended rotator life. A single eight-conductor control cable connects the rotator with the control console.

TELEX hy-gain

TELEX COMMUNICATIONS, INC.

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FACTORY DIRECT

5 Watts 2m FM 800ch Synthesizer.

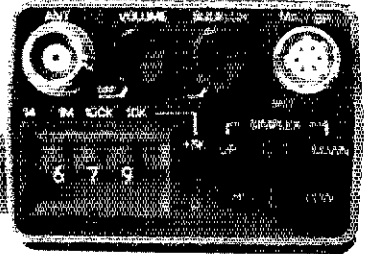


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MODEL DG800



All controls are on the Top.

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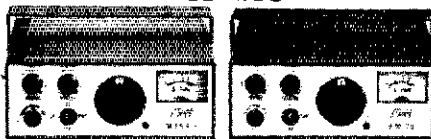
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6.67R	11.61R
6.67R	11.64R
6.67R	11.67R
6.67R	11.70R
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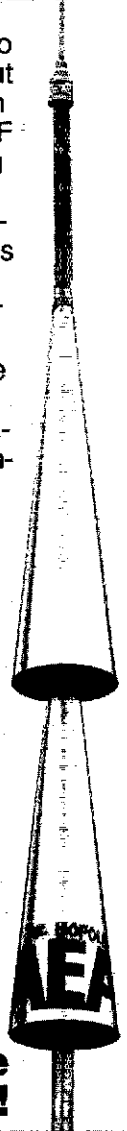
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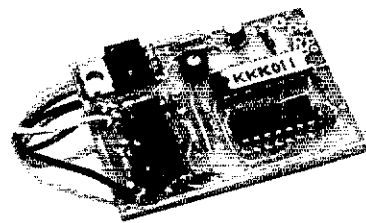
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INLINE relays save energy and money since they are more efficient than Band Traps or Antenna Tuners because: Traps have insertion loss that cost you power output and the resulting shortened antenna has narrow bandwidth and lowered radiating efficiency. Antenna Tuners with random length wire antennas have extremely narrow bandwidth and very low radiating efficiency. The difference between a non resonant antenna and a switched resonant antenna is up to 10 db more signal at the distant receiver, equivalent to adding a linear amplifier.

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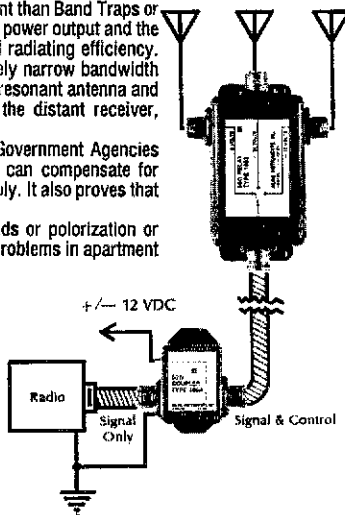
** (See literature for frequency De-rating curve.)

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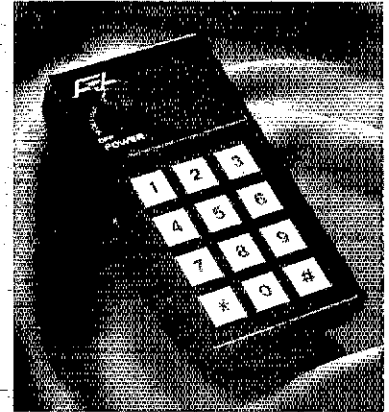
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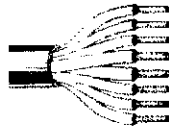
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		200	2.6	8.5
		300	3.3	10.3
		400	3.8	12.5
RG8/u Foam .81VF				
	8214	50	1.2	3.9
		100	1.8	5.9
		200	2.6	8.5
		300	3.3	10.3
		400	3.8	12.5
RG8/u Regular .77 VF				
	8237	100	2.0	6.6
		200	3.0	9.8
		400	4.7	15.4
		900	7.8	25.5
RG8/u Non-contaminating				
	8267	100	2.0	6.6
		200	3.0	9.8
		400	4.7	15.4
		900	7.8	25.5



8448
24¢/ft.

No. of Cond. — 8
AWG (in mm) —
6-22 (7×30),
2-18 (16×30), (1.19)



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38¢/ft.

No. of Cond. — 8
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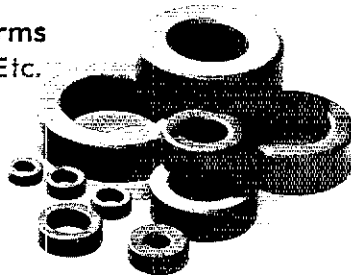
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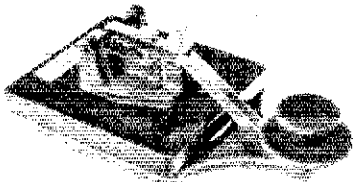
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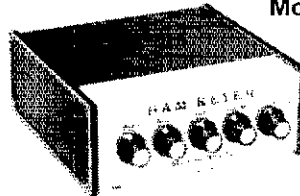
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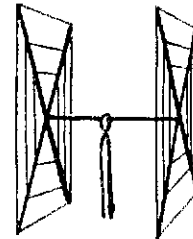
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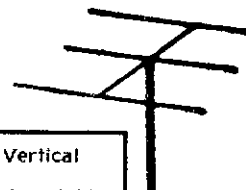
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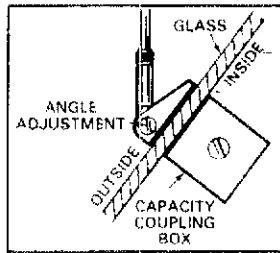
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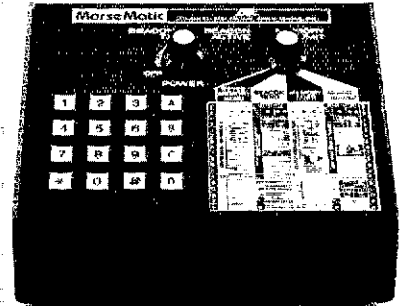
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*FT-901/101ZD/107	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FT-401/560/570	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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KENWOOD	\$55 EACH										
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"80"

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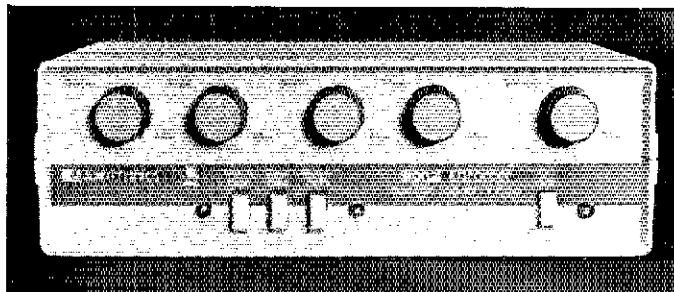
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Two "tuning eyes" on the Signal Enforcer front panel make accurate location of signals possible even during crowded band conditions. The Signal Enforcer's internal power supply is switchable for 230 VAC or 115 VAC or will accept 12 to 18 VDC.

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Specifications **Bandwidth** continuously variable from less than 30 Hz to over 1000 Hz. Once set, bandwidth remains constant regardless of frequency changes. **Frequency Range** from less than 150 Hz to over 3000 Hz. **Power Requirements** 115 VAC or 230 VAC at 50 to 60 Hz or external 12-18 VDC source. **Inputs** signal input, external DC input. **Outputs** external speaker, external headphones, demodulator output. **Size** 2 1/4" by 8" by 6".

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- Eight Message Memory Keyer
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\$229 Assembled and Tested

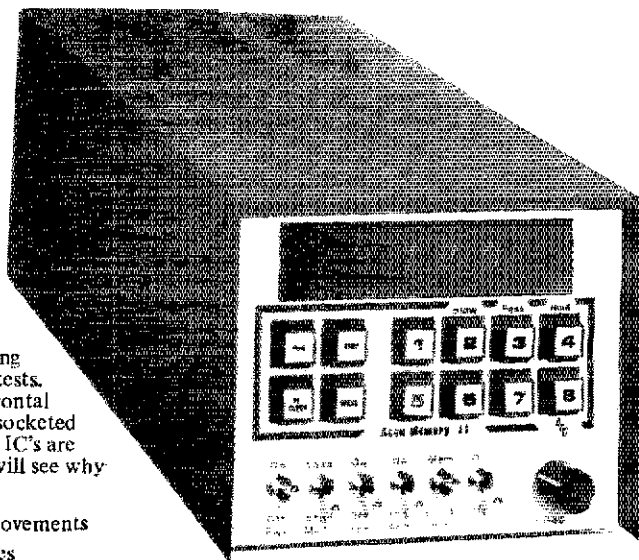
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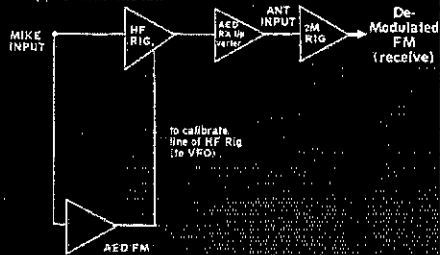
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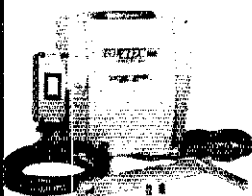
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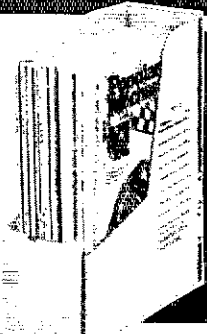
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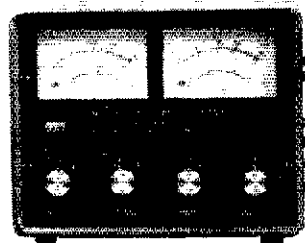
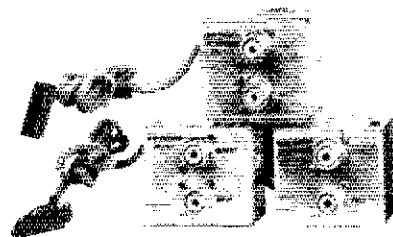
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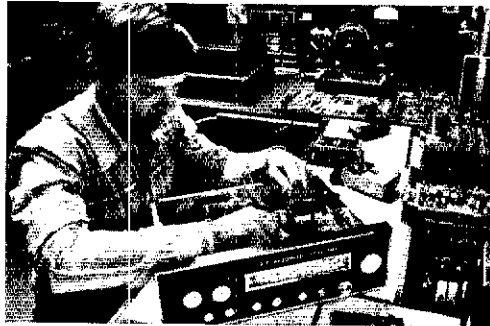
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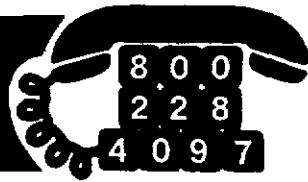
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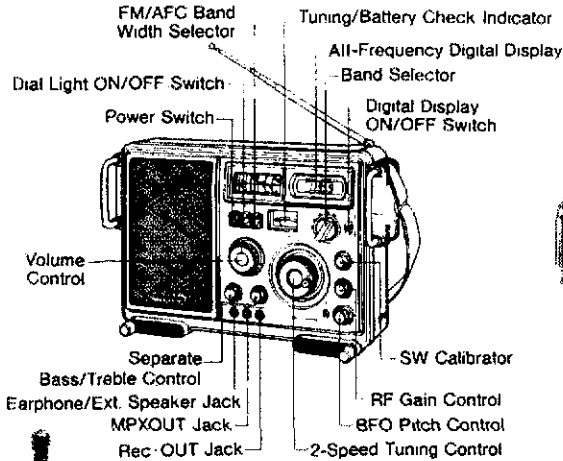
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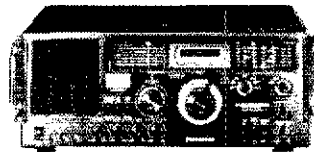
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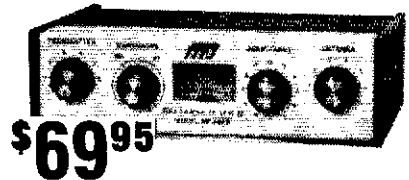
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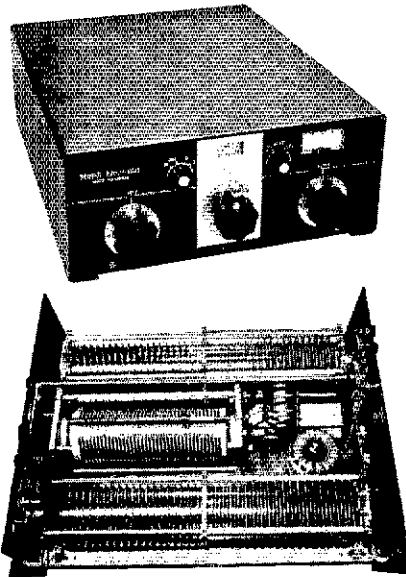
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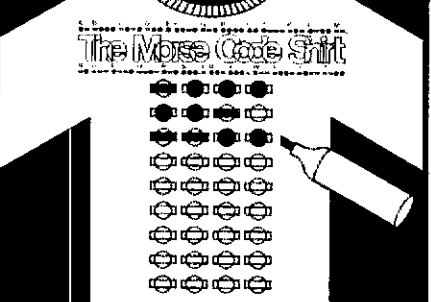
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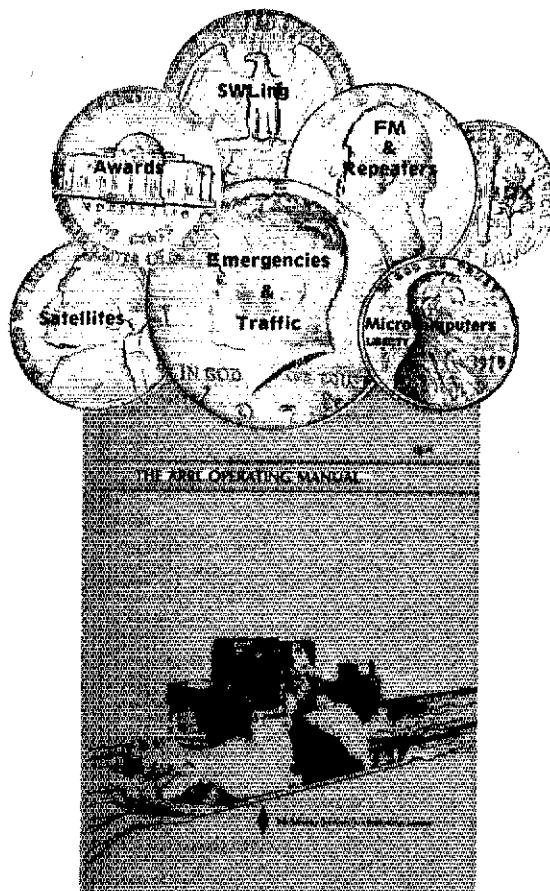
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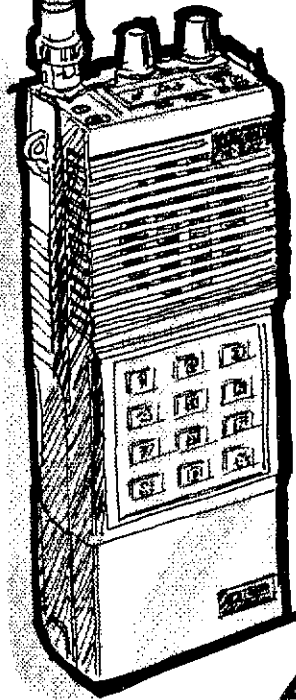
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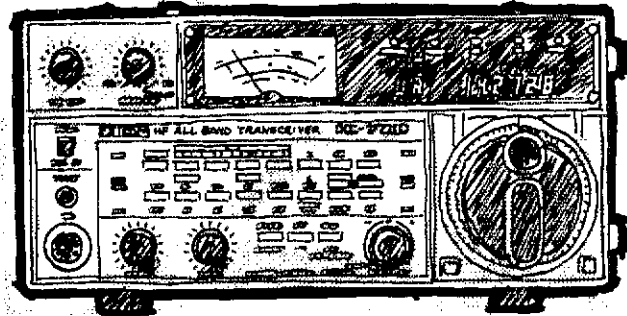
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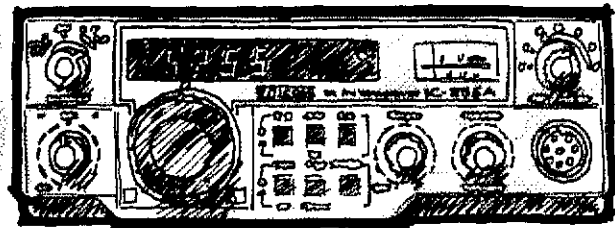
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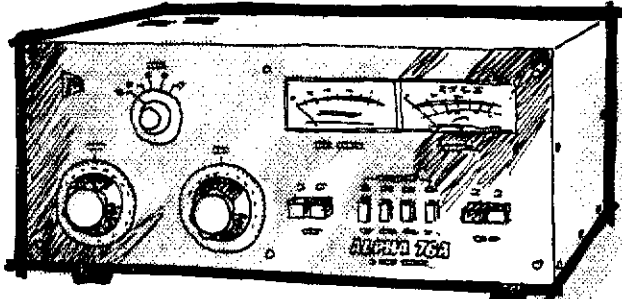


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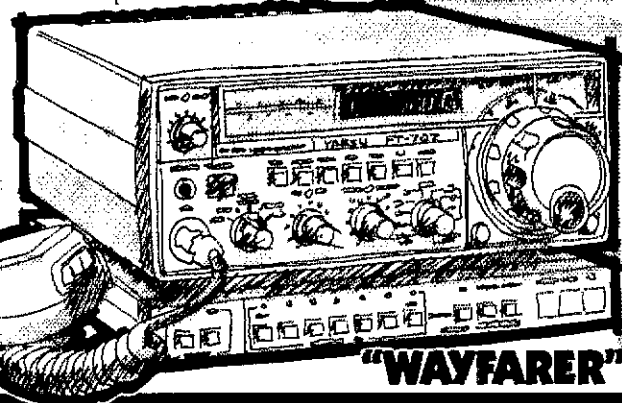
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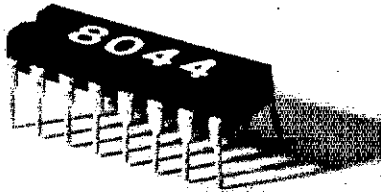
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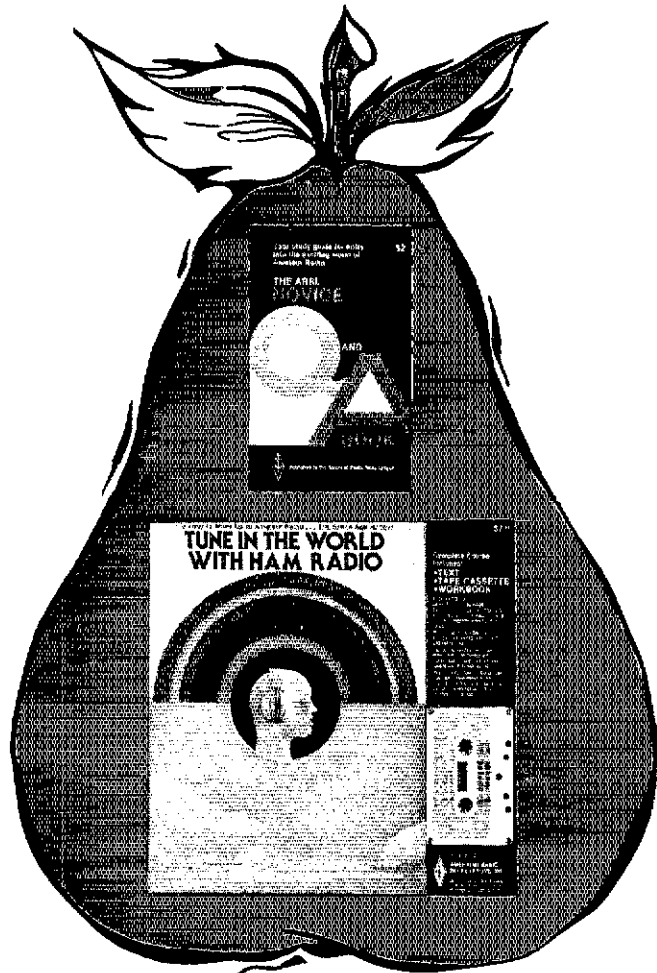
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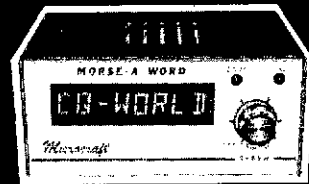
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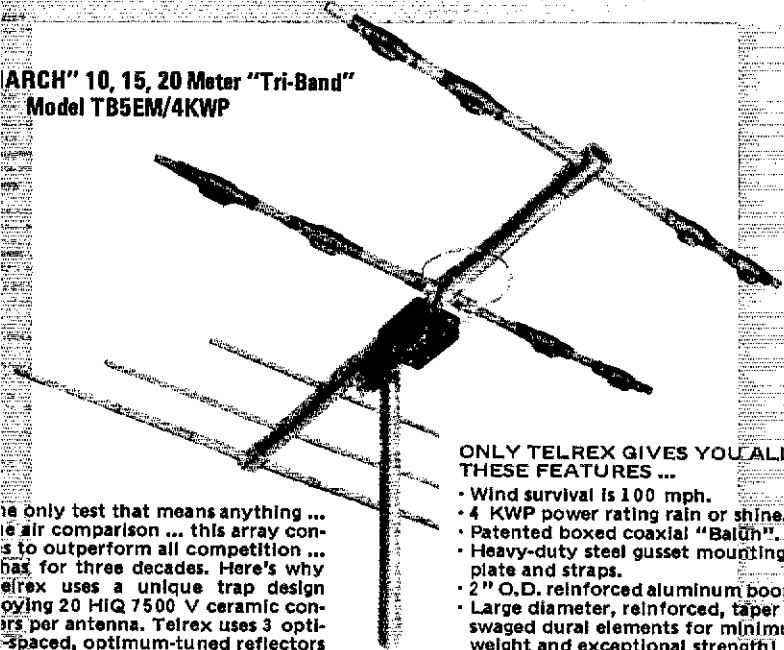
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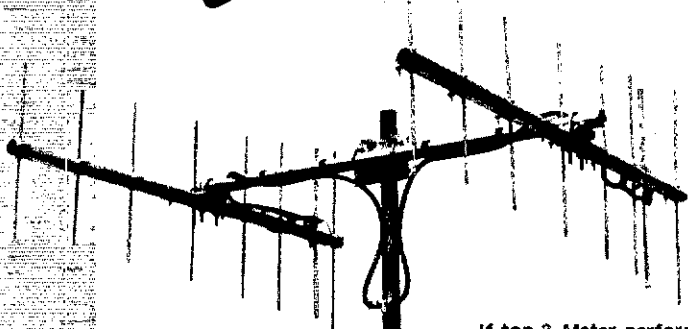
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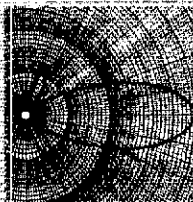
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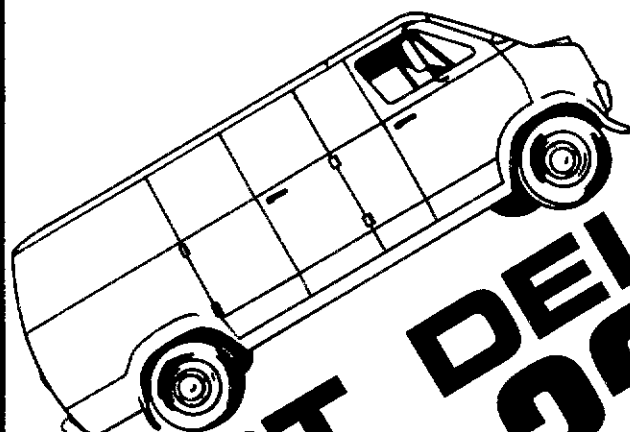
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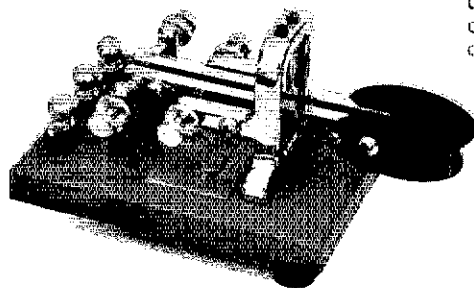
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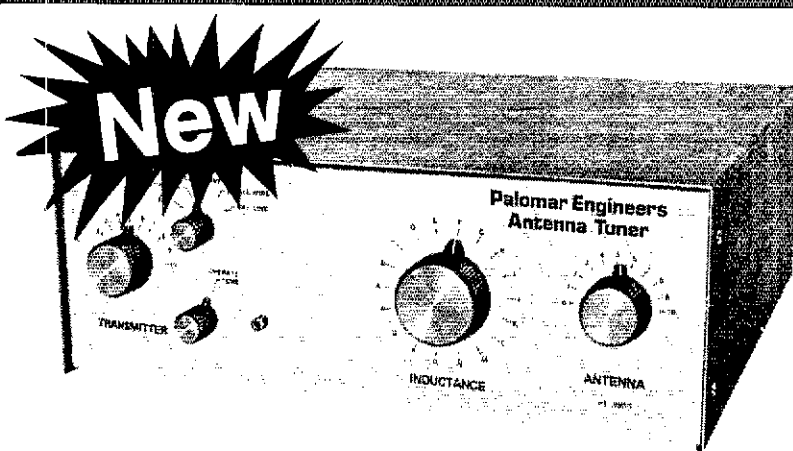
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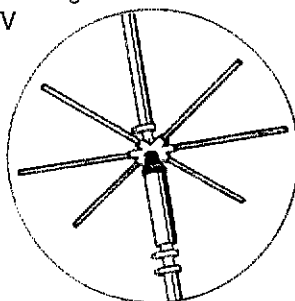
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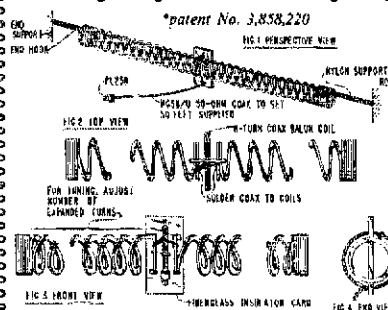
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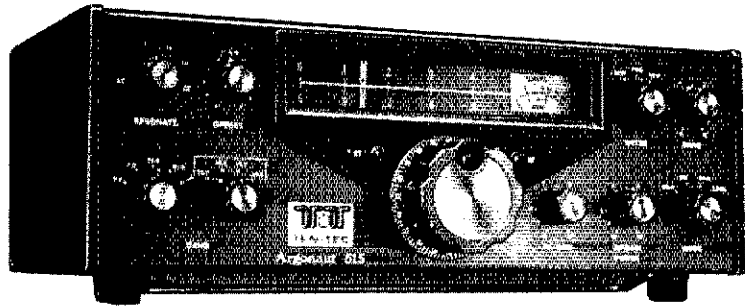
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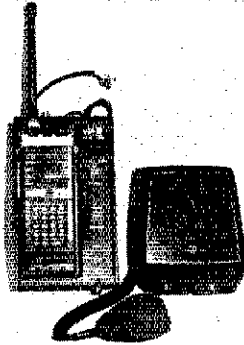
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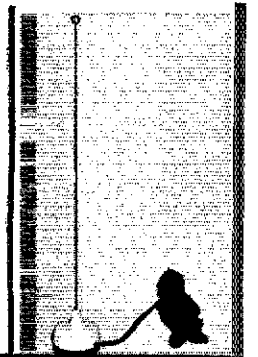


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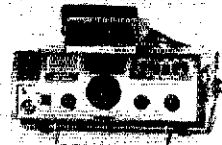
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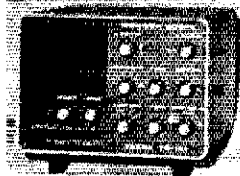
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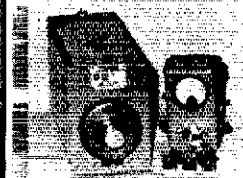


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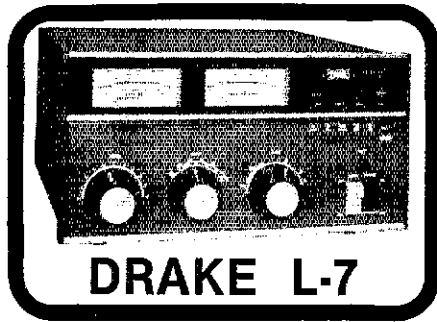
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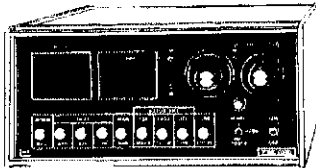


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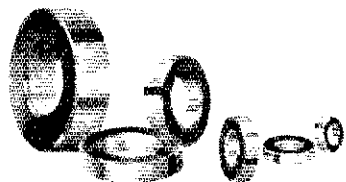
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RM-80S 80 meter sup. resonator	28.95
RSS-2 Bus, spring-stainless steel	6.95
SSM-2 Commercial stainless bell mount	16.95

HY-GAIN	List Price
TH6DX \$379.95	
TH5DX 269.95	
18AVT 109.95	

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Webster

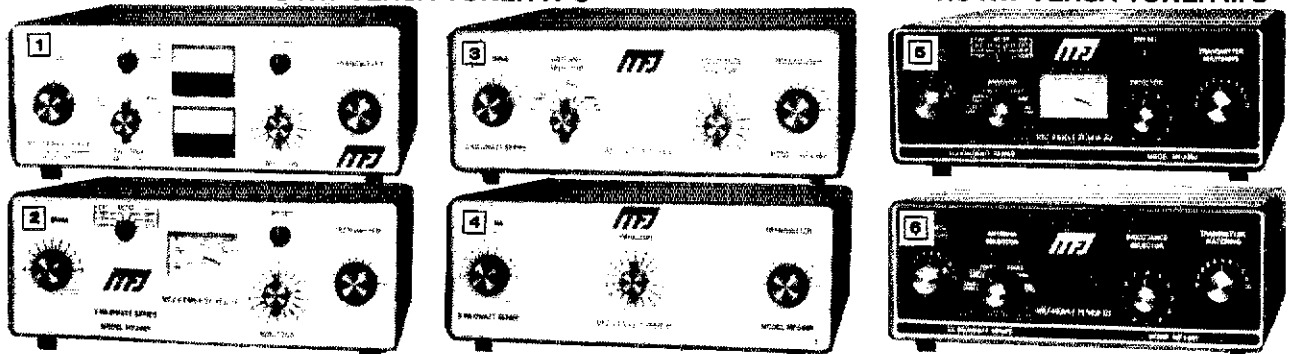
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New MFJ 3 & 1.5 KW Versa Tuners

Run up to 3 KW or 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun.

3 KW VERSA TUNER IV's

1.5 KW VERSA TUNER III's



NEW MFJ KW VERSA TUNERS HAVE THESE FEATURES IN COMMON

These 6 new MFJ KW Versa Tuners let you run up to 3 KW or 1.5 KW PEP (depending on the model) and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire. Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions. All metal, low profile cabinet gives RFI protection, rigid construction, sleek styling. Black. Rich anodized aluminum front panel. 5x14x14 inches.

Flip down stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 250 pf, 6000 volt capacitors. 18 position dual inductor, 17 amp, 3000 V ceramic rotary switch (3 KW version). 12 position inductor, ceramic rotary switch (1.5 KW version). 2% meters. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. One year limited warranty. Made in U.S.A.

3 KW VERSA TUNER IV's

1 MFJ-984 3 KW VERSA TUNER IV

\$299⁹⁵

EXCLUSIVE RF AMMETER

insures maximum power to antenna at minimum SWR. Built-in dummy load.

This is MFJ's best 3 KW Versa Tuner IV. The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

An exclusive 10 amp RF ammeter insures maximum power to antenna at minimum SWR. A separate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

Versatile antenna switch lets you select 2 coax lines thru tuner and 1 thru or direct, or random wire, balanced line or dummy load.

A 200 watt 50 ohm dummy load lets you tune your exciter off air for peak performance. Efficient, encapsulated 4:1 ferrite balun.

2 MFJ-981 3 KW VERSA TUNER IV

\$199⁹⁵

Accurate meter gives SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. 4:1 ferrite balun.

The MFJ-981 3 KW Versa Tuner IV is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

3 MFJ-982 3 KW VERSA TUNER IV

\$199⁹⁵

Antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.

The MFJ-982 3 KW Versa Tuner IV gives you a versatile 7 position antenna switch that lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

If you already have a SWR/wattmeter, the MFJ-982 is for you.

4 MFJ-980 3 KW VERSA TUNER IV

\$169⁹⁵

Heavy duty encapsulated 4:1 ferrite balun for balanced lines.

The MFJ-980 is MFJ's lowest priced 3 KW Versa Tuner IV but has the same matching capabilities as the other 3 KW Versa Tuner IV's.

Features an efficient, encapsulated 4:1 ferrite balun for balanced lines.

1.5 KW VERSA TUNER III's

5 MFJ-962 1.5 KW VERSA TUNER III

\$169⁹⁵

SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.

The MFJ-962 1.5 KW Versa Tuner III is an exceptional value. An accurate meter gives SWR, forward and reflected power in 2 ranges (2000 and 200 watts).

A versatile six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

Black front panel has reverse lettering.

6 MFJ-961 1.5 KW Versa Tuner III

\$149⁹⁵

6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.

The MFJ-961 1.5 KW Versa Tuner III gives you a versatile six position antenna switch. It lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 ferrite balun.

If you already have a SWR/wattmeter, the MFJ-961 is for you.

Black front panel has reverse lettering.

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Why not visit your dealer today? Compare these 3 KW and 1.5 KW Versa Tuners to other tuners. You'll be convinced that its value, quality and features make it a truly outstanding value. If no dealer is available, order direct from MFJ and try it. If not delighted, return it within 30 days for a prompt refund (less shipping). Charge VISA, MC. Or mail check, money order plus \$10 shipping/handling.

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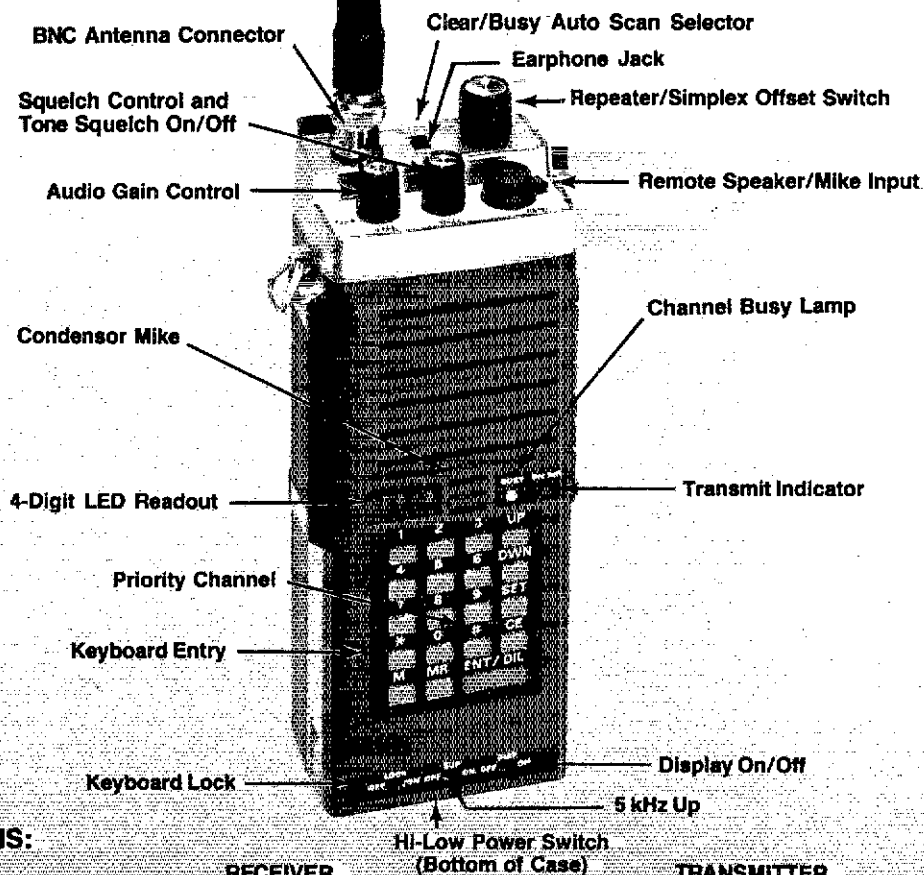
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NBP-9 BATTERY PACK
NC-9B WALL CHARGER
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SPECIFICATIONS:

GENERAL

Frequency coverage: 144-148 MHz
Number of channels: 800
Emission type: F3
Batteries: NiCd battery pack
Voltage requirement: 10.8 VDC
±10% maximum
Current consumption:
Receive: 35 mA squelched (150 mA unsquelched with maximum audio)
Transmit: 800 mA (full power)
Case dimensions: 68 x 181 x 54 mm (HWD)
Weight (with batteries): 680 grams

RECEIVER

Circuit type: Double conversion superheterodyne intermediate frequencies.
1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 μ V for 20 dB quieting
Selectivity: \pm 7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

TRANSMITTER

Power Output: 2.5 watts minimum /200mW
Deviation: \pm 5 kHz
Spurious radiation: \sim 60 dB or better
Microphone: Condenser type (2000 ohms)

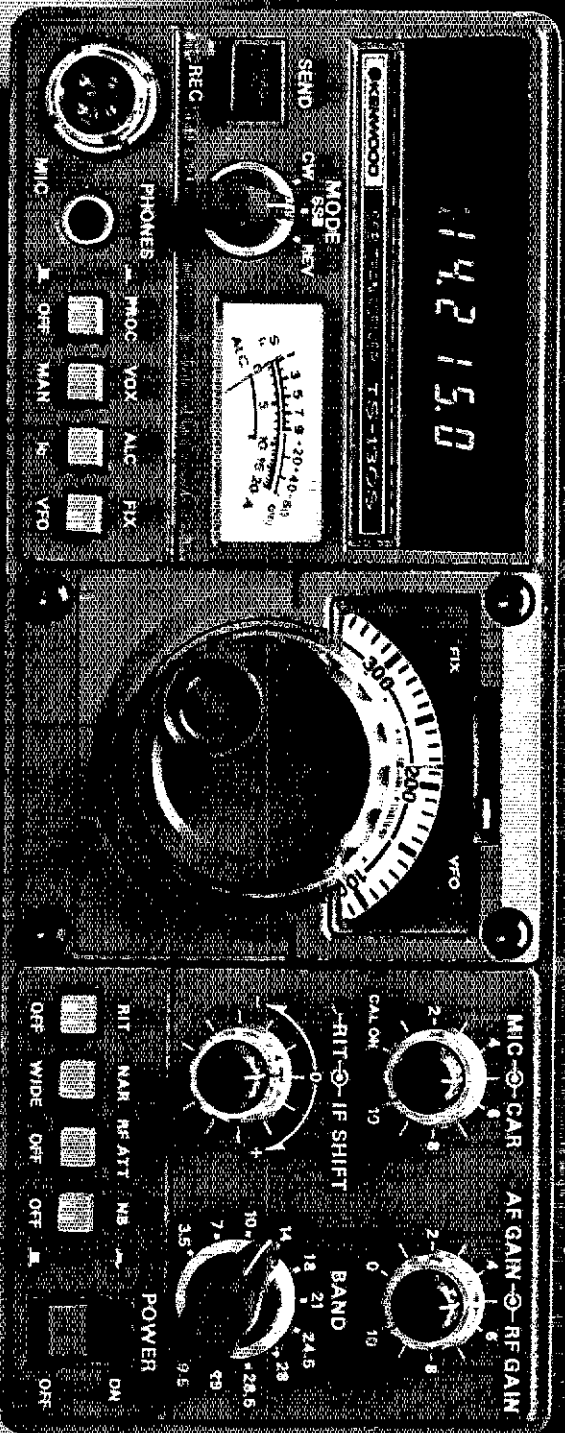
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LC-67 Leather Carrying Case
YM-24 Remote Speaker/Microphone Tone Squelch Unit

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Small wonder.

Processor, N/W switch, IF shift, DFC option



controller. The TS-130S runs high power and the TS-130V is a low-power version for QRP applications.

Ask your Authorized Kenwood Dealer about the compact, full-featured, all solid-state TS-130 Series.

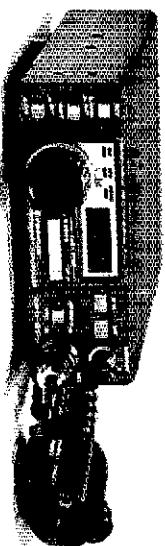
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Optional DFC-230 Digital Frequency Controller

Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-KHz band. Very compact.

An incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (on both SSB and CW), and optional DFC-230 digital frequency